TRIGONOMETRY

(Previous Year Questions)

(CPO – 2020)

1. If $4(\text{cosec}^2 57° - \tan^2 33°) - \cos 90° - y \tan^2 66° \tan^2 24° = \frac{y}{2}$ the value of y is:

यदि $4(\text{cosec}^2 57° - \tan^2 33°) - \cos 90° - y \tan^2 66° \tan^2 24° = \frac{y}{2}$ हैं, तो y का मान ज्ञात करें।

(CPO 23-10-2020 Shift I)

(A) $\frac{3}{8}$ (B) 8 (C) $\frac{1}{3}$ (D) $\frac{8}{3}$

2. A ladder leaning against a wall makes an angle θ with the horizontal ground such that $\cos\theta = \frac{5}{13}$. If the height of the top of the ladder from the wall is 18m, then what is the distance (in m) of the foot of the ladder from the wall ?

एक सीढ़ी दीवार के सहारे झुकी हैं और वह क्षैतिज भूमि के साथ θ कोण इस प्रकार बनाती हैं कि $\cos\theta = \frac{5}{13}$ हैं यदि दीवार से सीढ़ी के शीर्ष की ऊँचाई 18 मी. हैं, तो दीवार से सीढ़ी के आधार की दूरी (मी में) ज्ञात करें। **(CPO 23-10-2020 Shift I)**

(A) 19.5 (B) 13
(C) 7.5 (D) 18

3. If $4 - 2\sin^2\theta - 5\cos\theta = 0, 0° < \theta < 90°$, then the value of $\cos\theta + \tan\theta$ is :

यदि $4 - 2\sin^2\theta - 5\cos\theta = 0, 0° < \theta < 90°$ हैं, तो $\cos\theta + \tan\theta$ का मान ज्ञात करें। **(CPO 23-10-2020 Shift I)**

(A) $\frac{2+\sqrt{3}}{2}$ (B) $\frac{2-\sqrt{3}}{2}$

(C) $\frac{1+2\sqrt{3}}{2}$ (D) $\frac{1-2\sqrt{3}}{2}$

4. A person was standing on a road near a mall. He was 1425 m away from the mall and able to see the top of the mall from the road in such a way that the top of a tree, which is in between him and the mall, was exactly in line of sight with the top of the mall. The tree height is 10 m and it is 30 m away from him. How tall (in m) is the mall ?

एक व्यक्ति मॉल के निकट सड़क पर खड़ा हैं। वह मॉल से 1425 मी. की दूरी पर हैं और सड़क से मॉल के शीर्ष को इस प्रकार देखने में सक्षम हैं कि उसके और मॉल के बीच स्थित पेड़ का शीर्ष मॉल के शीर्ष के साथ दृष्टि रेखा में हैं। पेड़ की ऊँचाई 10 मी. हैं और यह उस व्यक्ति से 30 मी. की दूरी पर स्थित हैं। मॉल की ऊँचाई (मी. में) ज्ञात करें। **(CPO 23-10-2020 Shift I)**

(A) 475 (B) 300
(C) 425 (D) 525

5. If $\sec 3x = \text{cosec}(3x - 45°)$, where 3x is an acute angle, then x is equal to;

यदि $\sec 3x = \text{cosec}(3x - 45°)$ है, जहां 3x, न्यून कोण है, तो x का मान ज्ञात करें- **(CPO 23-10-2020 Shift II)**

(A) 27.5° (B) 45°
(C) 35° (D) 22.5°

6. The value of

$$\frac{\sin^2 30° + \cos^2 60° - \sec 35° . \sin 55°}{\sec 60° + \text{cosec}\, 30°}$$ is equal to:

$$\frac{\sin^2 30° + \cos^2 60° - \sec 35° . \sin 55°}{\sec 60° + \text{cosec}\, 30°}$$ का मान ज्ञात करें। **(CPO 23-10-2020 Shift II)**

(A) $-\frac{1}{4}$ (B) $\frac{1}{4}$

(C) $-\frac{1}{8}$ (D) $\frac{1}{8}$

7. The length of the shadow of a vertical pole on the ground is 18 m. If the angle of elevation of the sun at that time is θ. Such that $\cos\theta = \frac{12}{13}$, then what is the height (in m) of the pole?

भू-तल पर किसी अधोलंब खंभे की परछाई की लंबाई 18m है। यदि उस समय सूर्य का उन्नयन कोण θ इस प्रकार है कि $\cos\theta = \frac{12}{13}$ है तो खंभे की ऊंचाई (m में) ज्ञात करें-**(CPO 23-10-2020 Shift II)**

(A) 7.5 (B) 9
(C) 18 (D) 12

8. Asha and Sumans's mud forts have heights 9 cm and 16 cm. They are 24 cm apart. How far (in cm) are the fort tops from each other?
आशा और सुमन द्वारा बनाए गए मिट्टी के किलों की ऊंचाई 9 cm और 16 cm है। वे एक-दूसरे से 24 cm की दूरी पर हैं। उनके शीर्षों के बीच की दूरी (cm में) ज्ञात करें। **(CPO 23-10-2020 Shift II)**
(A) 16 (B) 7
(C) 25 (D) 24

9. The length of the shadow of a vertical pole on the ground is 36m. If the angle of elevation of the sun at the time is θ. Such that $\sec\theta = \frac{13}{12}$, then what is the height (in cm) of the pole ?
किसी अधोलंब स्तंभ की भूमि पर पड़ने वाली परछाई की लंबाई 36 है। यदि उस समय सूर्य का उन्नयन कोण θ इस प्रकार है कि $\sec\theta = \frac{13}{12}$ है, तो स्तंभ की ऊँचाई (cm. में) ज्ञात करें।
(CPO 24-10-2020 Shift I)
(A) 12 (B) 9
(C) 18 (D) 15

10. If $\sin 3x = \cos(3x - 45°)$, $0° < 3x < 90°$, then x is equal to :
यदि $\sin 3x = \cos(3x - 45°)$, $0° < 3x < 90°$ है, तो x का मान ज्ञात करें ? **(CPO 24-10-2020 Shift I)**
(A) 35° (B) 45°
(C) 22.5° (D) 27.5°

11. The value of $\frac{\sin^2 30° + \cos^2 60° + \sec 45° . \sin 45°}{\sec 60° + \operatorname{cosec} 30°}$ is :
$\frac{\sin^2 30° + \cos^2 60° + \sec 45° . \sin 45°}{\sec 60° + \operatorname{cosec} 30°}$ का मान ज्ञात करें ?
(CPO 24-10-2020 Shift I)
(A) $-\frac{1}{4}$ (B) $\frac{3}{8}$
(C) $-\frac{3}{8}$ (D) $\frac{1}{4}$

12. Asha and Suman's mud forts have heights 9 cm and 16 cm. If the fort tops are at 25 cm apart from each other, then the distance (in cm) between two forts is : **(CPO 24-10-2020 Shift I)**
आशा और सुमन के मिट्टी के घरौंदों की ऊँचाई 9 cm और 16 cm है। यदि घरौंदों के शीर्ष एक दूसरे से 25 cm दूर हैं, तो दोनों घरौंदों के बीच की दूरी (cm में) ज्ञात करें।
(A) 24 (B) 16
(C) 7 (D) 25

13. The value of $\frac{\sin^2 52° + 2 + \sin^2 38°}{4\cos^2 43° - 5 + 4\cos^2 47°}$ is :
$\frac{\sin^2 52° + 2 + \sin^2 38°}{4\cos^2 43° - 5 + 4\cos^2 47°}$ का मान ज्ञात करें।
(CPO 24-10-2020 Shift II)
(A) 3 (B) $\frac{1}{3}$ (C) $-\frac{1}{3}$ (D) –3

14. A ladder is resting against a wall. The angle between the foot of the ladder and wall is 60° and the foot of the ladder is 3.6 m away from the wall. The length of the ladder (in m) is :
दीवार की तरफ झुकी हुई सीढ़ी का उन्नयन कोण 60° है और सीढ़ी का आधार दीवार से 3.6 m दूर है। सीढ़ी की लंबाई (m में) ज्ञात करें।
(CPO 24-10-2020 Shift II)
(A) 5.4 (B) 3.6
(C) 14.4 (D) 7.2

15. If 4θ is an acute angle and $\cot 4\theta = \tan(\theta - 5°)$, then what is the value of θ ?
यदि 4θ, न्यून कोण है और $\cot 4\theta = \tan(\theta - 5°)$ है, तो θ का मान ज्ञात करें। **(CPO 24-10-2020 Shift II)**
(A) 19° (B) 45°
(C) 21° (D) 24°

16. Let A and B be two towers with same base. From the midpoint of the line joining their feet, the angles of elevation of the tops of A and B are 30° and 60°, respectively. The ratio of the heights of B and A is :
माना A और B समान आधार वाली दो मीनारें हैं। और दोनों मीनारों के आधारों को जोड़ने वाली रेखा के मध्यबिंदु से, A और B के शीर्ष का उन्नयन कोण क्रमश: 30° और 60° है। B और A की ऊंचाई का अनुपात ज्ञात करें। **(CPO 24-10-2020 Shift II)**
(A) 1 : 3 (B) 3 : 1
(C) 1 : 2 (D) $1 : \sqrt{3}$

17. If $4(\operatorname{cosec}^2 57 - \tan^2 33) - \cos 90 + y \times \tan^2 66 \times \tan^2 24 = \frac{y}{2}$, then the value of y is:
यदि $4(\operatorname{cosec}^2 57 - \tan^2 33) - \cos 90 + y \times \tan^2 66 \times \tan^2 24 = \frac{y}{2}$ है तो y का मान ज्ञात करें।
(CPO 25-10-2020 Shift I)
(A) –4 (B) 8
(C) 4 (D) –8

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18. A ladder leaning against a wall makes an angle θ with the horizontal ground such that $\tan\theta = \frac{12}{5}$. If the height of the top of the ladder from the wall is 24m, then what is the distance (in m) of the foot of the ladder from the wall?

एक सीढ़ी दीवार के सहारे झुकी हैं और वह क्षैतिज भूमि के साथ θ कोण इस प्रकार बनाती हैं कि $\tan\theta = \frac{12}{5}$ यदि दीवार से सीढ़ी के शीर्ष की ऊँचाई 24 मी. हैं, तो दीवार से सीढ़ी के आधार की दूरी (मी.में) ज्ञात करें। **(CPO 25-10-2020 Shift I)**

(A) 18 (B) 19.5
(C) 10 (D) 7.5

19. A person was standing on a road near a mall. He was 1215 m away from the mall and able to see the top of the mall from the road in such a way that the top of a tree which is in between him and the mall, was exactly in line of sight with the top of the mall. The tree height is 20 m and it is 60 m away from him. How tall (in m) is the mall ?

एक व्यक्ति मॉल के निकट सड़क पर खड़ा हैं। वह मॉल से 1215 मी. की दूरी पर हैं और सड़क से मॉल के शीर्ष को इस प्रकार देखने में सक्षम हैं, कि उसके और मॉल के बीच स्थित एक पेड़ का शीर्ष मॉल के शीर्ष के साथ दृष्टि रेखा में हैं। पेड़ की ऊँचाई 20 मी. हैं और यह उस व्यक्ति 60 मी. की दूरी पर स्थित हैं। मॉल की ऊँचाई (मी. में) ज्ञात करें। **(CPO 25-10-2020 Shift I)**

(A) 375 (B) 300 (C) 405 (D) 250

20. If $4 - 2\sin^2\theta - 5\cos\theta = 0, 0° < \theta < 90°$, then the value of $\cos\theta - \tan\theta$ is :

यदि $4 - 2\sin^2\theta - 5\cos\theta = 0, 0° < \theta < 90°$ हैं, तो $\cos\theta - \tan\theta$ का मान ज्ञात करें। **(CPO 25-10-2020 Shift I)**

(A) $\frac{1+2\sqrt{3}}{2}$ (B) $\frac{2+\sqrt{3}}{2}$

(C) $\frac{2-\sqrt{3}}{2}$ (D) $\frac{1-2\sqrt{3}}{2}$

21. Solve for θ : $\cos^2\theta - \sin^2\theta = \frac{1}{2}$, $0 < \theta < 90°$.

θ का मान ज्ञात करें $\cos^2\theta - \sin^2\theta = \frac{1}{2}$ जहाँ $0 < \theta < 90°$ हैं। **(CPO 25-10-2020 Shift II)**

(A) 45° (B) 60°
(C) 40° (D) 30°

22. If $\cot\theta = \frac{1}{\sqrt{3}}$, $0° < \theta° < 90°$, then the value of $\frac{2-\sin^2\theta}{1-\cos^2\theta} + (\text{cosec}^2\theta - \sec\theta)$ is:

यदि $\cot\theta = \frac{1}{\sqrt{3}}$, $0° < \theta° < 90°$, तब $\frac{2-\sin^2\theta}{1-\cos^2\theta} + (\text{cosec}^2\theta - \sec\theta)$ का मान ज्ञात करो- **(CPO 25-10-2020 Shift II)**

(A) 5 (B) 0
(C) 1 (D) 2

23. Let A and B be two towers with the same base. From the mid point of the line joining their feet, the angles of elevation of the tops of A and B are 30° and 45%, respectively. The ratio of the heights of A and B is:

माना कि A और B समान आधार वाली दो मीनारें हैं। और दोनों मीनारों के आधार के बीच ठीक मध्य से, A और B के शीर्ष के उन्नयन कोण क्रमश: 30° और 45% हैं। A और B की ऊँचाई का अनुपात ज्ञात करें। **(CPO 25-10-2020 Shift II)**

(A) $\sqrt{3}:1$ (B) $1:\sqrt{3}$
(C) 3 : 1 (D) 1 : 3

24. A ladder is resting against a wall, The angle between the foot of the ladder and the wall is 45° and the foot of the ladder is 6.6 an away from the wall. The length of the (in m) is:

दीवार के सहारे रखी हुई एक सीढ़ी के पाद और दीवार के मध्य कोण 45° हैं, और सीढ़ी का पाद दीवार से 6.6 मी. दूर हैं। सीढ़ी की लम्बाई (मी. में) ज्ञात करें। **(CPO 25-10-2020 Shift II)**

(A) $6.6 \times \sqrt{2}$ (B) $2.2 \times \sqrt{2}$
(C) $3.3 \times \sqrt{2}$ (D) $3.6 \times \sqrt{2}$

Solution

1. (D) $4(\text{cosec}^2 57° - \tan^2 33°) - \cos 90° - y \tan^2 + 66° \tan^2 24 = \frac{y}{2}$

$4(\text{cosec}^2 57 - \tan^2(90° - 57°)) - y \tan^2 66°$

$\tan^2(90°-66°) = \frac{y}{2}$

$4(\text{cosec}^2 51° - \cot^2 57°) - y \tan^2 66° \cot^2 66°$

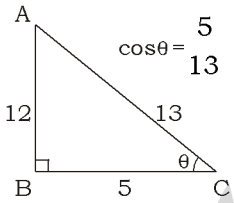
$= \frac{y}{2}$

$4(1) - y = \frac{y}{2}$

$4 = \frac{3y}{2}$

$y = \frac{8}{3}$

2. (C)



(AB) 12 — 18

(C) $1 - \frac{18}{12}$

(BC) $5 - \frac{18}{12} \times 5 = \frac{3}{2} \times 5 = 7.5$ cm

3. (C) $4 - 2\sin^2\theta - 5\cos\theta = 0$

$4 - 2(1 - \cos^2\theta) - 5\cos\theta = 0$

$4 - 2 + 2\cos^2\theta - 5\cos\theta = 0$

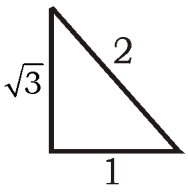
$2\cos^2\theta - 5\cos\theta + 2 = 0$

$2\cos^2\theta - 4\cos\theta - \cos\theta + 2 = 0$

$2\cos\theta(\cos\theta - 2) - 1(\cos\theta - 2) = 0$

$(\cos\theta - 2)(2\cos\theta - 1) = 0$

$\cos\theta = \frac{1}{2}, 2$

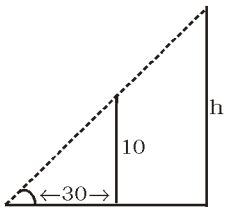


$\cos\theta + \tan\theta$

$\frac{1}{2} + \sqrt{3}$

$\frac{2\sqrt{3}+1}{2}$

4. (A)



$\tan\theta = \frac{10}{30} = \frac{1}{3}$ $\tan\theta = \frac{h}{1425}$

$\frac{1}{3} = \frac{h}{1425}$

$h = 475$m

5. (D) $3x + 3x - 45° = 90°$

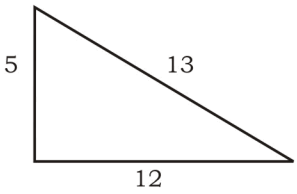
$6x = 135°$

$x = 22.5$

6. (C) $\frac{\left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)^2 - \text{Cosec}\,55°, \text{Sin}55°}{2+2}$

$= \frac{\frac{1}{4} + \frac{1}{4} - 1}{4} = -\frac{1}{2} \times \frac{1}{4} = -\frac{1}{8}$

7. (A)

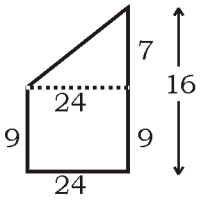


$12 \rightarrow 18$

$1 \rightarrow \frac{18}{12}$

$5 \rightarrow \frac{18}{12} \times 5 = 7.5$

8. (C)



distance fart tops from each other

$= \sqrt{(7)^2 + (24)^2} = \sqrt{625} = 25$

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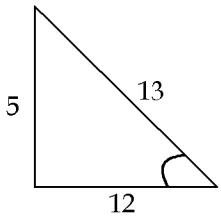
9. (D)



$\sec\theta = \frac{12}{13}$

$12 \xrightarrow{\times 3} 36$

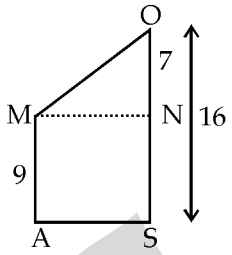
$\therefore 5 \xrightarrow{\times 3} \boxed{15}$

10. (C) $3x + 3x - 45° = 90$
$6x = 135°$
$x = 22.5°$

11. (B) $\frac{\sin^2 30° + \cos^2 60° + \sec 45° \cos 45°}{\sec 60° + \text{cosec}\, 30°}$

$= \frac{\frac{1}{4} + \frac{1}{4} + 1}{2+2} = \frac{6}{16} = \frac{3}{8}$

12. (A)

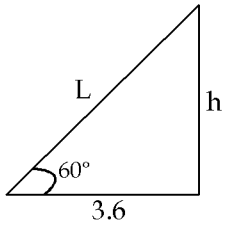


$\therefore (25)^2 = (7)^2 + (MN)^2$
$\Rightarrow MN = 24$

13. (D) $\frac{\sin^2 52 + 2 + \sin^2 38°}{4\cos^2 43° - 5 + 4\cos^2 47°}$

$= \frac{\sin^2 52 + \cos^2 52 + 2}{4(\cos^2 43 + \sin^2 43) - 5} = \frac{1+2}{4-5} = -3$

14. (D)

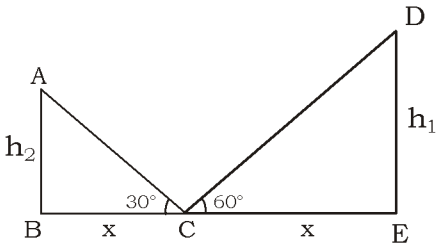


$\cos 60° = \frac{3.6}{L}$

$L = 3.6 \times 2$
$h = 7.2$ cm

15. (A) $\cot 4\theta = \tan(\theta - 5°)$
$40 + \theta - 5 = 90$
$5\theta = 95$
$\theta = 19°$

16. (B)



$\Delta ABC \quad \Delta DCE$

$\tan 30° = \frac{h_2}{x} \quad \tan 60° = \frac{h_1}{x}$

$h_2 = \frac{x}{\sqrt{3}} \quad h_1 = \sqrt{3}\,x$

$h_1 : h_2$

$\sqrt{3}\,x : \frac{x}{\sqrt{3}}$

$3 : 1$

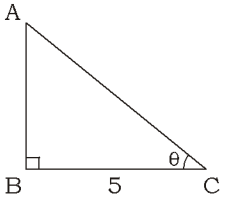
17. (D) $4(\sec^2 33° - \tan^2 33°) - \cos 90° + y\tan^2 66°$

$\cot^2 66° = \frac{y}{2}$

$\Rightarrow 4 \times 1 - 0 + y = \frac{y}{2}$

$\Rightarrow y - \frac{y}{2} = 4 \qquad \Rightarrow y = -8$

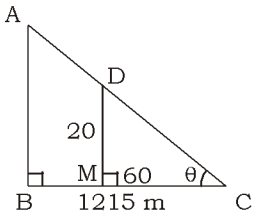
18. (C)



$9 \rightarrow 331.20$

$\therefore \quad BC = \frac{24}{12} \times 5 = 10\text{m}$

19. (C)



$\Delta ABC \sim \Delta DMC$

$\frac{BC}{CM} = \frac{AB}{DM} \Rightarrow \frac{1215}{60} = \frac{AB}{20}$

$\therefore \qquad AB = 405$

20. (D) $4 - 2\sin^2\theta - 5\cos\theta = 0$

Put $\theta = 60°$

$$4 - 2 \times \frac{3}{4} - \frac{5}{2} = 0$$

$\therefore$ $\cos 60° - \tan 60° = 0$

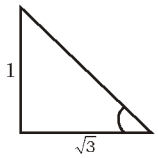
$$\Rightarrow \frac{1}{2} - \sqrt{3} \qquad \Rightarrow \frac{1-2\sqrt{3}}{2}$$

21. (D) $\cos^2\theta - \sin^2\theta = \frac{1}{2}$

$\cos 2\theta = \cos 60°$

$\theta = 30°$

22.(C)



$$\cot\theta = \frac{1}{\sqrt{3}}$$

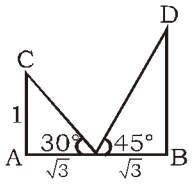
Put $\theta = 60°$

$$\frac{2 - \sin^2\theta}{1 - \cos^2\theta} + (\operatorname{cosec}^2\theta - \sec\theta)$$

$$\Rightarrow \frac{2 - \frac{3}{4}}{1 - \frac{1}{4}} + \left(\frac{4}{3} - 2\right) \Rightarrow \frac{5}{3} - \frac{2}{3}$$

$\Rightarrow$ 1

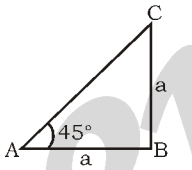
23. (B)



OB = BD

$$\frac{AC}{BD} = \frac{1}{\sqrt{3}}$$

24. (A)



$6.6 \rightarrow a$

$\therefore a\sqrt{2} = 6.6\sqrt{2}$

Leanth of ladder = $6.6 \times \sqrt{2}$

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(CPO – 2019)

1. A clock tower stands at the crossing of two roads which point in the north-south and the east-west directions. P, Q, R and S are points on the roads due north, east, south and west respectively, where the angles of elevation of the top of the tower are respectively, α, β, γ and δ. Then $\left(\frac{PQ}{RS}\right)^2$ is equal to:

एक घंटा-घर दो ऐसी सड़कों के चौराहे पर स्थित है जो उत्तर-दक्षिण और पूर्व-पश्चिम दिशाओं की ओर जाती है। P, Q, R और S सड़क की क्रमशः उत्तर, पूर्व, दक्षिण और पश्चिम दिशाओं में स्थित ऐसे बिंदु है, जहाँ से घंटा-घर के शीर्ष के उनन्यन कोण क्रमशः α,β,γ और δ है। तो $\left(\frac{PQ}{RS}\right)^2$ का मान ज्ञात किजिए।

(A) $\frac{\tan^2\alpha+\tan^2\delta}{\tan^2\beta+\tan^2\gamma}$ (B) $\frac{\tan^2\alpha+\tan^2\beta}{\tan^2\gamma+\tan^2\delta}$

(C) $\frac{\cot^2\alpha+\cot^2\beta}{\cot^2\gamma+\cot^2\delta}$ (D) $\frac{\cot^2\alpha+\cot^2\delta}{\cot^2\beta+\cot^2\gamma}$

2. If $0 \le \theta \le 90°$, and $\sin(2\theta + 50°) = \cos(4\theta + 16°)$, then what is the value of θ (in degrees) ?
यदि $0 \le \theta \le 90°$ और $\sin(2\theta + 50°) = \cos(4\theta + 16°)$ है, तो θ का मान (अंश में) ज्ञात कीजिए।
(A) 8° (B) 10°
(C) 12° (D) 4°

3. If $0 \le \theta \le 90°$, and $\sec^{107}\theta + \cos^{107}\theta = 2$, then $(\sec\theta + \cos\theta)$ is equal to :
यदि $0 \le \theta \le 90°$, और $\sec^{107}\theta + \cos^{107}\theta = 2$ है, तो $(\sec\theta + \cos\theta)$ का मान ज्ञात कीजिए ।

(A) 2^{-107} (B) 1 (C) 2 (D) $\frac{1}{2}$

4. A pole stands vertically on a road, which goes in the north-south direction P, Q are two points towards the north of the pole, such that PQ = b, and the angles of elevation of the top of the pole at P, Q, are α, β respectively. Then the height of the pole is :
एक खंभा उस सड़क पर उर्ध्वाकार रूप से खड़ा हुआ है, जो उत्तर दक्षिण दिशा में जाती है। P, Q खंभे के उत्तर में स्थित दो ऐसे बिंदु हैं, कि PQ = b और P, Q से खंभे के शीर्ष के उन्नयन कोण क्रमशः α, β हैं। खंभे की ऊँचाई ज्ञात कीजिए।

(A) $\frac{b}{\tan\beta+\tan\alpha}$ (B) $\frac{b}{\cot\alpha-\cot\beta}$

(C) $\frac{b}{\tan\beta-\tan\alpha}$ (D) $\frac{b\tan a}{\tan\beta}$

5. If $\frac{1}{\operatorname{cosec}\theta+1}+\frac{1}{\operatorname{cosec}\theta-1} = 2\sec\theta$, $0° < \theta < 90°$, then the value of $\frac{\tan\theta+2\sec\theta}{\operatorname{cosec}\theta}$ is :
यदि $\frac{1}{\operatorname{cosec}\theta+1}+\frac{1}{\operatorname{cosec}\theta-1} = 2\sec\theta$, $0° < \theta < 90°$ है, तो $\frac{\tan\theta+2\sec\theta}{\operatorname{cosec}\theta}$ का मान है :

(A) $\frac{2+\sqrt{3}}{2}$ (B) $\frac{4+\sqrt{2}}{2}$ (C) $\frac{2+\sqrt{2}}{2}$ (D) $\frac{4+\sqrt{3}}{2}$

6. If $(\cos\theta + \sin\theta) : (\cos\theta - \sin\theta) = \left(\sqrt{3}+1\right):\left(\sqrt{3}-1\right)$, $0° < \theta < 90°$, then what is the value of $\sec\theta$?
यदि $(\cos\theta + \sin\theta) : (\cos\theta - \sin\theta) = \left(\sqrt{3}+1\right):\left(\sqrt{3}-1\right)$, $0° < \theta < 90°$ है, तो $\sec\theta$ का मान क्या होगा ?

(A) 1 (B) 2 (C) $\sqrt{2}$ (D) $\frac{2\sqrt{3}}{3}$

7. From the top of a house A in a street, the angles of elevation and depression of the top and foot of another house B on the opposite side of the street are 60° and 45°, respectively. If the height of house A is 36 m. then what is the height of house B ? (Your answer should be nearest to an integer.)
एक गली में स्थित मकान A के शीर्ष से, सड़क के दूसरी ओर स्थित एक अन्य मकान B के शीर्ष और पाद के उन्नयन और अवनमन कोण क्रमशः 60° और 45° हैं। यदि मकान A की ऊँचाई 36 m है, तो मकान B की ऊंचाई कितनी है ? (आपका उत्तर पूर्णांक के सबसे निकट होना चाहिए)
(A) 91 m (B) 93 m
(C) 94 m (D) 98 m

8. The angles of elevation of the top of a tower from two points on the ground at distance 32 m and 18 m from its base and in the same straight line with it are complementary. The height (in m) of the tower is :

एक टॉवर के शीर्ष के, भूमि पर टॉवर के आधार से 32 मी. और 18 मी. की दूरी पर एक सीधी रेखा पर स्थित दो बिंदुओं से बनने वाले उन्नयन कोण पूरक हैं। टावर की ऊंचाई (m में) ज्ञात कीजिए।

(A) 24 (B) 20
(C) 28 (D) 16

9. If $3 + \cos^2\theta = 3(\cot^2\theta + \sin^2\theta)$, $0° < \theta < 90°$, then what is the value of $(\cos\theta + 2\sin\theta)$?
यदि $3 + \cos^2\theta = 3(\cot^2\theta + \sin^2\theta)$, $0° < \theta < 90°$ है, तो $(\cos\theta + 2\sin\theta)$ का मान ज्ञात कीजिए ?

(A) $3\sqrt{2}$ (B) $\frac{\sqrt{3}+2}{2}$
(C) $\frac{2\sqrt{3}+1}{2}$ (D) $\frac{3\sqrt{3}+1}{2}$

10. If $\tan(11\theta) = \cot(7\theta)$, then what is the value of $\sin^2(6\theta) + \sec^2(9\theta) + \text{cosec}^2(12\theta)$?
यदि $\tan(11\theta) = \cot(7\theta)$ है, तो $\sin^2(6\theta) + \sec^2(9\theta) + \text{cosec}^2(12\theta)$ का मान ज्ञात कीजिये ?

(A) $\frac{35}{12}$ (B) $\frac{23}{6}$ (C) $\frac{31}{12}$ (D) $\frac{43}{12}$

11. If $7\sin^2\theta + 3\cos^2\theta = 4$, $0° < \theta < 90°$, then the value of $(\tan^2 2\theta + \text{cosec}^2 2\theta)$ is :
यदि $7\sin^2\theta + 3\cos^2\theta = 4$, $0° < \theta < 90°$ है, तो $(\tan^2 2\theta + \text{cosec}^2 2\theta)$ का मान क्या होगा ?

(A) 7 (B) $\frac{15}{4}$ (C) $\frac{13}{3}$ (D) $\frac{13}{4}$

12. If $21\tan\theta = 20$, then $(1 + \sin\theta + \cos\theta) : (1 - \sin\theta + \cos\theta) = ?$
यदि $21\tan\theta = 20$ है, तो $(1 + \sin\theta + \cos\theta) : (1 - \sin\theta + \cos\theta) = ?$

(A) 5 : 2 (B) 3 : 1
(C) 7 : 3 (D) 2 : 1

13. If $2\sin\theta + 15\cos^2\theta = 7, 0° < \theta < 90°$, then what is the value of $\frac{3-\tan\theta}{2+\tan\theta}$

यदि $2\sin\theta + 15\cos^2\theta = 7, 0° < \theta < 90°$ है, तो $\frac{3-\tan\theta}{2+\tan\theta}$ का मान क्या है ?

(A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{5}{8}$ (D) $\frac{3}{8}$

14. If $\text{cosec}\,\theta = 1.25$, then $\frac{4\tan\theta - 5\cos\theta + 1}{\sec\theta + 4\cot\theta - 1} = ?$

यदि $\text{cosec}\,\theta = 1.25$ है, तो $\frac{4\tan\theta - 5\cos\theta + 1}{\sec\theta + 4\cot\theta - 1} = ?$

(A) 2 (B) $\frac{10}{11}$ (C) $\frac{9}{10}$ (D) $\frac{1}{2}$

15. From the top of a lamp post of height x metres, two objects on the ground on the same side of it (and in line with the foot of the lamp post) are observed at angles of depression of 30° and 60°, respectively. The distance between the objects is $32\sqrt{3}$ m. The value of x is:
x मीटर ऊंचे एक प्रकाश स्तंभ के शीर्ष से, इसके एक ही तरफ भूमि पर स्थित दो वस्तुओं (प्रकाश स्तंभ के पाद की सीधी रेखा में) के अवलोकित किये गए अवनमण कोण क्रमशः 30° और 60° हैं। वस्तुओं के बीच की दूरी $32\sqrt{3}$ मी. है। x का मान ज्ञात कीजिए।

(A) 36 (B) 48
(C) 54 (D) 45

16. If $\sqrt{2}\sin(60° - \alpha) = 1$ where $0° < \alpha < 90°$, then the value of α will be?
यदि $\sqrt{2}\sin(60° - \alpha) = 1, 0° < \alpha < 90°$ है, तो α का मान क्या होगा ?

(A) 15° (B) 30°
(C) 45° (D) 60°

17. If $\sin\theta - \cos\theta = 0$ where $0° < \theta < 90°$, then what will be the value of $\sin^4\theta + \cos^4\theta$?
यदि $\sin\theta - \cos\theta = 0$, $0° < \theta < 90°$ है, तो $\sin^4\theta + \cos^4\theta$ का मान क्या होगा ?

(A) $\frac{1}{3}$ (B) 1 (C) $\frac{1}{2}$ (D) $\frac{1}{4}$

18. The angle of elevation of top of a tree from a point on the ground which is 300 m away from the base of the tree is 30°. When the height of the tree increases, the angle of elevation changes to 60°. Find out the increase in the height of the tree.
एक पेड़ के शीर्ष का भूमि पर स्थित उस बिंदु से उन्नयन कोण 30° है, जो पेड़ के तल से 300 मी. की दूरी पर है। जब पेड़ की ऊँचाई बढ़ जाती है, तो उसी बिंदु से उसके शीर्ष का उन्नयन कोण 60° हो जाता है। पेड़ की ऊंचाई में कितनी वृद्धि हुई है ? (पूर्णांक के निकटतम)

(A) 346 m/ मी. (B) 364 m/मी.
(C) 342 m/मी. (D) 384 m/मी.

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19. A ladder leaning against a window of a house makes an angle of 60° with the ground. If the distance of the foot of the ladder from the wall is 4.2 m, then the height of the point, where the ladder touches the window from the ground is closest to:
एक घर की खिड़की पर खड़ी हुई एक सीढ़ी भूमि के साथ 60° का कोण बनाती है। यदि दीवार से सीढ़ी के पाद की दूरी 4.2 मी. है, तो उस बिंदु की ऊंचाई क्या होगी, जहां सीढ़ी भूमि से खिड़की को स्पर्श करती है?

(A) 7.3 m/ मी. (B) 6.8 m/ मी.
(C) 7.8 m/ मी. (D)7 m/ मी.

20. A pole of length 7 m is fixed vertically on the top of a tower. The angle of elevation of the top of the pole observed from a point on the ground is 60°and the angle of depression of the same point on the ground from the top of the tower is 45°. The height (in m) of the tower is:
एक टॉवर के शीर्ष पर 7 मी. लंबी एक छड़ उर्ध्वाधर रूप से स्थापित की गई है। भूमि पर एक बिंदु से छड़ के शीर्ष का अवलोकित किया गया उन्नयन कोण 60° है और टॉवर के शीर्ष से भूमि पर उसी बिंदु का अवनमन कोण 45° है। टॉवर की ऊँचाई (मी. में) कितनी है?

(A) $7\left(2\sqrt{3}-1\right)$ (B) $\frac{7}{2}\left(2\sqrt{3}-1\right)$
(C) $7\sqrt{3}$ (D) $\frac{7}{2}\left(\sqrt{3}+1\right)$

21. If $3(\cot^2\theta - \cos^2\theta) = 1 - \sin^2\theta$, $0° < \theta < 90°$, then θ is equal to:
यदि $3(\cot^2\theta - \cos^2\theta) = 1 - \sin^2\theta$, $0° < \theta < 90°$ हो, तो θ का मान बताइए?

(A) 30° (B) 60°
(C) 45° (D) 15°

22. The value of $\tan^2 48° - \text{cosec}^2 42° + \text{cosec}(67° + \theta) - \sec(23° - \theta)$ is
$\tan^2 48° - \text{cosec}^2 42° + \text{cosec}(67° + \theta) - \sec(23° - \theta)$ का मान ज्ञात कीजिए।

(A) –1 (B) 0
(C) 1 (D) – 2

23. If $\cos^2\theta - \sin^2\theta = \tan^2\phi$. then which of the following is true?
यदि $\cos^2\theta - \sin^2\theta = \tan^2\phi$ है, तो निम्नलिखित में से कौन-सा विकल्प सही है?

(A) $\cos\theta \cos\phi = 1$
(B) $\cos^2\phi - \sin^2\phi = \tan^2\theta$
(C) $\cos^2\phi - \sin^2\phi = \cot^2\theta$
(D) $\cos\theta \cos\phi = \sqrt{2}$

24. If $\frac{\cos\theta}{1-\sin\theta} + \frac{\cos\theta}{1+\sin\theta} = 4$, $0° < \theta < 90°$, then what is the value of $(\sec\theta + \text{cose}s\theta + \cot\theta)$?

यदि $\frac{\cos\theta}{1-\sin\theta} + \frac{\cos\theta}{1+\sin\theta} = 4$, $0° < \theta < 90°$ है, तो $(\sec\theta + \text{cosec}\theta + \cot\theta)$ का मान ज्ञात कीजिए।

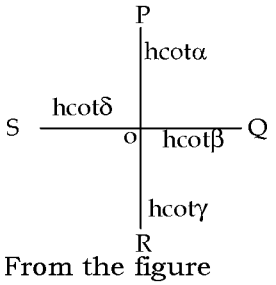
(A) $1+2\sqrt{3}$ (B) $\frac{1+2\sqrt{3}}{3}$
(C) $\frac{2+\sqrt{3}}{3}$ (D) $2+\sqrt{3}$

25. Two points A and B are on the ground and on opposite sides of a tower. A is closer to the foot of tower by 42 m than B. If the angles of elevation of the top of the tower, as observed from A and B are 60° and 45°, respectively then the height of the tower is closest to:
भूमि पर दो बिंदु A और B स्थित है, जो एक टॉवर के दोनों और एक-दूसरे की विपरीत दिशाओं में है। A, B की तुलना में टॉवर के पाद के 42 मी. अधिक निकट है। यदि A और B से अवलोकित किए गए टॉवर के शीर्ष का उन्नयन कोण क्रमश: 60° और 45° हैं, तो टॉवर की ऊंचाई लगभग कितनी है?

(A) 87.6 m
(B) 98.6 m
(C) 88.2 m
(D) 99.4 m

Solution

1. (C) ATQ,



From the figure

$PQ^2 = h^2\cot^2\alpha + h^2\cot^2\beta$

$RS^2 = h^2\cot^2\gamma + h^2\cot^2\delta$

$$\left(\frac{PQ}{RS}\right)^2 = \frac{\cot^2\alpha + \cot^2\beta}{\cot^2\gamma + \cot^2\delta}$$

2. (D) $\sin(2\theta + 50°) = \cos(4\theta + 16°)$

$\Rightarrow (2\theta + 50°) + (4\theta + 16°) = 90°$

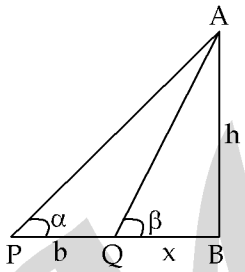
$\Rightarrow 6\theta + 66° = 90°$

$\Rightarrow 6\theta = 24°$

$\Rightarrow \theta = 4°$

3. (C)

4. (B)



$$\tan\alpha = \frac{h}{b+x}$$

$x = h\cot\alpha - b$

$h = x\tan\beta$

$h = (h\cot\alpha - b)\tan\beta$

$h(\cot\beta - \cot\alpha) = -b$

$$h = \frac{b}{\cot\alpha - \cot\beta}$$

5. (B) $$\frac{1}{\cos ec\theta + 1} + \frac{1}{\cos ec\ \theta - 1} = 2\sec\theta$$

$$\frac{Co\sec\theta - 1 + Co\sec\theta + 1}{Co\sec^2\theta - 1^2} = 2\sec\theta$$

$$\frac{2\cos ec\theta}{\cot^2\theta} = 2\sec\theta$$

$$2 \times \left[\frac{Sin^2\theta}{\cos^2\theta \times \sin\theta}\right] = \frac{2}{\cos\theta}$$

$$\frac{Sin\ \theta}{Cos\ \theta} = 1 \Rightarrow \tan\ \theta = 1$$

$\Rightarrow \theta = 45°$

Value of $\frac{\tan\theta + 2\sec\theta}{Co\sec\theta} = \frac{\tan 45° + 2\sec 45°}{Co\sec 45°}$

$$= \frac{1 + 2\sqrt{2}}{\sqrt{2}} \text{ or } \frac{\sqrt{2} + 4}{2} = \frac{4 + \sqrt{2}}{2}$$

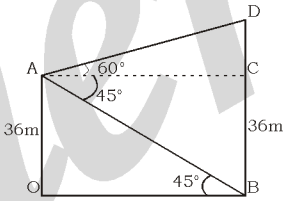
6. (D) $$\frac{Cos\theta + Sin\theta}{Cos\theta - Sin\theta} = \frac{\sqrt{3} + 1}{\sqrt{3} - 1}$$

Using C & D

$$\frac{\cos\theta}{\sin\theta} = \frac{\sqrt{3}}{1} \Rightarrow \text{Cot}\,\theta = \sqrt{3} \Rightarrow \theta = 30°$$

$$\Rightarrow \text{Sec}\ \theta = \text{Sec}30° = \frac{2}{\sqrt{3}} \text{ or } \frac{2\sqrt{3}}{3}$$

7. (D)



As $\angle ABO = 45°$

$\Rightarrow AO = OB = 36 = BC = AC$ in ΔACD

$$\tan 60° = \frac{DC}{AC}$$

$$\sqrt{3} = \frac{DC}{36}$$

$\Rightarrow DC = 36\sqrt{3}$ m

$\Rightarrow$ Height of House B

$= BC + CD = 36 + 36\sqrt{3}$

$= 98$m

8. (A) As we know in the given case height

$$= \sqrt{32 \times 18} = 24\text{m}$$

9. (C) $3 + \cos^2\theta = 3(\cot^2\theta + \sin^2\theta)$

Put $\theta = 60°$ which satisfies the equation

$\Rightarrow \cos\theta + 2\sin\theta = \cos 60 + 2\sin 60$

$$= \frac{1}{2} + \frac{2\sqrt{3}}{2} = \frac{2\sqrt{3} + 1}{2}$$

10. (D) $\tan(11\theta) = \cot(7\theta)$

$\Rightarrow 11\theta + 7\theta = 90°$

$\Rightarrow 18\theta = 90°$

$\Rightarrow \theta = 5°$

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$\Rightarrow \sin^2(6\theta) + \sec^2(9\theta) + \text{cosec}^2(12\theta)$
$= \sin^2 30° + \sec^2(45°) + \text{cosec}^2(60°)$

$$= \left(\frac{1}{2}\right)^2 + \left(\sqrt{2}\right)^2 + \left(\frac{2}{\sqrt{3}}\right)^2$$

$$= \frac{1}{4} + 2 + \frac{4}{3} = \frac{3+24+16}{12} = \frac{43}{12}$$

11. (C) $7\sin^2\theta + 3\cos^2\theta = 4$
$7\sin^2\theta + 3(1 - \sin^2\theta) = 4$
$4\sin^2\theta = 1$
$\theta = 30°$

$$\tan^2 60° + \text{cosec}^2 60° = 3 + \frac{4}{3} = \frac{13}{3}$$

12. (C) $\tan\theta = \frac{20}{21}$, $\frac{1+\sin\theta+\cos\theta}{1-\sin\theta+\cos\theta}$, divided by $\cos\theta$

$$\sec\theta = \sqrt{1+\left(\frac{20}{21}\right)^2}, \frac{\sec\theta+\tan\theta+1}{\sec\theta-\tan\theta+1}$$

$$\sec\theta = \frac{29}{21}, \frac{\frac{29}{21}+\frac{20}{21}+1}{\frac{29}{21}-\frac{20}{21}+1} = \frac{7}{3}$$

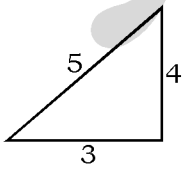
13. (B) $2\sin\theta + 15\cos^2\theta = 7$
$\Rightarrow 2\sin\theta + 15 - 15\sin^2\theta = 7$
$\Rightarrow 15\sin^2\theta - 2\sin\theta - 8 = 0$

$$\Rightarrow \quad \sin\theta = \frac{4}{5} \Rightarrow \tan\theta = \frac{4}{3}$$

Putting value of $\tan\theta$ in required equation

$$\frac{3-\tan\theta}{2+\tan\theta} = \frac{3-\frac{4}{3}}{2+\frac{4}{3}} = \frac{\left(\frac{5}{3}\right)}{\left(\frac{10}{3}\right)} = \frac{1}{2}$$

14. (B)



$$\text{cosec}\theta = \frac{125}{100} = \frac{5}{4}$$

$$\Rightarrow \quad \tan\theta = \frac{4}{3} \Rightarrow \cos\theta = \frac{3}{5}$$

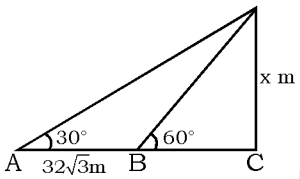
$$\Rightarrow \quad \sec\theta = \frac{5}{3} \Rightarrow \cot\theta = \frac{3}{4}$$

Putting respective values at required equation

$$\Rightarrow \frac{4\left(\frac{4}{3}\right) - 5\left(\frac{3}{5}\right) + 1}{\frac{5}{3} + 4 \times \frac{3}{4} - 1} = \frac{\frac{16}{3} - 3 + 1}{\frac{5}{3} + 2} = \frac{\frac{16}{3} - 2}{\frac{5}{3} + 2}$$

$$= \frac{10}{11}$$

15. (B)



As we know
$x(\cot 30 - \cot 60) = AB$

$$\Rightarrow \quad x \times \frac{2}{\sqrt{3}} = 32\sqrt{3} \Rightarrow x = 48 \text{ m}$$

16. (A) $\sqrt{2}\sin(60° - \alpha) = 1$

$$\sin(60 - \alpha) = \frac{1}{\sqrt{2}}$$

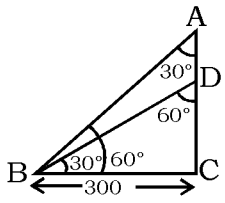
$\sin(60 - \alpha) = \sin 45°$
$60 - \alpha = 45°$
$\alpha = 15°$

17. (C) $\sin\theta - \cos\theta = 0$
$\sin\theta = \cos\theta$
$\theta = 45°$

$$(\sin 45°)^4 + (\cos 45)^4 = \left(\frac{1}{\sqrt{2}}\right)^4 + \left(\frac{1}{\sqrt{2}}\right)^4$$

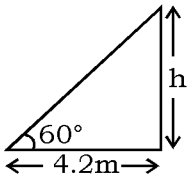
$$= \frac{1}{2}$$

18. (A)



$DC = 100\sqrt{3}$ m
$AC = 300\sqrt{3}$ m
Increase in height
$= 300\sqrt{3} - 100\sqrt{3}$
$= 200 \times \sqrt{3}$
$= 200 \times 1.73$
$= 346$m

19. (A)



$$\tan 60° = \frac{h}{4.2}$$

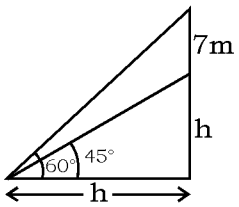
$$\sqrt{3} = \frac{h}{4.2}$$

$$h = 4.2 \times \sqrt{3}$$

$$h = 4.2 \times 1.72$$

$$h = 7.3\text{m}$$

20. (D)



$$\tan 60° = \frac{h+7}{h}$$

$$h\sqrt{3} = h + 7$$

$$h\left(\sqrt{3}-1\right) = 7$$

$$h = \frac{7}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$$

$$h = \frac{7}{2}\left(\sqrt{3}+1\right)\text{m}$$

21. (B) $3(\cot^2\theta - \cos^2\theta) = 1 - \sin^2\theta$

$3(\cos^2\theta.\operatorname{cosec}^2\theta - \cos^2\theta) = \cos^2\theta$

$3\cot^2\theta = 1$ $(\operatorname{cosec}^2\theta - 1 = \cot^2\theta)$

$$\cot\theta = \frac{1}{\sqrt{3}}$$

$$\theta = 60°$$

22. (A) We know that

$\operatorname{cosec}(90 - \theta) = \sec\theta$

$\tan^2 48 - \operatorname{cosec}^2 42° + 0$

$\tan^2(90 - 42) - \operatorname{cosec}^2 42°$

$\cot^2 42 - \operatorname{cosec}^2 42 = -1$

$[\operatorname{cosec}^2\theta - \cot^2\theta = 1]$

23. (B) $\cos^2\theta - \sin^2\theta = \tan^2\phi$

Let the value of $\theta = 0$ and $\phi = 45°$

So, LHS $\cos^2 0° - \sin^2 0° = 1 - 0 = 1$

RHS $\tan^2 45° = 1$ (LHS = RHS)

Now, put these value in option

And $\cos^2\phi - \sin^2\phi = \tan^2\theta$

$$\text{LHS, } \frac{1}{2} - \frac{1}{2} = 0$$

RHS = $\tan^2 0° = 0$

So, answer is (B)

24. (D) $$\cos\theta\left[\frac{1}{1-\sin\theta} + \frac{1}{1+\sin\theta}\right] = 4$$

$$\Rightarrow \cos\theta\left[\frac{1+\sin\theta+1-\sin\theta}{1-\sin^2\theta}\right] = 4$$

$[(1 - \sin\theta)(1 + \sin\theta) = 1 - \sin^2\theta]$

$$\Rightarrow \cos\theta \times \frac{2}{\cos^2\theta} = 4 \Rightarrow \cos\theta = \frac{1}{2}$$

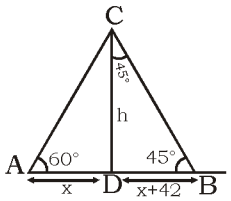
$$\cos\theta = \cos 60°$$

Now,

$\Rightarrow \sec 60° + \operatorname{cosec} 60° + \cot 60°$

$$\Rightarrow 2 + \frac{2}{\sqrt{3}} + \frac{1}{\sqrt{3}} \Rightarrow 2 + \sqrt{3}$$

25. (D)



By triangle BCD $h = x + 42$

By triangle ADC $h = x\sqrt{3}$

$$x\sqrt{3} = x + 42$$

$$x\sqrt{3} - x = 42$$

$$x\left(\sqrt{3}-1\right) = 42 \Rightarrow x = \frac{42\left(\sqrt{3}+1\right)}{2}$$

$$= 21\left(\sqrt{3}+1\right) \sim 57.372$$

So, length of tower = 57.372 + 42 = 99.37

= 99.37 ~ 99.40

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(CPO – 2018)

1. If tan x = cot (45° + 2x), then what is the value of x?
यदि tan x = cot (45° + 2x) हो, तो x का मान क्या होगा ?
(A) 45° (B) 15°
(C) $\frac{45^\circ}{2}$ (D) 20°

2. From the top of a 10 m high building, the angle of elevation of the top of a tower is 60° and the angle of depression of the foot of the tower is θ, such that tan θ = 2/3. What is the height of the tower to nearest metres?
10 मी ऊंची एक इमारत की छत से एक टॉवर के शीर्ष का उन्नयन कोण 60° तथा टॉवर के निचला हिस्से का अवनयन कोण θ है, जैसे tan θ = 2/3 है। टॉवर की ऊंचाई (निकटतम) मीटर में कितनी है ?
(A) 34 m. (B) 35 m.
(C) 36 m. (D) 33 m.

3. The value of
$\left[\frac{\sin^2 24^\circ + \sin^2 66^\circ}{\cos^2 24^\circ + \cos^2 66^\circ} + \sin^2 61^\circ + \cos 61^\circ \sin 29^\circ\right]$ is equal to:
का मान निम्नलिखित में से किसके बराबर होगा ?
(A) 2 (B) 3
(C) 1 (D) 0

4. A ladder leaning against a wall makes an angle α with the horizontal ground such that tan α = 3/4. If the foot of the ladder is 5 m away from the wall, what is the length of the ladder?
दीवार के सहारे लगी हुई एक सीढ़ी, भूमि से क्षैतिज α कोण इस प्रकार बनाती है कि tan α = 3/4 यदि सीढ़ी दीवार से 5 मीटर दूर हैं तो सीढ़ी की लंबाई क्या होगी ?
(A) 5.25 m./मी. (B) 3.75 m./मी.
(C) 6.25 m./मी. (D) 4.5 m./मी.

5. The value of $\frac{\sin 30^\circ - \cos 60^\circ + \cot^2 45^\circ}{\cos 30^\circ - \tan 45^\circ + \sin 90^\circ}$ is equal to:
$\frac{\sin 30^\circ - \cos 60^\circ + \cot^2 45^\circ}{\cos 30^\circ - \tan 45^\circ + \sin 90^\circ}$ का मान है—
(A) $\frac{2\sqrt{3}}{3}$ (B) $\frac{\sqrt{3}}{2}$
(C) $\frac{3}{2}$ (D) $\frac{\sqrt{3}}{4}$

6. From the top of a 12 m high building the angle of elevation of the top of a tower is 60° and the angle of depression of the foot of the tower is q, such that tan q = 3/4. What is the height of the tower $\left(\sqrt{3} = 1.73\right)$?
एक 12 मीटर ऊँची इमारत के ऊपर से किसी टावर के शीर्ष का उन्नयन कोण 60° है तथा पाद का अवनमन कोण q है यदि tan q = 3/4 हो, तो टावर की ऊँचाई होगी ?
(A) 41.41 m. (B) 36.22 m.
(C) 37.95 m. (D) 39.68 m.

7. If tan 3x = cot (30° + 2x), then what is the value of x?
यदि tan 3x = cot (30° + 2x) है, तो x का मान है–
(A) 18° (B) 12°
(C) 10° (D) 15°

8. A ladder leaning against a wall makes an angle θ with the horizontal ground such that sin θ = 12/13. If the foot of the ladder is 7.5 m from the wall, then what is the height of the point where the top of the ladder touches the wall?
एक दीवार के सहारे झुकी हुई सीढ़ी जमीन के साथ θ कोण बनाती है। यदि sinθ = 12/13 है तथा सीढ़ी का पाद दीवार से 7.5 मीटर की दूरी पर है तो दीवार की ऊँचाई होगी—
(A) 15 m. (B) 8 m.
(C) 18 m. (D) 12 m.

9. The value of $\sin^2 30^\circ.\cos^2 45^\circ + 2\tan^2 30^\circ - \sec^2 60^\circ$ is equal to:
$\sin^2 30^\circ.\cos^2 45^\circ + 2\tan^2 30^\circ - \sec^2 60^\circ$ का मान निम्नलिखित में से किसके बराबर है ?
(A) $-\frac{13}{12}$ (B) $-\frac{77}{24}$ (C) $-\frac{25}{12}$ (D) $-\frac{1}{12}$

10. From the top of 75 m high tower, the angle of depression of two points P and Q on opposite side of the base of the tower on level ground is θ and ϕ, such that tan θ = 3/4 and tan ϕ = 5/8. What is the distance between the points P and Q
75 m ऊँचे टावर के शीर्ष से भू-तल पर विपरीत दिशाओं में स्थित दो बिंदुओं P और Q पर टावर के अवनयन कोण θ और ϕ हैं तथा tan θ = 3/4 और tan ϕ = 5/8 है। P और Q बिंदुओं के बीच की दूरी कितनी होगी ?
(A) 190 m./मी. (B) 200 m./मी.
(C) 180 m./मी. (D) 220 m./मी.

11. If $\sin(A + B) = \frac{\sqrt{3}}{2}$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$, then $(2A + 3B)$ is equal to:

यदि $\sin(A + B) = \frac{\sqrt{3}}{2}$ और $\tan(A - B) = \frac{1}{\sqrt{3}}$ तो $(2A + 3B)$ बराबर है —

(A) 120° (B) 135°
(C) 130° (D) 125°

12. The angle of elevation of top of a tower from a point P, on the ground is θ such that $\tan\theta = \frac{12}{5}$. If distance of the point P, from the base of the tower is 75 m, what is the height of the tower?

भूमि पर स्थित किसी बिन्दु P से एक टावर के शीर्ष का उन्नयन कोण θ है, जिसमें $\tan\theta = \frac{12}{5}$ है। टॉवर के पांव से बिन्दु P की दूरी 75 मीटर है, तो टावर की ऊँचाई कितनी होगी ?

(A) 160 m./मी. (B) 200 m./मी.
(C) 190 m./मी. (D) 180 m./मी.

13. From the top of a 120 m high tower, the angle of depression of the top of a pole is 45° and the angle of depression of the foot of the pole is θ, such that $\tan\theta = 3/2$. What is the height of the pole?

120 मीटर ऊंचे टॉवर के शीर्ष से, एक खंभे के शीर्ष का अवनयन कोण 45° तथा खंभे के आधार का अवनयन कोण θ इस प्रकार है कि $\tan\theta = 3/2$ है, खंभे की ऊंचाई कितनी है ?

(A) 60 m./मी. (B) 75 m./मी.
(C) 80 m./मी. (D) 40 m./मी.

14. If $\sec 2x = \text{cosec}\,(3x - 45°)$, then x is equal to:

यदि $\sec 2x = \text{cosec}\,(3x - 45°)$ है, तो x बराबर है:

(A) 40° (B) 45°
(C) 27° (D) 35°

15. The length of shadow of a vertical pole on the ground is 24 m. If the angle of elevation of the sun at that time is θ, such that $\sin\theta = 5/13$, then what is the height of the pole?

भूमि पर गड़े एक ऊर्ध्वाकार खंभे की छाया 24 मीटर लंबी है। यदि उस समय सूर्य का उन्नयन कोण θ इस प्रकार है कि $\sin\theta = 5/13$, तो खंभे की ऊंचाई क्या होगी ?

(A) 8 m./मी. (B) 10 m./मी.
(C) 12 m./मी. (D) 18 m./मी.

16. The value of $\frac{\sin^2 60° + \cos^2 30° - \sec 35°.\sin 55°}{\sec 60° + \text{cosec}\,30°}$ is equal to/

का मान निम्नलिखित में से किसके बराबर है ?

(A) $\frac{1}{8}$ (B) $\frac{1}{3}$
(C) $\frac{1}{2}$ (D) $\frac{1}{4}$

17. If $\cos\theta = \frac{1}{\sqrt{10}}$, then $\tan\theta$ is equal to:

यदि $\cos\theta = \frac{1}{\sqrt{10}}$ हो, तो $\tan\theta$ का मान ज्ञात कीजिये ?

(A) $\frac{1}{\sqrt{3}}$ (B) $\frac{1}{3}$ (C) $\sqrt{3}$ (D) 3

18. From the top of 120 m high lighthouse, the angle of depression of two ships on opposite side of the base of the lighthouse is 30° and 60°. What is the distance between the ships? (rounded off)

120 मीटर ऊंचे प्रकाश स्तंभ के शीर्ष से प्रकाशस्तंभ के दोनों ओर विपरीत दिशाओं में दो जहाजों का अवनमन कोण 30° और 60° है। जहाजों के बीच की दूरी क्या है ? (लगभग)

(A) 327 m (B) 127 m
(C) 277 m (D) 177 m

19. The string of a kite is 30 m long and it makes an angle 60° with the horizontal. The height of the kite above the ground is:

पतंग की डोर 30 मीटर लम्बी है और वह क्षैतिज से 60° का कोण बनाती है, तो धरती से पतंग की ऊंचाई ज्ञात कीजिये ?

(A) $10\sqrt{3}$ m (B) 15 m
(C) 7.5 m (D) $15\sqrt{3}$ m

20. The top of a broken tree touches the ground at an angle of 60° and at a distance of 45 m from the base of the tree. The total height of the tree is: (Use $\sqrt{3} = 1.73$ and $\sqrt{2} = 1.41$)

टूटे हुए एक पेड़ का शीर्ष पेड़ की जड़ से 45 मीटर दूर 60° के कोण पर भूमि को स्पर्श करता है। पेड़ की कुल लम्बाई क्या होगी ? ($\sqrt{3} = 1.73$ और $\sqrt{2} = 1.41$ का उपयोग कीजिए ?)

(A) 141.3 m (B) 153.45 m
(C) 167.94 m (D) 137.24 m

21. A ladder leaning against a wall make an angle of 60° with the horizontal. If the foot of the ladder is 10 m away from the wall, what is the length of the ladder?

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दीवार के सहारे लगी हुई एक सीढ़ी, भूमि के क्षैतिज 60° का कोण बनाती हैं। यदि सीढ़ी का निचला सिरा दीवार से 10 मीटर दूर हैं, तो सीढ़ी की लंबाई क्या होगी ?

(A) 34.6 m (B) 17.3 m
(C) 20 m (D) 40 m

22. If $4 \tan \theta = 3$, $\frac{5\sin\theta - 3\cos\theta}{5\sin\theta + 3\cos\theta}$ then equal is:

यदि $4 \tan \theta = 3$ है तो $\frac{5\sin\theta - 3\cos\theta}{5\sin\theta + 3\cos\theta}$ मान क्या है ?

(A) $\frac{1}{3}$ (B) 9

(C) 3 (D) $\frac{1}{9}$

23. $(1 + \cot^2 \theta)(1 - \cos^2 \theta)$ is equal to:
$(1 + \cot^2 \theta)(1 - \cos^2 \theta)$ मान क्या है ?

(A) 0 (B) $\frac{1}{2}$ (C) 1

(D) Not defined / परिभाषित नहीं किया गया है

24. If $x = a\cos\theta + b\sin\theta$ and $y = a\sin\theta - b\cos\theta$, the value of $x^2 + y^2$ is :
यदि $x = a\cos\theta + b\sin\theta$ और $y = a\sin\theta - b\cos\theta$ तो $x^2 + y^2$ होगा :
(A) $a^2 - b^2$ (B) $a - b$
(C) $a^2 + b^2$ (D) $a + b$

25. A and B are standing on the same side of a wall and observe that the angles of elevation to the top of the wall are 45° and 60° respectively. If the height of the wall is 50 m, the distance between A and B is :
A और B एक दीवार के एक ही तरफ खड़े हैं और निरीक्षण करते हैं कि दीवार के शीर्ष पर ऊंचाई के कोण क्रमश: 45° और 60° हैं। यदि दीवार की ऊंचाई 50 मीटर है, तो A और B के बीच की दूरी है:

$\left(Use \sqrt{3} = 1.73 \, and \, \sqrt{2} = 1.41\right)$

(A) 25.07 m (B) 21.10 m
(C) 17.38 m (D) 14.65 m

26. The value of $4 \sin^2 30° + 3 \cot^2 60°$ is :
$4 \sin^2 30° + 3 \cot^2 60°$ का मान होगा :

(A) 1 (B) $\frac{1}{\sqrt{3}}$ (C) 2 (D) 0

27. If the height of a pole and the distance between the pole and a man standing nearby are equal what would be the angle of elevation to the top of the pole ?
यदि ध्रुव की ऊंचाई और ध्रुव और पास में खड़े व्यक्ति के बीच की दूरी बराबर है, तो ध्रुव के शीर्ष पर कोण क्या होगा ?
(A) 60° (B) 90°
(C) 30° (D) 45°

28. $1 + \frac{\tan^2 A}{1 + \sec A}$ is equalt to:

$1 + \frac{\tan^2 A}{1 + \sec A}$ का मान क्या होगा ?

(A) cosec A (B) cos A
(C) sec A (D) sin A

29. What is the angle of elevation of the sun from the top of a vertical pole when its height is equal to the length of its shadow?
किसी खम्भे के शीर्ष से सूर्य का उन्नयन कोण क्या है जब इसकी ऊँचाई इसकी छाया की लंबाई के बराबर हो ?
(A) 30° (B) 90°
(C) 45° (D) 60°

30. $\frac{\text{cosec}\, 31^\circ}{\sec 59^\circ}$ is equal to:

$\frac{\text{cosec}\, 31^\circ}{\sec 59^\circ}$ का मान क्या होगा ?

(A) 3 (B) 2
(C) 1 (D) 0

31. From the top of a hill 96 m high, the angle of depression of two cars parked on the same side of the hill (at same level as the base of the hill) are 30° and 60° respectively. The distance between the cars is:

(use $\sqrt{3} = 1.73$ and round off to nearest whole number)
96 m ऊँची पहाड़ की चोटी से, पहाड़ी की एक ही दिशा में खड़ी की गई दो कारों के अवनयन कोण (पहाड़ी के आधार रूप में समान स्तर पर) क्रमश: 30° और 60° हैं। कारों के बीच की दूरी कितनी है ?

($\sqrt{3} = 1.73$ का प्रयोग कीजिए और निकटतम पूर्ण संख्या में पूर्णांकित कीजिए)
(A) 220 m (B) 165 m
(C) 111 m (D) 243 m

32. A boy is standing near a pole which is 2.7 m high and the angle of elevation is 30°. The distance of the boy from the pole is $\left(\sqrt{3} = 1.73\right)$:

एक लड़का एक खंभे के पास खड़ा है जो 2.7 मी.ऊंचा है और उन्नयन कोण 30° है। खंभे से लड़के की दूरी है।
(A) 4.68 m (B) 4.53 m
(C) 4.63 m (D) 4.42 m

33. If $5\cos\theta - 12\sin\theta = 0$, the value of $\frac{2\sin\theta + \cos\theta}{\cos\theta - \sin\theta}$ is:

यदि $5\cos\theta - 12\sin\theta = 0$ है, तो $\frac{2\sin\theta + \cos\theta}{\cos\theta - \sin\theta}$ का मान है:

(A) $1\frac{75}{119}$ (B) $2\frac{34}{35}$

(C) $3\frac{2}{3}$ (D) $3\frac{1}{7}$

34. The shadow of tower, when the angle of elevation of the sun is 60° is found to be 15 m shorter than when it is 45°. The height of the tower is:
एक मीनार की छाया, सूर्य का उन्नयन कोण 60° होने पर, सूर्य के उन्नयन कोण 45° होने पर प्राप्त होने वाली मीनार की छाया से 15m छोटी पाई जाती है। मीनार की ऊँचाई :

(A) 41.5 m (B) 26.5 m
(C) 20.5 m (D) 35.5 m

35. $\sin18° - \cos72°$ is equal to:
$\sin18° - \cos72°$ बराबर है :

(A) 1 (B) 2

(C) 0 (D) $\frac{1}{2}$

36. The angle of elevation of a flying drone from a point on the ground is 60°. After flying for 5 seconds the angle of elevation drops to 30°. If the drone is flying horizontally at a constant height of $1000\sqrt{3}$ m, the distance travelled by the drone is :
जमीन पर एक बिंदु से एक उड़ान ड्रोन का उन्नयन कोण 60° है। 5 सेकंड उड़ान भरने के बाद उन्नयन कोण 30 डिग्री तक कम हो जाता है। यदि ड्रोन क्षैतिज रूप से $1000\sqrt{3}$ मी. की निरंतर ऊंचाई पर उड़ रहा है, तो ड्रोन द्वारा 5 सेकंड में तय की गई दूरी ज्ञात कीजिए :

(A) 2000 m/मी. (B) 1000 m/मी.
(C) 3000 m/मी. (D) 4000 m/मी.

37. The value of $\cos^2 45° + \sin^2 30° - \sin^2 60°$ is equal to :
$\cos^2 45° + \sin^2 30° - \sin^2 60°$ का मान ज्ञात करें :

(A) $\frac{3}{2}$ (B) $\frac{1}{2}$

(C) 0 (D) 1

38. The value of $\cot^2 A - \frac{1}{\sin^2 A}$ is equal to :

$\cot^2 A - \frac{1}{\sin^2 A}$ का मान ज्ञात करें :

(A) 0 (B) – 1
(C) – 2 (D) 1

39. A girl 1.2 m tall can just see the sun over a 3.62 m tall wall which is 2.42 m away from her. The angle of elevation of the sun is :
1.2 मीटर लंबी एक लड़की 3.62 मीटर लंबी दीवार के ऊपर सिर्फ सूरज को देख सकती है यदि दीवार उससे 2.42 मीटर दूर है तो सूर्य का उन्नयन कोण है :

(A) 60° (B) 30°
(C) 90° (D) 45°

40. $\frac{4}{3}\tan^2 60° + 3\cos^2 30° - 2\sec^2 30° - \frac{3}{4}\cot^2 60°$ बराबर है :

(A) $\frac{8}{3}$ (B) $\frac{7}{3}$

(C) $\frac{10}{3}$ (D) $\frac{5}{4}$

41. When the sun's angle of depression on change from 30° to 60°, the length of the shadow of a tower decreased by 70 m, What is the height of the tower ?
जब सूर्य का अवनमन कोण 30° से 60° हो, जाए तो परछाई 70 मी. घट जाती है, तो टावर की ऊँचाई ज्ञात कीजिए ?

(A) 36.55 m (B) 65.55 m
(C) 45.65 m (D) 60.55 m

42. From a point P on a level ground, the angle of elevation of the top of a tower is 30°. If the tower is 270 m high, the distance of point P from the foot of the tower is :
जमीन पर किसी बिन्दू P से किसी टावर की उन्नयन कोण 30° हो तथा टावर की ऊँचाई 270 मीटर हो, तो बिन्दू P की टावर के तल से दूरी ज्ञात करें ?

(A) 467.65 m (B) 476.65 m
(C) 376.65 m (D) 367.65 m

43. $(\text{cosec}A - \sin A)^2 + (\sec A - \cos A)^2 - (\cot A - \tan A)^2$ बराबर है :

(A) 2
(B) 1
(C) 0
(D) – 1

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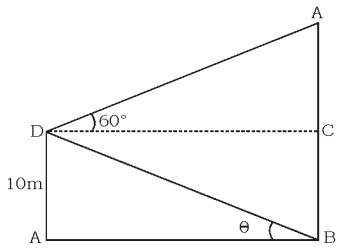
Solution

1. (B) $x + 45 + 2x = 90$

$3x = 45$

$\Rightarrow x = 15°$

2. (C)



$\tan\theta = \frac{2}{3}$

$\Rightarrow AB = 15$

$\Rightarrow CD = 15$

$\Rightarrow AC = 15\tan 60°$

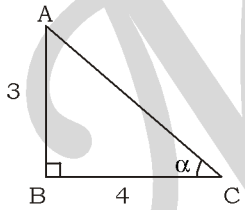
$= 15\sqrt{3}$

$\Rightarrow$ height of tower = AC + CB = $15\sqrt{3} + 10 =$ 36 m

3. (A) $\frac{\sin^2 24 + \cos^2 24}{\sin^2 66 + \cos^2 66} + \sin^2 61 + \cos^2 61$

$\Rightarrow \frac{1}{1} + 1 = 2$

4. (C)



BC = 4 $\rightarrow$ 5

1 $\rightarrow \frac{5}{4}$

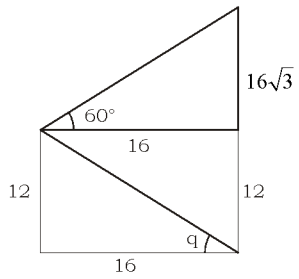
AC = 5

$\Rightarrow \frac{5\times 5}{4} = 6.25$ m.

5. (A) $\frac{\frac{1}{2} - \frac{1}{2} + 1}{\frac{\sqrt{3}}{2} - 1 + 1} = \frac{1}{\left(\frac{\sqrt{3}}{2}\right)} = \frac{2}{\sqrt{3}}$

or $= \frac{2\sqrt{3}}{3}$

6. (D)



$\tan 60° = \frac{x}{16}$

$\tan q = \frac{3}{4}$

From the figure

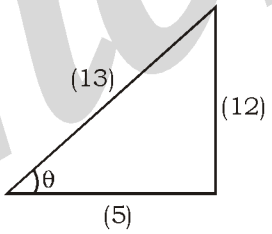
height of tower = $\frac{12}{3} \times \left(3 + 4\sqrt{3}\right)$

$= 4\left(3 + 4\sqrt{3}\right) = 39.68$ m

7. (B) $3x + (30 + 2x) = 90°$

$\Rightarrow 5x = 60° \Rightarrow x = 12°$

8. (C)



$\sin\theta = \frac{12}{13}$

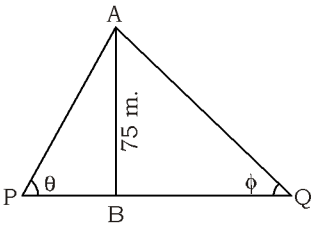
$\Rightarrow \frac{7.5}{5} \times 12 = 1.5 \times 12 = 18$m

9. (B) $\sin^2 30°.\cos^2 45° + 2\tan^2 30° - \sec^2 60°$

$= \left(\frac{1}{2}\right)^2 \times \left(\frac{1}{2}\right) + 2\times\frac{1}{3} - (2)^2$

$= \frac{1}{8} + \frac{2}{3} - 4 = \frac{3 + 16 - 96}{24} \Rightarrow -\frac{77}{24}$

10. (D)



$\tan\theta = \frac{3}{4}$ $\tan\phi = \frac{5}{8}$

In Δ ABP,

$$\frac{AB}{PB} = \tan\theta$$

$$\frac{75}{PB} = \frac{3}{4}$$

$$\Rightarrow \quad PB = 25 \times 4$$
$$= 100\text{m}$$

In ABQ,

$$\frac{AB}{BQ} = \tan\phi$$

$$\Rightarrow \quad \frac{75}{BQ} = \frac{5}{8}$$

$$\Rightarrow \quad BQ = 15 \times 8$$
$$= 120\text{m}$$

$$\Rightarrow \quad PQ = 100 + 120 = 220\text{m}$$

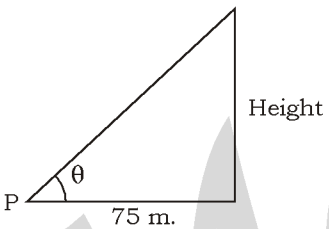
11. (B) $A + B = 60°$ $\quad A - B = 30°$

$\Rightarrow A = 45° \quad B = 15°$

$\Rightarrow 2A + 3B = 2(45°) + 3(15°)$

$= 90° + 45° = 135°$

12. (D)



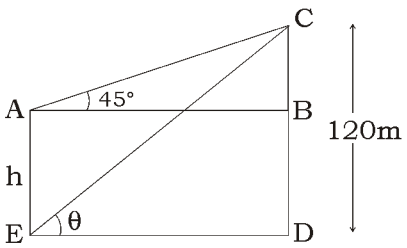
$$\tan\theta = \frac{12}{5}\text{(Given)}$$

$$\tan\theta = \frac{Perpendicular}{Base}$$

$$\Rightarrow \frac{12}{5} = \frac{height}{75}$$

$\Rightarrow$ height = 15×12 = 180 meter

13. (D)



Given, $\tan\theta = \frac{3}{2}$

In ΔCDE,

$$\tan\theta = \frac{3}{2}$$

$$\Rightarrow \quad \frac{CD}{DE} = \frac{3}{2}$$

$$\Rightarrow \quad \frac{120}{DE} = \frac{3}{2} \Rightarrow DE = 80\text{ m}$$

As DE = AB = 80m

In ΔABC

$\tan 45° = 1$

$\Rightarrow$ BC = AB = 80 m

From the figure,

AE = CD – BC

= 120 – 80 = 40m

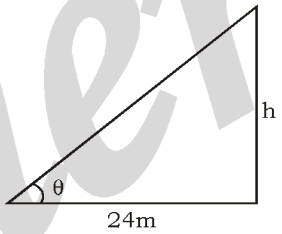
14. (C) $\sec 2x = \text{cosec}(3x - 45°)$

$\Rightarrow 2x + (3x - 45°) = 90°$

$\Rightarrow 5x = 135°$

$\Rightarrow x = 27°$

15. (B)



Given, $\sin\theta = \frac{5}{13}$

If h = 5, hypoteneus = 13

$\Rightarrow$ base = 12

$$\Rightarrow \quad \frac{24}{12} \times 5 = \text{height}$$

$\Rightarrow$ h = 10m

16. (A) $= \dfrac{\sin^2 60 + \cos^2 30 - \sec 35 . \sin 55}{\sec 60 + \text{cosec}\, 30}$ As, sec35 =cosec55

So, $= \dfrac{\left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 - \text{cosec}\, 55 . \sin 55}{2 + 2}$

$$= \frac{\frac{3}{4} + \frac{3}{4} - 1}{4}$$

$$\Rightarrow \frac{\left(\frac{3}{2} - 1\right)}{4} \Rightarrow \left(\frac{1}{2}\right) \times \frac{1}{4} \Rightarrow \frac{1}{8}$$

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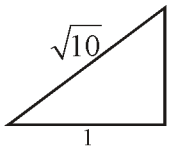
17. (D) $\text{Cos}\theta = \frac{1}{\sqrt{10}}$

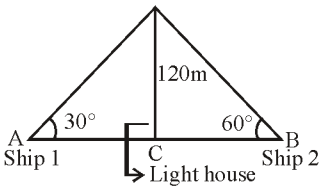
$$\text{As Cos}\theta = \frac{B}{H} = \frac{1}{\sqrt{10}}$$

$\Rightarrow$ 

$$\Rightarrow \quad \text{height} = \sqrt{\left(\sqrt{10}\right)^2 - 1^2} = \sqrt{9} = 3$$

$$\Rightarrow \quad \tan\theta = \frac{\text{height}}{\text{base}}$$

$$\tan\theta = \frac{3}{1} = 3$$

18. (C) 

here, AB is distance between both ships

AC = 120 cot 30

BC = 120 cot 60

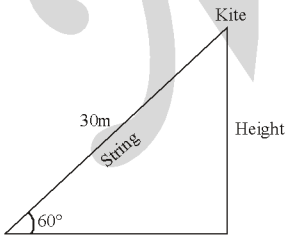
$\Rightarrow$ AB = AC + BC

= 120 cot 30 + 120 cot60°

= 120 [cot 30 + cot60°]

$$= 120\left[\sqrt{3} + \frac{1}{\sqrt{3}}\right]$$

$$= 120 \times \frac{4}{\sqrt{3}} = \frac{480\sqrt{3}}{3} = 160\sqrt{3} = 277 \text{ m}$$

19. (D) 

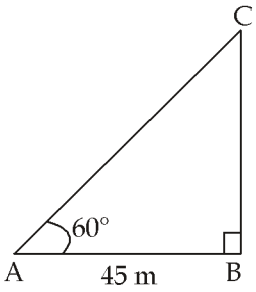
As we know

$$\text{Sin}\theta = \frac{\text{height}}{\text{hypoteneus}}$$

$$\Rightarrow \quad \text{Sin } 60 = \frac{\text{height}}{30}$$

$$\Rightarrow \quad \frac{\sqrt{3}}{2} = \frac{\text{height}}{30}$$

$$\Rightarrow \quad \text{height} = \frac{30 \times \sqrt{3}}{2} \Rightarrow 15\sqrt{3} \text{ m.}$$

20. (C) 

Length of tree = AC + CB

AC = 45 sec 60°

= 45 × 2 = 90 m

BC = 45 tan 60°

$= 45\sqrt{3}$

= 77.94 m

Total Length = 90 + 77.94

= 167.94 m

21. (C) As we know,

$$\cos\theta = \frac{\text{base}}{\text{hypoteneus}}$$

$$\Rightarrow \cos 60° = \frac{10}{\text{ladder}}$$

$$\Rightarrow \frac{1}{2} = \frac{10}{\text{ladder}}$$

$\Rightarrow$ ladder = 20 m

22. (D) $4\tan\theta = 3; \qquad \tan\theta = \frac{3}{4}$ (*Given*)

$$\frac{5\sin\theta - 3\cos\theta}{5\sin\theta + 3\cos\theta} = ?$$

Divide numerator and dinominator by cosθ

$$\frac{5\left(\frac{\sin\theta}{\cos\theta}\right) - 3\left(\frac{\cos\theta}{\cos\theta}\right)}{5\left(\frac{\sin\theta}{\cos\theta}\right) + 3\left(\frac{\cos\theta}{\cos\theta}\right)} = \frac{5\tan\theta - 3}{5\tan\theta + 3}$$

Putting value of tanθ which is 3/4 in above equation

$$= \frac{5 \times \frac{3}{4} - 3}{5 \times \frac{3}{4} + 3} = \frac{15 - 12}{15 + 12} = \frac{3}{27} = \frac{1}{9}$$

23. (C) From trigonometric identities

We know,

$\text{cosec}^2\theta = 1 + \cot^2\theta$

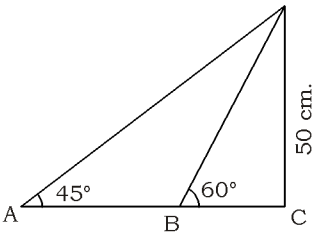
$\sin^2\theta = 1 - \cos^2\theta$

Putting there values in original equation
$\Rightarrow \text{cosec}^2\theta . \sin^2\theta$

$\Rightarrow \frac{1}{\sin^2\theta} \times \sin^2\theta = 1$

24. (C) $x = a\cos\theta + b\sin\theta$ [Given]
$y = a\sin\theta - b\cos\theta$
$\Rightarrow x^2 + y^2 = (a\cos\theta + b\sin\theta)^2 + (a\sin\theta - b\cos\theta)^2$
$\Rightarrow a^2\cos^2\theta + b^2\sin^2\theta + 2ab\sin\theta\cos\theta + a^2\sin^2\theta + b^2\cos^2\theta - 2ab\cos\theta\sin\theta$
$\Rightarrow a^2(\sin^2\theta + \cos^2\theta) + b^2(\cos^2\theta + \sin^2\theta)$
$\Rightarrow a^2 + b^2$

25. (B)



Here, BC = 50 cot60°
AC = 50 cot45°
Distance between A and B
= AC – BC
= 50 cot45° – 50 cot60°
= 50 (cot45° – cot60°)

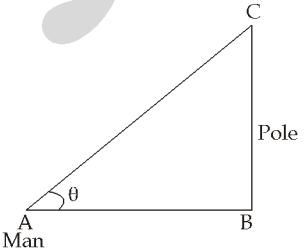
$= 50\left(1 - \frac{1}{\sqrt{3}}\right) = \frac{50(\sqrt{3}-1)}{\sqrt{3}}$

$= \frac{50(3-\sqrt{3})}{3} = 21.10 \text{ m}$

26. (C) $4\sin^2 30° + 3\cot^2 60°$

$\Rightarrow 4\left(\frac{1}{2}\right)^2 + 3\left(\frac{1}{\sqrt{3}}\right)^2 = \frac{4}{4} + \frac{3}{3} \Rightarrow 1 + 1 = 2$

27. (D)



Given (AB = BC)

$\Rightarrow \tan\theta = \frac{BC}{AB} = \frac{AB}{AB} = 1$

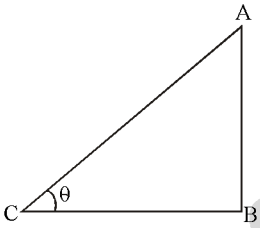
$\Rightarrow \theta = 45°$

28. (C) $1 + \frac{\tan^2 A}{1+\text{Sec}A} = \frac{1 + \text{Sec}A + \tan^2 A}{1+\text{Sec}A}$

As we know,
$1 + \tan^2 A = \text{Sec}^2 A$

$= \frac{\text{Sec}^2 A + \text{Sec}A}{1+\text{Sec}A} = \frac{\text{Sec}A(1+\text{Sec}A)}{(1+\text{Sec}A)} = \text{Sec } A$

29. (C)



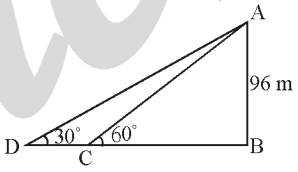
Given, AB = CB

$\Rightarrow \tan\theta = \frac{AB}{CB} = \frac{AB}{AB} = 1$

$\Rightarrow \theta = 45°$

30. (C) $\frac{\text{cosec}31°}{\sec 59°} = \frac{\text{cosec}(90° - 59°)}{\sec 59°} = \frac{\sec 59°}{\sec 59°} = 1$

31. (C)

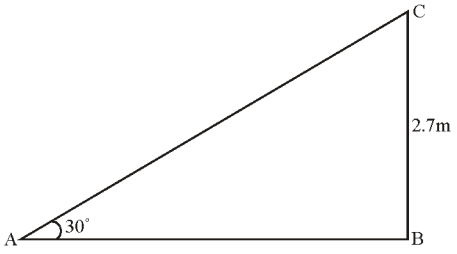


BC = 96 Cot 60°
BD = 96 Cot 30°
$\Rightarrow$ CD = BD - BC
= 96 Cot 30 - 96 Cot 60
= 96 (Cot 30 - Cot 60)

$\Rightarrow CD = 96\left(\sqrt{3} - \frac{1}{\sqrt{3}}\right) = 96 \times \frac{2}{\sqrt{3}}$

$= \frac{96 \times 2 \times \sqrt{3}}{3} = 32 \times 2 \times \sqrt{3} = 64\sqrt{3}$
$\approx 111\text{m}$

32. (A)



$\Rightarrow$ AB = 2.7 cot 30°
= 4.68 m

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33.(D) $5\,\text{Cos}\theta = 12\,\text{Sin}\theta$

$$\Rightarrow \frac{\text{Sin}\theta}{\text{Cos}\theta} = \frac{5}{12}$$

$$\Rightarrow \tan\theta = \frac{5}{12}$$

$$\frac{2\text{Sin}\theta + \text{Cos}\theta}{\text{Cos}\theta - \text{Sin}\theta} = ?$$

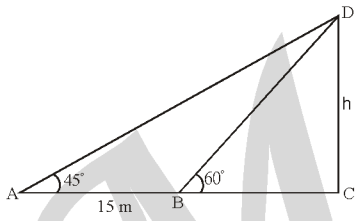
Divide numberator and denominator by $\text{Cos}\theta$

$$\Rightarrow \frac{\left(2\frac{\text{Sin}\theta}{\text{Cos}\theta} + \frac{\text{Cos}\theta}{\text{Cos}\theta}\right)}{\left(\frac{\text{Cos}\theta}{\text{Cos}\theta} - \frac{\text{Sin}\theta}{\text{Cos}\theta}\right)} \Rightarrow \frac{2\tan\theta + 1}{1 - \tan\theta}$$

$$\Rightarrow \frac{2\times\frac{5}{12}+1}{1-\frac{5}{12}} \Rightarrow \frac{\left(\frac{5}{6}+1\right)}{1-\frac{5}{12}} \Rightarrow \frac{\left(\frac{11}{6}\right)}{\left(\frac{7}{12}\right)} \Rightarrow \frac{11}{6}\times\frac{12}{7}$$

$$\Rightarrow \frac{22}{7} \Rightarrow 3\frac{1}{7}$$

34. (D)



As, BC = hcot60° AC = hcot45°

$\Rightarrow$ AB = AC - BC

= hcot45° - hcot60°

$\Rightarrow$ 15 = h (cot45° - cot60°)

$$\Rightarrow 15 = h\left(1 - \frac{1}{\sqrt{3}}\right)$$

$$\Rightarrow 15 = h\left(\frac{\sqrt{3}-1}{\sqrt{3}}\right)$$

$$\Rightarrow h = \frac{15\sqrt{3}}{\sqrt{3}-1}$$

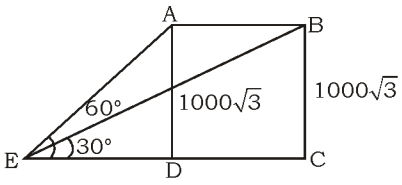
$$\approx 35.5m$$

35. (C) Sin 18° – Cos 72°

= Sin 18° – Cos (90°-18°)

= Sin 18° – Sin 18° = 0

36. (A)



DE = $1000\sqrt{3}$ cot60

EC = $1000\sqrt{3}$ cot30

Distance travelled by drone

= CE – DE = DC

$\Rightarrow 1000\sqrt{3}\ [\cot 30 - \cot 60]$

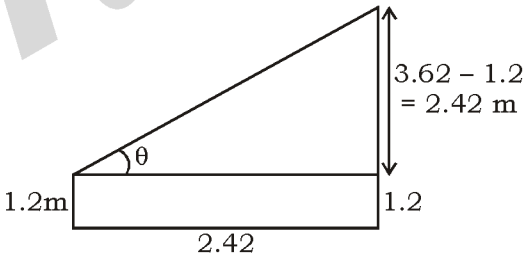
$$\Rightarrow 1000\sqrt{3} \times \frac{2}{\sqrt{3}} = 2000\text{m}$$

37. (C) $\frac{1}{2} + \frac{1}{4} - \frac{3}{4} = \frac{3}{4} - \frac{3}{4} = 0$

38. (B) Put A = 45°

$$1 - \frac{1}{\left(1/2\right)} \Rightarrow 1 - 2 = -1$$

39. (D)



From the figure

$$\tan\theta = \frac{2.42}{2.42} = 1$$

$\Rightarrow \theta = 45°$

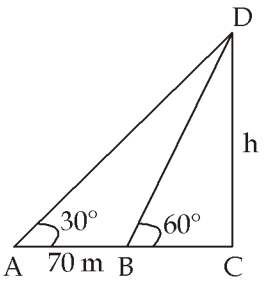
40. (C) $\frac{4}{3}\tan^2 60° + 3\cos^2 30° - 2\sec^2 30° - \frac{3}{4}\cot^2 60°$

$$= \frac{4}{3}\left(\sqrt{3}\right)^2 + 3\left(\frac{\sqrt{3}}{2}\right)^2 - 2\left(\frac{2}{\sqrt{3}}\right)^2 - \frac{3}{4}\times\left(\frac{1}{\sqrt{3}}\right)^2$$

$$= 4 + \frac{9}{4} - \frac{8}{3} + -\frac{1}{4} = \frac{48+27-32-3}{12}$$

$$= \frac{75-35}{12} \Rightarrow \frac{40}{12} = \frac{10}{3}$$

41. (A)



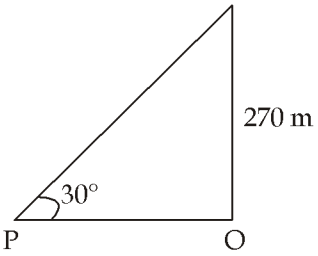
Let Height of tower = h m
As we know,
AB = h (cot 30 – cot 60)

$\Rightarrow 70 = h\left(\sqrt{3}-\frac{1}{\sqrt{3}}\right)$

$\Rightarrow h = \frac{70}{\left(2/\sqrt{3}\right)} = 35\sqrt{3}$

≈ 60.55 m

42. (A)



OP = 270 cot 30°

$= 270 \times \sqrt{3} = 467.65$ m

43. (B) Put A = 45°

$= \left(\sqrt{2}-\frac{1}{\sqrt{2}}\right)^2 + \left(\sqrt{2}-\frac{1}{\sqrt{2}}\right)^2 - (1-1)^2$

$= 2\left(\sqrt{2}-\frac{1}{\sqrt{2}}\right)^2 = 2\left(\frac{1}{\sqrt{2}}\right)^2 = \frac{2}{2} = 1$

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(CPO – 2017)

1. What is the simplified value of $\left(\frac{\cot\theta+\tan\theta}{\sec\theta}\right)$?

$\left(\frac{\cot\theta+\tan\theta}{\sec\theta}\right)$ का सरलीकृत मान क्या है ?

(A) $1 - \cos^2\theta$ (B) $2\sin\theta$
(C) $\text{cosec}\,\theta$ (D) $\sec^2\theta$

2. If x and y are positive acute angles such that $\sin(4x - y) = 1$ and $\cos(2x + y) = 1/2$, then what is the value of $\cot(x + 2y)$?
यदि x तथा y धनात्मक न्यूनकोण है, $\sin(4x - y) = 1$ तथा $\cos(2x + y) = 1/2$ है, तो $\cot(x + 2y)$ का मान क्या होगा ?

(A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$
(C) 1
(D) Cannot be determined/ज्ञात नहीं किया जा सकता

3. 80 m away from the foot of the tower, the angle of elevation of the top of the tower is 60°. What is the height (in metres) of the tower?
एक मीनार के पाद से 80 मीटर दूर किसी बिंदु से मीनार के शीर्ष का उन्नयन कोण 60° है। मीनार की ऊँचाई (मीटर में) क्या है ?

(A) 40 (B) $60\sqrt{3}$
(C) $80\sqrt{3}$ (D) $\frac{40}{\sqrt{3}}$

4. The respective ratio between the height of tower and the point at some distance from its foot is $57 : 19\sqrt{3}$. What is the angle (in degrees) of elevation of the top of the tower?
एक मीनार की ऊँचाई तथा उसके पाद से कुछ दूरी पर स्थित एक बिंदु की दूरी का अनुपात $57 : 19\sqrt{3}$ है। मीनार के शीर्ष का उन्नयन कोण (डिग्री में) क्या है ?

(A) 30 (B) 45
(C) 60 (D) 75

5. If the $\cos\theta + \sin\theta = m$ and $\sec\theta + \text{cosec}\,\theta = n$, then what is the value of $\frac{n}{2}(m^2 - 1)$?

यदि $\cos\theta + \sin\theta = m$ तथा $\sec\theta + \text{cosec}\,\theta = n$ है, तो $\frac{n}{2}(m^2 - 1)$ का मान क्या है ?

(A) m (B) 2m
(C) mn (D) 2n

6. If $\sec\theta + \text{cosec}\,\theta = \sqrt{2}\sec(90 - \theta)$ then what is the value of $\cot\theta$?
यदि $\sec\theta + \text{cosec}\,\theta = \sqrt{2}\sec(90 - \theta)$ है, तो $\cot\theta$ का मान क्या है ?

(A) $\sqrt{2}$ (B) 2
(C) $\sqrt{2} - 1$ (D) $\sqrt{2} + 1$

7. What is the simplified value of

$\left(\frac{1}{\text{cosec}\,\theta + \cot\theta}\right)^2$?

$\left(\frac{1}{\text{cosec}\,\theta + \cot\theta}\right)^2$ का सरलीकृत मान क्या है ?

(A) $\text{cosec}\,\theta + \tan\theta$
(B) $\sin\theta + \cos\theta$
(C) $(1 - \cos\theta) / (1 + \cos\theta)$
(D) $(1 - \sin\theta) / (1 + \sin\theta)$

8. If $\sin(\theta + 23°) = \cos 58°$, then what is the value of $\cos 5\theta$?
यदि $\sin(\theta + 23°) = \cos 58°$ है, तो $\cos 5\theta$ का मान क्या है ?

(A) $\frac{1}{2}$ (B) $\frac{1}{\sqrt{2}}$ (C) $\frac{\sqrt{3}}{2}$ (D) 0

9. If $x\sin\theta = \frac{5\sqrt{3}}{2}$ and $x\cos\theta = \frac{5}{2}$ then what is the value of x?
यदि $x\sin\theta = \frac{5\sqrt{3}}{2}$ तथा $x\cos\theta = \frac{5}{2}$ है तो x का मान क्या है।

(A) $\sqrt{3}$ (B) 1/2 (C) $\frac{\sqrt{3}}{2}$ (D) 5

10. If $\theta + \varphi = \frac{2}{3}\pi$ and $\cos\theta = \frac{\sqrt{3}}{2}$, the what is the value of $\sin\varphi$?

यदि $\theta + \varphi = \frac{2}{3}\pi$ तथा $\cos\theta = \frac{\sqrt{3}}{2}$ है, तो $\sin\varphi$ का मान क्या है ?

(A) 0 (B) $\frac{1}{2}$ (C) $\frac{1}{\sqrt{2}}$ (D) 1

11. If $4\sin^2\theta - 3 = 0$ and θ is acute, then what is the value of $(\cot^2\theta + \tan^2\theta)$?
यदि $4\sin^2\theta - 3 = 0$ तथा θ न्युनकोण है, तो $(\cot^2\theta + \tan^2\theta)$ का मान क्या होगी ?
(A) 2 (B) 0
(C) 10/3 (D) 6

12. If $\frac{\cos\theta}{1+\sin\theta} + \frac{\cos\theta}{1-\sin\theta} = 4$ and θ is a acute, then what is the value (in degrees) of θ ?
यदि $\frac{\cos\theta}{1+\sin\theta} + \frac{\cos\theta}{1-\sin\theta} = 4$ तथा θ न्यूनकोण है, θ का मान (डिग्री में) क्या है ?
(A) 30 (B) 45
(C) 60 (D) 90

13. If $\frac{1}{\sin\theta + \text{cosec}\theta} = \frac{1}{2}$, then what is the value of $\sin^{100}\theta + \text{cosec}^{100}\theta$?
यदि $\frac{1}{\sin\theta + \text{cosec}\theta} = \frac{1}{2}$ है, तो $\sin^{100}\theta + \text{cosec}^{100}\theta$ का मान क्या है ?
(A) -1 (B) 0 (C) 1 (D) 2

14. What is the value of
$\frac{\tan^2 25°}{\text{cosec}^2 65°} + \frac{\cot^2 25°}{\sec^2 65°} + 2\tan20°\tan45°\tan70°$?
$\frac{\tan^2 25°}{\text{cosec}^2 65°} + \frac{\cot^2 25°}{\sec^2 65°} + 2\tan20°\tan45°\tan70°$ का मान क्या है ?
(A) 1 (B) 2
(C) 3 (D) 4

15. If $\text{cosec}\theta + \text{cosec}^2\theta = 1$, then what is the value of $(\cot^{12}\theta - 3\cot^{10}\theta + 3\cot^8\theta - \cot^6\theta)$?
यदि $\text{cosec}\theta + \text{cosec}^2\theta = 1$ है, तो $(\cot^{12}\theta - 3\cot^{10}\theta + 3\cot^8\theta - \cot^6\theta)$ का मान क्या है ?
(A) -2 (B) -1 (C) 0 (D) 1

16. If $\sec\theta = \frac{13}{12}$ and θ is acute, then what is the value of $(\sqrt{\cot\theta + \tan\theta})$?
यदि $\sec\theta = \frac{13}{12}$ तथा θ न्यूनकोण है, तो $(\sqrt{\cot\theta + \tan\theta})$ का मान क्या है ?
(A) $\frac{13}{2\sqrt{15}}$ (B) $\frac{12}{2\sqrt{13}}$ (C) $\frac{13}{2\sqrt{5}}$ (D) $\frac{2}{13}$

17. If $(1+\tan^2\theta) = \frac{625}{49}$ and θ is acute, then what is the value of $\left(\sqrt{\sin\theta + \cos\theta}\right)$?
यदि $(1+\tan^2\theta) = \frac{625}{49}$ तथा θ न्यूनकोण है, तो $\left(\sqrt{\sin\theta + \cos\theta}\right)$ का मान क्या है ?
(A) 1 (B) $\frac{5}{4}\sqrt{\frac{31}{42}}$ (C) $\frac{\sqrt{31}}{5}$ (D) 5/7

18. If $\sin\theta + \sin^2\theta = 1$, then what is the value of $(\cos^{12}\theta + 3\cos^{10}\theta + 3\cos^8\theta + \cos^6\theta - 1)$?
यदि $\sin\theta + \sin^2\theta = 1$ है, तो $(\cos^{12}\theta + 3\cos^{10}\theta + 3\cos^8\theta + \cos^6\theta - 1)$ का मान क्या है ?
(A) -1 (B) 0
(C) 1 (D) 2

19. If $\cot\theta = \sqrt{11}$ and θ is acute, then what is the value of $\frac{\left(\text{cosec}^2\theta + \sec^2\theta\right)}{\left(\text{cosec}^2\theta - \sec^2\theta\right)}$?
यदि $\cot\theta = \sqrt{11}$ तथा θ न्यूनकोण है, तो $\frac{\left(\text{cosec}^2\theta + \sec^2\theta\right)}{\left(\text{cosec}^2\theta - \sec^2\theta\right)}$ का मान क्या है ?
(A) $\frac{2}{3}$ (B) $\frac{6}{5}$ (C) $\frac{3}{4}$ (D) $\frac{7}{6}$

20. If $\frac{\cos\theta}{1+\sin\theta} + \frac{\cos\theta}{1-\sin\theta} = 2\sqrt{2}$ and θ is acute, then what is the value (in degrees) of θ ?
यदि $\frac{\cos\theta}{1+\sin\theta} + \frac{\cos\theta}{1-\sin\theta} = 2\sqrt{2}$ तथा θ न्यूनकोण है, तो θ का मान (डिग्री में) क्या है ?
(A) 30 (B) 45 (C) 60 (D) 90

21. If $\sin\theta + \cos\theta = \sqrt{3}\cos(90 - \theta)$, then what is the value of $\tan\theta$?
यदि $\sin\theta + \cos\theta = \sqrt{3}\cos(90 - \theta)$ है, तो $\tan\theta$ का मान क्या है ?
(A) $\sqrt{3} - 1$ (B) $\sqrt{3} + 1$
(C) $\frac{\left(\sqrt{3}+1\right)}{2}$ (D) $\frac{\left(\sqrt{3}-1\right)}{2}$

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22. If $\tan A = \frac{1}{3}$ and $\tan B = \frac{2}{5}$, then what is the value of tan (2A+B)?

यदि $\tan A = \frac{1}{3}$ तथा $\tan B = \frac{2}{5}$ है, तो tan(2A+B) का मान क्या है ?

(A) $\frac{8}{15}$ (B) $\frac{6}{13}$ (C) $\frac{37}{115}$ (D) $\frac{23}{14}$

23. What is the simplified value of $[(1+\sec 2\theta)\tan^2\theta] + 1$?

$[(1+\sec 2\theta)\tan^2\theta] + 1$ का सरलीकृत मान क्या है ?

(A) $\cos 2\theta$ (B) 1

(C) $\sec^2\theta$ (D) $\operatorname{cosec}\theta$

24. What is the simplified value of $[(1 - \cos^2\theta)\operatorname{cosec}^4\theta] - \cot^2\theta$?

$[(1 - \cos^2\theta)\operatorname{cosec}^4\theta] - \cot^2\theta$ का सरलीकृत मान क्या है ?

(A) -1 (B) 0

(C) 1 (D) 3

25. If $\cos(\theta + 31°) = \sin 47°$, then what is the value of $\sin 5\theta$?

यदि $\cos(\theta + 31°) = \sin 47°$ है, तो $\sin 5\theta$ का मान क्या है ?

(A) $\frac{1}{2}$ (B) $\frac{1}{\sqrt{2}}$

(C) $\frac{\sqrt{3}}{2}$ (D) 0

26. If $2\cos^2\theta - 1 = 0$ and θ is acute, then what is the value of $(\cot^2\theta - \tan^2\theta)$?

यदि $2\cos^2\theta - 1 = 0$ तथा θ न्यूनकोण है, तो $(\cot^2\theta - \tan^2\theta)$ का मान क्या होगा ?

(A) 0 (B) 2

(C) 10/3 (D) 1

27. If $\frac{1}{\cos\theta + \sec\theta} = \frac{1}{2}$, then what is the value of $\cos^{100}\theta + \sec^{100}\theta$?

यदि $\frac{1}{\cos\theta + \sec\theta} = \frac{1}{2}$ है, तो $\cos^{100}\theta + \sec^{100}\theta$ का मान क्या है ?

(A) 0 (B) 1 (C) 2 (D) 4

28. What is the simplified value of $1 + \cot A \operatorname{Cot}\left(\frac{A}{2}\right)$?

$1 + \cot A \operatorname{Cot}\left(\frac{A}{2}\right)$ का सरलीकृत मान क्या है ?

(A) $\cos\left(\frac{A}{2}\right)$ (B) $\sin^2\left(\frac{A}{2}\right)$

(C) $\frac{1}{2}\operatorname{cosec}^2\left(\frac{A}{2}\right)$ (D) $\cos A$

29. If $\tan\left(\frac{\theta}{2}\right)\tan\left(\frac{2\theta}{5}\right) = 1$, then what is the value (in degrees) of θ ?

यदि $\tan\left(\frac{\theta}{2}\right)\tan\left(\frac{2\theta}{5}\right) = 1$ है, तो θ का मान डिग्री में क्या है ?

(A) 45° (B) 90°

(C) 100° (D) 120°

30. What is the simplified value of $\frac{3}{\operatorname{cosec}^2\theta} + \frac{5}{1+\tan^2\theta} - 2\cos^2\theta$?

$\frac{3}{\operatorname{cosec}^2\theta} + \frac{5}{1+\tan^2\theta} - 2\cos^2\theta$ का सरलीकृत मान क्या है ?

(A) 3 (B) 4 (C) 5 (D) 7

31. What is the simplified value of $\frac{\sqrt{\sec^2\theta + \operatorname{cosec}^2\theta}}{2}$?

का सरलीकृत मान क्या है ?

(A) $\operatorname{cosec} 2\theta$ (B) $\sec^2\theta$

(C) $\operatorname{cosec}\theta \sec\theta$ (D) $\tan\theta$

32. If $\frac{x - x\tan^2 15°}{1+\tan^2 15°} = \sin 60° + \cos 30°$, then what is the value of x?

यदि $\frac{x - x\tan^2 15°}{1+\tan^2 15°} = \sin 60° + \cos 30°$ है, तो x का मान क्या है ?

(A) 2 (B) -1 (C) -2 (D) 1

33. What is the simplified value of $\frac{2\sin^3\theta - \sin\theta}{\cos\theta - 2\cos^3\theta}$?

$\frac{2\sin^3\theta - \sin\theta}{\cos\theta - 2\cos^3\theta}$ का सरलीकृत मान क्या है ?

(A) $\tan\theta$ (B) $\sin\theta$

(C) $\cos\theta$ (D) $\cot\theta$

34. If $\tan\theta \tan 5\theta = 1$, then what is the value of $\sin 2\theta$?
यदि $\tan\theta \tan 5\theta = 1$, है, तो $\sin 2\theta$ का मान क्या है ?

(A) 0 (B) $\frac{1}{2}$ (C) $1\sqrt{2}$ (D) $\frac{\sqrt{3}}{2}$

35. The angles of elevation of the top of a building from the top and bottom of a tree are 30° and 60° respectively. If the height of the tree is 50 m, then what is the height of the building?
एक पेड़ के शीर्ष तथा आधार से किसी इमारत के शीर्ष का उन्नयन कोण क्रमश: 30° तथा 60° है। यदि पेड़ की ऊँचाई 50 मीटर है, तो इमारत की ऊँचाई कितनी है ?

(A) $50\sqrt{3}$ (B) 75

(C) $50+\left(\sqrt{3}+1\right)$ (D) $75\sqrt{3}$

36. If $\tan\theta = \frac{2}{3}$ then what is the value of $\frac{15\sin^2\theta - 3\cos^2\theta}{5\sin^2\theta + 3\cos^2\theta}$?

यदि $\tan\theta = \frac{2}{3}$ है, तो $\frac{15\sin^2\theta - 3\cos^2\theta}{5\sin^2\theta + 3\cos^2\theta}$ का मान क्या है ?

(A) $\frac{33}{32}$ (B) $\frac{11}{29}$

(C) $\frac{33}{47}$ (D) $\frac{11}{32}$

37. If $\sqrt{5}\tan\theta = 5\sin\theta$ then what is the value of $(\sin^2\theta - \cos^2\theta)$?
यदि $\sqrt{5}\tan\theta = 5\sin\theta$ है, तो $(\sin^2\theta - \cos^2\theta)$ का मान क्या है ?

(A) $\frac{3}{5}$ (B) $\frac{1}{5}$

(C) $\frac{4}{5}$ (D) $\frac{2}{5}$

38. What is the simplified value of $\frac{7}{\sec^2\theta} + \frac{3}{1+\cot^2\theta} + 4\sin^2\theta$?

$\frac{7}{\sec^2\theta} + \frac{3}{1+\cot^2\theta} + 4\sin^2\theta$ का सरलीकृत मान क्या है ?

(A) 3 (B) 4
(C) 5 (D) 7

39. Two posts are 4 m apart. Both posts are on same side of a tree. If the angles of depressions of these posts when observed from the top of the tree are 45° and 60° respectively, then what is the height of the tree?
दो खंभे 4 मीटर की दूरी पर हैं। दोनों खंभे पेड़ की एक ओर हैं। यदि पेड़ की ऊँचाई से देखा जाए तो इन खंभों का अवगमन कोण क्रमश: 45° तथा 60° है, तो पेड़ की ऊँचाई कितनी है ?

(A) $\sqrt{3}+1$ (B) $\sqrt{3}(\sqrt{3}+1)$

(C) $2\sqrt{3}(\sqrt{3}+1)$ (D) $4\sqrt{3}(\sqrt{3}+1)$

40. If $\operatorname{cosec}\theta + 3\sec\theta = 5\operatorname{cosec}\theta$ then what is the value of $\cot\theta$?
यदि $\operatorname{cosec}\theta + 3\sec\theta = 5\operatorname{cosec}\theta$ है, तो $\cot\theta$ का मान क्या है ?

(A) $\frac{4}{3}$ (B) $\frac{3}{4}$

(C) $\frac{1}{\sqrt{3}}$ (D) $\sqrt{3}$

41. If $\operatorname{cosec}^2\theta = \frac{25}{16}$ and θ is acute, then what is the value of $\left(\sqrt{\cot\theta + \tan\theta}\right)$?

यदि $\operatorname{cosec}^2\theta = \frac{25}{16}$ तथा θ न्यूनकोण है, तो $\left(\sqrt{\cot\theta + \tan\theta}\right)$ का मान क्या है ?

(A) $\frac{\sqrt{3}}{2}$ (B) $\frac{5}{2\sqrt{3}}$

(C) $\frac{12}{\sqrt{3}}$ (D) $\frac{2\sqrt{3}}{3}$

42. If $(\operatorname{cosec}^2\theta - 1) = \frac{144}{25}$ and θ is acute, then what is the values of $\left(\sqrt{\cot\theta + \tan\theta}\right)$?

यदि $(\operatorname{cosec}^2\theta - 1) = \frac{144}{25}$ तथा θ न्यूनकोण है, तो $\left(\sqrt{\cot\theta + \tan\theta}\right)$ का मान क्या है ?

(A) $\frac{13}{5}$ (B) $\frac{60}{13}$

(C) $\frac{2\sqrt{15}}{13}$ (D) $\frac{13}{2\sqrt{15}}$

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43. If $\tan\theta = \sqrt{\frac{1}{13}}$ and θ is acute, then what is the value of $\frac{\text{cosec}^2\theta - \sec^2\theta}{\text{cosec}^2\theta + \sec^2\theta}$?

यदि $\tan\theta = \sqrt{\frac{1}{13}}$ तथा θ न्यूनकोण है, तो $\frac{\text{cosec}^2\theta - \sec^2\theta}{\text{cosec}^2\theta + \sec^2\theta}$ का मान क्या है ?

(A) $\frac{2}{3}$ (B) $\frac{3}{4}$ (C) $\frac{5}{6}$ (D) $\frac{6}{7}$

44. If $\frac{\sin^2\theta}{1+\cos^2\theta} + \frac{\sin^2\theta}{1-\cos^2\theta} = \frac{8}{5}$ and θ is acute, then what is the value (in degrees) of θ?

यदि $\frac{\sin^2\theta}{1+\cos^2\theta} + \frac{\sin^2\theta}{1-\cos^2\theta} = \frac{8}{5}$ तथा θ न्यूनकोण है, तो θ का मान (डिग्री में) क्या है ?

(A)0 (B)30
(C)45 (D)60

45. If $\sec^2\theta - \sec\theta = 1$, then what is the value of $(\tan^{12}\theta - 3\tan^{10}\theta + 3\tan^8\theta - \tan^6\theta)$?

यदि $\sec^2\theta - \sec\theta = 1$ है, तो $(\tan^{12}\theta - 3\tan^{10}\theta + 3\tan^8\theta - \tan^6\theta)$ का मान क्या है ?

(A)-1 (B)0
(C)1 (D)2

46. If $\theta + \varphi = \frac{\pi}{2}$ and $\tan\theta = \sqrt{3}$, then what is the value of $\cos(\theta - \varphi)$?

यदि $\theta + \varphi = \frac{\pi}{2}$ तथा $\tan\theta = \sqrt{3}$ है, तो $\cos(\theta - \varphi)$ का मान क्या है?

(A) 1/2 (B) $\sqrt{3}/2$
(C) 1 (D) $1/\sqrt{2}$

47. If x and y are positive acute angles such that $\sin(2x + 3y) = \frac{\sqrt{3}}{2}$ and $\cos(4x - 3y) = \frac{\sqrt{3}}{2}$, then what is the value of $\tan(6x - 3y)$?

यदि x तथा y धनात्मक न्यूनकोण है, $\sin(2x + 3y) = \frac{\sqrt{3}}{2}$ तथा $\cos(4x - 3y) = \frac{\sqrt{3}}{2}$ है, तो $\tan(6x - 3y)$ का मान क्या है?

(A) 0 (B) 1
(C) $1/\sqrt{3}$ (D) $\sqrt{3}$

48. If $3\cot\theta = 4\cos\theta$, then what is the value of $\cos 2\theta$?

यदि $3\cot\theta = 4\cos\theta$ है, तो $\cos 2\theta$ का मान क्या होगा?

(A) 2/16 (B) - 1/8
(C) 7/16 (D) 9/16

49. A person observes that the angle of elevation of the top of a pole of height 15 m is 30°. What is the distance (in metres) of the person from the pole?

एक व्यक्ति पाता है कि 15 मीटर ऊँचाई वाले एक खंभे के शीर्ष का उन्नयन कोण 30° है। इस खम्भे से व्यक्ति की दूरी (मीटर में) कितनी है?

(A) 15 (B) $15\sqrt{3}$
(C) $15/\sqrt{3}$ (D) 30

50. If $\text{cosec}^2\theta + \cot^2\theta = 7$, then what is the value (in degrees) of ?

यदि $\text{cosec}^2\theta + \cot^2\theta = 7$ है, तो का मान (डिग्री में) क्या होगा?

(A) 15 (B) 30
(C) 45 (D) 60

51. What is the value of $\frac{\sec\theta}{\tan\theta + \cot\theta}$?

$\frac{\sec\theta}{\tan\theta + \cot\theta}$ का मान क्या है?

(A) $\cos\theta$ (B) $\tan\theta$
(C) $\sin\theta$ (D) $\cot\theta$

52. What is the value of $\sin 8\theta + \sin 6\theta$?

$\sin 8\theta + \sin 6\theta$ का मान क्या है?

(A) $2\sin 7\theta \cos 7\theta$ (B) $2\sin 7\theta \cos\theta$
(C) $2\sin\theta \cos 7\theta$ (D) $2\sin 4\theta \cos 3\theta$

53. What is the value of $\frac{\cot x}{1-\tan x} + \frac{\tan x}{1-\cot x}$?

$\frac{\cot x}{1-\tan x} + \frac{\tan x}{1-\cot x}$ का मान क्या है?

(A) $\sin x \cos x + 1$ (B) $\sec x \text{cosec} x + 1$
(C) $\tan x \cot x + 1$ (D) $\sec^2 x \text{cosec}^2 x + 1$

54. Find the value of $\frac{\sqrt{\text{cosec}^2 A - 1}}{\cot A + \tan A}$?

$\frac{\sqrt{\text{cosec}^2 A - 1}}{\cot A + \tan A}$ का मान क्या है?

(A) $\sin^2 A$ (B) $\cos A \sin A$
(C) $\cos^2 A$ (D) $\sec A \text{cosec} A$

55. If 5sinx=4, then the numerical value of $\left(\frac{\tan x-\cot x}{\sec x-\tan x}\right)\left(\frac{\cos^4 x-\sin^4 x}{2\cos^2 x-1}\right)$?

यदि 5sinx=4 है, तो $\left(\frac{\tan x-\cot x}{\sec x-\tan x}\right)\left(\frac{\cos^4 x-\sin^4 x}{2\cos^2 x-1}\right)$ का संख्यात्मक मान क्या है?

(A) $\frac{3}{5}$ (B) $\frac{5}{4}$ (C) $\frac{7}{4}$ (D) $\frac{9}{5}$

56. What is the value of $\frac{\left(\tan^2 x-\sin^2 x\right)}{\sec^2 x}$?

$\frac{\left(\tan^2 x-\sin^2 x\right)}{\sec^2 x}$ का मान क्या है ?

(A) $\sin^4 x$ (B) $\cos^2 x$
(C) $\sin^2 x$ (D) $\cos^4 x$

57. If sinx= $\frac{1}{3}$ and cos y= $\frac{1}{3}$, then what is the values of sin (x+y)?

यदि sinx= $\frac{1}{3}$ तथा cos y= $\frac{1}{3}$ है, तो sin (x+y) का मान क्या है ?

(A) 2/3 (B) 4/9
(C) 5/9 (D) 1

58. What is the value of $\frac{\cos x+\cos y}{\sin x+\sin y}$?

$\frac{\cos x+\cos y}{\sin x+\sin y}$ का मान क्या है ?

(A) $\tan\left(\frac{x+y}{2}\right)$ (B) $\tan\left(\frac{x-y}{2}\right)$

(C) $\cot\left(\frac{x-y}{2}\right)$ (D) $\cot\left(\frac{x+y}{2}\right)$

59. What is the value of sec12° sin12° tan38° tan78° tan52°?

sec12° sin12° tan38° tan78° tan52° का मान क्या है ?

(A) 1 (B) 3
(C) 1/2 (D) 3/2

60. Find the value of

$\left(\frac{(\cot\theta-\operatorname{cosec}\theta+1)(\tan\theta+\sec\theta+1)}{\cos\theta\operatorname{cosec}\theta}\right)$?

$\left(\frac{(\cot\theta-\operatorname{cosec}\theta+1)(\tan\theta+\sec\theta+1)}{\cos\theta\operatorname{cosec}\theta}\right)$ का मान क्या है?

(A) 2 cos θ (B) 2
(C) 2 cot θ (D) 2 tan θ

61. What is the value of $\frac{\sin 30^\circ+\cos 30^\circ}{\cos 30^\circ-\sin 30^\circ}$?

$\frac{\sin 30^\circ+\cos 30^\circ}{\cos 30^\circ-\sin 30^\circ}$ का मान क्या है ?

(A) $2-\sqrt{3}$ (B) $2+\sqrt{3}$
(C) 1 (D) $-(2-\sqrt{3})$

62. What is the value of $\frac{\sin\theta}{1-\cot\theta}-\frac{\cos\theta}{1-\tan\theta}$?

$\frac{\sin\theta}{1-\cot\theta}-\frac{\cos\theta}{1-\tan\theta}$ का मान क्या है ?

(A) $\sin\theta+\cos\theta$ (B) $\sin\theta-\cos\theta$

(C) $\frac{1}{\sin\theta+\cos\theta}$ (D) $\frac{1}{\sin\theta-\cos\theta}$

63. If sin A = x – cos A and sec A = y – cosec A, then the value of $y(x^2-1)$ is equal to:

यदि sinA = x – cosA and sec A = y – cosec A है, तो $y(x^2-1)$ का मान बराबर है;

(A) 3x (B) 2x
(C) 2xy (D) 0

64. What is the value of $\sqrt{\sec^2 A+\operatorname{cosec}^2 A}$?

$\sqrt{\sec^2 A+\operatorname{cosec}^2 A}$ का मान क्या है ?

(A) sec A + cosec A (B) cos A + sin A
(C) tan A + cot A (D) sec A + cot A

65. If $\frac{\cot^2 x}{(1+\sqrt{3})}+\frac{1}{2}(3-\sqrt{3})$ = cotx, then what is the value of x?

यदि $\frac{\cot^2 x}{(1+\sqrt{3})}+\frac{1}{2}(3-\sqrt{3})$ = cotx है, तो x का मान क्या है ?

(A) $\frac{\pi}{2},\frac{\pi}{4}$ (B) $\frac{\pi}{6},\frac{\pi}{2}$

(C) $\frac{\pi}{6},\frac{\pi}{4}$ (D) $\pi,\frac{\pi}{4}$

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66. What is the value of sin (30 + x) – cos (60 – x)?
sin (30 + x) – cos (60 – x) का मान क्या है ?
(A) 1 (B) 2
(C) 0 (D) 1/2

67. What is the least value of $15\cos^2\theta + 17\sin^2\theta$?
$15\cos^2\theta + 17\sin^2\theta$ का न्यूनतम मान क्या है ?
(A) 14 (B) 15
(C) 2 (D) 18

68. If $\cos 37° = \frac{a}{b}$, then what is the value of cosec37° – cos53°?
यदि $\cos 37° = \frac{a}{b}$ हो, तो cosec37° – cos53° का मान क्या है ?
(A) $\frac{b^2 - a^2}{ab}$ (B) $\frac{a^2}{b\sqrt{a^2 + b^2}}$
(C) $\frac{b\sqrt{a^2 + b^2}}{a}$ (D) $\frac{a^2}{b\sqrt{b^2 - a^2}}$

69. If $\tan\theta = \frac{5}{9}$, then what is the value of $\frac{5\sin\theta + 9\cos\theta}{5\sin\theta - 9\cos\theta}$?
यदि $\tan\theta = \frac{5}{9}$ हो, तो $\frac{5\sin\theta + 9\cos\theta}{5\sin\theta - 9\cos\theta}$ का मान क्या है ?
(A) $\frac{17}{12}$ (B) $\frac{-53}{28}$
(C) $\frac{-27}{25}$ (D) $\frac{31}{23}$

70. What is the value of tany if $\frac{\sin y + \cos y}{\sin y - \cos y} = 3$?
यदि $\frac{\sin y + \cos y}{\sin y - \cos y} = 3$ हो, तो tany का मान क्या है ?
(A) 1 (B) $\frac{1}{\sqrt{3}}$
(C) $\frac{1}{2}$ (D) 2

Solution

1. **(C)** $\left(\frac{\cot\theta+\tan\theta}{\sec\theta}\right)$

$\left(\frac{\frac{\cos\theta}{\sin\theta}+\frac{\sin\theta}{\cos\theta}}{\sec\theta}\right)$

$\left(\frac{\cos^2\theta+\sin^2\theta}{\sin\theta\cos\theta\sec\theta}\right)$

$\frac{1}{\sin\theta\cos\theta\frac{1}{\cos\theta}}$

$\frac{1}{\sin\theta}$

$\text{cosec}\theta$

2. **(C)** $\text{Sin}\,(4x-4)=1$

$\text{Cos}\,(2x+4)=\frac{1}{2}$

$\sin(4x-y)=\sin 90$

$4x-y=90$

$\text{Cos}\,(2x+y)=\cos 60$

$2x+y=60$

$4x-y=90$

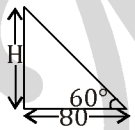
$6x=150$

$x=25$

$y=10$

$\cot(x+2y)=\cot 45°=1$

3. **(C)**

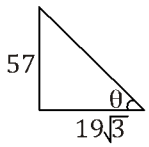


$\frac{H}{80}=\tan 60°$

$\frac{H}{80}=\sqrt{3}$

$H=80\sqrt{3}$

4. **(C)**



$\tan\theta=\frac{57}{19\sqrt{3}}$

$\tan\theta=\sqrt{3}$

$\theta=60°$

5. **(A)** $\cos\theta+\sin\theta=m$

$\sec\theta+\text{cose}\,\theta=n$

$\frac{n}{2}(m^2-1)$

$\frac{\sec\theta+\text{cosec}\theta}{2}((\cos\theta+\sin\theta)^2-1)$

$\frac{\frac{1}{\cos\theta}+\frac{1}{\sin\theta}}{2}(\cos^2\theta+\sin^2\theta+2\sin\theta\cos\theta-1)$

$\frac{\sin\theta+\cos\theta}{2\sin\theta\cos\theta}(1+2\sin\theta\cos\theta-1)$

$\frac{\sin\theta+\cos\theta}{2\sin\theta\cos\theta}\times 2\sin\theta\cos\theta$

$\sin\theta+\cos\theta=m$

6. **(D)** $\sec\theta+\text{cosec}\theta=\sqrt{2}\sec\theta\,(90-\theta)$

$\cot\theta=?$

$\sec\theta+\text{cosec}\theta=\sqrt{2}\,\text{cosec}\theta$

$\sec\theta=\text{cosec}\theta\left(\sqrt{2}-1\right)$

$\frac{\sec\theta}{\text{cosec}\theta}=\sqrt{2}-1$

$\cot\theta=\frac{1}{\sqrt{2}-1}\times\frac{\sqrt{2}+1}{\sqrt{2}+1}$

$\cot\theta=\;=\sqrt{2}+1$

7. **(C)** $\left(\frac{1}{\text{cosec}\theta+\cot\theta}\right)^2=?$

$\sin\theta=\frac{1}{\text{cosec}\theta}$, $\cot\theta=\frac{\cos\theta}{\sin\theta}$

$\left(\frac{1}{\frac{1}{\sin\theta}+\frac{\cos\theta}{\sin\theta}}\right)^2$

$\left(\frac{\sin\theta}{1+\cos\theta}\right)^2$

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$$\frac{\sin^2\theta}{(1+\cos\theta)^2}$$

$$\frac{1-\cos^2\theta}{(1+\cos\theta)^2}$$

$$\frac{(1+\cos\theta)(1-\cos\theta)}{(1+\cos\theta)^2}$$

$$= \frac{1-\cos\theta}{1+\cos\theta}$$

8. (B) $\sin(\theta + 23°) = \cos58°$
$\cos5\theta = ?$
$\sin(\theta + 23°) = \cos(90° - 58°)$
$\sin(\theta + 23°) = \sin 32°$
$\theta = 9°$

$$\cos 45° = \frac{1}{\sqrt{2}}$$

9. (D) $x\sin\theta = \frac{5\sqrt{3}}{2}$, $x\cos\theta = \frac{5}{2}$

$x = ?$

$x^2\sin^2\theta = \frac{75}{4}$ and $x^2\cos^2\theta = \frac{25}{4}$

$$x^2(\sin^2\theta + \cos^2\theta) = \frac{75}{4} + \frac{25}{4}$$

$x^2 = 25$
$x = 5$

10. (D) $\theta + \phi = \frac{2}{3}\pi$ and $\cos\theta = \frac{\sqrt{3}}{2}$

$\sin\phi = ?$

$$\cos\theta = \frac{\sqrt{3}}{2} \Rightarrow \theta = 30°$$

$$\theta + \phi = \frac{2}{3} \times 180$$

$30° + \phi = 120$
$\phi = 90°$
$\sin90 = 1$

11. (C) $4\sin^2\theta - 3 = 0$

$$\sin\theta = \frac{\sqrt{3}}{2}$$

$$\cot^2\theta + \tan^2\theta = \left(\frac{1}{\sqrt{3}}\right)^2 + \left(\sqrt{3}\right)^2 = \frac{10}{3}$$

12. (C) $\frac{\cos\theta}{1+\sin\theta} + \frac{\cos\theta}{1-\sin\theta} = 4$

$$\frac{\cos\theta - \cos\theta\sin\theta + \cos\theta + \cos\theta\sin\theta}{\cos^2\theta} = 4$$

$$\cos\theta = \frac{1}{2}$$

$\theta = 60°$

13. (D) $\frac{1}{\sin\theta + \operatorname{cosec}\theta} = \frac{1}{2}$

$$\sin\theta + \frac{1}{\sin\theta} = 2$$

$$\sin^{100}\theta + \operatorname{cosec}^{100}\theta = \sin^{100}\theta + \frac{1}{\sin^{100}\theta} = 2$$

14. (C) $\frac{\tan^2 25}{\operatorname{cosec}^2 65°} + \frac{\cot^2 25}{\sec^2 65°} + 2\tan20°\tan45\tan70°$

$$\frac{\tan^2 25}{\sec^2 25°} + \frac{\tan^2 65}{\sec^2 65°} + 2$$

$$\frac{\frac{\sin^2 25}{\cos^2 25}}{\frac{1}{\cos^2 25}} + \frac{\frac{\sin^2 65}{\cos^2 65}}{\frac{1}{\cos^2 65}} + 2$$

$\sin^2 25 + \cos^2 25 + 2 = 3$

15. (D) $\operatorname{cosec}\theta + \operatorname{cosec}^2\theta = 1$
$\operatorname{cosec}\theta + 1 + \cot^2\theta = 1$
$\cot^2\theta = -\operatorname{cosec}\theta$
$(\cot^{12}\theta - 3\cot^{10}\theta + 3\cot^8\theta - \cot^6\theta)$
$(\operatorname{cosec}^2\theta + \operatorname{cosec}\theta)^3 = (1)^3 = 1$

16. (A) $\sec\theta = \frac{13}{12}$

$$\cos\theta = \frac{12}{13} = \frac{A}{K}$$

$L = \sqrt{(13)^2 - (12)^2}$
$L = 5$, $A = 12$, $K = 13$

$$\sqrt{\cot\theta + \tan\theta} = \sqrt{\frac{A}{L} + \frac{L}{A}}$$

$$= \sqrt{\frac{12}{5} + \frac{5}{12}} = \sqrt{\frac{144+25}{60}} = \frac{13}{2\sqrt{15}}$$

17. (C) $(1 + \tan^2\theta) = \frac{625}{49}$

$\tan^2\theta = \frac{576}{49}$

$\tan\theta = \frac{24}{7} = \frac{L}{A}$

L = 24, A = 7, K = $\sqrt{(24)^2 + (7)^2}$

k = 25

$\sqrt{\sin\theta + \cos\theta}$

$\sqrt{\frac{24}{25} + \frac{7}{25}} = \frac{\sqrt{31}}{5}$

18. (B) $\sin\theta + \sin^2\theta = 1$

$\sin\theta = 1 - \sin^2\theta$

$\sin\theta = \cos^2\theta$ .....(1)

$(\cos^{12}\theta + 3\cos^{10}\theta + 3\cos^8\theta + \cos^6\theta - 1) = ?$

Put value $\cos^2\theta = \sin\theta$

$\sin^6\theta + 3\sin^5\theta + 3\sin^4\theta + \sin^3\theta - 1$

$(\sin^2\theta + \sin\theta)^3 - 1$

Eqn. (1)

$(\sin^2\theta + \cos^2\theta)^3 - 1$

1 – 1 = 0

19. (B) $\cot\theta = \sqrt{11}$

$$\frac{(\operatorname{cosec}^2\theta + \sec^2\theta)}{(\operatorname{cosec}^2\theta - \sec^2\theta)} = ?$$

$$\begin{bmatrix} 1 + \tan^2\theta = \sec^2\theta \\ 1 + \cot^2\theta = \operatorname{cosec}^2\theta \end{bmatrix}$$

$\cot^2\theta = 11$ or $\tan^2\theta = \frac{1}{11}$

$$= \frac{1 + \cot^2\theta + 1 + \tan^2\theta}{1 + \cot^2\theta - 1 - \tan^2\theta}$$

$$= \frac{2 + \cot^2\theta + \tan^2\theta}{\cot^2\theta - \tan^2\theta}$$

Put the value

$$= \frac{2 + 11 + \frac{1}{11}}{11 - \frac{1}{11}}$$

$$= \frac{144}{120} = \frac{6}{5}$$

20. (B) $$\frac{\cos\theta}{1 + \sin\theta} + \frac{\cos\theta}{1 - \sin\theta} = 2\sqrt{2}$$

$$\frac{\cos\theta - \cos\theta\sin\theta + \cos\theta + \cos\theta\sin\theta}{(1 + \sin\theta)(1 - \sin\theta)} = 2\sqrt{2}$$

$\cos\theta = \frac{1}{\sqrt{2}}$

$\theta = 45°$

21. (C) $\sin\theta + \cos\theta = \sqrt{3}\cos(90 - \theta)$

$\sin\theta + \cos\theta = \sqrt{3}\sin\theta$

$\cos\theta = \sin\theta\left(\sqrt{3} - 1\right)$

$$\tan\theta = \frac{1}{\sqrt{3} - 1} \times \frac{\sqrt{3} + 1}{\sqrt{3} + 1}$$

$$\tan\theta = \frac{\sqrt{3} + 1}{2}$$

22. (D) $\tan A = \frac{1}{3}$ and $\tan B = \frac{2}{5}$

$$\tan 2A = \frac{2\tan A}{1 - \tan^2 A} = \frac{2 \times \frac{1}{3}}{1 - \frac{1}{9}}$$

$$\tan 2A = \frac{3}{4}$$

$$\tan(2A + B) = \frac{\tan 2A + \tan B}{1 - \tan 2A.\tan B}$$

$$= \frac{\frac{3}{4} + \frac{2}{5}}{1 - \frac{3}{4} \times \frac{2}{5}}$$

$$= \frac{23}{20} \times \frac{10}{7} = \frac{23}{14}$$

23. (C) $[(1 + \sec 2\theta)\tan^2\theta]$

$$\left[\left(1 + \frac{1}{\cos 2\theta}\right)\tan^2\theta\right] + 1$$

$$\left(\frac{\cos 2\theta + 1}{\cos 2\theta}\right)\tan^2\theta + 1$$

$$\left[\left(\frac{2\cos^2\theta}{\cos^2\theta - \sin^2\theta}\right)\tan^2\theta\right] + 1$$

$$= \frac{2\sin^2\theta}{\cos^2\theta - \sin^2\theta} + 1$$

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$$\frac{\sin^2\theta+\cos^2\theta}{\cos^2\theta-\sin^2\theta}$$

$$=\frac{1}{\cos^2\theta}$$

$=\sec^2\theta$

24. (C) $[(1-\cos^2\theta)\operatorname{cosec}^4\theta]-\cot^2\theta$

$[(1-1+\sin^2\theta)\operatorname{cosec}^4\theta]-\cot^2\theta$

$$\frac{\sin^2\theta}{\sin^4\theta}-\frac{\cos^2\theta}{\sin^2\theta}$$

$$=\frac{1-\cos^2\theta}{\sin^2\theta}$$

$$=\frac{\sin^2\theta}{\sin^2\theta}$$

$=1$

25. (C) $\cos(\theta+31^\circ)=\sin47^\circ$

$\cos(\theta+31^\circ)=\sin(90^\circ-47^\circ)$

$\cos(\theta+31^\circ)=\cos43^\circ$

$\theta=12^\circ$

Find out $\sin5\theta=?$

$$\sin60^\circ=\frac{\sqrt{3}}{2}$$

26. (A) $2\cos^2\theta=1$

$\theta=45^\circ$

$\cot^2\theta-\tan^2\theta=(1-1)=0$

27. (C) $$\frac{1}{\cos\theta+\sec\theta}=\frac{1}{2}$$

$\cos\theta+\sec\theta=2$

$$\cos\theta+\frac{1}{\cos\theta}=2$$

$\cos^2\theta-2\cos\theta+1=0$

$\cos^2\theta-\cos\theta-\cos\theta+1=0$

$\cos\theta(\cos\theta-1)-(\cos\theta-1)=0$

$\cos\theta=1$

$\theta=0^\circ$

$\cos\theta^{100}+\sec\theta^{100}$

Put $\theta=0^\circ$

$=1+1=2$

28. (C) $1+\cot A\cot\left(\frac{A}{2}\right)$

$$1+\frac{\cot^2\left(\frac{A}{2}\right)-1}{2\cot\left(\frac{A}{2}\right)}\times\cot\left(\frac{A}{2}\right)$$

$$\because\left[\cot2\theta=\frac{2\cot^2\theta-1}{2\cot\theta}\right]$$

$$\frac{1+\cot^2\left(\frac{A}{2}\right)}{2}=\frac{\operatorname{cosec}^2\left(\frac{A}{2}\right)}{2}$$

29. (C) $\tan\left(\frac{\theta}{2}\right)\tan\left(\frac{2\theta}{5}\right)=1$

$$\tan\left(\frac{\theta}{2}\right)=\cot\left(\frac{2\theta}{5}\right)$$

$$\left(\frac{\theta}{2}\right)+\left(\frac{2\theta}{5}\right)=90^\circ$$

$$\frac{5\theta+4\theta}{10}=90^\circ \qquad \left[\begin{array}{l}If\ \tan x=\cot y\\ then\ \ x+y=90^\circ\end{array}\right]$$

$\theta=100^\circ$

30. (A) $$\frac{3}{\operatorname{cosec}^2\theta}+\frac{5}{1+\tan^2\theta}-2\cos^2\theta$$

$$3\sin^2\theta+\frac{5}{\sec^2\theta}-2\cos^2\theta$$

$3\sin^2\theta+5\cos^2\theta-2\cos^2\theta$

$=3$

31. (A) **32. (A)** **33. (A)** **34. (B)** **35. (B)**

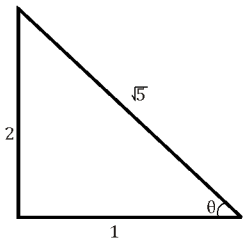
36. (C) $\tan\theta=\frac{2}{3}$

$$=\frac{15\sin^2\theta-3\cos^2\theta}{5\sin^2\theta+3\cos^2\theta} \qquad (\text{Take common } \cos^2\theta)$$

$$\frac{15\tan^2\theta-3}{5\tan^2\theta+3}$$

$$=\frac{15\left(\frac{2}{3}\right)^2-3}{5\left(\frac{2}{3}\right)^2+3}=\frac{15\times\frac{4}{9}-3}{5\times\frac{4}{9}+3}=\frac{33}{47}$$

37. (A)



$\sqrt{5}\tan\theta=5\sin\theta$

$$\cos\theta=\frac{1}{\sqrt{5}}$$

$\sin\theta = \frac{2}{\sqrt{5}}$

$\sin^2\theta - \cos^2\theta$

$\left(\frac{2}{\sqrt{5}}\right)^2 - \left(\frac{1}{\sqrt{5}}\right)^2$

$\frac{4}{5} - \frac{1}{5} = \frac{3}{5}$

38. (D) $\frac{7}{\sec^2\theta} + \frac{3}{1+\cot^2\theta} + 4\sin^2\theta$

$7\cos^2\theta + \frac{3}{\text{cosec}^2\theta} + 4\sin^2\theta$

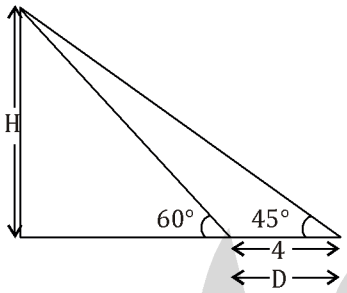
$1 + \cot^2\theta = \text{cosec}^2\theta$

$7\cos^2\theta + 3\sin^2\theta + 4\sin^2$

$7(\cos^2\theta + \sin^2\theta)$

$= 7$

39. (C)



$D = 4(\cot\theta_1 - \cot\theta_2)$

$4 = 4(\cot 45° - \cot 60°)$

$4 = 4\left(1 - \frac{1}{\sqrt{3}}\right)$

$4\sqrt{3} = 4(\sqrt{3} - 1)$

$H = \frac{4\sqrt{3}}{\sqrt{3}-1}\frac{\sqrt{3}+1}{\sqrt{3}+1} = \frac{4\sqrt{3}}{2}(\sqrt{3}+1)$

$= 2\sqrt{3}(\sqrt{3}+1)$

40. (A) $\text{cosec}\,\theta + 3\sec\theta = 5\,\text{cosec}\,\theta$

$1 + 3\frac{\sec\theta}{\text{cosec}\theta} = 5$

$1 + 3\tan\theta = 4$

$\tan\theta = \frac{4}{3}$

$\cot\theta = \frac{3}{4}$

41. (B) $\text{cosec}^2\theta = \frac{25}{16}$

$\text{cosec}^2\theta = \frac{5}{4} = \frac{K}{L}$

$A^2 = 5^2 - 4^2$

$A = 3, K = 5, L = 4$

$\sqrt{\cot\theta + \tan\theta} = \sqrt{\frac{A}{L} + \frac{L}{A}}$

$= \sqrt{\frac{3}{4} + \frac{4}{3}} = \sqrt{\frac{25}{12}}$

$= \frac{5}{2\sqrt{3}}$

42. (D) $\text{cosec}^2\theta - 1 = \frac{144}{25}$

then

$\text{cosec}\theta = \frac{13}{5} = \frac{K}{L}$

$K = 13, L = 5, A = 12$

$\sqrt{\cot\theta + \tan\theta} = \sqrt{\frac{12}{5} + \frac{5}{12}} = \sqrt{\frac{169}{60}}$

$= \frac{13}{2\sqrt{15}}$

43. (D) $\tan\theta = \sqrt{\frac{1}{13}}$

$\tan^2\theta = \frac{1}{13}$

and $\cot^2 = \frac{13}{1}$

$\frac{\text{cosec}^2\theta - \sec^2\theta}{\text{cosec}^2\theta + \sec^2\theta} = ?$

$[1 + \tan^2\theta = \sec^2\theta$
$1 + \cot^2\theta = \text{cosec}^2\theta]$

$\frac{1 + \cot^2\theta - 1 - \tan^2\theta}{1 + \cot^2\theta + 1 + \tan^2\theta}$

$\frac{\cot^2\theta - \tan^2\theta}{2 + \cot^2\theta + \tan^2\theta}$ Put the value

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$$\Rightarrow \frac{13-\frac{1}{13}}{2+13+\frac{1}{13}} = \frac{168}{196} = \frac{6}{7}$$

44. (D) $\frac{\sin^2\theta}{1+\cos^2\theta} + \frac{\sin^2\theta}{1-\cos^2\theta} = \frac{8}{5}$

$(\sin^2\theta = 1 - \cos^2\theta)$

$\frac{1-\cos^2\theta}{1+\cos^2\theta} = \frac{3}{5}$

$5 - 5\cos^2\theta = 3 + 3\cos^2\theta$

$\cos^2\theta = \frac{1}{4} \qquad \Rightarrow \cos\theta = \frac{1}{2}$

$\theta = 60°$

45. (C) $\sec^2\theta - \sec\theta = 1$

$[\sec^2\theta = 1 + \tan^2\theta]$

$1 + \tan^2\theta - \sec\theta = 1$

$\tan^2\theta = \sec\theta$

$\sec^6\theta - 3\sec^5\theta + 3\sec^4\theta - \sec^3\theta$

$(\sec^2\theta - \sec\theta)^3$

$(1)^3 = 1$

46. (B) $\theta + Q = \frac{\pi}{2}$

$\tan\theta = \sqrt{3}$

$\tan\theta = 60°$

$\theta = 60°$

$\theta + \Phi = 90°$

$\Phi = 30°$

$\cos(60° - 30°)$

$\cos 30° = \frac{\sqrt{3}}{2}$

47. (D) $\sin(2x+3y) = \frac{\sqrt{3}}{2} \qquad \left(\therefore \sin 60° = \frac{\sqrt{3}}{2}\right)$

$2x + 3y = 60°$

$\cos(4x - 3y) = \frac{\sqrt{3}}{2} \left(\therefore \cos 30° = \frac{\sqrt{3}}{2}\right)$

$4x - 3y = 30°$

$2x + 3y = 60°$

$4x - 3y = 30°$

$6x \quad = 90°$

$x = 15$

$y = 10$

$\tan(6x - 3y) = ?$

$\tan 60° = \sqrt{3}$

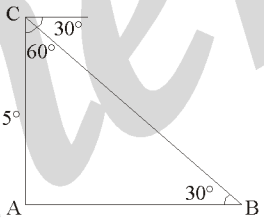
48. (B) $\frac{3\cos\theta}{\sin\theta} = 4\cos\theta$

$\sin\theta = \frac{3}{4}$

$\cos 2\theta = 1 - 2\sin^2\theta$

$\cos 2\theta = 1 - 2 \times \frac{9}{16} = -\frac{1}{8}$

49. (B)



Distance of AB $= \frac{AC}{AB}$

$= \frac{15}{AB} = \tan 30°$

AB $= 15\sqrt{3}$ meter

50. (B) $\text{cosec}^2\theta + \cot^2\theta = 7$

$\frac{1}{\sin^2\theta} + \frac{1}{\cos^2\theta} = 7$

$\frac{1+\cos^2\theta}{\sin^2\theta} = 7$

$= 1 + \cos^2\theta = 7\sin^2\theta \ \therefore (\cos^2\theta = 1 - \sin^2\theta)$

$= 1 + 1 - \sin^2\theta = 7\sin^2\theta$

$= 2 = 8\sin^2\theta$

$= \sin\theta = \frac{1}{2}$

$\theta = 30°$

51. (C) $\frac{\sec\theta}{\tan\theta + \cot\theta} \Rightarrow \frac{\frac{1}{\cos\theta}}{\frac{\text{san}\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}}$

$= \frac{\frac{1}{\cos\theta}}{\frac{\text{san}^2\theta + \cos^2}{\cos\theta\sin\theta}}$

$\frac{\sin\theta\cos\theta}{\cos\theta} = \sin\theta\ (\because \sin^2 + \cos^2 = 1)$

52. (B)

53. (B) $\frac{\cot x}{1-\tan x} + \frac{\tan x}{1-\cot x}$

$= \frac{\frac{\cos x}{\sin x}}{1-\frac{\sin x}{\cos}} + \frac{\frac{\sin x}{\cos x}}{1-\frac{\cos x}{\sin x}}$

$= \frac{\cos^2 x}{\sin x(\cos x - \sin x)} + \frac{\sin^2 x}{\cos x(\cos x - \sin x)}$

$= \frac{\cos^2 x}{\sin x(\cos x - \sin x)} - \frac{\sin^2 x}{\cos x(\cos x - \sin x)}$

$= \frac{\cos^3 x - \sin^3 x}{\sin x \cos x(\cos x - \sin x)}$

$\frac{(\cos x - \sin x)\sin 2x + \cos^2 x + \cos x \sin x}{\sin x \cos x(\cos x - \sin x)}$

$= \frac{1 + \cos x \sin x}{\sin x \cos x^2}$

$= \sec x \operatorname{cosec} x + 1$

54. (C) $\frac{\text{cosec}^2 A - 1}{\cot A + \tan A}$

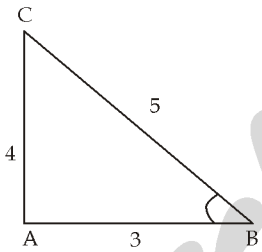
$= \frac{\cot A}{\cot A + \tan A}$

$= \frac{\frac{\cos A}{\sin A}}{\frac{\cos A}{\sin A} + \frac{\sin A}{\cos A}}$

$= \frac{\frac{\cos A}{\sin A}}{\frac{\cos^2 A + \sin^2 A}{\sin A \cos A}}$

$= \frac{\cos A}{\sin A} \times \frac{\sin A \cos A}{1} = \cos^2 A$

55. (C) $\sin x = \frac{4}{5}$ $\quad \therefore \cos^2 A + \sin^2 A = 1$



$\left(\frac{\tan x - \cot x}{\sec x - \tan x}\right)\left(\frac{\cos^4 x - \sin^4 x}{2\cos^2 x - 1}\right)$

$= \left(\frac{\frac{4}{3} - \frac{3}{4}}{\frac{5}{3} - \frac{4}{3}}\right) \cdot \frac{(\cos^2 x + \sin^2 x)(\cos^2 x - \sin^2 x)}{2\cos^2 x - 1}$

$\therefore \cos^2 A + \sin^2 A = 1$

$= \left(\frac{7}{4}\right)\left(\frac{\frac{9}{25} - \frac{16}{25}}{\frac{18}{25} - 1}\right) = \left(\frac{7}{4} \times \frac{-\frac{7}{25}}{-\frac{7}{25}}\right) = \frac{7}{4}$

56. (A) $\frac{\tan^2 x - \sin^2 x}{\sec^2 x}$

$\frac{\frac{\sin^2 x}{\cos^2 x} - \sin^2 x}{\sec^2 x}$

$\frac{\sin^2 x\left[1 - \cos^2 x\right]}{\cos^2 x \times \frac{1}{\cos^2 x}} = \sin^4 x$

57. (D) $\sin(x + y) = \sin x \cos y + \cos x \sin y$

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$\sin x = \frac{1}{3}$, $\cos y = \frac{1}{3}$

$= \frac{1}{3} \times \frac{1}{3} + \frac{2\sqrt{2}}{3} \times \frac{2\sqrt{2}}{3}$

$= \frac{1}{9} + \frac{4 \times 2}{9}$

$= 1$

58. (D) $\frac{\cos x + \cos y}{\sin x + \sin y}$

$$\frac{2\cos\frac{x+y}{2}\cos\frac{x-y}{2}}{2\sin\frac{x+y}{2}\cos\frac{x-y}{2}} = \cot\frac{x+y}{2}$$

59. (A)

sec12sin12tan38tan78tan52

$\frac{\sin 12}{\cos 12}$ tan (90-38)tan78tan52

tan12cot52tan78tan52

tan(90-12)cot52tan78tan52

cot78cot 52 tan 78 tan52 =1

60. (D) $\frac{(\cot\theta - \operatorname{cosec}\theta + 1)(\tan\theta + \sec\theta + 1)}{\cos\theta \operatorname{cosec}\theta}$

$$\frac{\left(\frac{\cos\theta}{\sin\theta} - \frac{1}{\sin\theta} + 1\right)\left(\frac{\sin\theta}{\cos\theta} + \frac{1}{\cos\theta} + 1\right)}{\cos\theta \operatorname{cosec}\theta}$$

$$\frac{(\cos\theta - 1 + \sin\theta)(\sin\theta + 1 - \cos\theta)}{\sin\theta\cos\theta\cos\theta\operatorname{cosec}\theta}$$

$$\frac{(\cos\theta + \sin\theta)^2 - 1}{\cos^2\theta}$$

$$\frac{1 + 2\cos\theta\sin\theta - 1}{\cos^2\theta}$$

$= 2\tan\theta$

61. (B) $\frac{\sin 30° + \cos 30°}{\cos 30° - \sin 30°}$

$$= \frac{\frac{1}{2} + \frac{\sqrt{3}}{2}}{\frac{\sqrt{3}}{2} - \frac{1}{2}} = \frac{1+\sqrt{3}}{\sqrt{3}-1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1}$$

$$= \frac{1}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}} = 2+\sqrt{3}$$

62. (D) $\frac{\sin\theta}{1-\cot\theta} - \frac{\cos\theta}{1-\tan\theta}$

$$= \frac{\sin^2\theta}{\sin\theta - \cos\theta} - \frac{\cos^2\theta}{\cos\theta - \sin\theta}$$

$$= \frac{\sin^2\theta}{\sin\theta - \cos\theta} + \frac{\cos^2\theta}{\cos\theta - \sin\theta}$$

$$= \frac{\sin^2\theta + \cos^2\theta}{\sin\theta - \cos\theta} = \frac{1}{\sin\theta - \cos\theta}$$

63. (B) $x = \sin A + \cos A$

$y = \sec A + \operatorname{cosec} A$

$y(x^2 - 1)$

$\operatorname{Sec}A + \operatorname{Cosec}A[(\sin A + \cos A)^2 - 1]$

$$\frac{1}{\cos A} + \frac{1}{\sin A}\left(\sin^2 A + \cos^2 A + 2\sin A\cos A - 1\right)$$

$$\frac{\sin A + \cos A}{\sin A\cos A} \times 2\sin A\cos A$$

$2(\sin A + \cos A)$ $\quad \therefore \sin A + \cos A = x$

$2x$

64. **(C)** $\sqrt{\sec^2 A + \operatorname{cosec}^2 A}$

$$\sqrt{1 + \tan^2 A + 1 + \cot^2 A}$$

$$= \sqrt{(\tan A + \cot A)^2}$$

$= \tan A + \cot A$

65. (C) $\frac{\cot^2 x}{1+\sqrt{3}} + \frac{1}{2}\left(3 - \sqrt{3}\right) = \cot x$

$$\frac{\left(\sqrt{3}-1\right)\cot^2 x}{2}+\frac{3-\sqrt{3}}{2}=\cot x$$

$$=\left(\sqrt{3}-1\right)\cot^2 x-2\cot x+3-\sqrt{3}$$

$$\text{Cotx}=\frac{2\pm\sqrt{4-4\left(4\sqrt{3}-6\right)}}{2\left(\sqrt{3}-1\right)}$$

66. (C) $\sin(30+x)-\cos(60-x)$

$\sin(A+B)-\cos(A-B)=\sin A\cos B+\cos A\sin B-\cos A\cos B-\sin A\sin B$

$=\sin30.\cos x+\cos30\sin x-\cos60\cos x-\sin60\sin x$

$$=\frac{1}{2}\cos x+\frac{\sqrt{3}}{2}\sin x-\frac{1}{2}\cos x-\frac{\sqrt{3}}{2}\sin x$$

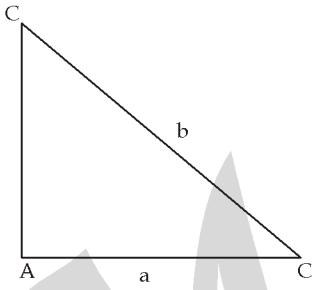
$=0$

67. (B) $15\cos^2\theta+17\sin2\theta=?$

Least value $=15$

$\therefore$ Put $\theta=0$ value

68. (D)



$$\cos37^\circ=\frac{a}{b}$$

$AC^2=BC^2-AB^2$

$AC^2=b^2-a^2$

$AC=\sqrt{b^2-a^2}$

A.T.Q.

$=\text{cosec}37^\circ-\cos53^\circ$

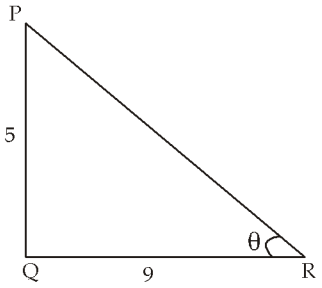
$\cos(90-\theta)=\sin\theta$

$$=\text{cosec}37^2-\sin37^\circ$$

$$=\frac{b}{\sqrt{b^2-a^2}}-\frac{\sqrt{b^2-a^2}}{b}$$

$$=\frac{b^2-b^2+a^2}{b\sqrt{b^2-a^2}}=\frac{a^2}{b\sqrt{b^2-a^2}}$$

69. (B)



$$\tan\theta=\frac{5}{9}$$

$PR^2=PQ^2+QR^2$

$PR^2=5^2+9^2$

$PR^2=25+81$

$PR^2=106$

$PR=\sqrt{106}$

$$=\frac{5\sin\theta+9\cos\theta}{5\sin\theta-9\cos\theta}$$

$$=\frac{\frac{5\times5}{\sqrt{106}}+\frac{9\times9}{\sqrt{106}}}{\frac{5\times5}{\sqrt{106}}-\frac{9\times9}{\sqrt{106}}}$$

$$=\frac{106}{\sqrt{106}}\times\frac{\sqrt{106}}{-56}=\frac{-53}{28}$$

70. (D) $\dfrac{\sin y+\cos y}{\sin y-\cos y}=3$

$\sin y+\cos y=3\sin y-3\cos y$

$4\cos y=2\sin y$

$$\frac{\sin y}{\cos y}=\frac{4}{2}$$

$\tan y=2$

$$=\frac{2\pm2\sqrt{7-4\sqrt{3}}}{2\left(\sqrt{3}-1\right)}=\frac{1\pm2-\sqrt{3}}{\sqrt{3}-1}$$

$$=\frac{3-\sqrt{3}}{\sqrt{3}-1},\frac{-1+\sqrt{3}}{\sqrt{3}-1}$$

$$=\frac{3-\sqrt{3}}{\sqrt{3}-1}\times\frac{\sqrt{3}+1}{\sqrt{3}+1},1$$

$\sqrt{3}, 1, x=30^\circ, 45^\circ$

then $\dfrac{\pi}{6},\dfrac{\pi}{4}$

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(SSC CGL MAINS – 2020)

1. If $3\tan\theta = 2\sqrt{3}\sin\theta$, $0° < \theta < 90°$, then the value of $\frac{\text{cosec}^2 2\theta + \cot^2 2\theta}{\sin^2\theta + \tan^2 2\theta}$ is:

यदि $3\tan\theta = 2\sqrt{3}\sin\theta$, $0° < \theta > 90°$ है, तो , then the value of का मान क्या होगा ?

(A) $\frac{4}{13}$ (B) $\frac{20}{39}$

(C) $\frac{4}{3}$ (D) $\frac{20}{27}$

2. The value of / का मान क्या होगा ?

$$\frac{3\left(\cot^2 47°-\sec^2 43°\right)-2\left(\tan^2 23°-\text{cosec}^2 67°\right)}{\text{cosec}^2(68°+\theta)-\tan(\theta+61°)-\tan^2(22°-\theta)+\cot(29°-\theta)}$$

(A) –1 (B) 1
(C) 5 (D) 0

3. If $1 + 2\tan^2\theta + 2\sin\theta\sec^2\theta = \frac{a}{b}$, $0° < \theta < 90°$, then $\frac{a+b}{a-b}$ = ?

यदि $1 + 2\tan^2\theta + 2\sin\theta\sec^2\theta = \frac{a}{b}$, $0° < \theta < 90°$ है, तो $\frac{a+b}{a-b}$ का मान क्या होगा ?

(A) $\sin\theta$ (B) $\cos\theta$
(C) $\text{cosec}\theta$ (D) $\sec\theta$

4. $\left(\frac{\tan^3\theta}{\sec^2\theta} + \frac{\cot^3}{\text{cosec}^2\theta} + 2\sin\theta\cos\theta\right) \div (1 + \text{cosec}^2\theta + \tan^2\theta)$, $0° < \theta < 90°$, is equal to:/ का मान इनमें से किसके बराबर होगा ?

(A) $\text{cosec}\theta\sec\theta$ (B) $\text{cosec}\theta$
(C) $\sin\theta\cos\theta$ (D) $\sec\theta$

5. If $7\sin^2\theta + 4\cos^2\theta = 5$ and θ lies in the first quadrant, then what is the value of $\frac{\sqrt{3}\sec\theta + \tan\theta}{\sqrt{2}\cot\theta - \sqrt{3}\cos\theta}$?

यदि $7\sin^2\theta + 4\cos^2\theta = 5$ और θ पहले चतुर्थांश में स्थित है, तो $\frac{\sqrt{3}\sec\theta + \tan\theta}{\sqrt{2}\cot\theta - \sqrt{3}\cos\theta}$ का मान क्या होगा ?

(A) $2(1 + \sqrt{2})$ (B) $3\sqrt{2}$

(C) $2\left(\sqrt{2}-1\right)$ (D) $4\sqrt{2}$

6. Let $0° < \theta < 90°$.$(1 + \cot^2\theta)(1 + \tan^2\theta) \times (\sin\theta - \text{cosec}\theta)(\cos\theta - \sec\theta)$ is equal to:
मान लें कि $0° < \theta < 90°$ है, तो $(1 + \cot^2\theta)(1 + \tan^2\theta) \times (\sin\theta - \text{cosec}\theta)(\cos\theta - \sec\theta)$ का मान इनमें से किसके बराबर होगा ?

(A) $\sin\theta + \cos\theta$ (B) $\sin\theta\cos\theta$
(C) $\sec\theta\,\text{cosec}\theta$ (D) $\sec\theta + \text{cosec}\theta$

7. $\frac{(1+\sec\theta\,\text{cosec}\theta)^2(\sec\theta-\tan\theta)^2(1+\sin\theta)}{(\sin\theta+\sec\theta)^2+(\cos\theta+\text{cosec}\theta)^2}$, $0° < \theta < 90°$, is equal to:

$\frac{(1+\sec\theta\,\text{cosec}\theta)^2(\sec\theta-\tan\theta)^2(1+\sin\theta)}{(\sin\theta+\sec\theta)^2+(\cos\theta+\text{cosec}\theta)^2}$, $0° < \theta < 90°$, का मान इनमें से किसके बराबर होगा ?

(A) $1 - \cos\theta$ (B) $1 - \sin\theta$
(C) $\cos\theta$ (D) $\sin\theta$

8. $\frac{1+\cos\theta-\sin^2\theta}{\sin\theta(1+\cos\theta)} \times \frac{\sqrt{\sec^2\theta+\text{cosec}^2\theta}}{\tan\theta+\cot\theta}$, $0° < \theta < 90°$, is equal to:

$\frac{1+\cos\theta-\sin^2\theta}{\sin\theta(1+\cos\theta)} \times \frac{\sqrt{\sec^2\theta+\text{cosec}^2\theta}}{\tan\theta+\cot\theta}$, $0° < \theta < 90°$ का मान इनमें से किसके बराबर होगा ?

(A) $\tan\theta$ (B) $\sec\theta$
(C) $\text{cosec}\theta$ (D) $\cot\theta$

9. The angle of elevation of the top of a tower $25\sqrt{3}$ m high from two points on the level ground on its opposite sides are 45° and 60°. What is the distance (in m) between the two points (correct to one decimal place)?

$25\sqrt{3}$ मीटर ऊँचे एक टॉवर के शीर्ष का, इसके दोनों ओर सतमल मैदान पर स्थित दो बिन्दुओं से उन्नयन कोण 45° और 60° हैं। दोनों बिन्दुओं के बीच की दूरी (मीटर में, दशमलव के एक स्थान तक सही) कितनी है ?

(A) 45.3 (B) 58.4
(C) 68.3 (D) 50.6

10. The value of

$$\frac{4\tan^2 30°+\sin^2 30°\cos^2 45°+\sec^2 48°-\cot^2 42°}{\cos 37°\sin 53°+\sin 37°\cos 53°+\tan 18°\tan 72°}$$ is:

$$\frac{4\tan^2 30°+\sin^2 30°\cos^2 45°+\sec^2 48°-\cot^2 42°}{\cos 37°\sin 53°+\sin 37°\cos 53°+\tan 18°\tan 72°}$$ का मान ज्ञात कीजिए?

(A) $\frac{35}{48}$ (B) $\frac{59}{48}$ (C) $\frac{49}{24}$ (D) $\frac{35}{24}$

11. The value of

$$\frac{3(cosec^2 26° - \tan^2 64°) + (\cot^2 42° - \sec^2 48°)}{\cot(22° - \theta) - cosec^2(62° + \theta) - \tan(\theta + 68°) + \tan^2(28° - \theta)}$$ is :

का मान बताइए?

(A) 3 (B) 4
(C) –1 (D) –2

12. If $\cos\theta = \frac{12}{13}$, then the velue of $\frac{\sin\theta(1-\tan\theta)}{\tan\theta(1+cosec\theta)}$ is:

यदि $\cos\theta = \frac{12}{13}$ है, तो $\frac{\sin\theta(1-\tan\theta)}{\tan\theta(1+cosec\theta)}$ का मान बताइए।

(A) $\frac{25}{78}$ (B) $\frac{35}{234}$ (C) $\frac{35}{108}$ (D) $\frac{25}{156}$

13. If $\frac{\sec\theta-\tan\theta}{\sec\theta+\tan\theta}=\frac{1}{7}$, θ lies in first quadrant, then the value of $\frac{cosec\theta+\cot^2\theta}{cosec\theta-\cot^2\theta}$ is:

यदि $\frac{\sec\theta-\tan\theta}{\sec\theta+\tan\theta}=\frac{1}{7}$, θ प्रथम चतुर्थांश में स्थित है, तो $\frac{cosec\theta+\cot^2\theta}{cosec\theta-\cot^2\theta}$ का मान बताइए।

(A) $\frac{19}{5}$ (B) $\frac{22}{3}$ (C) $\frac{37}{12}$ (D) $\frac{37}{19}$

14. The expression $\frac{\tan^6\theta-\sec^6\theta+3\sec^2\theta\tan^2\theta}{\tan^2\theta+\cot^2\theta+2}$,

$0° < \theta < 90°$, is equal to :

व्यंजक $\frac{\tan^6\theta-\sec^6\theta+3\sec^2\theta\tan^2\theta}{\tan^2\theta+\cot^2\theta+2}$ का मान बताइए जहां $0° < \theta < 90°$ है।

(A) $\sec^2\theta\text{cosec}^3\theta$ (B) $-\sec^2\theta\text{cosec}^2\theta$
(C) $\cos^2\theta\sin^2\theta$ (D) $-\cos^2\theta\sin^2\theta$

15. The expression

$$\frac{\cos^4\theta-\sin^4\theta+2\sin^2\theta+3}{(\cos ec\theta+\cot\theta+1)(\cos ec\theta-\cot\theta+1)-2},$$

$0° < \theta < 90°$, is sequal to:

व्यंजक $\frac{\cos^4\theta-\sin^4\theta+2\sin^2\theta+3}{(\cos ec\theta+\cot\theta+1)(\cos ec\theta-\cot\theta+1)-2}$, का मान बताइए, जहाँ $0° < \theta < 90°$ है।

(A) $\frac{1}{2}\sin\theta$ (B) $2\sin\theta$
(C) $\sec\theta$ (D) $2\,\text{cosec}\,\theta$

16. The expression

$$\frac{(1-\sin\theta+\cos\theta)^2(1-\cos\theta)\sec^3\theta\cos ec^2\theta}{(\sec\theta-\tan\theta)(\tan\theta+\cot\theta)},$$

$0° < \theta < 90°$, is equal to:

व्यंजक $\frac{(1-\sin\theta+\cos\theta)^2(1-\cos\theta)\sec^3\theta\cos ec^2\theta}{(\sec\theta-\tan\theta)(\tan\theta+\cot\theta)}$

का मान बताइए, जहाँ $0° < \theta < 90°$ है।

(A) $\sin\theta$ (B) $2\cos\theta$
(C) $\cot\theta$ (D) $2\tan\theta$

17. The value of

$$\frac{(\cos 9°+\sin 81°)(\sec 9°+\text{cosec}\,81°)}{\cos ec^2 71°+\cos^2 15°-\tan^2 19°+\cos^2 75°}$$ is:

$$\frac{(\cos 9°+\sin 81°)(\sec 9°+\text{cosec}\,81°)}{\cos ec^2 71°+\cos^2 15°-\tan^2 19°+\cos^2 75°}$$ का मान बताइए।

(A) 1 (B) 4
(C) – 3 (D) 2

18. If $\frac{\sin^2\theta}{\cos^2\theta-3\cos\theta+2}=1$, θ lies in the first quadrant, then the value of $\frac{\tan^2\frac{\theta}{2}+\sin^2\frac{\theta}{2}}{\tan\theta+\sin\theta}$ is:

यदि $\frac{\sin^2\theta}{\cos^2\theta-3\cos\theta+2}=1$, θ प्रथम चतुर्थांश में स्थित है, तो $\frac{\tan^2\frac{\theta}{2}+\sin^2\frac{\theta}{2}}{\tan\theta+\sin\theta}$ का मान बताइए?

(A) $\frac{2\sqrt{3}}{27}$ (B) $\frac{5\sqrt{3}}{27}$ (C) $\frac{2\sqrt{3}}{9}$ (D) $\frac{7\sqrt{3}}{54}$

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19. Two pillars A and B of the same height are on opposite sides of a road which is 40 m wide. The angles of elevation of the tops of the pillars A and B are 30° and 45°, respectively, at a point on the road between the pillars. What is the distance (in m) of the point from the foot of pillar A?

समान ऊँचाई वाले दो स्तम्भ A और B, एक ऐसी सड़क के दोनों ओर स्थित हैं जिसकी चौड़ाई 40 मीटर है। दोनों स्तम्भों के बीच सड़क पर स्थित एक बिंदु से स्तम्भों A और B के शीर्षों के उन्नयन कोण क्रमश: 30° और 45° है। स्तम्भ A के पाद से उस बिंदु की दूरी (मी. में) कितनी है ?

(A) $40\left(\sqrt{3}-1\right)$ (B) $20\left(2-\sqrt{3}\right)$

(C) $20\left(3-\sqrt{3}\right)$ (D) $39\sqrt{3}$

20. The expression

$$\frac{\left(1-2\sin^2\theta\cos^2\theta\right)\left(\cot\theta+1\right)\cos\theta}{\left(\sin^4+\cos^4\theta\right)\left(1+\tan\theta\right)\cos ec\theta}-1,\ 0°<\theta<90°.$$ equals:

व्यंजक $\frac{\left(1-2\sin^2\theta\cos^2\theta\right)\left(\cot\theta+1\right)\cos\theta}{\left(\sin^4+\cos^4\theta\right)\left(1+\tan\theta\right)\cos ec\theta}-1$ का मान

बताइए, जहाँ $0°<\theta<90°$ है।

(A) $\cos^2\theta$

(B) $-\sin^2\theta$

(C) $\sec^2\theta$

(D) $-\sec^2\theta$

Solution

1. (B) $3\tan\theta = 2\sqrt{3}\ \sin\theta$

$$\frac{3\sin\theta}{\cos\theta}=2\sqrt{3}\sin\theta$$

$$\cos\theta=\frac{\sqrt{3}}{2} \qquad \theta=30°$$

ATQ, $\frac{\cos ec^2 60+\cot^2 60}{\sin^2 30+\tan^2 60}$

$$=\frac{\frac{4}{3}+\frac{1}{3}}{\frac{1}{4}+3}=\frac{\frac{5}{3}}{\frac{13}{4}}=\frac{20}{39}$$

2. (A) $\frac{3(\cot^2 47-\sec^2 43)-2(\tan^2 23-cosec^2 67)}{cosec^2(68+\theta)-\tan(\theta+61)-\tan^2(22-\theta)+\cot(29-\theta)}$

$$=\frac{3(-1)-2(-1)}{1+0}=\frac{-3+2}{1}$$

$=-1$

3. (C) $1+2\tan^2\theta+2\sin\theta.\sec^2\theta=\frac{a}{b}$

Put $\theta=30°$

$$=1+2\left(\frac{1}{3}\right)+2\times\frac{1}{2}\times\frac{4}{3}=\frac{a}{b}$$

$$=1+\frac{2}{3}+\frac{4}{3}=\frac{a}{b}$$

$$\Rightarrow \frac{a}{b}=3$$

ATQ, $\frac{a+b}{a-b}=\frac{3+1}{3-1}=\frac{4}{2}=2$

Option C is correct

4. (C) $\left[\frac{\tan^3\theta}{\sec^2\theta}+\frac{\cot^3}{cosec^2\theta}+2\sin\theta\cos\theta\right]\div$

$$\left(1+cosec^2\theta+\tan^2\theta\right)$$

$$=\left[\frac{\frac{\sin^3\theta}{\cos^3\theta}}{\frac{1}{\cos^2\theta}}+\frac{\frac{\cos^3\theta}{\sin^3\theta}}{\frac{1}{\sin^2\theta}}+2\sin\theta\cos\theta\right]\div[\text{cosec}^2\theta+\sec^2\theta]$$

$$=\left[\frac{\sin^3\theta}{\cos\theta}+\frac{\cos^3\theta}{\sin\theta}+2\sin\theta\cos\theta\right]\div\left[\frac{1}{\sin^2\theta.\cos^2\theta}\right]$$

$$=\left[\frac{\sin^4\theta+\cos^4\theta+2\sin^2\theta\cos^2\theta}{\cos\theta}\right]\times\sin^2\theta.\cos^2\theta$$

$$=\left[\frac{\left(\sin^2\theta+\cos^2\theta\right)^2}{\left(\sin\theta.\cos\theta\right)}\right].\left(\sin\theta.\cos\theta\right)^2$$

$=\sin\theta.\cos\theta$

5. (A) $7\sin^2\theta+4\cos^2\theta=5$

$4\sin^2\theta+3\sin^2\theta+4\cos^2\theta=5$

$3\sin^2\theta=1$

$$\sin\theta=\frac{1}{\sqrt{3}}$$

ATQ, $\frac{\sqrt{3}\sec\theta+\tan\theta}{\sqrt{2}\cot\theta-\sqrt{3}\cos\theta}$

$$=\frac{\sqrt{3}\times\frac{\sqrt{3}}{\sqrt{2}}\times\frac{1}{\sqrt{2}}}{\sqrt{2}\times\sqrt{2}-\sqrt{3}\times\frac{\sqrt{2}}{\sqrt{3}}}$$

$$=\frac{\frac{3+1}{\sqrt{2}}}{2-\sqrt{2}}=\frac{2\sqrt{2}}{\sqrt{2}\left(\sqrt{2}-1\right)}=2\left(\sqrt{2}+1\right)$$

6. (C) $(1+\cot^2\theta)(1+\tan^2\theta)\times(\sin\theta-\operatorname{cosec}\theta)(\cos\theta-\sec\theta)$

$$\operatorname{cosec}^2\theta\ \sec^2\theta\left(\frac{-\cos^2\theta}{\sin\theta}\right)\left(\frac{-\sin^2\theta}{\cos\theta}\right)$$

$$= \frac{1}{\sin\theta\cos\theta} = \sec\theta\operatorname{cosec}\theta$$

7. (B) $$\frac{(1+\sec\theta.\operatorname{cosec}\theta)^2(\sec\theta-\tan\theta)^2(1+\sin\theta)}{(\sin\theta+\sec\theta)^2+(\cos\theta+\operatorname{cosec}\theta)^2}$$

$$= \frac{\left(1+\frac{1}{\sin\theta\cos\theta}\right)^2\cdot\left(\frac{1-\sin\theta}{\cos\theta}\right)^2(1+\sin\theta)}{\left(\frac{\sin\theta\cos\theta+1}{\cos\theta}\right)^2+\left(\frac{\sin\theta.\cos\theta+1}{\sin\theta}\right)^2}$$

$$= \frac{\frac{(\sin\theta\cos\theta+1)^2}{(\sin\theta\cos\theta)^2}\cdot\frac{(1-\sin\theta)^2}{\cos^2\theta}(1+\sin\theta)}{(\sin\theta.\cos\theta+1)^2\left[\frac{1}{\cos^2\theta}+\frac{1}{\sin^2\theta}\right]}$$

$$= \frac{\frac{(1-\sin\theta)(1-\sin^2\theta)}{\cos^2\theta.(\sin\theta\cos\theta)^2}}{\frac{\sin^2\theta+\cos^2\theta}{(\sin\theta.\cos)^2}}$$

$$= \frac{(1-\sin\theta).\cos^2\theta}{\cos^2\theta}$$

$= 1 - \sin\theta$

8. (D) $$\frac{1+\cos\theta-\sin\theta}{\sin\theta(1+\cos\theta)}\times\frac{\sqrt{\sec^2\theta+\operatorname{cosec}^2\theta}}{\tan\theta+\cos\theta}$$

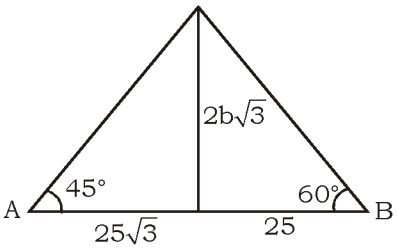
$$\frac{\cos^2\theta+\cos\theta}{\sin\theta(1+\cos\theta)}\times\frac{\sqrt{\frac{1}{\sin^2\theta\cos^2\theta}}}{\frac{\sec^2\theta}{\tan\theta}}$$

$$\frac{\cos\theta(1+\cos\theta)}{\sin\theta(1+\cos\theta)}\times\frac{\tan\theta}{\sin\theta\cos\theta\bullet\sec^2\theta}$$

$$\cot\theta\times\frac{\cot\theta}{\cot\theta}$$

$= \cot\theta$

9. (C)



Distance b/w A and B $\rightarrow 25\sqrt{3} + 25$

$= 25\left(\sqrt{3}+1\right) = 25 \times 2.732 = 68.3$

10. (B) $$\frac{4\tan^2 30+\sin^2 30\cos^2 45+\sec^2 48-\cot^2 42}{\cos 37\sin 53+\sin 37\cos 53+\tan 18\tan 72}$$

$$= \frac{4\times\frac{1}{3}+\frac{1}{4}\times\frac{1}{2}+1}{1+1+0} = \frac{59}{48}$$

11. (D) $$\frac{3\left(\operatorname{cosec}^2 26^\circ-\tan^2 64^\circ\right)+\left(\cot^2 42^\circ-\sec^2 48^\circ\right)}{\cot(22^\circ-\theta)-\operatorname{cosec}^2(62^\circ+\theta)-\tan(\theta+68^\circ)+\tan^2(28^\circ-\theta)}$$

$$= \frac{3(\sec^2 64^\circ-\tan^2 64^\circ)+(\tan^2 48^\circ-\sec^2 48^\circ)}{\cot(22^\circ-\theta)-\sec^2(28^\circ-\theta)-\cot(22^\circ-\theta)+\tan^2(28^\circ-\theta)}$$

$$= \frac{3-1}{-1} = -2$$

12. (B) $\cos\theta = \frac{12}{13}$, $\sin\theta = \frac{5}{13}$, $\tan\theta = \frac{5}{12}$

$$\frac{\sin\theta(1-\tan\theta)}{\tan\theta(1+\operatorname{cosec}\theta)} = \frac{\frac{5}{13}\left(1-\frac{5}{12}\right)}{\frac{5}{12}\left(1+\frac{13}{5}\right)}$$

$$= \frac{\frac{5}{13}\times\frac{7}{12}}{\frac{5}{12}\times\frac{18}{5}} = \frac{35\times12}{12\times13\times18} = \frac{35}{234}$$

13. (A) $$\frac{\sec\theta-\tan\theta}{\sec\theta+\tan\theta} = \frac{1}{7} \Rightarrow \frac{\sec\theta+\tan\theta}{\sec\theta-\tan\theta} = \frac{7}{1}$$

applying c & d rule

$$\Rightarrow \frac{\sec\theta}{\tan\theta} = \frac{8}{6} = \frac{4}{3}$$

$$\Rightarrow \frac{1\times\cos\theta}{\cos\theta\times\sin\theta} = \frac{4}{3}$$

$\Rightarrow \sin\theta = \frac{3}{4}$ $\qquad$ $\tan\theta = \frac{3}{\sqrt{7}}$

$$\frac{\operatorname{cosec}\theta+\cot^2\theta}{\operatorname{cosec}-\cot^2\theta} = \frac{\frac{4}{3}+\frac{7}{9}}{\frac{4}{3}-\frac{7}{9}} = \frac{12+7}{12-7} = \frac{19}{5}$$

14. (D) $$\frac{\tan^6\theta-\sec^6\theta+3\sec^2\theta\tan^2\theta}{\tan^2\theta+\cot^2\theta+2}$$

Put $\theta = 45^\circ$

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$$= \frac{1-\left(\sqrt{2}\right)^6+3\left(\sqrt{2}\right)^2\times 1}{1+1+2}$$

$$= \frac{1-8+6}{4} = \frac{-1}{4}$$

Checking by options at $\theta = 45°$

$= -\cos^2 45°.\sin^2 45°$

$$= -\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{-1}{4}$$

15. (B) $\dfrac{\cos^4\theta-\sin^4\theta+2\sin^2\theta+3}{(\text{cosec}\theta+\cot\theta+1)(\text{cosec}\theta-\cot\theta+1)-2}$

$$= \frac{(\cos^2\theta-\sin^2\theta)(\cos^2\theta+\sin^2\theta)+2\sin^2\theta+3}{(\text{cosec}\theta+1)^2-\cot^2\theta-2}$$

$$= \frac{\cos^2\theta-\sin^2\theta+2\sin^2\theta+3}{\text{cosec}^2\theta+1+2\,\text{cosec}\theta-\cot^2\theta-2}$$

$$= \frac{\cos^2\theta+\sin^2\theta+3}{1+\cot^2\theta+1+2\,\text{cosec}\theta-\cot^2\theta-2}$$

$$= \frac{4}{2\,\text{cosec}\theta} = 2\sin\theta$$

16. (D) $\dfrac{(1-\sin\theta+\cos\theta)^2(1-\cos\theta)\sec^3\theta.\text{cosec}^2\theta}{(\sec\theta-\tan\theta)(\tan\theta+\cot\theta)}$

Put $\theta = 45°$

$$= \frac{(1)\left(1-\frac{1}{\sqrt{2}}\right)\times 2\sqrt{2}\times 2}{\left(\sqrt{2}-1\right)(1+1)} = \frac{4\sqrt{2}}{\sqrt{2}\times 2} = 2$$

by options at $\theta = 45°$, $2\tan\theta = 2$

17. (D) $\dfrac{(\cos 9°+\cos 9°)(\sec 9°+\sec 9°)}{(\sec^3 19°-\tan^2 19°)+(\cos^2 15°+\sin^2 15°)}$

$$= \frac{2\cos 9°\,2\sec 9°}{1+1} = 2$$

18. (D) $\dfrac{\sin^2\theta}{\cos^2\theta-3\cos\theta+2} = 1$

$\Rightarrow \sin^2\theta = \cos^2\theta - 3\cos\theta + 2$

$1-\cos^2\theta = \cos^2\theta - 3\cos\theta + 2$

$\Rightarrow 2\cos^2\theta - 3\cos\theta + 1 = 0$

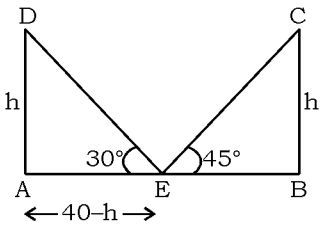
$\Rightarrow 2\cos^2\theta - 2\cos\theta - \cos\theta + 1 = 0$

$\Rightarrow 2\cos\theta(\cos\theta-1)-1(\cos\theta-1) = 0$

$\Rightarrow (\cos\theta-1)(2\cos\theta-1) = 0$

$$\Rightarrow \cos\theta = \frac{1}{2} \Rightarrow \cos\theta = 60°$$

19. (C)



BC = BE

then AE = 40 – h

In ΔDAE

$$\frac{AD}{AE} = \tan\theta$$

$$\frac{h}{40-h} = \tan 30°$$

$$\frac{h}{40-h} = \frac{1}{\sqrt{3}}$$

$$\sqrt{3}h = 40-h$$

$$\sqrt{3}h + h = 40$$

$$h = \frac{40}{\sqrt{3}+1}\times\frac{\sqrt{3}-1}{\sqrt{3}-1}$$

$AE = 20(3-\sqrt{3})$

20. (B) $\dfrac{(1-2\sin^2\cos^2\theta)(\cot\theta+1)\cos\theta}{(\sin^4\theta+\cos^4\theta)(1+\tan\theta)\,\text{cosec}\theta} - 1$

$\because \sin^4\theta + \cos^4\theta = (\sin^2\theta)^2 + (\cos^2\theta)^2 + 2\sin^2\theta\cos^2\theta - 2\sin^2\theta\cos^2\theta$

[Adding and subtracing $2\sin^2\theta\cos^2\theta$]

$(\sin^2\theta+\cos^2\theta)^2 - 2\sin^2\theta\cos^2\theta = 1 - 2\sin^2\theta\cos^2\theta$

$$\frac{(1-2\sin^2\theta\cos^2\theta)\left(\frac{\cos\theta}{\sin\theta}+1\right)\cos\theta}{(1-2\sin^2\theta\cos^2\theta)\left(1+\frac{\sin\theta}{\cos\theta}\right)\text{cosec}\theta} - 1$$

$$\left(\frac{\cos^2\theta}{\sin\theta\times\frac{1}{\sin\theta}}\right) - 1 = \cos^2\theta - 1$$

$= -\sin^2\theta$

(SSC CGL MAINS – 2019)

1. The Value of

$$\frac{\sec^2\theta\left(2+\tan^2\theta+\cot^2\theta\right)\div\left(\sin^2\theta-\tan^2\theta\right)}{\left(\text{cosec}^2\theta+\sec^2\theta\right)\left(1+\cot^2\theta\right)^2}$$ is:

$$\frac{\sec^2\theta\left(2+\tan^2\theta+\cot^2\theta\right)\div\left(\sin^2\theta-\tan^2\theta\right)}{\left(\text{cosec}^2\theta+\sec^2\theta\right)\left(1+\cot^2\theta\right)^2}$$ का

मान ज्ञात कीजिए।

(A) 1 (B) – 1
(C) 2 (D) – 2

2. If sin3A = cos(A + 10°), where 3A is an acute angle, then what is the value of

$$2\text{cosec}\frac{3A}{2}+6\sin^2 3A-\frac{3}{2}\tan^2 3A$$?

यदि sin3A = cos(A + 10°) है, जहां 3A न्यून कोण है, तो

$$2\text{cosec}\frac{3A}{2}+6\sin^2 3A-\frac{3}{2}\tan^2 3A$$ का मान ज्ञात कीजिए।

(A) 5 (B) $\frac{7}{4}$ (C) $\frac{17}{2}$ (D) 4

3. cosA(secA – cosA)(cotA + tanA) is equal to :
cosA(secA – cosA)(cotA + tanA) किसके बराबर है ?
(A) sinA (B) cotA
(C) secA (D) tanA

4. If $\sec\theta=\frac{a}{b}$, $b\neq 0$, then the value of $\frac{1-\tan^2\theta}{2-\sin^2\theta}$ is:

यदि $\sec\theta=\frac{a}{b}$, $b\neq 0$ है, तो $\frac{1-\tan^2\theta}{2-\sin^2\theta}$ का मान ज्ञात करें।

(A) $\frac{a^2\left(2b^2+a^2\right)}{b^2\left(a^2-b^2\right)}$ (B) $\frac{b^2\left(2b^2-a^2\right)}{a^2\left(a^2+b^2\right)}$

(C) $\frac{a^2\left(2b^2-a^2\right)}{b^2\left(a^2+b^2\right)}$ (D) $\frac{a^2\left(2b^2+a^2\right)}{b^2\left(a^2+b^2\right)}$

5. $\frac{\sin\theta\left[(1-\tan\theta)\tan\theta+\sec^2\theta\right]}{(1-\sin\theta)\tan\theta(1+\tan\theta)(\sec\theta+\tan\theta)}$ is equal to -

$\frac{\sin\theta\left[(1-\tan\theta)\tan\theta+\sec^2\theta\right]}{(1-\sin\theta)\tan\theta(1+\tan\theta)(\sec\theta+\tan\theta)}$ के बराबर है।

(A) – 1 (B) 1
(C) sinθcosθ (D) cosecθ secθ

6. The value of

$$\frac{\cos^6\theta+\sin^6\theta+3\sin^2\theta\cos^2\theta}{\text{cosec}\,\theta\sec\theta(\sin\theta+\cos\theta-1)(\sin\theta+\cos\theta+1)}$$ is:

$$\frac{\cos^6\theta+\sin^6\theta+3\sin^2\theta\cos^2\theta}{\text{cosec}\,\theta\sec\theta(\sin\theta+\cos\theta-1)(\sin\theta+\cos\theta+1)}$$

का मान ज्ञात कीजिए ?

(A) 1 (B) 3 (C) $\frac{1}{2}$ (D) 2

7. $\left(\frac{1}{\cos\theta}-\frac{1}{\sin\theta}\right)+\frac{1}{\text{cosec}\,\theta-\cot\theta}-\frac{1}{\sec\theta+\tan\theta}$ =?

$\left(\frac{1}{\cos\theta}-\frac{1}{\sin\theta}\right)+\frac{1}{\text{cosec}\,\theta-\cot\theta}-\frac{1}{\sec\theta+\tan\theta}$

किसके बराबर है ?
(A) sin θ tan θ (B) cosec θ cot θ
(C) sin θ cos θ (D) sec θ cosec θ

8. The value of $\frac{\text{cosec}^2 30°\sin^2 45°+\sec^2 60°}{\tan 60°\,\text{cosec}^2 45°-\sec^2 60°\tan 45°}$ is :

$\frac{\text{cosec}^2 30°\sin^2 45°+\sec^2 60°}{\tan 60°\,\text{cosec}^2 45°-\sec^2 60°\tan 45°}$ का मान ज्ञात कीजिए।

(A) $3\left(2+\sqrt{3}\right)$ (B) $2\left(\sqrt{3}+2\right)$

(C) $-2\sqrt{3}-2$ (D) $-3\left(2+\sqrt{3}\right)$

9. The value of $\frac{2\sin^2 38°\sec^2 52°+\cos 64°\sin 26°+\sin^2 64°}{\tan^2 23°+\cot^2 23°-\sec^2 67°-\text{cosec}^2 67°}$ is :

$\frac{2\sin^2 38°\sec^2 52°+\cos 64°\sin 26°+\sin^2 64°}{\tan^2 23°+\cot^2 23°-\sec^2 67°-\text{cosec}^2 67°}$ का मान ज्ञात कीजिए।

(A) –2 (B) $\frac{3}{2}$ (C) 2 (D) $\frac{-3}{2}$

10. In ΔPQR, ∠Q = 90°. If cot R = $\frac{1}{3}$, then what is the value of $\frac{\sec P(\cos R+\sin P)}{\text{cosec}R(\sin R-\text{cosec}P)}$ is :

ΔPQR में ∠Q = 90° है। यदि cot R = $\frac{1}{3}$ है, तो $\frac{\sec P(\cos R+\sin P)}{\text{cosec}R(\sin R-\text{cosec}P)}$ का मान ज्ञात कीजिए।

(A) $\frac{2}{7}$ (B) $-\frac{2}{7}$ (C) $\frac{5}{7}$ (D) $-\frac{3}{7}$

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11. If x = sec57°, then $\cot^2 33° + \sin^2 57° + \sin^2 33° + \text{cosec}^2 57° \cos^2 33° + \sec^2 33° \sin^2 57°$ is equal to :
यदि x = sec57° है, तो $\cot^2 33° + \sin^2 57° + \sin^2 33° + \text{cosec}^2 57° \cos^2 33° + \sec^2 33° \sin^2 57°$ ..... के बराबर है।
(A) $x^2 + 2$ (B) $2x^2 + 1$
(C) $x^2 + 1$ (D) $\frac{1}{x^2+1}$

12. The value of $(\tan^2 A + \cot^2 A - 2) - \sec^2 A \, \text{cosec}^2 A$ is :
$(\tan^2 A + \cot^2 A - 2) - \sec^2 A \, \text{cosec}^2 A$ का मान ज्ञात कीजिए।
(A) –4 (B) –1
(C) 1 (D) 4

13. The value of $\frac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\tan^2 60° - \sin^2 30° - \cos^2 45°}$ is :
$\frac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\tan^2 60° - \sin^2 30° - \cos^2 45°}$ का मान ज्ञात कीजिए।
(A) $\frac{19}{9}$ (B) $\frac{67}{27}$ (C) $\frac{22}{9}$ (D) $\frac{67}{24}$

14. If $\cos(2\theta + 54°) = \sin\theta$, $0° < (2\theta + 54°) < 90°$, then what is the value of $\frac{1}{\tan 5\theta + \text{cosec}\frac{5\theta}{2}}$?
यदि $\cos(2\theta + 54°) = \sin\theta$, $0° < (2\theta + 54°) < 90°$ है, तो $\frac{1}{\tan 5\theta + \text{cosec}\frac{5\theta}{2}}$ का मान ज्ञात कीजिए।
(A) $2 + \sqrt{3}$ (B) $3\sqrt{2}$
(C) $2\sqrt{3}$ (D) $2 - \sqrt{3}$

15. If $\text{cosec}\theta = b/a$, then $\frac{\sqrt{3}\cot\theta + 1}{\tan\theta + \sqrt{3}}$ is equal to :
यदि $\text{cosec}\theta = b/a$ है, तो $\frac{\sqrt{3}\cot\theta + 1}{\tan\theta + \sqrt{3}}$ के बराबर है।
(A) $\frac{\sqrt{b^2 - a^2}}{a}$ (B) $\frac{\sqrt{a^2 + b^2}}{a}$
(C) $\frac{\sqrt{a^2 + b^2}}{b}$ (D) $\frac{\sqrt{b^2 - a^2}}{b}$

16. $\frac{\sin^2\theta}{\cos\theta(1 + \cos\theta)} + \frac{1 + \cos\theta}{\cos\theta} = ?$
(A) $2\cos\theta$ (B) $\sec\theta$
(C) $2\sec\theta$ (D) $\text{cosec}\theta$

17. In ΔABC, right angled at B, If $\tan A = \frac{1}{2}$, then the value of $\frac{\sin A(\cos C + \cos A)}{\cos C(\sin C - \sin A)}$ is :
ΔABC में, जो B पर समकोण है, यदि $\tan A = \frac{1}{2}$ है, तो $\frac{\sin A(\cos C + \cos A)}{\cos C(\sin C - \sin A)}$ का मान ज्ञात कीजिए।
(A) $2\sqrt{5}$ (B) 3
(C) 2 (D) 1

18. The value of $\frac{\sin\theta + \cos\theta - 1}{\sin\theta - \cos\theta + 1} \times \sqrt{\frac{1 + \sin\theta}{1 - \sin\theta}}$ is :
$\frac{\sin\theta + \cos\theta - 1}{\sin\theta - \cos\theta + 1} \times \sqrt{\frac{1 + \sin\theta}{1 - \sin\theta}}$ का मान ज्ञात कीजिए।
(A) 1 (B) –1
(C) –2 (D) 2

19. $\frac{(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \text{cosec}\theta)}{(\sec\theta + \tan\theta)(1 - \sin\theta)}$ is equal to :
$\frac{(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \text{cosec}\theta)}{(\sec\theta + \tan\theta)(1 - \sin\theta)}$ .... के बराबर है।
(A) $2\sec\theta$ (B) $\sec\theta$
(C) $2\text{cosec}\theta$ (D) $\text{cosec}\theta$

20. $\frac{\sec A(\sec A + \tan A)(1 - \sin A)}{(\text{cosec}^2 A - 1)\sin^2 A}$ is equal to :
$\frac{\sec A(\sec A + \tan A)(1 - \sin A)}{(\text{cosec}^2 A - 1)\sin^2 A}$ ..... के बराबर है।
(A) $\sec^2 A$ (B) $\cos^2 A$
(C) $\cot A$ (D) $\cos A$

21. If $(\sin\theta + \text{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2 = k + \tan^2\theta + \cot^2\theta$, then the value of k is equal to :
यदि $(\sin\theta + \text{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2 = k + \tan^2\theta + \cot^2\theta$ है, तो k का मान ज्ञात कीजिए।
(A) 7 (B) 2
(C) 9 (D) 5

22. If $\cos\theta = \frac{5}{13}$, then the value of $\tan^2\theta + \sec^2\theta$ is equal to:
यदि $\cos\theta = \frac{5}{13}$ है, तो $\tan^2\theta + \sec^2\theta$ का मान ज्ञात कीजिए।
(A) $\frac{323}{25}$ (B) $\frac{313}{25}$ (C) $\frac{303}{25}$ (D) $\frac{233}{25}$

23. If $\sin\theta + \sin^2\theta = 1$, then the value of $\cos^2\theta + \cos^4\theta$ is equal to :
यदि $\sin\theta + \sin^2\theta = 1$ है, तो $\cos^2\theta + \cos^4\theta$ का मान ज्ञात कीजिए।

(A) 0 (B) $\frac{1}{2}$ (C) 5 (D) 1

24. If $\sin(x + y) = \cos(x - y)$, then the value of $\cos^2 x$ is :
यदि $\sin(x + y) = \cos(x - y)$ है, तो $\cos^2 x$ का मान ज्ञात कीजिए।

(A) 5 (B) 3 (C) $\frac{1}{2}$ (D) $\frac{1}{4}$

25. If $\frac{\cos^2\theta}{\cot^2\theta - \cos^2\theta} = 3$, where $0° < \theta < 90°$ then the value of θ is :

यदि $\frac{\cos^2\theta}{\cot^2\theta - \cos^2\theta} = 3$, जहाँ $0° < \theta < 90°$ है, तो θ का मान ज्ञात कीजिए।

(A) 50° (B) 60°
(C) 30° (D) 45°

26. If $\frac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta} = 2\frac{51}{79}$, then the value of $\sin\theta$ is equal to :

यदि $\frac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta} = 2\frac{51}{79}$ है, $\sin\theta$ का मान ज्ञात कीजिए।

(A) $\frac{65}{144}$ (B) $\frac{35}{72}$ (C) $\frac{91}{144}$ (D) $\frac{39}{72}$

27. If $\sec\theta + \tan\theta = 3$, then the value of $\sec\theta$ is :
यदि $\sec\theta + \tan\theta = 3$ है, तो $\sec\theta$ का मान ज्ञात कीजिए।

(A) $\frac{5}{3}$ (B) $\frac{4}{3}$ (C) $\frac{3}{5}$ (D) $\frac{3}{4}$

28. If $\alpha + \beta = 90°$ and $\alpha = 2\beta$, then the value of $3\cos^2\alpha - 2\sin^2\beta$ is equal to :
यदि $\alpha + \beta = 90°$ और $\alpha = 2\beta$ है, तो $3\cos^2\alpha - 2\sin^2\beta$ का मान ज्ञात कीजिए।

(A) $\frac{1}{4}$ (B) $\frac{3}{2}$ (C) $\frac{4}{3}$ (D) $\frac{3}{4}$

29. If $\text{cosec}39° = x$, then the value of $\frac{1}{\text{cosec}^2 51°} + \sin^2 39° + \tan^2 51° - \frac{1}{\sin^2 51° \sec^2 39°}$ is :

यदि $\text{cosec}39° = x$ है, तो $\frac{1}{\text{cosec}^2 51°} + \sin^2 39° + \tan^2 51° - \frac{1}{\sin^2 51° \sec^2 39°}$ का मान ज्ञात कीजिए।

(A) $\sqrt{x^2 - 1}$ (B) $\sqrt{1 - x^2}$
(C) $1 - x^2$ (D) $x^2 - 1$

30. If $3\sin x + 4\cos x = 2$, then the value of $3\cos x - 4\sin x$ is equal to :
यदि $3\sin x + 4\cos x = 2$ है, तो $3\cos x - 4\sin x$ का मान ज्ञात कीजिए।

(A) $\sqrt{21}$ (B) $\sqrt{23}$
(C) 21 (D) $\sqrt{29}$

Solution

1.(A) Put $\theta = 45$

$$\frac{\sec^2 45\left(2 + \tan^2 45 + \cot^2 45\right) \div \left(\sin^2 45 + \tan^2 45\right)}{\left(\text{cosec}^2 45 + \sec^2 45\right)\left(1 + \cot^2 45\right)^2}$$

$$= \frac{2 \times 4(-2)}{4 \times 4} = -1$$

2.(D) $\sin 3A = \cos(A + 10)$
$\cos(90 - 3A) = \cos(A + 10)$
$90 - 3A = A + 10$
$A = 20$

$2\text{cosec}30 + 6\sin^2 60° - \frac{3}{2}\tan^2 60°$

$2 \times 2 + 6 \times \left(\frac{\sqrt{3}}{2}\right)^2 - \frac{3}{2}\left(\sqrt{3}\right)^2$

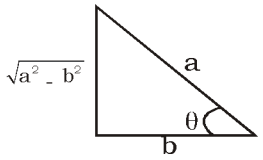
$4 + 6 \times \frac{3}{4} - \frac{3 \times 3}{2} = 4$

3.(D) $\cos A\left(\frac{1 - \cos^2 A}{\cos A}\right) \times \left(\frac{\cos A}{\sin A} + \frac{\sin A}{\cos A}\right)$

$\sin^2 A \times \left(\frac{\cos^2 A + \sin^2 A}{\sin A \cos A}\right)$

$\frac{\sin A}{\cos A} = \tan A$

4.(C) $\sec\theta = \frac{a}{b}$



$\tan\theta = \frac{\sqrt{a^2 - b^2}}{b}$ $\sin\theta = \frac{\sqrt{a^2 - b^2}}{a}$

$$\frac{1-\tan^2\theta}{2-\sin^2\theta}=\frac{1-\frac{a^2-b^2}{b^2}}{2-\frac{a^2-b^2}{a^2}}=\frac{\left(b^2-a^2+b^2\right)a^2}{\left(2a^2-a^2+b^2\right)b^2}$$

$$=\frac{\left(2b^2-a^2\right)}{\left(a^2+b^2\right)}\frac{a^2}{b^2}$$

5.(B)

$$\frac{\sin\theta\left[\tan\theta-\tan^2\theta+\sec^2\theta\right]}{(1-\sin\theta)\frac{\sin\theta}{\cos\theta}(1+\tan\theta)\left(\frac{1+\sin\theta}{\cos\theta}\right)}$$

$$\frac{\sin\theta(\tan\theta+1)\cos^2\theta}{(1-\sin\theta)\sin\theta(1+\sin\theta)(1+\tan\theta)}$$

$$=\frac{\cos^2\theta}{1-\sin^2\theta}=\frac{\cos^2\theta}{\cos^2\theta}=1$$

6.(C)

$$\frac{\left(\cos^2\theta\right)^3+\left(\sin^2\theta\right)^3+3\sin^2\theta\cos^2\theta}{\frac{1}{\sin\theta\cos\theta}\left[(\sin\theta+\cos\theta)^2-1\right]}$$

$$\frac{\left(\cos^2\theta+\sin^2\theta\right)\left[\left(\cos^4\theta+\sin^4\theta-\cos^2\theta.\sin^2\theta\right)+3\sin^2\theta\cos^2\theta\right]}{\frac{\sin^2\theta+\cos^2\theta+2\sin\theta\cos\theta-1}{\sin\theta.\cos\theta}}$$

$$\frac{\cos^4\theta+\sin^4\theta+2\sin^2\theta\cos^2\theta}{1+2\sin\theta\cos\theta-1}$$

$$=\frac{\left(\cos^2\theta+\sin^2\theta\right)^2}{2}=\frac{1}{2}$$

7.(D) Put $\theta=45°$

$$\left(\frac{1}{\cos45°}-\frac{1}{\sin45°}\right)+\frac{1}{\operatorname{cosec}45°-\cot45°}-\frac{1}{\sec45°+\tan45°}$$

$$\left(\sqrt{2}-\sqrt{2}\right)+\frac{1}{\sqrt{2}-1}-\frac{1}{\sqrt{2}+1}$$

$$=\frac{\sqrt{2}+1-\sqrt{2}+1}{\left(\sqrt{2}\right)^2-(1)^2}=2$$

$\sec\theta\operatorname{cosec}\theta\Rightarrow\sec45\operatorname{cosec}45=\sqrt{2}\ \sqrt{2}=2$

8.(D)

$$\frac{\operatorname{cosec}^2 30\sin^2 45+\sec^2 60}{\tan60\operatorname{cosec}^2 45-\sec^2 60\tan45°}$$

$$\frac{(2)^2\left(\frac{1}{\sqrt{2}}\right)^2+(2)^2}{\sqrt{3}\left(\sqrt{2}\right)^2-(2)^2(1)}$$

$$=\frac{4\times\frac{1}{2}+4}{\sqrt{3}\times2-4}=\frac{6}{2\sqrt{3}-4}=\frac{3}{\sqrt{3}-2}\times\frac{\sqrt{3}+2}{\sqrt{3}+2}$$

$$=\frac{3\left(\sqrt{3}+2\right)}{3-4}=-3\left(2+\sqrt{3}\right)$$

9.(D)

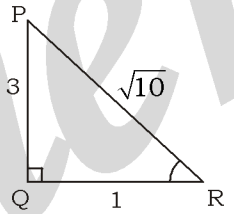
$$\frac{2\sin^2 38\sec^2 52+\cos64\sin26+\sin^2 64}{\tan^2 23+\cot^2 23-\sec^2 67-\operatorname{cosec}^2 67}$$

$$\frac{2\sin^2 38\operatorname{cosec}^2 38+\cos^2 64+\sin^2 64}{\tan^2 23+\cot^2 23-\operatorname{cosec}^2 23-\sec^2 23}$$

$$=-\frac{2+1}{\left[\left(\sec^2 23-\tan^2 23\right)\right]+\left[\left(\operatorname{cosec}^2 23-\cot^2 23\right)\right]}$$

$$=-\frac{3}{[1+1]}=\frac{-3}{2}$$

10.(B)



$\cos R=\frac{1}{\sqrt{10}}$ $\quad\sin R=\frac{3}{\sqrt{10}}$

$\operatorname{cosec}R=\frac{\sqrt{10}}{3}$ $\quad\sec P=\frac{\sqrt{10}}{3}$

$\sin P=\frac{1}{\sqrt{10}}$ $\quad\operatorname{cosec}P=\frac{\sqrt{10}}{1}$

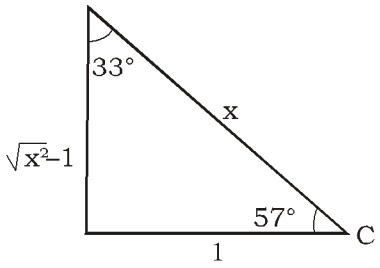
$$\frac{\sec P(\cos R+\sin P)}{\operatorname{cosec}R(\sin R-\operatorname{cosec}P)}$$

$$=\frac{\frac{\sqrt{10}}{3}\left(\frac{1}{\sqrt{10}}+\frac{1}{\sqrt{10}}\right)}{\frac{\sqrt{10}}{3}\left(\frac{3}{\sqrt{10}}-\frac{\sqrt{10}}{1}\right)}=\frac{\frac{\sqrt{10}}{3}\left(\frac{2}{\sqrt{10}}\right)}{\frac{\sqrt{10}}{3}\left(\frac{3-10}{\sqrt{10}}\right)}$$

$$=\frac{2}{3-10}\qquad=\frac{2}{-7}$$

11.(A) $x=\sec57°$

$\cot^2 33°+\sin^2 57+\sin^2 33+\operatorname{cosec}^2 57.\cos^2 33+\sec^2 33.\sin^2 57$



$$x^2+1+\frac{x^2-1}{x^2}+\frac{1}{x^2}+\frac{x^2}{x^2-1}\times\frac{x^2-1}{x^2}+\frac{x^2}{x^2-1}\times\frac{x^2-1}{x^2}$$

$= x^2 + 2$

12.(A) $(\tan^2A + \cot^2A - 2) - \frac{1}{\cos^2A}\times\frac{1}{\sin^2A}$

Let A = 45°

$$(1+1-2)-\frac{1}{\left(\frac{1}{2}\right)}\times\frac{1}{\left(\frac{1}{2}\right)}$$

$0 - 4 = -4$

13.(B) $$\frac{5\times\frac{1}{4}+4\times\frac{4}{3}-1}{3-\frac{1}{4}-\frac{1}{2}}=\frac{\frac{15+64-12}{12}}{\frac{9}{4}}=\frac{67}{27}$$

14.(D) $\cos(2\theta + 54) = \sin\theta = \cos(90 - \theta)$

$2\theta + 54 = 90 - \theta$

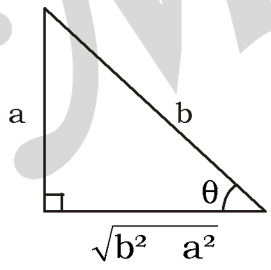
$3\theta = 36$

$\theta = 12$

$$=\frac{1}{\tan 60+\operatorname{cosec} 30}=\frac{1}{\sqrt{3}+2}$$

$$=\frac{2-\sqrt{3}}{\left(\sqrt{3}+2\right)\left(2-\sqrt{3}\right)}=2-\sqrt{3}$$

15.(A)



$$\frac{\frac{\sqrt{3}\sqrt{b^2-a^2}}{a}+1}{\frac{a}{\sqrt{b^2-a^2}}+\sqrt{3}}=\frac{\sqrt{3}\sqrt{b^2-a^2}+a}{\frac{a(a+\sqrt{3}\sqrt{b^2-a^2})}{\sqrt{b^2-a^2}}}$$

$$=\frac{\sqrt{b^2-a^2}}{a}$$

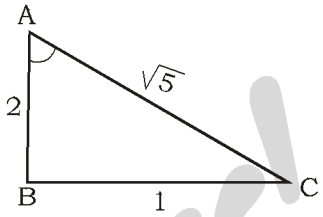
16. (C) $\theta = 45°$

$$\frac{\frac{1}{2}}{\frac{1}{\sqrt{2}}\left(1+\frac{1}{\sqrt{2}}\right)}+\frac{1+\frac{1}{\sqrt{2}}}{\frac{1}{\sqrt{2}}}$$

$$\frac{1}{\sqrt{2}+1}+\frac{\sqrt{2}+1}{1}=\frac{\sqrt{2}-1}{1}+\sqrt{2}+1=2\sqrt{2}$$

Put in options only C 2.sec 45° = $2\sqrt{2}$

17.(B)



$$\frac{\frac{1}{\sqrt{5}}\left(\frac{1}{\sqrt{5}}+\frac{2}{\sqrt{5}}\right)}{\frac{1}{\sqrt{5}}\left(\frac{2}{\sqrt{5}}-\frac{1}{\sqrt{5}}\right)}=\frac{\frac{3}{5}}{\frac{1}{5}}=3$$

18. (A) $$\frac{\sin\theta+\cos\theta-1}{\sin\theta-\cos\theta+1}\times\sqrt{\frac{(1+\sin\theta)(1+\sin\theta)}{(1-\sin\theta)(1+\sin\theta)}}$$

$$=\frac{\sin\theta+\cos\theta-1}{\sin\theta-\cos\theta+1}\times\frac{1+\sin\theta}{\cos\theta}$$

$\theta = 45°$

$$=\frac{\sqrt{2}-1}{1}\times\frac{\sqrt{2}+1}{1}$$

$= 2 - 1 = 1$

19.(A) $$\frac{\left(1+\frac{\sin\theta}{\cos\theta}+\frac{1}{\cos\theta}\right)\left(1+\frac{\cos\theta}{\sin\theta}-\frac{1}{\sin\theta}\right)}{\left(\frac{1}{\cos\theta}+\frac{\sin\theta}{\cos\theta}\right)(1-\sin\theta)}$$

$$\frac{(\cos\theta+\sin\theta+1)(\sin\theta+\cos\theta-1)}{\cos\theta\sin\theta\frac{(1+\sin\theta)}{\cos\theta}(1-\sin\theta)}$$

$$\frac{\cos^2\theta+\sin^2\theta+2\sin\theta\cos\theta-1}{\sin\theta(1-\sin^2\theta)}$$

$$\frac{2\sin\theta\cos\theta}{\sin\theta\cos^2\theta}=2\sec\theta$$

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20.(A) Put $\theta = 45°$

$$\frac{\sec 45°(\sec 45° + \tan 45°)(1 - \sin 45°)}{(\text{cosec}^2 45° - 1)\sin^2 45°}$$

$$\frac{\sqrt{2}(\sqrt{2} + 1)\left(1 - \frac{1}{\sqrt{2}}\right)}{(2 - 1)\frac{1}{2}} = 2$$

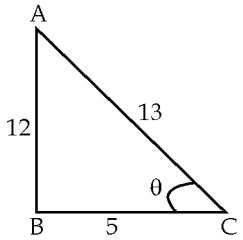
$\text{Sec}^2 45° = 2$

21.(A) $\sin^2\theta + \text{cosec}^2\theta + 2 + \cos^2\theta + \sec^2\theta + 2 = k + \tan^2\theta + \cot^2\theta$

$5 + 1 + \tan^2\theta + 1 + \cot^2\theta = k + \tan^2\theta + \cot^2\theta$

$k = 7$

22.(B)



$$\tan^2\theta + \sec^2\theta = \frac{144}{25} + \frac{169}{25}$$

$$= \frac{313}{25}$$

23.(D) $\sin\theta = 1 - \sin^2\theta$

$\sin\theta = \cos^2\theta$

$\sin^2\theta = \cos^4\theta$

$\sin^2\theta + \sin^4\theta = 1$

24.(C) $\sin(x + y) = \cos(x - y)$

$x + y = 90 - x + y$

$2x = 90$

$x = 45°$

$$\cos^2 45 = \frac{1}{2}$$

25.(B)

$$\frac{\cos^2\theta}{\frac{\cos^2\theta}{\sin^2\theta} - \cos^2\theta} = 3$$

$$\frac{\sin^2\theta}{1 - \sin^2\theta} = 3$$

$$\frac{\sin^2\theta}{\cos^2\theta} = 3$$

$\tan^2\theta = 3$

$\tan\theta = \sqrt{3}$

$\theta = 60°$

26.(A)

$$\frac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta} = \frac{209}{79}$$

$$= \frac{2\sec\theta}{2\tan\theta} = \frac{288}{130}$$

$$= \frac{1}{\sin\theta} = \frac{144}{65}$$

$$\sin\theta = \frac{65}{144}$$

27.(A) $\sec\theta + \tan\theta = 3$

$$\sec\theta - \tan\theta = \frac{1}{3}$$

$$2\sec\theta = 3 + \frac{1}{3} = \frac{10}{3}$$

$$\sec\theta = \frac{5}{3}$$

28.(A) $\alpha + \beta = 90°$

$\alpha = 2\beta$

$3\beta = 90°$

$\beta = 30°$

$\alpha = 60°$

$3\cos^2 60° - 2\sin^2 30°$

$$3 \times \frac{1}{4} - 2 \times \frac{1}{4}$$

$$= \frac{1}{4}$$

29.(D)

$$\frac{1}{\text{cosec}^2 51°} + \sin^2 39° + \tan^2 51° -$$

$$\frac{1}{\sin^2 51°.\sec^2 39°}$$

$= \sin^2 51° + \cos^2 51° + \tan^2 51° -$

$$\frac{1}{\sin^2 51°.\text{cosec}^2 51°}$$

$1 + \tan^2 51° - 1$

$= \tan^2 51$

$= \text{cosec}39° = x$

$\tan 51° = \sqrt{x^2 - 1}$

$\tan^2 51° = \left(\sqrt{x^2 - 1}\right)^2 = (x^2 - 1)$

30.(A) $3\cos x - 4\sin x = \sqrt{9 + 16 - 4}$

$= \sqrt{21}$

(SSC CGL MAINS – 2018)

1. If $\sin\theta = \sqrt{3}\cos\theta$, $0° < \theta < 90°$, then the value of $2\sin^2\theta + \sec^2\theta + \sin\theta\sec\theta + \text{cosec}\theta$ is :
यदि $\sin\theta = \sqrt{3}\cos\theta$, $0° < \theta < 90°$ है, तो $2\sin^2\theta + \sec^2\theta + \sin\theta\sec\theta + \text{cosec}\theta$ का मान है ?

(A) $\frac{33+10\sqrt{3}}{6}$ (B) $\frac{19+10\sqrt{3}}{6}$

(C) $\frac{33+10\sqrt{3}}{3}$ (D) $\frac{19+10\sqrt{3}}{3}$

2. The value of the expression $(\cos^6\theta + \sin^6\theta - 1)(\tan^2\theta + \cot^2\theta + 2)$ is :
व्यंजक $(\cos^6\theta + \sin^6\theta - 1)(\tan^2\theta + \cot^2\theta + 2)$ निम्न में से किसके बराबर है ?

(A) 0 (B) –1
(C) –3 (D) 1

3. $\frac{(2\sin A)(1+\sin A)}{1+\sin A+\cos A}$ is equal to :

$\frac{(2\sin A)(1+\sin A)}{1+\sin A+\cos A}$ का मान निम्न में से किसके बराबर है ?

(A) 1 + sinA – cosA (B) 1 – sinA cosA
(C) 1 + cosA – sinA (D) 1 + sinA cosA

4. The value of $\frac{(\cos 9° + \sin 81°)(\sec 9° + \text{cosec}81°)}{\sin 56°\sec 34° + \cos 25°\text{cosec}65°}$ is:

$\frac{(\cos 9° + \sin 81°)(\sec 9° + \text{cosec}81°)}{\sin 56°\sec 34° + \cos 25°\text{cosec}65°}$ का मान है :

(A) 4 (B) $\frac{1}{2}$ (C) 2 (D) $\frac{1}{4}$

5. If θ lies in the first quadrant and $\cos^2\theta - \sin^2\theta = \frac{1}{2}$, then the value of $\tan^2 2\theta + \sin^2 3\theta$ is :

यदि θ प्रथम चतुर्थांश में है तथा $\cos^2\theta - \sin^2\theta = \frac{1}{2}$ है, तो $\tan^2 2\theta + \sin^2 3\theta$ का मान है :

(A) $\frac{7}{2}$ (B) 3 (C) 4 (D) $\frac{4}{3}$

6. What is the value of $\text{cosec}(65° + \theta) - \sec(25° - \theta) + \tan^2 20° - \text{cosec}^2 70°$?
$\text{cosec}(65° + \theta) - \sec(25° - \theta) + \tan^2 20° - \text{cosec}^2 70°$ का मान है :

(A) 0 (B) 1
(C) 2 (D) –1

7. $\frac{(1+\cos\theta)^2 + \sin^2\theta}{(\text{cosec}^2\theta - 1)\sin^2\theta}$ is equal to:-

$\frac{(1+\cos\theta)^2 + \sin^2\theta}{(\text{cosec}^2\theta - 1)\sin^2\theta}$ का मान है

(A) $\cos\theta(1 + \sin\theta)$ (B) $2\cos\theta(1 + \sec\theta)$
(C) $\sec\theta(1 + \sin\theta)$ (D) $2\sec\theta(1 + \sec\theta)$

8. $\left(\frac{1-\tan\theta}{1-\cot\theta}\right)^2 + 1$ is equals to—

$\left(\frac{1-\tan\theta}{1-\cot\theta}\right)^2 + 1$ निम्न में से किसके बराबर है ?

(A) $\text{cosec}^2\theta$ (B) $\sec^2\theta$
(C) $\sin^2\theta$ (D) $\cos^2\theta$

9. $\sqrt{\frac{\cot\theta + \cos\theta}{\cot\theta - \cos\theta}}$ is equal to :

$\sqrt{\frac{\cot\theta + \cos\theta}{\cot\theta - \cos\theta}}$ निम्न में से किसके बराबर है ?

(A) $\sec\theta + \tan\theta$ (B) $1 + \sec\theta + \tan\theta$
(C) $1 - \sec\theta + \tan\theta$ (D) $\sec\theta - \tan\theta$

10. If $5\sin\theta - 4\cos\theta = 0$, $0° < \theta < 90°$, then the value of $\frac{5\sin\theta - 2\cos\theta}{5\sin\theta + 3\cos\theta}$ is :
यदि $5\sin\theta - 4\cos\theta = 0$, $0° < \theta < 90°$ है, तो $\frac{5\sin\theta - 2\cos\theta}{5\sin\theta + 3\cos\theta}$ का मान है :

(A) $\frac{3}{8}$ (B) $\frac{3}{7}$ (C) $\frac{2}{7}$ (D) $\frac{5}{8}$

11. From the top of a tower, the angles of depression of two objects on the ground on the same side of it, are observed to be 60° and 30° respectively and the distance between the objects is $400\sqrt{3}$ m. The height (in m) of the tower is :
एक मीनार के शीर्ष से दो वस्तुओं का अवनमन कोण, भूमि पर उसके समान किनारे पर क्रमश: 60° और 30° पाए जाते हैं और दोनों वस्तुओं के बीच की दूरी $400\sqrt{3}$ m मापी जाती है। मीनार की ऊंचाई (मीटर में) है :

(A) 800 (B) $800\sqrt{3}$
(C) 600 (D) $600\sqrt{3}$

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12. The value of $\left(\frac{\sin A}{1-\cos A}+\frac{1-\cos A}{\sin A}\right)\div\left(\frac{\cot^2 A}{1+\text{cosec}A}+1\right)$ is :

$\left(\frac{\sin A}{1-\cos A}+\frac{1-\cos A}{\sin A}\right)\div\left(\frac{\cot^2 A}{1+\text{cosec}A}+1\right)$ का मान है:

(A) $\frac{3}{2}$ (B) $\frac{1}{2}$ (C) 1 (D) 2

13. If $\frac{1+\sin\phi}{1-\sin\phi}=\frac{p^2}{q^2}$ then secϕ is equal to :

यदि $\frac{1+\sin\phi}{1-\sin\phi}=\frac{p^2}{q^2}$ है, तो secϕ निम्नलिखित में से किसके बराबर है :

(A) $\frac{2p^2q^2}{p^2+q^2}$ (B) $\frac{1}{2}\left(\frac{q}{p}+\frac{p}{q}\right)$

(C) $\frac{1}{p^2}+\frac{1}{q^2}$ (D) $\frac{p^2q^2}{p^2+q^2}$

14. The value of $\frac{\sec\phi(1-\sin\phi)(\sin\phi+\cos\phi)(\sec\phi+\tan\phi)}{\sin\phi(1+\tan\phi)+\cos\phi(1+\cot\phi)}$ is equal to :

$\frac{\sec\phi(1-\sin\phi)(\sin\phi+\cos\phi)(\sec\phi+\tan\phi)}{\sin\phi(1+\tan\phi)+\cos\phi(1+\cot\phi)}$ का मान निम्नलिखित में से किसके बराबर है ?

(A) 2cosϕ (B) cosecϕ secϕ
(C) 2sinϕ (D) sinϕ cosϕ

15. If $3(\cot^2\phi-\cos^2\phi)=\cos^2\phi$, $0°<\phi<90°$, then the value of $(\tan^2\phi+\text{cosec}^2\phi+\sin^2\phi)$ is :

यदि $3(\cot^2\phi-\cos^2\phi)=\cos^2\phi$, $0°<\phi<90°$ है, तो $(\tan^2\phi+\text{cosec}^2\phi+\sin^2\phi)$ का मान है :

(A) $\frac{13}{3}$ (B) $\frac{61}{12}$ (C) $\frac{25}{12}$ (D) $\frac{15}{4}$

16. If $\frac{\sin^2\phi-3\sin\phi+2}{\cos^2\phi}=1$, where $0°<\phi<90°$, then what is the value of $(\cos2\phi+\sin3\phi+\text{cosec}2\phi)$?

यदि $\frac{\sin^2\phi-3\sin\phi+2}{\cos^2\phi}=1$ है, जिसमें $0°<\phi<90°$ है, तो $(\cos2\phi+\sin3\phi+\text{cosec}2\phi)$ का मान क्या है ?

(A) $\frac{2+\sqrt{3}}{3}$ (B) $\frac{3+4\sqrt{3}}{6}$

(C) $\frac{9+4\sqrt{3}}{6}$ (D) $\frac{3+2\sqrt{3}}{3}$

17. The value of $\frac{\sin(78°+\phi)-\cos(12°-\phi)+(\tan^2 70°-\text{cosec}^2 20°)}{\sin25°\cos65°+\cos25°\sin65°}$ is :

$\frac{\sin(78°+\phi)-\cos(12°-\phi)+(\tan^2 70°-\text{cosec}^2 20°)}{\sin25°\cos65°+\cos25°\sin65°}$ का मान है :

(A) 2 (B) –1
(C) –2 (D) 0

18. The value of $\sqrt{\frac{\text{cosec}\phi-\cot\phi}{\text{cosec}\phi+\cot\phi}}\div\frac{\sin\phi}{1+\cos\phi}$ is equal to:

$\sqrt{\frac{\text{cosec}\phi-\cot\phi}{\text{cosec}\phi+\cot\phi}}\div\frac{\sin\phi}{1+\cos\phi}$ का मान निम्नलिखित में से किसके बराबर है ?

(A) cosecϕ (B) $\frac{1}{2}$ (C) secϕ (D) 1

19. From a point exactly midway between the foot of two towers P and Q, the angles of elevation of their tops are 30° and 60°, respectively. The ratio of the height of P to that of Q is :

दो मीनार P और Q के आधार के बिल्कुल मध्य में, उनके शीर्ष की ऊंचाई के कोण क्रमश: 30° और 60° हैं। तो P और Q की ऊंचइयों का अनुपात है :

(A) 1 : 3 (B) 1 : 2
(C) $1:2\sqrt{3}$ (D) $2:3\sqrt{3}$

20. The value of $(\tan29°\cot61°-\text{cosec}^2 61°)+\cot^2 54°-\sec^2 36°+(\sin^2 1°+\sin^2 3°+\sin^2 5°+\ldots\ldots+\sin^2 89°)$ is :

$(\tan29°\cot61°-\text{cosec}^2 61°)+\cot^2 54°-\sec^2 36°+(\sin^2 1°+\sin^2 3°+\sin^2 5°+\ldots\ldots+\sin^2 89°)$ का मान है :

(A) $20\frac{1}{2}$ (B) 21

(C) $22\frac{1}{2}$ (D) 22

21. If $\sec\theta+\tan\theta=p$, $(p>1)$ then $\frac{\text{cosec}\theta+1}{\text{cosec}\theta-1}$ = ?

यदि $\sec\theta+\tan\theta=p$, $(p>1)$ है, तो $\frac{\text{cosec}\theta+1}{\text{cosec}\theta-1}$ =

(A) $\frac{p+1}{p-1}$ (B) p^2

(C) $\frac{p-1}{p+1}$ (D) $2p^2$

22. The value cosec (67° + θ) – sec (23° – θ) + cos15° cos35° cosec55° cos60° cosec75° is :
cosec (67° + θ) – sec (23° – θ) + cos15° cos35° cosec55° cos60° cosec75° का मान क्या है ?

(A) 2 (B) 0 (C) 1 (D) $\frac{1}{2}$

23. If $2\cos^2\theta + 3\sin\theta = 3$, where $0° < \theta < 90°$, then what is the value of $\sin^2 2\theta + \cos^2\theta + \tan^2 2\theta + \text{cosec}^2 2\theta$?
यदि $2\cos^2\theta + 3\sin\theta = 3$ जहाँ $0° < \theta < 90°$ है, तो $\sin^2 2\theta + \cos^2\theta + \tan^2 2\theta + \text{cosec}^2 2\theta$ का मान क्या होगा ?

(A) $\frac{35}{12}$ (B) $\frac{29}{3}$ (C) $\frac{35}{6}$ (D) $\frac{29}{6}$

24. The value of $(1 + \cot\theta - \text{cosec}\theta)(1 + \cos\theta + \sin\theta)\sec\theta$ = ?
$(1 + \cot\theta - \text{cosec}\theta)(1 + \cos\theta + \sin\theta)\sec\theta$ का मान क्या है ?

(A) –2 (B) 2
(C) $\sec\theta\text{cosec}\theta$ (D) $\sin\theta\cos\theta$

25. The value of $\frac{\sec^2\theta}{\text{cosec}^2\theta} + \frac{\text{cosec}^2\theta}{\sec^2\theta} - (\sec^2\theta + \text{cosec}^2\theta)$ is :

$\frac{\sec^2\theta}{\text{cosec}^2\theta} + \frac{\text{cosec}^2\theta}{\sec^2\theta} - (\sec^2\theta + \text{cosec}^2\theta)$ का मान क्या है ?

(A) 0 (B) –2 (C) 2 (D) 1

26. The value of $\frac{2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta)}{\cos^4\theta - \sin^4\theta - 2\cos^2\theta}$ is :

$\frac{2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta)}{\cos^4\theta - \sin^4\theta - 2\cos^2\theta}$ का मान क्या है ?

(A) –1 (B) –2 (C) 2 (D) 1

27. The value of $\sin^2 64° + \cos 64°\sin 26° + 2\cos 43°\text{cosec}47°$ is :
$\sin^2 64° + \cos 64°\sin 26° + 2\cos 43°\text{cosec}47°$ का मान क्या है ?

(A) 4 (B) 1 (C) 2 (D) 3

28. The value of $\frac{(\sin\theta - \cos\theta)(1 + \tan\theta + \cot\theta)}{1 + \sin\theta\cos\theta}$ = ?

$\frac{(\sin\theta - \cos\theta)(1 + \tan\theta + \cot\theta)}{1 + \sin\theta\cos\theta}$ का मान क्या है ?

(A) $\sec\theta - \text{cosec}\theta$ (B) $\text{cosec}\theta - \sec\theta$
(C) $\sin\theta + \cos\theta$ (D) $\tan\theta - \cot\theta$

29. The value of $\frac{\sin\theta + \cos\theta - 1}{\sin\theta - \cos\theta + 1} \times \frac{\tan^2\theta(\text{cosec}^2\theta - 1)}{\sec\theta - \tan\theta}$ is :

$\frac{\sin\theta + \cos\theta - 1}{\sin\theta - \cos\theta + 1} \times \frac{\tan^2\theta(\text{cosec}^2\theta - 1)}{\sec\theta - \tan\theta}$ का मान क्या है ?

(A) 0 (B) –1
(C) 1 (D) $\frac{1}{2}$

30. P and Q are two points on the ground on either side of a pole. The angles of elevation of the top of the pole as observed from P and Q are 60° and 30°, respectively and the distance between them is $84\sqrt{3}$ m. What is the height (in m) of the pole ?
एक खंभे के दोनों ओर आधार पर P और Q दो बिंदु हैं। P और Q के हिसाब से खंभे के शीर्ष के उन्नयन कोण क्रमशः 60° और 30° हैं तथा उनके बीच की दूरी $84\sqrt{3}$ मीटर है। खंभे की ऊंचाई (मीटर में) क्या है ?

(A) 63 (B) 73.5 (C) 52.5 (D) 60

31. If $\frac{\sin\theta}{1 + \cos\theta} + \frac{1 + \cos\theta}{\sin\theta} = \frac{4}{\sqrt{3}}$, $0° < \theta < 90°$, then the value of $(\tan\theta + \sec\theta)^{-1}$ is :

यदि $\frac{\sin\theta}{1 + \cos\theta} + \frac{1 + \cos\theta}{\sin\theta} = \frac{4}{\sqrt{3}}$, $0° < \theta < 90°$ है, तो $(\tan\theta + \sec\theta)^{-1}$ का मान क्या होगा ?

(A) $2 - \sqrt{3}$ (B) $3 - \sqrt{2}$
(C) $2 + \sqrt{3}$ (D) $3 + \sqrt{2}$

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Solution

1. (A) $\tan\theta = \sqrt{3}$

$\Rightarrow \theta = 60°$

$\Rightarrow 2\sin^2\theta + \sec^2\theta + \sin\theta\sec\theta + \operatorname{cosec}\theta$

$= 2 \times \frac{3}{4} + 4 + \sqrt{3} + \frac{2}{\sqrt{3}}$

$= \frac{9+24+6\sqrt{3}+4\sqrt{3}}{6} = \frac{33+10\sqrt{3}}{6}$

2. (C) $\left(\cos^6\theta + \sin^6\theta - 1\right)\left(\tan^2\theta + \cot^2\theta + 2\right)$

$= \left(\left(\sin^2\theta+\cos^2\theta\right)^3 - 3\sin^2\theta\cos^2\theta - 1\right)\left(\frac{1}{\sin\theta\cos\theta}\right)^2$

$= -3$

3. (A) $\frac{(2\sin A)(1+\sin A)}{(1+\sin A+\cos A)} \times \frac{(1+\sin A-\cos A)}{(1+\text{Sin}A-\cos A)}$

$= \frac{(2\sin A)(1+\sin A)(1+\sin A-\cos A)}{1+\sin^2 A+2\sin A-\cos^2 A}$

$= \frac{(2\sin A)(1+\sin A)(1+\sin A-\cos A)}{(2\sin A)(1+\sin A)}$

$= 1 + \sin A - \cos A$

4. (C) $\frac{(\cos 9° + \sin 81°)(\sec 9° + \operatorname{cosec} 81°)}{(\sin 56°\sec 34° + \cos 25°\operatorname{cosec} 65°)}$

$= \frac{2\cos 9° \times 2\sec 9°}{\left(\frac{\sin 56°}{\sin 56°}\right) + \left(\frac{\cos 25°}{\cos 25°}\right)} = \frac{4}{2} = 2$

5. (C) $\cos^2\theta - \sin^2\theta = \frac{1}{2}$

$\Rightarrow \quad 2\cos^2\theta = \frac{3}{2}$

$\Rightarrow \quad \cos\theta = \frac{\sqrt{3}}{2} = \cos 30°$

$\Rightarrow \quad \theta = 30°$

So, $\tan^2 2\theta + \text{Sin}^3 3\theta = 3 + 1 = 4$

6. (D) $\operatorname{cosec}(65+\theta) - \sec(25-\theta) + \tan^2 20° - \operatorname{cosec}^2 70°$

$= \operatorname{cosec}(65+\theta) - \operatorname{cosec}(65+\theta) + \cos^2 70° - \operatorname{cosec}^2 70°$

$= 0 - 1 = -1$

7. (D) $\frac{(1+\cos\theta)^2 + \sin^2\theta}{\left(\operatorname{cosec}^2\theta - 1\right)\sin^2\theta} = \frac{2(1+\cos\theta)}{\cos^2\theta}$

$= 2\sec\theta\,(1 + \sec\theta)$

8. (B) $\left(\frac{1-\tan\theta}{1-\cot\theta}\right)^2 + 1 = (-\tan\theta)^2 + 1 = \sec^2\theta$

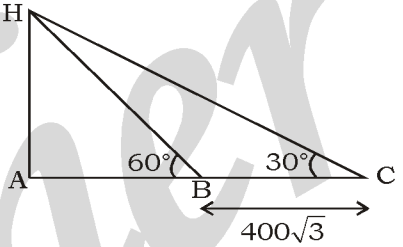
9. (A) $\sqrt{\frac{\cot\theta+\cos\theta}{\cot\theta-\cos\theta}} = \sqrt{\frac{1+\sin\theta}{1-\sin\theta}}$

$= \frac{1+\sin}{\cos\theta} = (\sec\theta + \tan\theta)$

10. (C) $5\sin\theta - 4\cos\theta = 0 \qquad \tan\theta = \frac{4}{5}$

So, $\frac{5\sin\theta - 2\cos\theta}{5\sin\theta + 3\cos\theta} = \frac{4-2}{4+3} = \frac{2}{7}$

11. (C) H



BC = $400\sqrt{3}$

So, AB = $200\sqrt{3}$

then H = $200\sqrt{3} \times \sqrt{3} = 600$ m

12. (D) Put A = 90°

$(1 + 1) \div (0 + 1)$

$\frac{2}{1} = 2$

13. (B) $\frac{2\sin\phi}{2} = \frac{P^2-q^2}{P^2+q^2}$

$\sin\phi = \frac{P^2-q^2}{P^2+q^2}$

$\Rightarrow \sec\phi = \frac{p^2+q^2}{2Pq} \Rightarrow \frac{1}{2}\left[\frac{q}{p} + \frac{p}{q}\right]$

14. (D) Put $\phi = 45°$

$\frac{\left(\sqrt{2}\right)\left(\sqrt{2}-1\right)}{\sqrt{2}}\left(\sqrt{2}\right)\left(\sqrt{2}+1\right) \Rightarrow \frac{\sqrt{2}}{2\sqrt{2}} = \frac{1}{2}$

15. (B) $\cot^2\phi - \cos^2\phi = \frac{\cos^2\phi}{3}$

$\cot^2\phi = \frac{4\cos^2\phi}{3}$

$\sin^2\phi = \frac{3}{4}$

$\Rightarrow \phi = 60°$

$\Rightarrow \tan^2 60° + \text{cosec}^2 60° + \sin^2 60°$

$3 + \frac{4}{3} + \frac{3}{4} \Rightarrow 3 + \frac{25}{12} \Rightarrow \frac{61}{12}$

16. (C) $\sin^2\phi - 3\sin\phi + 2 = 1 - \sin^2\phi$

$2\sin^2\phi - 3\sin\phi + 1 = 0$

$\Rightarrow \phi = 30°$

$\Rightarrow \cos 60° + \sin 90° + \text{cosec } 60°$

$\frac{1}{2} + 1 + \frac{2}{\sqrt{3}}$

$\frac{\sqrt{3} + 2\sqrt{3} + 4}{2\sqrt{3}} \Rightarrow \frac{4 + 3\sqrt{3}}{2\sqrt{3}} = \frac{9 + 4\sqrt{3}}{6}$

17. (B) $\frac{\sin(78° + \phi) - \sin(78° + \phi) + \tan^2 70° - \sec^2 70°}{\sin^2 25° + \text{con}^2 25°}$

$= \frac{-1}{1} = -1$

18. (D) $\text{cosec}\phi - \cot\phi \div \left(\frac{1 - \cos\phi}{\sin\phi}\right)$

$= \frac{\text{cosec}\phi - \cot\phi}{\text{cosec}\phi - \cot\phi} = 1$

19. (A) $x \tan 30 : x \tan 60$

$\frac{1}{\sqrt{3}} : \sqrt{3}$

$\Rightarrow 1 : 3$

20. (A) $(\tan^2 29 - \text{cosec}^2 61) + \cot^2 54 - \sec^2 36 + 22\frac{1}{2}$

$\Rightarrow (\cot^2 61 - \text{cosec}^2 61) + \tan^2 36 - \sec^2 36 + 22\frac{1}{2}$

$\Rightarrow -1 - 1 + 22\frac{1}{2} \Rightarrow 20\frac{1}{2}$

21. (B) $\sec\theta + \tan\theta = P$

$\Rightarrow \sec\theta - \tan\theta = \frac{1}{p} \quad \Rightarrow 2\sec\theta = \frac{p^2 + 1}{p}$

$\Rightarrow \cos\theta = \frac{2p}{p^2 + 1} \quad \Rightarrow \sin\theta = \frac{p^2 - 1}{p^2 + 1}$

$\Rightarrow \frac{\text{cosec}\theta + 1}{\text{cosec}\theta - 1} = \frac{\left(\frac{p^2 + 1}{p^2 - 1} + 1\right)}{\left(\frac{p^2 + 1}{p^2 - 1} - 1\right)} \Rightarrow \frac{2p^2}{2} = p^2$

22. (D) $\text{cosec}(67 + \theta) - \sec(23 + \theta) + \cos 15 \cos 35 \text{ cosec} 55 \cos 60 \text{ cosec} 75°$

$\Rightarrow 0 + \cos 15 \cos 35 \text{cosec} 55 \cos 60 \text{cosec} 75$

$0 + \cos 60 = \frac{1}{2}$

23. (C) $2\cos^2\theta + 3\sin\theta = 3 \qquad 0 < \theta < 90$

$2 - 2\sin^2\theta + 3\sin\theta = 3$

$\Rightarrow 2\sin^2\theta - 3\sin\theta + 1 = 0$

$\Rightarrow \theta = 30°$

$\Rightarrow \sin^2 60 + \cos^2 30 + \tan^2 60 + \text{cosec}^2 60$

$\frac{3}{4} + \frac{3}{4} + 3 + \frac{4}{3} = \frac{3}{2} + 3 + \frac{4}{3} = \frac{9 + 18 + 8}{6} = \frac{35}{6}$

24. (B) $(1 + \cot\theta - \text{cosec}\theta)(1 + \cos\theta + \sin\theta)\sec\theta$

Put $\theta = 45° \qquad \left(2 - \sqrt{2}\right)\left(2 + \sqrt{2}\right) = 2$

Put $\theta = 30° \quad 2$

25. (B) Put $\theta = 45°$

$1 + 1 - 4 = -2$

26. (D) Put $\theta = 0°$

$\frac{2 - 3}{1 - 0 - 2} = \frac{-1}{-1} = 1$

27. (D) $\sin^2 64 + \cos^2 64 + 2$

$\Rightarrow 1 + 2 = 3$

28. (A) $\frac{(\sin\theta - \cos\theta)(1 + \tan\theta + \cot\theta)}{1 + \sin\theta\cos\theta}$

$\frac{(\sin\theta - \cos\theta)(\sin\theta\cos\theta + 1)}{\sin\theta\cos\theta(1 + \sin\theta\cos\theta)}$

$= \frac{\sin\theta - \cos\theta}{\sin\theta\cos\theta} = \sec\theta - \text{cosec}\theta$

29. (C) Put $\theta = 45°$

$\left[\frac{\left(\sqrt{2} - 1\right)}{1}\right] \times \frac{(1)}{\left(\sqrt{2} - 1\right)} = 1$

30. (A) Let height = h

$\Rightarrow h(\cot 60 + \cot 30) = 84\sqrt{3}$

$h \times \frac{4}{\sqrt{3}} = 84\sqrt{3}$

$\Rightarrow h = 21 \times 3 = 63$

31. (A) $\frac{\sin\theta(1 - \cos\theta) + \sin\theta(1 + \cos\theta)}{\sin^2\theta}$

$\frac{\sin\theta(1 - \cos\theta) + \sin\theta(1 + \cos\theta)}{\sin^2\theta} = \frac{4}{\sqrt{3}}$

$\frac{2}{\sin\theta} = \frac{4}{\sqrt{3}} = \theta = 60°$

$(\tan 60 + \sec 60)^{-1}$

$= \left(\sqrt{3} + 2\right)^{-1} = 2 - \sqrt{3}$

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(SSC CGL MAINS – 2017)

1. What is the value of $\frac{2\left(1-\sin^2\theta\right)\text{cosec}^2\theta}{\cot^2\theta\left(1+\tan^2\theta\right)}-1$?

$\frac{2\left(1-\sin^2\theta\right)\text{cosec}^2\theta}{\cot^2\theta\left(1+\tan^2\theta\right)}-1$ का मान क्या है ?

(A) $\sin 2\theta$ (B) $\sin^2\theta$
(C) $\cos^2\theta$ (D) $\cos 2\theta$

2. What is the value of $\cos 15° - \cos 165°$?
$\cos 15° - \cos 165°$ का मान क्या है ?

(A) $\sqrt{3}\sqrt{2}$ (B) $2\left(\sqrt{3}-1\right)$

(C) $\left(\sqrt{3}+1\right)\sqrt{2}$ (D) $\frac{\left(\sqrt{3}+1\right)}{2}$

3. What is the value of

$\frac{\left[1+2\cot^2(90-x)-2\,\text{cosec}(90-x)\cot(90-x)\right]}{\left[\text{cosec}(90-x)-\cot(90-x)\right]}$?

$\frac{\left[1+2\cot^2(90-x)-2\,\text{cosec}(90-x)\cot(90-x)\right]}{\left[\text{cosec}(90-x)-\cot(90-x)\right]}$ का मान क्या है ?

(A) cosx + sinx (B) sinx – cosx
(C) secx + tanx (D) sec x – tan x

4. What is the value of $\sin(180-\theta)\sin(90-\theta)-\left[\frac{\cot(90-\theta)}{1+\tan^2\theta}\right]$

$\sin(180-\theta)\sin(90-\theta)-\left[\frac{\cot(90-\theta)}{1+\tan^2\theta}\right]$ का मान क्या है?

(A) $\cos^2\theta\,\sin^2\theta$ (B) $\frac{\cot\theta}{\left(1+\cot^2\theta\right)^2}$

(C) $\frac{\tan\theta}{\left(1+\tan^2\theta\right)^2}$ (D) 0

5. A pole is standing on the top of a house, Height of house is 25 metres. The angle of elevation of the top of house from point P is 45° and the angle of elevation of the top of pole from P is 60°. PointP is on the ground level. What is the height (in metres) of pole ?

एक घर की चोटी पर एक खम्भा खड़ा है। घर की ऊँचाई 25 मीटर है। बिन्दु P से घर की चोटी का उन्नयन कोण 45° है तथा P से खम्भे की चोटी का उन्नयन कोण 60° है। बिन्दु P भूमि की सतह पर है। खम्भे की ऊँचाई (मीटर में) क्या है ?

(A) $10\left(\sqrt{3}+1\right)$ (B) $15\left(\sqrt{3}+1\right)$

(C) $25\left(\sqrt{3}-1\right)$ (D) $20\left(\sqrt{3}-1\right)$

6. A ladder is placed against a wall such that it just reaches the top of the wall. The foot of the ladder is at a distance of 5 metres from the wall. The angle of elevation of the top of the wall from the base of the ladder is 15°. What is the length (in metres) of the ladder ?
एक सीढ़ी दीवार के सहारे इस प्रकार खड़ी है कि वह दीवार की चोटी तक पहुँचती है। सीढ़ी का आधार दीवार से 5 मीटर की दूरी है। सीढ़ी के आधार से दीवार की चोटी का उन्नयन कोण 15° है। सीढ़ी की लम्बाई (मीटर में) क्या है ?

(A) $5\sqrt{6}-5\sqrt{3}$ (B) $5\sqrt{6}-5\sqrt{2}$
(C) $5\sqrt{2}-1$ (D) $5\sqrt{3}-5\sqrt{2}$

7. An aeroplane is flying horizontally at a height of 1.8 km above the ground. The angle of elevation of plane from point X is 60° and after 20 seconds, its angle of elevation from X is become 30°. If point X is on ground, then what is the speed (in km/hr) of aeroplane ?
एक हवाई जहाज भूमि से 1.8 कि.मी. की ऊँचाई पर उड़ रहा है। बिन्दु X से जहाज का उन्नयन कोण 60° है तथा 20 सेकण्ड पश्चात् X से उन्नयन कोण 30° हो जाता है। यदि बिन्दु X भूमि पर है, तो हवाई जहाज की गति (किमी./ घंटा में) क्या है ?

(A) $216\sqrt{3}$ (B) $105\sqrt{3}$
(C) $201\sqrt{3}$ (D) $305\sqrt{3}$

8. What is the value of / का मान क्या है ?

$\frac{\left[(\sin x+\sin y)(\sin x-\sin y)\right]}{\left[(\cos x+\cos y)(\cos y-\cos x)\right]}$

(A) 0 (B) 1 (C) – 1 (D) 2

9. What is the value of / का मान क्या है ?

$\left[\frac{(\tan 5\theta+\tan 3\theta)}{4\cos 4\theta(\tan 5\theta-\tan 3\theta)}\right]$

(A) $\sin 2\theta$ (B) $\cos 2\theta$
(C) $\tan 4\theta$ (D) $\cot 2\theta$

10. What is the value of $\left(\frac{4}{3}\right)\cot^2\left(\frac{\pi}{6}\right)+3\cos^2(150°)-4\text{cosec}^2 45° + 8\sin\left(\frac{\pi}{2}\right)$?

$\left(\frac{4}{3}\right)\cot^2\left(\frac{\pi}{6}\right)+3\cos^2(150°)-4\text{cosec}^2 45° + 8\sin\left(\frac{\pi}{2}\right)$ का मान क्या है ?

(A) $\frac{25}{4}$ (B) 1 (C) $\frac{-7}{2}$ (D) $\frac{13}{2}$

11. What is the value of sin (B – C) cos (A – D) + sin (A – B) cos (C – D) + sin (C – A) cos (B – D)?
sin (B – C) cos (A – D) + sin (A – B) cos (C – D) + sin (C – A) cos (B – D) का मान क्या है ?

(A) $\frac{3}{2}$ (B) – 3 (C) 1 (D) 0

12. What is the value of / का मान क्या है ?

$$\frac{\left[4\cos(90-A)\sin^3(90+A)\right]-\left[4\sin(90+A)\cos^3(90-A)\right]}{\cos\left(\frac{180+8A}{2}\right)}$$

(A) 1 (B) – 1 (C) 0 (D) 2

13. What is the value of / का मान क्या है ?

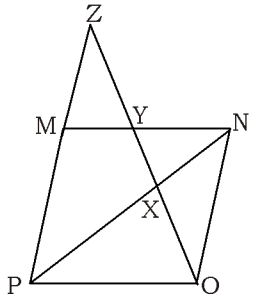
$$\cos\left[\frac{(180-\theta)}{2}\right]\cos\left[\frac{(180-9\theta)}{2}\right]+\sin\left[\frac{(180-3\theta)}{2}\right]\sin\left[\frac{(180-13\theta)}{2}\right]$$

(A) sin 2θ sin 4θ (B) cos 2θ cos 6θ
(C) sin 2θ sin 6θ (D) cos 2θ cos 4θ

14. What is the value of $[\tan^2(90-\theta)-\sin^2(90-\theta)]\,\text{cosec}^2(90-\theta)\cot^2(90-\theta)$?
$[\tan^2(90-\theta)-\sin^2(90-\theta)]\,\text{cosec}^2(90-\theta)\cot^2(90-\theta)$ का मान क्या है ?

(A) 0 (B) 1
(C) – 1 (D) 2

15. Two points P and Q are at the distance of x and y (where y > x) respectively from the base of a building and on a straight line. If the angles of elevation of the top of the building from points P and Q are complementary, then what is the height of the building?
P तथा Q दो बिन्दु एक इमारत के आधार से क्रमशः x तथा y (जहाँ y > x हैं) की दूरी पर हैं तथा एक सीधी रेखा पर हैं। यदि बिन्दु P तथा Q से इमारत की चोटी के उन्नयन कोण पूरक हैं, तो इमारत की ऊँचाई क्या है ?



(A) xy (B) $\sqrt{\left(\frac{y}{x}\right)}$

(C) $\sqrt{\left(\frac{x}{y}\right)}$ (D) $\sqrt{(xy)}$

16. The tops of two poles of height 60 metres and 35 metres are connected by a rope. If the rope makes an angle with the horizontal whose tangent is 5/9 metres, then what is the distance (in metres) between the two poles?
दो खंभे जिनकी ऊँचाई 60 मीटर तथा 35 मीटर हैं, की चोटियों को रस्सी से जोड़ा गया है। यदि रस्सी क्षैतिज के साथ कोण बनाती हैं जिसकी स्पर्श रेखा 5/9 मीटर है, तो दोनों खम्भों के बीच की दूरी (मीटर में) क्या है ?

(A) 63 (B) 30
(C) 25 (D) 45

17. A Navy captain going away from a lighthouse at the speed of $4\left[\left(\sqrt{3}\right)-1\right]$ m/s. He observes that it takes him 1 minute to change the angle of elevation of the top of the lighthouse from 60° to 45°. What is the height (in metres) of the lighthouse?
एक नौसेना कप्तान $4\left[\left(\sqrt{3}\right)-1\right]$ मी./से. की गति से लाइट हाऊस से दूर जा रहा है। वह निरीक्षण करता है कि लाइट हाऊस की चोटी का उन्नयन कोण 60° से 45° बदलने के लिए उसे एक मिनट लगता है। लाइट हाऊस की ऊँचाई (मीटर में) क्या है ?

(A) $240\sqrt{3}$ (B) $480\left[\left(\sqrt{3}\right)-1\right]$

(C) $360\sqrt{3}$ (D) $280\sqrt{2}$

18. What is the value of $[(\sin 7x-\sin 5x)\div(\cos 7x+\cos 5x)]-[(\cos 6x-\cos 4x)\div(\sin 6x+\sin 4x)]$?
$[(\sin 7x-\sin 5x)\div(\cos 7x+\cos 5x)]-[(\cos 6x-\cos 4x)\div(\sin 6x+\sin 4x)]$ का मान क्या है ?

(A) 1 (B) 2 tan x

(C) tan 2 x (D) $\tan\left(\frac{3x}{2}\right)$

19. What is the value of $[(\cos^3 2\theta+3\cos 2\theta)\div(\cos^6\theta-\sin^6\theta)]$?
$[(\cos^3 2\theta+3\cos 2\theta)\div(\cos^6\theta-\sin^6\theta)]$ का मान क्या है ?

(A) 0 (B) 1
(C) 4 (D) 2

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20. What is the value of $\tan\left(\frac{\pi}{4}+A\right)\times\tan\left(\frac{3\pi}{4}+A\right)$?

$\tan\left(\frac{\pi}{4}+A\right)\times\tan\left(\frac{3\pi}{4}+A\right)$ का मान क्या है ?

(A) 1 (B) 0

(C) $\cot\frac{A}{2}$ (D) – 1

21. What is the value of

$\left[\left(\sec^2\theta+1\right)\sqrt{\sec^2\theta-1}\right]\times\frac{1}{2}(\cot\theta-\tan\theta)$?

का मान क्या है ?

(A) 0 (B) 1

(C) cosec θ (D) sec θ

22. What is the value of sin (630° + A) + cos A?
sin (630° + A) + cos A का मान क्या है ?

(A) $\frac{\sqrt{3}}{2}$ (B) $\frac{1}{2}$

(C) 0 (D) $\frac{2}{\sqrt{3}}$

23. What is the value of [(sin 59° cos 31° + cos 59° sin 31°) ÷ (cos 20° cos 25° – sin 20° sin 25°)]?
[(sin 59° cos 31° + cos 59° sin 31°) ÷ (cos 20° cos 25° – sin 20° sin 25°)] का मान क्या है ?

(A) $\frac{1}{\sqrt{2}}$ (B) $\frac{2}{\sqrt{2}}$

(C) $\sqrt{3}$ (D) $\sqrt{2}$

24. What is the value of cos (90 – B) sin (C – A) + sin (90 + A) cos (B + C) – sin (90 – C) cos (A + B)?
cos (90 – B) sin (C – A) + sin (90 + A) cos (B + C) – sin (90 – C) cos (A + B) का मान क्या है ?

(A) 1 (B) sin (A + B – C)

(C) cos (B + C – A) (D) 0

25. Two trees are standing along the opposite sides of a road. Distance between the two trees is 400 metres. There is a point on the road between the trees. The angle of depressions of the point from the top of the trees are 45° and 60°. If the height of the tree which makes 45° angle is 200 metres, then what will be the height (in metres) of the other tree?

दो वृक्ष एक सड़क की विपरीत दिशा में खड़े हैं। दोनों वृक्षों के मध्य की दूरी 400 मीटर है। दोनों वृक्षों के मध्य सड़क पर एक बिन्दु है। वृक्षों की चोटी से बिन्दु का अवनमन कोण 45° तथा 60° हैं। यदि वह वृक्ष जो 45° का कोण बनाता है की ऊँचाई 200 मीटर है, तो दूसरे वृक्ष की ऊँचाई (मीटर में) क्या है ?

(A) 200 (B) $200\sqrt{3}$

(C) $100\sqrt{3}$ (D) 250

26. A tower stands on the top of a building which is 40 metres high. The angle of depression of a point situated on the ground from the top and bottom of the tower are found to be 60° and 45° respectively. What is the height (in metres) of tower?
एक भवन जिसकी ऊँचाई 40 मीटर है, के शिखर पर एक मीनार खड़ी है। मीनार के शिखर तथा पाद बिन्दु से भुमि पर स्थित एक बिन्दु का अवनमन कोण क्रमश: 60° तथा 45° हैं। मीनार की ऊँचाई (मीटर में) क्या है ?

(A) $20\sqrt{3}$ (B) $30\left(\sqrt{3}+1\right)$

(C) $40\left(\sqrt{3}-1\right)$ (D) $50\left(\sqrt{3}-1\right)$

27. From a point P, the angle of elevation of a tower is such that its tangent is 3/4. On walking 560 metres towards the tower the tangent of the angle of elevation of the tower becomes 4/3. What is the height (in metres) of the tower?
एक बिन्दु P से, एक मीनार का उन्नयन कोण इस प्रकार है की उसकी स्पर्शज्या (टेनजेंट) 3/4 है। मीनार की ओर 560 मीटर चलने पर मीनार के उन्नयन कोण की स्पर्शज्या (टेनजेंट) 4/3 हो जाती है। मीनार की ऊँचाई (मीटर में) क्या है ?

(A) 720 (B) 960

(C) 840 (D) 1030

28. What is the value of [(cos 7A + cos 5A) ÷ (sin 7A – sin 5A)]?
[(cos 7A + cos 5A) ÷ (sin 7A – sin 5A)] का मान क्या है ?

(A) tan A (B) tan 4 A

(C) cot 4 A (D) cot A

29. What is the value of [1 – sin (90 – 2A)] / [1 + sin (90 + 2A)]?
[1 – sin (90 – 2A)] / [1 + sin (90 + 2A)] का मान क्या है ?

(A) sinA cosA (B) cot2A

(C) tan2A (D) sin2A cosA

30. What is the value of sin 75° + sin 15°?
sin 75° + sin 15° का मान क्या है ?

(A) $\sqrt{3}$ (B) $2\sqrt{3}$

(C) $\frac{\sqrt{3}}{2}$ (D) $\sqrt{\frac{3}{2}}$

31. What is the value of [(cos 3θ + 2cos 5θ + cos 7θ) ÷ (cos θ + 2cos 3θ + cos 5θ)] + sin 2θ tan 3θ?
[(cos 3θ + 2cos 5θ + cos 7θ) ÷ (cos θ + 2cos 3θ + cos 5θ)] + sin 2θ tan 3θ का मान क्या है ?

(A) cos 2θ (B) sin 2θ
(C) tan 2θ (D) cotθ sin 2θ

32. What is the value of $\frac{[2 \sin (45 + \theta) \sin (45 - \theta)}{\cos 2\theta}$?

$\frac{[2 \sin (45 + \theta) \sin (45 - \theta)}{\cos 2\theta}$ का मान क्या है ?

(A) 0 (B) tan 2θ
(C) cot 2θ (D) 1

33. What is the value of sin (90° + 2A)[4 – cos² (90° – 2A)]?
(90° + 2A)[4 – cos² (90° – 2A)] का मान क्या है ?

(A) 2(cos³ A – sin³ A) (B) 2(cos³ A + sin³ A)
(C) 4(cos⁶ A+ sin⁶ A) (D) 4(cos⁶ A – sin⁶ A)

34. What is the value of [cos (90 + A) ÷ sec (270 – A)] + [sin (270 + A) ÷ cosec (630 – A)]?
[cos (90 + A) ÷ sec (270 – A)] + [sin (270 + A) ÷ cosec (630 – A)] का मान क्या है ?

(A) 3 sec A (B) tan A sec A
(C) 0 (D) 1

35. On walking 100 metres towards a building in a horizontal line, the angle of elevation of its top changes from 45° to 60°. What will be the height (in metres) of the building?
एक इमारत की ओर क्षैतिज रेखा में 100 मीटर चलने से उसकी चोटी का उन्नयन कोण 45° से 60° हो जाता है। इमारत की ऊँचाई (मीटर में) क्या होगी ?

(A) $50\left(3+\sqrt{3}\right)$ (B) $100\left(\sqrt{3}+1\right)$

(C) 150 (D) $100\sqrt{3}$

36. The upper part of a tree broken over by the wind make an angle of 60° with the ground. The distance between the root and the point where top of the tree touches the ground is 25 metres. What was the height (in metres) of the tree?
एक वृक्ष का ऊपरी भाग आँधी के कारण टूटकर भूमि की सतह से 60° का कोण बनाता है। जड़ और जिस बिन्दु पर वृक्ष का शीर्ष भूमि को छूता है के मध्य की दूरी 25 मीटर है। वृक्ष की ऊँचाई (मीटर में) क्या थी ?

(A) 84.14 (B) 93.3
(C) 98.25 (D) 120.24

37. The height of a tower is 300 meters. When its top is seen from top of another tower,then the angle of depression is 60°. The horizontal distance between the bases of the two towers is 120 metres. What is the height (in metres) of the small tower?
एक मीनार की ऊँचाई 300 मीटर है। जब उसकी चोटी को दूसरे मीनार की चोटी से देखा जाता है, तो उन्नयन कोण 60° का होता है। दोनों मीनारों के आधारों के मध्य की दूरी 120 मीटर है। छोटे मीनार की ऊँचाई (मीटर में) क्या है ?

(A) 88.24 (B) 106.71
(C) 92.15 (D) 112.64

38. What is the value of $\frac{[\sin(y-z)+\sin(y+z)+2\sin y]}{[\sin(x-z)+\sin(x+z)+2\sin x]}$?
का मान क्या है ?

(A) cos x sin y (B) $\frac{(\sin y)}{(\sin x)}$

(C) sin z (D) sin x tan y

39. What is the value of / का मान क्या है ?

$$\left\{\frac{[\sin(x+y)-2\sin x+\sin(x-y)]}{[\cos(x-y)+\cos(x+y)-2\cos x]}\right\}\times\left[\frac{(\sin 10-\sin 8x)}{(\cos 10x+\cos 8x)}\right]$$

(A) 0 (B) tan² x
(C) 1 (D) 2 tan x

40. What is the value of / का मान क्या है ?

$$\left[\frac{\sin(90^\circ-10\theta)-\cos(\pi-6\theta)}{\cos\left(\frac{\pi}{2}-10\theta\right)-\sin(\pi-6\theta)}\right]$$

(A) tan 2θ (B) cot 2θ
(C) cotθ (D) cot 3θ

41. If secθ (cosθ + sin θ) = $\sqrt{2}$, then what is the value of $\frac{2\sin\theta}{(\cos\theta-\sin\theta)}$?
यदि secθ (cosθ + sin θ) = $\sqrt{2}$ है, तो $\frac{2\sin\theta}{(\cos\theta-\sin\theta)}$ का मान क्या है ?

(A) $3\sqrt{2}$ (B) $\frac{3}{\sqrt{2}}$ (C) $\frac{1}{\sqrt{2}}$ (D) $\sqrt{2}$

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42. What is the value of

$$\frac{1}{\sin^4(90-\theta)}+\frac{1}{\left[\cos^2(90-\theta)\right]-1}?$$

का मान क्या है ?

(A) $\tan^2\theta\sec^2\theta$ (B) $\sec^4\theta$
(C) $\tan^4\theta$ (D) $\tan^2\theta\sin^2\theta$

43. What is the value of / का मान क्या है ?

$$\frac{\left[\tan(90-A)+\cot(90-A)\right]^2}{\left[2\sec^2(90-2A)\right]}$$

(A) 0 (B) 1 (C) 2 (D) – 1

44. What is the value of {sin (90 – x) cos [π – (x – y)]} + {cos (90 – x) sin [π – (y – x)]}?
{sin (90 – x) cos [π – (x – y)]} + {cos (90 – x) sin [π – (y – x)]} का मान क्या है ?

(A) -cos y (B) -sin y
(C) cos x (D) tan y

45. The angle of elevation of an aeroplane from a point on the ground is 60°. After flying for 30 seconds, the angle of elevation changes to 30°. If the aeroplane is flying at a height of 4500 m, then what is the speed (in m/s) of aeroplane?
मैदान पर एक बिन्दु से एक जवाई जहाज का उन्नयन कोण 60° है। 30 सेकण्ड उड़ने के पश्चात्, उन्नयन कोण 30° में परिवर्तित हो जाता है। यदि हवाई जहाज 4500 मी. की ऊँचाई पर उड़ रहा है, तो हवाई जहाज की गति (मी./सै. में) क्या है ?

(A) $50\sqrt{3}$ (B) $100\sqrt{3}$
(C) $200\sqrt{3}$ (D) $300\sqrt{3}$

46. A kite is flying in the sky. The length of string between a point on the ground and kite is 420 m. The angle of elevation of string with the ground is 30°. Assuming that there is no slack in the string, then what is the height (in metres) of the kite?
एक पतंग आकाश में उड़ रही है। मैदान पर एक बिन्दु से पतंग तक धागे की लम्बाई 420 मी. है। मैदान से धागे का उन्नयन कोण 30° है। मान लीजिए कि धागे में कोई ढीलापन नहीं है, तो पतंग की ऊँचाई (मीटर में) क्या है ?

(A) 210 (B) $140\sqrt{3}$
(C) $210\sqrt{3}$ (D) 150

47. A balloon leaves from a point P rises at a uniform speed. After 6 minutes, an observer situated at a distance of $450\sqrt{3}$ metres from point P observes that angle of elevation of the balloon is 60°. Assume that point of observation and point P are on the same level. What is the speed (in m/s) of the balloon?
एक गुब्बारा एक समान गति से बिन्दु P से छोड़ा जाता है। 6 मिनट पश्चात्, बिन्दु P से $450\sqrt{3}$ मीटर दूरी पर एक समीक्षक है जो देखता है कि गुब्बारे का उन्नयन कोण 60° है। मान लीजिए कि समीक्षा बिन्दु तथा बिन्दु P एक ही स्तर पर हैं। गुब्बारे की गति (मी./सै. में) क्या है ?

(A) 4.25 (B) 3.75
(C) 4.5 (D) 3.45

48. What is the value of / का मान क्या है ?

$$\frac{\{(\sin 4x+\sin 4y)\ (\tan\ (2x-2y))\}}{(\sin 4x-\sin 4y)}$$

(A) tan 2 (2x + 2y) (B) tan2
(C) cot (x – y) (D) tan (2x + 2y)

49. What is the value of / का मान क्या है ?

$$\frac{\left(32\cos^6 x-48\cos^4 x+18\cos^2 x-1\right)}{\left[4\sin x\cos x\sin(60-x)\cos(60-x)\sin(60+x)\cos(60+x)\right]}$$

(A) 4 tan 6x (B) 4 cot 6x
(C) 8 cot 6x (D) 8 tan 6x

50. What is the value of / का मान क्या है ?

$$\frac{\left[2\cot\frac{(\pi-a)}{2}\right]}{\left[1+\tan^2\frac{(2\pi-a)}{2}\right]}$$

(A) $\frac{2\sin^2 A}{2}$ (B) cos A

(C) sin A (D) $\frac{2\cos^2 A}{2}$

51. If $\tan\theta+\sec\theta=\frac{(x-2)}{(x+2)}$ then what is the value of cos θ?

यदि $\tan\theta+\sec\theta=\frac{(x-2)}{(x+2)}$ है, तो cos θ का मान क्या है ?

(A) $\frac{(x^2-1)}{(x^2+1)}$ (B) $\frac{(2x^2-4)}{(2x^2+4)}$

(C) $\frac{(x^2-4)}{(x^2+4)}$ (D) $\frac{(x^2-2)}{(x^2+2)}$

52. What is the value of $\frac{(\cos 40^\circ - \cos 140^\circ)}{(\sin 80^\circ + \sin 20^\circ)}$?

$\frac{(\cos 40^\circ - \cos 140^\circ)}{(\sin 80^\circ + \sin 20^\circ)}$ का मान क्या है ?

(A) $2\sqrt{3}$ (B) $\frac{2}{\sqrt{3}}$ (C) $\frac{1}{\sqrt{3}}$ (D) $\sqrt{3}$

53. What is the value of / का मान क्या है ?

$$\frac{[1-\tan(90-\theta)+\sec(90-\theta)]}{[\tan(90-\theta)+\sec(90-\theta)+1]}$$

(A) $\cot\left(\frac{\theta}{2}\right)$ (B) $\tan\left(\frac{\theta}{2}\right)$

(C) $\sin\theta$ (D) $\cos\theta$

54. What is the value of / का मान क्या है ?

$$\frac{[\sin(90-A)+\cos(180-2A)]}{[\cos(90-2A)+\sin(180-A)]}$$

(A) $\sin\left(\frac{A}{2}\right)$ (B) $\cot\left(\frac{A}{2}\right)$

(C) $\tan\left(\frac{A}{2}\right)$ (D) $\cos\left(\frac{A}{2}\right)$

55. The distance between the tops of two building 38 metres and 58 metres high is 52 metres. What will be the distance (in metres) between two buildings?

दो इमारत 38 मीटर तथा 58 मीटर ऊँची हैं, के शीर्षों के मध्य दूरी 52 मीटर है। दोनों इमारतों के मध्य की दूरी (मीटर में) क्या होगी ?

(A) 46 (B) 42
(C) 44 (D) 48

56. The angles of elevation of the top of a tree 220 meters high from two points lie on the same plane are 30° and 45°. What is the distance (in metres) between the two points?

220 मीटर ऊँचे एक वृक्ष के दो बिन्दुओं का समान तल पर उन्नयन कोण 30° तथा 45° हैं। दो बिन्दुओं के मध्य दूरी (मीटर में) क्या है ?

(A) 193.22 (B) 144.04
(C) 176.12 (D) 161.05

57. The angles of elevation of the top of a tower 72 metre high from the top and bottom of a building are 30° and 60° respectively. What is the height (in metres) of building?

72 मीटर ऊँचे एक मीनार के शीर्ष का इमारत के ऊपर तथा नीचे से उन्नयन कोण क्रमश: 30° तथा 60° हैं। इमारत की ऊँचाई (मीटर में) में क्या है ?

(A) 42 (B) $20\sqrt{3}$
(C) $24\sqrt{3}$ (D) 48

Solution

1. (D) $\frac{2\cos^2\theta}{\sin^2\theta \times \cot^2\theta(1+\tan^2\theta)} - 1$

$= \frac{2}{1+\tan^2\theta} - 1 = \frac{1-\tan^2\theta}{1+\tan^2\theta} = \cos 2\theta$

2. (D) $\cos 15^\circ - \cos 165^\circ$

$\Rightarrow \cos 15^\circ + \cos 15^\circ$

$= 2\cos 15^\circ = 2 \times \frac{\sqrt{3}+1}{2\sqrt{2}} = \frac{\sqrt{3}+1}{\sqrt{2}}$

3. (D) $\frac{1+2\tan^2 x - 2\sec x \tan x}{\sec x - \tan x}$

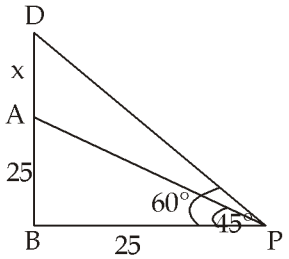
$= \frac{\sec^2 x + \tan^2 x - 2\sec x \tan x}{\sec x - \tan x}$

$= \frac{(\sec x - \tan x)^2}{\sec x - \tan x} = \sec x - \tan x$

4. (D) $\sin(180-\theta)\sin(90-\theta) - \left[\frac{\cot(90-\theta)}{1+\tan^2\theta}\right]$

$= \sin\theta\cos\theta - \left[\frac{\tan\theta}{\sec^2\theta}\right] = 0$

5. (C)



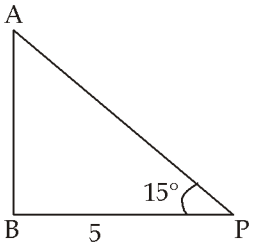
Here x = height of pole

AB = BP = 25 $\rightarrow$ in ΔABP

$25\sqrt{3} = 25 + x \rightarrow$ in ΔDBP

$x = 25\left(\sqrt{3}-1\right)$

6. (B)

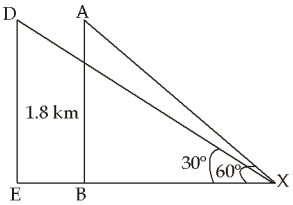


AP = length of ladder | $\cos 15° = \frac{BP}{AP} = \frac{5}{AP}$

$AP = \frac{5}{\cos 15°} = \frac{5}{(\sqrt{3}+1)} \times 2\sqrt{2} \times \frac{\sqrt{3}-1}{(\sqrt{3}-1)}$

$AP = 5\sqrt{2}(\sqrt{3}-1) \Rightarrow 5\sqrt{6} - 5\sqrt{2}$

7. (A)



$BX = \frac{1.8}{\sqrt{3}} = 0.6\sqrt{3}$

$ED = 1.8\sqrt{3}$

$EB = AD = 1.2\sqrt{3}$

$S = \frac{1.2\sqrt{3}}{20} \times 60 \times 60 = 216\sqrt{3}$ km/hr

8. (B) $\frac{(\sin x + \sin y)(\sin x - \sin y)}{(\cos x + \cos y)(\cos y - \cos x)}$

by putting
$x = 90°; \quad y = 0°$

$\frac{(\sin 90° + \sin 0°)(\sin 90° - \sin 0°)}{(\cos 90° + \cos 0°)(\cos 0° - \cos 90°)} = \frac{1}{1} = 1$

9. (B) $\frac{(\tan 5\theta + \tan 3\theta)}{4 \times \cos 4\theta (\tan 5\theta - \tan 3\theta)}$

$\frac{\frac{\sin 5\theta}{\cos 5\theta} + \frac{\sin 3\theta}{\cos 3\theta}}{4\cos 4\theta\left(\frac{\sin 5\theta}{\cos 5\theta} - \frac{\sin 3\theta}{\cos 3\theta}\right)}$

$= \frac{\sin 5\theta \cos 3\theta + \cos 5\theta \sin 3\theta}{4\cos 4\theta(\sin 5\theta \cos 3\theta - \cos 5\theta \sin 3\theta)}$

$= \frac{\sin 8\theta}{4\cos 4\theta \times \sin 2\theta} = \frac{2\sin 4\theta \cos 4\theta}{4\cos 4\theta \sin 2\theta}$

$= \frac{2 \times 2\sin 2\theta \cos 2\theta}{4\sin 2\theta} = \cos 2\theta$

10.(A) $\frac{4}{3}\cot^2\left(\frac{\pi}{6}\right) + 3\cos^2(150°) - 4\cos ec^2 45° + 8\sin\left(\frac{\pi}{2}\right)$

$\frac{4}{3} \times \cot^2 30° + 3\cos^2 150° - 4\cos ec^2 45° + 8\sin 90°$

$\frac{4}{3} \times \left(\sqrt{3}\right)^2 + 3 \times \left(\frac{-\sqrt{3}}{2}\right)^2 - 4 \times \left(\sqrt{2}\right)^2 + 8$

$\frac{12}{3} + \frac{9}{4} - 8 + 8 \Rightarrow 4 + \frac{9}{4} = \frac{25}{4}$

11.(D) sin(B–C) cos(A–D) + sin (A–B) cos(C–D) + sin (C–A) cos(B-D)

Let A = B = C = D

sin0°cos0° + sin0°cos0° + sin0°cos0°

0 + 0 + 0 = 0

12.(B) $\left[4\cos(90 - A)\sin^3(90 + A)\right] - \frac{\left[4\sin(90 + A)\cos^3(90 - A)\right]}{\cos\left(\frac{180 + 8A}{2}\right)}$

$= \frac{4\sin A\cos^3 A - 4\cos A\sin^3 A}{\cos(90 + 4A)}$

$= \frac{4\sin A\cos A(\cos^2 A - \sin^2 A)}{-\sin 4A}$

$= \frac{4\sin A\cos A\cos 2A}{-2\sin 2A\cos 2A}$

$= \frac{4\sin A\cos A}{-4\sin A\cos A} = -1$

13.(B) $\cos\left(\frac{180 - \theta}{2}\right)\cos\left(\frac{180 - 9\theta}{2}\right) + \sin\left(\frac{180 - 3\theta}{2}\right)\sin\left(\frac{180 - 13\theta}{2}\right)$

$= \left[\sin\frac{\theta}{2}\sin\frac{9\theta}{2} + \cos\frac{3\theta}{2}\cos\frac{13\theta}{2}\right]$

$= \frac{1}{2}\left[2 \times \sin\frac{\theta}{2}\sin\frac{9\theta}{2} + 2\cos\frac{3\theta}{2}\cos\frac{13\theta}{2}\right]$

$\frac{1}{2}[-\cos 5\theta + \cos 4\theta + \cos 5\theta + \cos 8\theta]$

$\frac{1}{2} \times 2\cos 6\theta \cos 2\theta = \cos 6\theta \cos 2\theta$

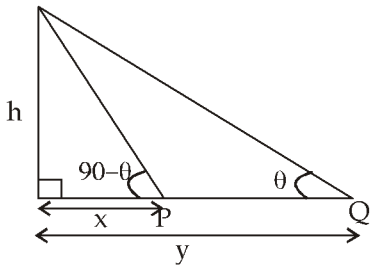
14.(B) $[(\tan^2(90–\theta) - \sin^2(90–\theta)]\ \cos ec^2(90–\theta)\ \cot^2(90 - \theta)$

$= (\cot^2\theta - \cos^2\theta)\ \sec^2\theta\ \tan^2\theta$

$= \cos^2\theta\left(\frac{1}{\sin^2\theta} - 1\right)\sec^2\theta\ \tan^2\theta$

$= \cos^4\theta \times \frac{1}{\sin^2\theta} \times \sec^4\theta \times \sin^2\theta = 1$

15.(D)



$$(1)\ \tan\theta = \frac{h}{y}$$

$$(2)\ \tan(90-\theta) = \frac{h}{x}$$

$$\cot\theta = \frac{h}{x}$$

$$\tan\theta = \frac{x}{h}$$

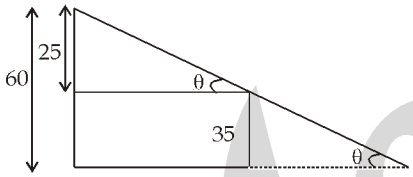
$$\tan\theta = \tan\theta$$

$$\frac{h}{y} = \frac{x}{h}$$

$$= h^2 = xy$$

$$h = \sqrt{xy}$$

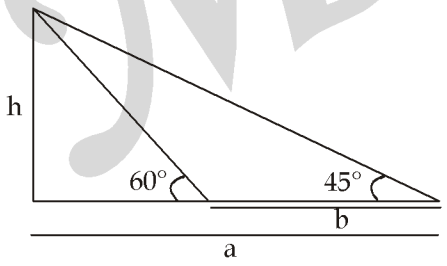
16.(D)



$$\tan\theta = \frac{5}{9} \Rightarrow \tan\theta = \frac{5}{9}$$

$$\frac{25}{b} = \frac{5}{9} \Rightarrow b = 45$$

17.(A)



Total distance = $4\left(\sqrt{3}-1\right)\times 60$

$b = 240\left(\sqrt{3}-1\right)$

(i) $\tan 45° = \frac{h}{a}$, $1 = \frac{h}{a}$, $h = a$

(ii) $\tan 60° = \frac{h}{a-b}$, $\sqrt{3} = \frac{h}{a-240\left(\sqrt{3}-1\right)}$

$h = \sqrt{3}a - 240\left(3-\sqrt{3}\right)$ $\quad a = \sqrt{3}a - 240\left(3-\sqrt{3}\right)$

$240\left(3-\sqrt{3}\right) = \sqrt{3}a - a$

$240\sqrt{3}\left(\sqrt{3}-1\right) = a\left(\sqrt{3}-1\right)$

$a = 240\sqrt{3}$ $\quad h = 240\sqrt{3}$

18.(B) $\dfrac{(\sin 7x - \sin 5x)}{\cos 7x + \cos 5x} - \dfrac{(\cos 6x - \cos 4x)}{\sin 6x + \sin 4x}$

Try putting $x = 30°$

$$\frac{\sin 210° - \sin 150°}{\cos 210° - \cos 150°} - \frac{\cos 180° - \cos 120°}{\sin 180° - \sin 120°}$$

$$\frac{-\sin 30° - \sin 30°}{-\cos 30° - \cos 30°} - \frac{(-1) + \cos 60°}{0 + \sin 60°}$$

$$\frac{-\frac{1}{2} - \frac{1}{2}}{-\frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2}} - \frac{(-1) + \frac{1}{2}}{\frac{\sqrt{3}}{2}} \Rightarrow \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{3}} = \frac{2}{\sqrt{3}}$$

In option 2tan x at 30° = $\frac{2}{\sqrt{3}}$

19.(C) $\left[\dfrac{\left(\cos^3 2\theta + 3\cos 2\theta\right)}{\cos^6\theta - \sin^6\theta}\right]$

Try put$\theta = 0°$

$$\frac{1+3}{1-0} = \frac{4}{1}$$

20.(D) $\tan\left(\frac{\pi}{4}+A\right)\tan\left(\frac{3\pi}{4}+A\right)$

$\tan\left(\frac{\pi}{4}+A\right)\tan\left(\frac{\pi}{2}+\frac{\pi}{4}+A\right)$

$-\tan\left(\frac{\pi}{4}+A\right)\cot\left(\frac{\pi}{4}+A\right)$

-1

21.(B) $\left[\left(\sec^2\theta+1\right)\sqrt{\sec^2\theta-1}\right]\times\frac{1}{2}\left[\cot\theta-\tan\theta\right]$

$$\left[\frac{\cos^2\theta+1}{\cos^2\theta}\right]\left[\frac{\sin\theta}{\cos\theta}\right]\times\frac{1}{2}\left[\frac{\cos^2\theta-\sin^2\theta}{\cos\theta\sin\theta}\right]$$

$$= \frac{\cos^2\theta - \sin^2\theta + \sin^2\theta + \cos^2\theta}{2\cos^2\theta} = \frac{2\cos^2\theta}{2\cos^2\theta} = 1$$

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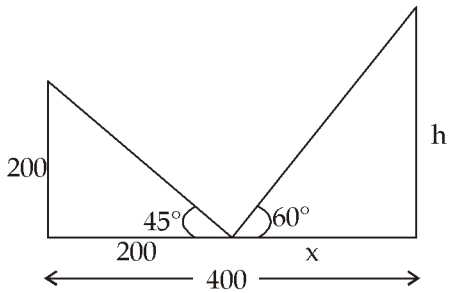
22.(C) sin (630 + A) + cosA
= sin (720 – 90+ A) + cosA
– cosA + cosA = 0

23.(D) (sin59 cos31 + cos59 sin31) ÷ (cos20 cos25 – sin20 sin25)

$$\frac{\sin(59+31)}{\cos(20+25)} = \frac{\sin 90}{\cos 45} = \frac{1}{\frac{1}{\sqrt{2}}} = \sqrt{2}$$

24.(D) cos (90 – B) sin (C – A) + sin (90 + A) cos (B + C) – sin (90 – C) cos (A + B) = ?
Put A = B = C = 0
cos90 sin0 + sin90 cos0 – sin90 cos0
0 + 1 – 1 = 0

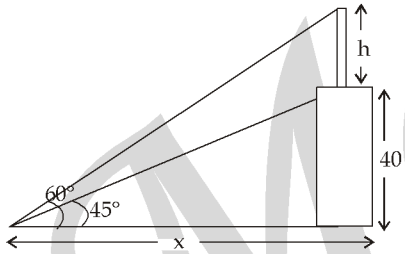
25.(B)



x = 400 – 200 = 200

h = x tan 60 = $200\sqrt{3}$

26.(C)



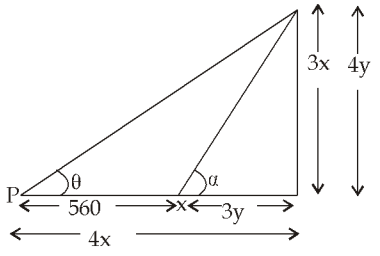
$$\tan 45 = \frac{40}{x} \Rightarrow x = 40m$$

$$\tan 60 = \frac{h+40}{x} = \frac{h+40}{40}$$

$$\sqrt{3} = \frac{h+40}{40} \Rightarrow h + 40 = 40\sqrt{3}$$

$$h = 40\sqrt{3} - 40 \Rightarrow 40\left(\sqrt{3}-1\right)$$

27.(B)



$$\tan\theta = \frac{3x}{4x}; \qquad \tan\alpha = \frac{4y}{3y}$$

Height is equal = 3x = 4y

$$\frac{x}{y} = \frac{4}{3}$$

$$4x = 560 + 3y \qquad 3y = \frac{ax}{4}$$

$$4x = 560 + \frac{ax}{4}$$

$$4x - \frac{ax}{4} = 560$$

$$\frac{7x}{4} = 560$$

$$\Rightarrow \quad x = 320$$

Height of tower = 3x
= 3 × 320 = 960 m

28.(D)

$$\frac{\cos 7A + \cos 5A}{\sin 7A - \sin 5A} = \frac{2\cos\frac{7A+5A}{2}\cos\frac{7A-5A}{2}}{2\cos\frac{7A+5A}{2}\sin\left(\frac{7A-5A}{2}\right)}$$

= cotA

29.(C)

$$\frac{1-\sin(90-2A)}{1+\sin(90-2A)} = \frac{1-\cos 2A}{1+\cos 2A}$$

$$= \frac{1-\left(1-2\sin^2 A\right)}{1+\left(2\cos^2 A-1\right)} = \frac{2\sin^2 A}{2\cos^2 A} = \tan^2 A$$

30.(D) sin75 + sin15
sin75 + sin (90 – 75)
= sin75 + cos75

$$= \sqrt{(\sin 75 + \cos 75)^2}$$

$$= \sqrt{\sin^2 75 + \cos^2 75 + 2\sin 75\cos 75} = \sqrt{1+\sin 150}$$

$$= \sqrt{1+\frac{1}{2}} = \sqrt{\frac{3}{2}}$$

31.(A)

$$\frac{\cos 3\theta + 2\cos 5\theta + \cos 7\theta}{\cos\theta + 2\cos 3\theta + \cos 5\theta} + \frac{\sin 2\theta \times \sin 3\theta}{\cos 3\theta}$$

$$= \frac{\cos 3\theta + \cos 5\theta + \cos 5\theta + \cos 7\theta}{\cos\theta + \cos 3\theta + \cos 3\theta + \cos 5\theta} + \frac{\sin 2\theta \sin 3\theta}{\cos 3\theta}$$

$$= \frac{2\cos 4\theta\cos\theta + 2\cos 6\theta\cos\theta}{2\cos 2\theta\cos\theta + 2\cos 4\theta\cos\theta} + \frac{\sin 2\theta\sin 3\theta}{\cos 3\theta}$$

$$= \frac{\cos 4\theta + \cos 6\theta}{\cos 2\theta + \cos 4\theta} + \frac{\sin 2\theta\sin 3\theta}{\cos 3\theta}$$

$$= \frac{2\cos 5\theta\cos\theta}{2\cos 3\theta\cos\theta} + \frac{\sin 2\theta\sin 3\theta}{\cos 3\theta}$$

$$= \frac{\cos(2\theta+3\theta)}{\cos 3\theta} + \frac{\sin 2\theta\sin 3\theta}{\cos 3\theta}$$

$$= \frac{\cos 2\theta\cos 3\theta - \sin 2\theta\sin 3\theta}{\cos 3\theta} + \frac{\sin 2\theta\sin 3\theta}{\cos 3\theta}$$

$$= \frac{\cos 2\theta\cos 3\theta}{\cos 3\theta} = \cos 2\theta$$

32.(D) $\dfrac{2\sin(45+\theta)\sin(45-\theta)}{\cos 2\theta}$

$$= \frac{\cos(45+\theta-45+\theta) - \cos(45+\theta+45-\theta)}{\cos 2\theta}$$

$$= \frac{\cos 2\theta - \cos 90}{\cos 2\theta} = \frac{\cos 2\theta}{\cos 2\theta} = 1$$

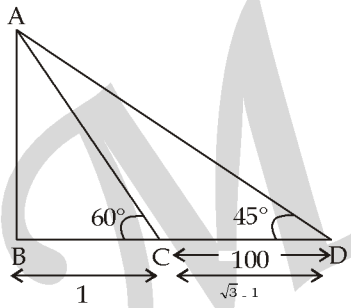
33.(D) $\sin(90+2A)\,[4-\cos^2(90-2A)]$

$4(\cos^6 A - \sin^6 A)$

34.(D) $\dfrac{\cos(90+A)}{\sec(270-A)} + \dfrac{\sin(270+A)}{\operatorname{cosec}(630-A)}$

$$= \frac{-\sin A}{-\operatorname{cosec} A} + \frac{-\cos A}{-\sec A} \Rightarrow \sin^2 A + \cos^2 A = 1$$

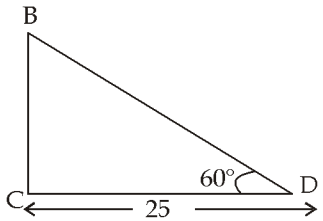
35.(A)



AB = BD

$$AB = BD = \frac{100}{\sqrt{3}-1} \times \sqrt{3} \Rightarrow AB = 50\left(3+\sqrt{3}\right)$$

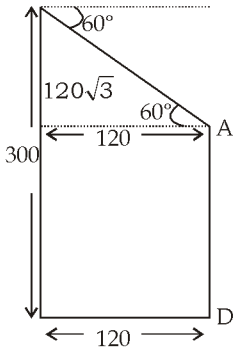
36.(B)



= 25 (2 + 1.732) ⇒ 25 × 3.732

= 93.3 meter

37.(C)



AD = 300 − $120\sqrt{3}$ = 92.15 meter

38.(B) $\dfrac{(\sin(y-z)+\sin(y+z)+2\sin y)}{(\sin(x-z)+\sin(x+z)+2\sin x)}$

Putting z = 0 and x = y = 90°

$$\frac{\sin 90+\sin 90+2\sin 90}{\sin 90+\sin 90+\sin 90} = \frac{4}{4} = 1$$

From options $\dfrac{\sin y}{\sin x} = \dfrac{\sin 90}{\sin 90} = 1$ (satisfy the question)

2nd Method:

Apply formula (sin C + sin D) in denominator and numerator

We have $\dfrac{\sin y}{\sin x}$

39.(B) $\dfrac{[\sin(x+y)-2\sin x+\sin(x-y)]}{[\cos(x-y)+\cos(x+y)-2\cos x]} \times \dfrac{(\sin 10x-\sin 8x)}{(\cos 10x+\cos 8x)}$

$$= \frac{2\sin x\cos y - 2\sin x}{2\cos x\cos y - 2\cos x} \times \frac{2\cos 9x\sin x}{2\cos 9x.\cos x}$$

$$= \frac{2\sin x(\cos y-1)}{2\cos x(\cos y-1)} \times \tan x$$

= tanx × tanx = $\tan^2 x$

40.(B) $\dfrac{\sin(90-10\theta)-\cos(\pi-6\theta)}{\cos\left(\frac{\pi}{2}-10\theta\right)-\sin(\pi-6\theta)}$

$$= \frac{\cos 10\theta+\cos 6\theta}{\sin 10\theta-\sin 6\theta} = \frac{2\cos 8\theta.\cos 2\theta}{2\cos 8\theta.\sin 2\theta} = \cot 2\theta$$

41.(D) $\sec\theta(\cos\theta+\sin\theta) = \sqrt{2}$

$$\Rightarrow \left(\frac{\cos\theta+\sin\theta}{\cos\theta}\right) = \sqrt{2} \Rightarrow 1+\tan\theta = \sqrt{2}$$

$\Rightarrow \tan\theta = \sqrt{2}-1 \qquad \Rightarrow \cot\theta = \sqrt{2}+1$

Now, $\frac{2\sin\theta}{(\cos\theta-\sin\theta)}=\frac{2}{(\cot\theta-1)}=\frac{2}{\sqrt{2}+1-1}$

$=\frac{2}{\sqrt{2}}=\sqrt{2}$

42.(A) $\frac{1}{\sin^4(90-\theta)}+\frac{1}{\cos^2(90-\theta)-1}=?$

$=\frac{1}{\cos^4\theta}+\frac{1}{\sin^2\theta-1}$

$=\frac{1}{\cos^4\theta}-\frac{1}{\cos^2\theta}=\frac{1-\cos^2\theta}{\cos^4\theta}$

$=\frac{\sin^2\theta}{\cos^4\theta}=\tan^2\theta\sec^2\theta$

43.(C) $\frac{\left[\tan(90-A)+\cot(90-A)\right]^2}{2\sec^2(90-2A)}$

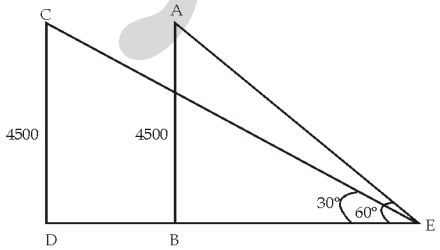
Put A = 30°

$=\frac{(\tan 60+\cot 60)^2}{2\sec^2 30}=\frac{\left(\sqrt{3}+\frac{1}{\sqrt{3}}\right)^2}{2\times\left(\frac{2}{\sqrt{3}}\right)^2}$

$=\frac{(3+1)^2}{3\times2\times\frac{4}{3}}=\frac{4^2}{8}\Rightarrow\frac{16}{8}=2$

44.(A) {sin (90–x) cos(π– (x – y))} +
{cos (90–x) sin(π– (y – x))}
= cosx .cos(y – x) + sinx sin (y – x)
= – (cos(y–x) cosx – sin(y–x) sinx)
= – (cos y) = – cos y

45.(B)



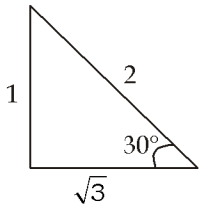
In ΔABE BE = $1500\sqrt{3}$

In ΔCDE DE = $4500\sqrt{3}$

BD = DE – BE = $3000\sqrt{3}$

So, Speed = $\frac{3000\sqrt{3}}{30}=100\sqrt{3}$ (M/Sec)

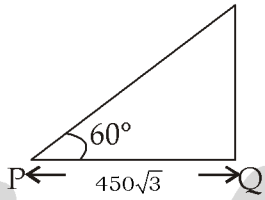
46.(A)



$2\rightarrow420$

$1\rightarrow\frac{420}{2}\times1=210$ m

47.(B)



$1\rightarrow450\sqrt{3}$

$\sqrt{3}\longrightarrow450\times3=1350$

Speed = $\frac{1350}{60\times6}=3.75/\text{sec}$

48.(D) $\frac{\left[(\sin4x+\sin4y)(\tan(2x-2y))\right]}{\sin4x-\sin4y}$

$=\frac{2\sin2(x+y)\cos2(x-y)\times\sin2(x-y)}{2\cos2(x+y)\sin2(x-y)\cos2(x-y)}$

= tan (2x + 2y)

49.(C) $\frac{(32\cos^6x-48\cos^4x+18\cos^2x-1)}{4\sin x\cos x.\sin(60-x).\cos(60-x)\sin(60+x)\cos(60+x)}$

$=\frac{32\cos^6x-48\cos^4x+18\cos^2x-1}{4.\frac{\cos3x}{4}.\frac{\sin3x}{4}}$

We know cos6x
$=32\cos^6x-48\cos^4x+18\cos^2x-1$

$=\frac{4\cos6x}{\cos3x.\sin3x}=8\cot6x$

50.(C) $\frac{2\cot\left(\frac{\pi-a}{2}\right)}{\sec^2\left(\frac{2\pi-a}{2}\right)}=\frac{2.\tan\frac{a}{2}}{\sec^2\left(\pi-\frac{a}{2}\right)}$

$\frac{2\tan\frac{a}{2}}{\sec^2\frac{a}{2}}\Rightarrow2\tan\frac{a}{2}\cos^2\frac{a}{2}\Rightarrow\sin a$

51.(C) $\tan\theta + \sec\theta = \dfrac{x-2}{x+2}$

We know,

$\sec\theta - \tan\theta = \dfrac{x+2}{x-2}$

Add $2\sec\theta = \dfrac{x-2}{x+2} + \dfrac{x+2}{x-2}$

$= \dfrac{(x-2)^2 + (x+2)^2}{x^2-4} = \cos\theta = \dfrac{x^2-4}{x^2+4}$

52.(B) $\dfrac{(\cos 40° - \cos 140°)}{(\sin 80° + \sin 20°)}$

$\dfrac{2\sin\dfrac{40+140}{2}.\sin\dfrac{140-40}{2}}{2\sin\dfrac{80+20}{2}.\cos\dfrac{80-20}{2}}$

$= \dfrac{2\sin 90°.\sin 50°}{2\sin 50°.\cos 30°} = \dfrac{\sin 90°}{\cos 30°} = \dfrac{1}{\cos 30°}$

$= \sec 30° = \dfrac{2}{\sqrt{3}}$

53.(B) $\dfrac{1-\cot\theta+\operatorname{cosec}\theta}{\cot\theta+\operatorname{cosec}\theta+1}$ $\{1 = \operatorname{cosec}^2\theta - \cot^2\theta\}$

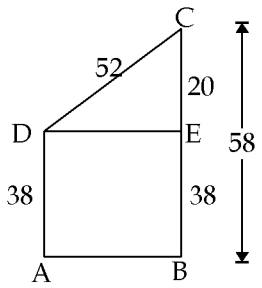
$= \dfrac{\operatorname{cosec}^2\theta - \cot^2\theta - \cot\theta + \operatorname{cosec}\theta}{(\cot\theta+\operatorname{cosec}\theta)+1}$

$= \operatorname{cosec}\theta - \cot\theta = \tan\left(\dfrac{\theta}{2}\right)$

54.(C) $\dfrac{\sin(90-A)+\cos(180-2A)}{\cos(90-2A)+\sin(180-A)} = \dfrac{\cos A - \cos 2A}{\sin 2A + \sin A}$

$= \dfrac{2\sin\dfrac{3A}{2}\sin\dfrac{A}{2}}{2\sin\dfrac{3A}{2}.\cos\dfrac{A}{2}} = \tan\dfrac{A}{2}$

55.(D)



Distance between two buildings

In ΔDEC $DE^2 = CD^2 - CE^2$

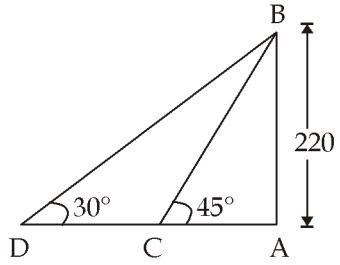
$= 52^2 - 20^2$

$= 2704 - 400$

$= \sqrt{2304}$

DE = 48 m.

56.(D)



$\tan 45° = \dfrac{AB}{AC} = \dfrac{220}{AC} \Rightarrow AC = 220$

$\tan 30° = \dfrac{AB}{AD}$

$\dfrac{1}{\sqrt{3}} = \dfrac{220}{AD}$

$\because$ AD = AC + DC

DC = AD – AC

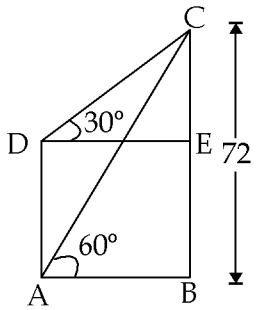
$= 220\sqrt{3} - 220$

$= 220\,(\sqrt{3} - 1)$

$= 220(1.732 - 1)$

$= 161.05$

57.(D)



BC = Tower, AD = Building

In ΔABC $\tan 60° = \dfrac{BC}{AB}$

$\sqrt{3} = \dfrac{72}{AB}$, $AB = 24\sqrt{3}$

$AB = DE = 24\sqrt{3}$

In ΔDEC $\tan 30° = \dfrac{CE}{DE}$

$\dfrac{1}{\sqrt{3}} = \dfrac{CE}{24\sqrt{3}}$ = CE = 24 m.

BE = DA = Height of Building

= 72 – 24 = 48 m

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(SSC CHSL – 2020)

1. If (sinA – cosA) = 0, then find the value of cotA.
यदि (sinA – cosA) = 0 है, तो cotA का मान ज्ञात करें।

(A) 0 (B) $\frac{\pi}{6}$ (C) 1 (D) $\frac{\pi}{4}$

2. If $\cos\theta = \frac{4x}{1+4x^2}$, then find the value of $\sin\theta$.

यदि $\cos\theta = \frac{4x}{1+4x^2}$ है, तो $\sin\theta$ का मान क्या होगा ?

(A) $\frac{1+4x^2}{4x^2}$ (B) $\frac{1-4x^2}{1+4x^2}$

(C) $\frac{1+4x^2}{1-4x^2}$ (D) $\frac{1-4x^2}{4x^2}$

3. If $\text{cosec}\theta = \frac{41}{9}$, find the value of $5\tan\theta$

यदि $\text{cosec}\theta = \frac{41}{9}$, तो $5\tan\theta$ का मान ज्ञात करो।

(A) $\frac{7}{8}$ (B) $\frac{9}{8}$ (C) $\frac{13}{4}$ (D) $\frac{11}{8}$

4. Find the value of θ in the following equation.
$3\cot\theta + \tan\theta - 2\sqrt{3} = 0, 0° < \theta < 90°$.
निम्न समीकरण में θ का मान ज्ञात करें।
$3\cot\theta + \tan\theta - 2\sqrt{3} = 0, 0° < \theta < 90°$.
(A) 30° (B) 45°
(C) 15° (D) 60°

5. In ΔABC, ∠A = 90°, AB = 20 cm and BC = 29 cm. Find the value of (sinB – cotC).
ΔABC में, ∠A = 90°, AB = 20 सेमी. और BC = 29 सेमी. है। (sinB – cotC) का मान ज्ञात करो।

(A) $-\frac{189}{580}$ (B) $\frac{9}{29}$ (C) $-\frac{9}{29}$ (D) $\frac{189}{580}$

6. If $2\cos^2\theta = 3(1 - \sin\theta)$, $0° < \theta < 90°$, then find the value of (tan2θ +cosec3θ – sec2θ).
यदि $2\cos^2\theta = 3(1 - \sin\theta)$, $0° < \theta < 90°$ है, तो (tan2θ + cosec3θ – sec2θ) का मान ज्ञात करो।

(A) $\sqrt{3} + 1$ (B) $\frac{\sqrt{3}+1}{\sqrt{3}}$

(C) $\sqrt{3} - 1$ (D) $\frac{1-\sqrt{3}}{\sqrt{3}}$

7. Find the value of $\frac{\tan 50° + \sec 50°}{\cot 40° + \text{cosec}40°} + \cos^2 65° + \sin 65°\cos 25° + \tan 30°$.

$\frac{\tan 50° + \sec 50°}{\cot 40° + \text{cosec}40°} + \cos^2 65° + \sin 65°\cos 25° + \tan 30°$ का मान ज्ञात करो।

(A) $2 + \sqrt{3}$ (B) $\frac{6+\sqrt{3}}{3}$

(C) $\frac{\sqrt{3}(\sqrt{3}+1)}{3}$ (D) $1 + \sqrt{3}$

8. If $\cos\theta = \frac{\sqrt{3}}{2}$, then find the value of $\frac{2-\sin^2\theta}{1-\cot^2\theta} + (\sec^2\theta + \text{cosec}\theta)$.

यदि $\cos\theta = \frac{\sqrt{3}}{2}$ तो $\frac{2-\sin^2\theta}{1-\cot^2\theta} + (\sec^2\theta + \text{cosec}\theta)$ का मान ज्ञात करें।

(A) $\frac{59}{24}$ (B) $\frac{25}{12}$ (C) $\frac{-59}{24}$ (D) $\frac{-25}{12}$

9. If tanx = cot(48° + 2x), and 0° < x < 90° then find the value of x.
यदि tanx = cot(48° + 2x), and 0° < x < 90°, तो x का मान ज्ञात करें।
(A) 12° (B) 21°
(C) 14° (D) 16°

10. Find the value of / का मान ज्ञात करें।

$$\frac{3\tan^2 60°\sec^2 30° - \sin^2 45°}{(\cos 15° + \sin 75°)(\sec 15° + \text{cosec}75°)}$$

(A) $\frac{59}{24}$ (B) $\frac{13}{12}$ (C) $\frac{65}{24}$ (D) $\frac{5}{12}$

11. If $7\sin^2\theta + 3\cos^2\theta = 4$, $0° < \theta < 90°$, then find the value of θ.
यदि $7\sin^2\theta + 3\cos^2\theta = 4$, $0° < \theta < 90°$ है, तो θ का मान ज्ञात करो।
(A) 45° (B) 30°
(C) 60° (D) 75°

12. If cos = $\frac{p^2-1}{p^2+1}$, $0° < \theta < 90°$, then the value of cosecθ.

यदि $\cos = \frac{p^2-1}{p^2+1}$, $0° < \theta < 90°$ है, तो cosecθ का मान ज्ञात करो।

(A) $\frac{1+p^2}{2p}$ (B) $\frac{1-p^2}{2p}$

(C) $\frac{2p}{1-p^2}$ (D) $\frac{2p}{1+p^2}$

13. If $\sec^2\theta + (1-\sqrt{3})\tan\theta - (1+\sqrt{3}) = 0$, where θ is an acute angle then find the value of θ.
यदि $\sec^2\theta + (1-\sqrt{3})\tan\theta - (1+\sqrt{3}) = 0$ जहाँ θ न्यून कोण है तो θ का मान ज्ञात करो।
(A) 30° (B) 60°
(C) 45° (D) 15°

14. If A = 30°, then / यदि A = 30° है, तो

$\frac{-3\sin^2 2A + 2\sec^2 A - \tan\frac{3A}{2}}{\frac{1}{3}\sin 3A}$ find the value of

/का मान ज्ञात करो।

(A) $\frac{-7}{36}$ (B) $\frac{-7}{4}$ (C) $\frac{11}{4}$ (D) $\frac{57}{4}$

15. If $\cos\theta = \frac{7}{3\sqrt{6}}$, where θ is an acute angle then find the value of $27\sin^2\theta - \frac{3}{2}$.
यदि $\cos\theta = \frac{7}{3\sqrt{6}}$, जहाँ θ न्यून कोण है तो $27\sin^2\theta - \frac{3}{2}$ का मान ज्ञात करें।
(A) 15 (B) 9
(C) 12 (D) 1

16. In ΔABC, ∠C = 90° and $\sec A = \frac{13}{5}$, Find the value of $\frac{1+\sin A}{\cos B}$.

ΔABC में, ∠C = 90° और $\sec A = \frac{13}{5}$ है। $\frac{1+\sin A}{\cos B}$ का मान ज्ञात करो।

(A) $\frac{18}{5}$ (B) 5 (C) $\frac{3}{2}$ (D) $\frac{25}{12}$

17. Find the value of following equation. / दिए गए व्यंजक का मान ज्ञात करो।

$$\frac{\tan^2 60° + \text{cosec}30°\sin 90° + 3\sec^2 30°}{4\cos^2 45° + \sec^2 60° - \cot^2 30° - \cos^2 90°}$$

(A) 3 (B) $\frac{7}{3}$ (C) $\frac{19}{17}$ (D) −12

18. If $\text{cosec}^2\theta(\cos\theta - 1)(1 + \cos\theta) = k$, then find the value of k?
यदि $\text{cosec}^2\theta(\cos\theta - 1)(1 + \cos\theta) = k$ है, तो k का मान ज्ञात करो।
(A) 1 (B) 0
(C) 1/2 (D) −1

19. If $\sin\theta + \text{cosec}\theta = 7$, then find the value of $\sin^3\theta + \text{cosec}^3\theta$.
यदि $\sin\theta + \text{cosec}\theta = 7$ है, तो $\sin^3\theta + \text{cosec}^3\theta$ का मान ज्ञात करो।
(A) 322 (B) 382
(C) 367 (D) 350

20. If 3cotA = 4tanA, where θ is an acute angle then find the value of secA.
यदि 3cotA = 4tanA, जहाँ θ न्यून कोण है, तो secA का मान ज्ञात करो।

(A) $\frac{\sqrt{7}}{2}$ (B) $\frac{1}{\sqrt{3}}$ (C) $\frac{1}{2}$ (D) $\frac{\sqrt{21}}{2}$

21. Find the value of $\frac{\cos^2 20° + \cos^2 70°}{\sin^2 90°} - \tan^2 45°$

$\frac{\cos^2 20° + \cos^2 70°}{\sin^2 90°} - \tan^2 45°$ का मान ज्ञात करो।

(A) −1 (B) 0
(C) −2 (D) 1

22. If /यदि $\frac{\sin^2\theta}{\tan^2\theta - \sin^2\theta} = 5$, then/ है, तो find the value of/ का मान ज्ञात करो $\frac{24\cos^2\theta - 15\sec^2\theta}{6\,\text{cosec}^2\theta - 7\cot^2\theta}$?

(A) 1 (B) 2
(C) 6 (D) 4

23. If $\frac{\cot\theta + \cos\theta}{\cot\theta - \cos\theta} = \frac{k+1}{1-k}$, and $k \neq 1$, then the value of k is equal to?

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यदि $\frac{\cot\theta+\cos\theta}{\cot\theta-\cos\theta} = \frac{k+1}{1-k}$, और $k \neq 1$ है, तो k का मान ज्ञात करो।

(A) $\cos\theta$ (B) $\sec\theta$
(C) $\sin\theta$ (D) $\operatorname{cosec}\theta$

24. If $\sqrt{13}\sin\theta = 2$, then what is the value of expression $\frac{3\tan\theta+\sqrt{13}\sin\theta}{\sqrt{13}\cos\theta-3\tan\theta}$

यदि $\sqrt{13}\sin\theta = 2$, तो $\frac{3\tan\theta+\sqrt{13}\sin\theta}{\sqrt{13}\cos\theta-3\tan\theta}$ का मान ज्ञात करें।

(A) 4 (B) 3 (C) 5 (D) $\frac{1}{2}$

25. If $\cos^2\theta - \sin^2\theta - 3\cos\theta + 2 = 0$, $0° < \theta < 90°$. Then find the value of $\sec\theta - \cos\theta$?
यदि $\cos^2\theta - \sin^2\theta - 3\cos\theta + 2 = 0$, $0° < \theta < 90°$ तो $\sec\theta - \cos\theta$ का मान ज्ञात करो।

(A) $\frac{1}{2}$ (B) $\frac{3}{2}$ (C) $\frac{4}{3}$ (D) $\frac{2}{3}$

26. If Δ ABC, $\angle C = 90°$ and sinA = sinB. Find the value of cosA?
Δ ABC में $\angle C = 90°$ और sinA = sinB है। cosA का मान ज्ञात करो।

(A) $\frac{1}{\sqrt{2}}$ (B) $\frac{\sqrt{3}}{2}$ (C) $\frac{1}{2}$ (D) 1

27. If $\frac{\operatorname{cosec}^2\theta}{\operatorname{cosec}^2\theta-\cot^2\theta} = \frac{13}{4}$ and $0° < \theta < 90°$, then find the value of $\frac{52\cos^2\theta-9\tan^2\theta}{18\sec^2\theta+8\cot^2\theta}$

यदि $\frac{\operatorname{cosec}^2\theta}{\operatorname{cosec}^2\theta-\cot^2\theta} = \frac{13}{4}$ और $0° < \theta < 90°$ है, तो $\frac{52\cos^2\theta-9\tan^2\theta}{18\sec^2\theta+8\cot^2\theta}$ का मान ज्ञात करो।

(A) $\frac{4}{11}$ (B) $\frac{8}{13}$ (C) $\frac{8}{11}$ (D) $\frac{5}{11}$

28. If $5\cos\theta = 4\sin\theta$ and $0° < \theta < 90°$, then find the value of $\sec\theta$.
यदि $5\cos\theta = 4\sin\theta$ और $0° < \theta < 90°$ है, तो $\sec\theta$ का मान ज्ञात करो।

(A) $\frac{\sqrt{41}}{16}$ (B) $\frac{\sqrt{41}}{5}$ (C) $\frac{\sqrt{41}}{4}$ (D) $\frac{3}{5}$

29. What is the correct value of θ (in degree) in the following equation?
$\sin3\theta\cos\theta - \cos3\theta\sin\theta = \frac{1}{2}$, $0 < \theta < \frac{\pi}{2}$.
निम्न समीकरण में θ(डिग्री में) का सही मान क्या है ?

$$\sin3\theta\cos\theta - \cos3\theta\sin\theta = \frac{1}{2},\ 0 < \theta < \frac{\pi}{2}$$

(A) 15 (B) 30
(C) 45 (D) 60

30. If $\sin B = \frac{9}{41}$, then what is the value of cotB where $0° < B < 90°$?
यदि $\sin B = \frac{9}{41}$ और $0° < B < 90°$ तो cotB का मान ज्ञात करें।

(A) $\frac{9}{41}$ (B) $\frac{40}{9}$ (C) $\frac{41}{9}$ (D) $\frac{9}{40}$

31. What is the value of =
$\frac{\cos8°\cos24°\cos60°\cos66°\cos82°}{\sin82°\sin66°\sin60°\sin8°\sin24°}$
$\frac{\cos8°\cos24°\cos60°\cos66°\cos82°}{\sin82°\sin66°\sin60°\sin8°\sin24°}$ का मान ज्ञात करें।

(A) 1 (B) $\frac{1}{\sqrt{2}}$ (C) $\frac{1}{\sqrt{3}}$ (D) 0

32. For θ: $0° < \theta < 90°$ and $3\sec\theta + 4\cos\theta = 4\sqrt{3}$ then calculate $(1 - \sin\theta + \cos\theta)$
θ के लिए : $0° < \theta < 90°$ है और $3\sec\theta + 4\cos\theta = 4\sqrt{3}$ है तो $(1 - \sin\theta + \cos\theta)$ का मान ज्ञात करो।

(A) $\frac{1+\sqrt{3}}{2}$ (B) $\frac{1-2\sqrt{3}}{2}$
(C) $\frac{1-\sqrt{3}}{2}$ (D) $\frac{1+2\sqrt{3}}{2}$

33. Calculate the value of following expression.
$\frac{3(\cot^2 46°-\sec^2 44°)}{2(\sin^2 28°+\sin^2 62^2)} + \frac{2\cos^2 60°\tan^2 33°\tan^2 57°}{\sec^2(90-\theta) - \cot^2\theta}$
$\frac{3(\cot^2 46°-\sec^2 44°)}{2(\sin^2 28°+\sin^2 62^2)} + \frac{2\cos^2 60°\tan^2 33°\tan^2 57°}{\sec^2(90-\theta) - \cot^2\theta}$
का मान ज्ञात करें।

(A) 2 (B) 1
(C) –1 (D) –2

34. If $\tan\theta = \frac{4}{3}$; then calculate $\frac{9\sin\theta+12\cos\theta}{27\cos\theta-20\sin\theta}$.

यदि $\tan\theta = \frac{4}{3}$; तो $\frac{9\sin\theta+12\cos\theta}{27\cos\theta-20\sin\theta}$ का मान ज्ञात करो।

(A) 36 (B) 72
(C) 18 (D) 100

35. If $\sin^2x - 3\cos^2x = 0$, then find the value of x? $(0° < x < 90°)$
यदि $\sin^2x - 3\cos^2x = 0$, तो x का मान ज्ञात करें। $(0° < x < 90°)$
(A) 60° (B) 45°
(C) 15° (D) 30°

36. If $\frac{5\cot\theta+\sqrt{3}\,\text{cosec}\theta}{2\sqrt{3}\,\text{cosec}\theta+3\cot\theta} = 1$ and $0° < \theta < 90°$ then find $\frac{\frac{7}{2}\cot^2\theta-\frac{3}{4}\text{cosec}^2\theta}{4\sin^2\theta+\frac{3}{2}\tan^2\theta}$.

यदि $\frac{5\cot\theta+\sqrt{3}\,\text{cosec}\theta}{2\sqrt{3}\,\text{cosec}\theta+3\cot\theta} = 1$ और $0° < \theta < 90°$ तो $\frac{\frac{7}{2}\cot^2\theta-\frac{3}{4}\text{cosec}^2\theta}{4\sin^2\theta+\frac{3}{2}\tan^2\theta}$ का मान ज्ञात करें।

(A) 7 (B) 2
(C) 3 (D) 5

37. What is the value of $\sqrt{(\cos 60°)\cos 30° - \sin 60°\sin 30°}$.

$\sqrt{(\cos 60°)\cos 30° - \sin 60°\sin 30°}$ का मान ज्ञात करो।

(A) $\frac{\sqrt{3}}{2}$ (B) $\frac{1}{\sqrt{2}}$ (C) 0 (D) 1

38. If $3\cos\theta = 2\sin^2\theta$, then find the value of $(\tan^2\theta + \sec^2\theta - \text{cosec}^2\theta)$? $(0° < \theta < 90°)$
यदि $3\cos\theta = 2\sin^2\theta$ तो $\tan^2\theta + \sec^2\theta - \text{cosec}^2\theta$ का मान ज्ञात करें। $(0° < \theta < 90°)$

(A) $\frac{-7}{3}$ (B) $\frac{-17}{3}$ (C) $\frac{7}{3}$ (D) $\frac{17}{3}$

39. What is the value of $\cot^2 46° - \sec^2 44° + (\sin^2 1° + \sin^2 3° + \sin^2 5° + \ldots\ldots + \sin^2 89°)$
$\cot^2 46° - \sec^2 44° + (\sin^2 1° + \sin^2 3° + \sin^2 5° + \ldots\ldots + \sin^2 89°)$ का मान ज्ञात करो।

(A) 20.5 (B) 21.5
(C) 22.5 (D) 26.5

40. If $(1 + \cot^2\theta) + (1 + (\cot^2\theta^{-1})$ is equal to k. Then find $\sqrt{k}$.

यदि $(1 + \cot^2\theta) + (1 + (\cot^2\theta^{-1}) = k$, तो $\sqrt{k}$ का मान ज्ञात करो।

(A) $\sin\theta\cos\theta$ (B) $\text{cosec}\theta\cos\theta$
(C) $\text{cosec}\theta\sec\theta$ (D) $\sin\theta\sec\theta$

41. Calculate the value of $\frac{(\sin^2 27° + \sin^2 63°)}{(\cos^2 24° + \cos^2 66°)} - \sin^2 69° - \cos 69°\sin 21°$.

$\frac{(\sin^2 27° + \sin^2 63°)}{(\cos^2 24° + \cos^2 66°)} - \sin^2 69° - \cos 69°\sin 21°$ का मान ज्ञात करो।

(A) 2 (B) 3
(C) 1 (D) 0

42. Find the value of $\frac{\sec\theta.\text{cosec}\theta}{2+\tan^2\theta+\cot^2\theta}$

$\frac{\sec\theta.\text{cosec}\theta}{2+\tan^2\theta+\cot^2\theta}$ का मान ज्ञात करो।

(A) $\text{cosec}\theta\cos\theta$ (B) $\sin\theta\cos\theta$
(C) $\text{cosec}\theta\sec\theta$ (D) $\sin\theta\sec\theta$

43. If $3\sin^2A + 4\cos^2A - 3 = 0$, then what is the value of cotA? (Where $0° \le A \le 90°$)
यदि $3\sin^2A + 4\cos^2A - 3 = 0$, तो cotA का मान ज्ञात करें। $(0° \le A \le 90°)$
(A) can not be determined/ निर्धारित नहीं कर सकते।
(B) ∞
(C) 0 (D) 1

44. If $3\text{cosec}\theta + 4\sin\theta - 4\sqrt{3} = 0$ where θ is an acute angle then find the value of θ.
यदि $3\text{cosec}\theta + 4\sin\theta - 4\sqrt{3} = 0$, जहां θ न्यून कोण है तो θ का मान ज्ञात करो।

(A) 30° (B) 60°
(C) 45° (D) 15°

45. If $\cot^2\theta + \cot^4\theta = 2$, then find the value of $2\sin^4\theta + \sin^2\theta$.
यदि $\cot^2\theta + \cot^4\theta = 2$, तो $2\sin^4\theta + \sin^2\theta$ का मान ज्ञात करो।

(A) 5 (B) 3
(C) 1 (D) 2

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46. If cotA + cosecA = 2 and A is an acute angle then find the value of $\frac{9\tan A+16\cos ecA}{5\sin A+3\tan A}$

यदि cotA + cosecA = 2, जहां A न्यून कोण है तो $\frac{9\tan A+16\cos ecA}{5\sin A+3\tan A}$ का मान ज्ञात करो।

(A) 3 (B) 6
(C) 8 (D) 4

47. What is the value of

$$\frac{\cos^2 89^\circ+\cos^2 1^\circ}{\cos 30^\circ\sin 90^\circ-\sin 30^\circ\cos 90^\circ}$$

$\frac{\cos^2 89^\circ+\cos^2 1^\circ}{\cos 30^\circ\sin 90^\circ-\sin 30^\circ\cos 90^\circ}$ का मान ज्ञात करो।

(A) $\frac{1}{\sqrt{3}}$ (B) $\frac{2}{\sqrt{3}}$ (C) $\frac{1}{1-\sqrt{3}}$ (D) $2\sqrt{3}$

48. If $6\tan^2\propto - 2 = 0$ and $0^\circ < \propto < 90^\circ$ then calculate the value of $\propto$.

यदि $6\tan^2\propto - 2 = 0$, $0^\circ < \propto < 90^\circ$ और तो $\propto$ का मान ज्ञात करो।

(A) 45° (B) 30°
(C) 75° (D) 15°

49. If $\sin\propto + \operatorname{cosec}\propto = \tan\frac{\pi}{3}$, then find the value of $\sin^3\propto + \operatorname{cosec}^3\propto$.

यदि $\sin\propto + \operatorname{cosec}\propto = \tan\frac{\pi}{3}$ है, तो $\sin^3\propto + \operatorname{cosec}^3\propto$ का मान ज्ञात करें।

(A) 1/2 (B) 1
(C) 3/2 (D) 0

50. If $8\sin^2\theta + 2\cos\theta = 5$, then find the value of $(\tan^2\theta + \sec^2\theta - \sin^2\theta$? $(0^\circ < \theta < 90^\circ)$

यदि $8\sin^2\theta + 2\cos\theta = 5$ तो $(\tan^2\theta + \sec^2\theta - \sin^2\theta$ का मान ज्ञात करें। $(0^\circ < \theta < 90^\circ)$

(A) $\frac{305}{144}$ (B) $\frac{153}{72}$ (C) $\frac{431}{144}$ (D) $\frac{23}{9}$

51. If $\operatorname{cosec}\theta = \frac{\sqrt{5}}{2}$, then find the value of $(\sec\theta + \tan\theta - \cot\theta\sin\theta$?

यदि $\operatorname{cosec}\theta = \frac{\sqrt{5}}{2}$ तो $(\sec\theta + \tan\theta - \cot\theta\sin\theta)$ का मान ज्ञात करें।

(A) $2 + \frac{\sqrt{5}}{2}$ (B) $2 + \frac{4\sqrt{5}}{2}$

(C) $2 + \frac{\sqrt{5}}{2}$ (D) $2 + \frac{2\sqrt{5}}{2}$

52. If $3\cot^2 x - 7\operatorname{cosec}^2 x + 7 = 0$ then calculate x $(0^\circ \le x \le 90^\circ)$

यदि $3\cot^2 x - 7\operatorname{cosec}^2 x + 7 = 0$ तो x $(0^\circ \le x \le 90^\circ)$ का मान ज्ञात करो।

(A) 60° (B) 0°
(C) 90° (D) 30°

53. Find the value of $\sin^2 60^\circ + \tan^2 45^\circ + \sec^2 45^\circ - \operatorname{cosec}^2 30^\circ$.

$\sin^2 60^\circ + \tan^2 45^\circ + \sec^2 45^\circ - \operatorname{cosec}^2 30^\circ$ का मान ज्ञात करो।

(A) –4 (B) $\frac{-1}{4}$ (C) $\frac{1}{4}$ (D) 4

54. If $2\tan x + 3\cot x = 5$, then find the value of $4\tan^2 x + 9\cot^2 x$.

यदि $2\tan x + 3\cot x = 5$ तो $4\tan^2 x + 9\cot^2 x$ का मान ज्ञात करो।

(A) 11 (B) 15
(C) 13 (D) 17

55. If $\sec\theta = \frac{65}{63}$ and A is an acute angle then find the value of $8(\operatorname{cosec}\theta - \cot\theta)$.

यदि $\sec\theta = \frac{65}{63}$, जहां A न्यून कोण है तो $8(\operatorname{cosec}\theta - \cot\theta)$ का मान ज्ञात करो।

(A) 2 (B) 4
(C) 1 (D) 8

56. If $2\cos\theta + \sec\theta - 2\sqrt{2} = 0$; where A is an acute angle then find the value of θ.

यदि $2\cos\theta + \sec\theta - 2\sqrt{2} = 0$, जहां A न्यून कोण है तो θ का मान ज्ञात करो।

(A) 15° (B) 60°
(C) 45° (D) 30°

57. In ΔABC, if angle B is 90°, AB = 21 cm and BC = 20 cm, then find $\frac{1+\sin A-\cos A}{1+\sin A+\cos A}$.

ΔABC में $\angle B = 90^\circ$, AB = 21 सेमी. और BC = 20 सेमी. तो $\frac{1+\sin A-\cos A}{1+\sin A+\cos A}$ का मान ज्ञात करो।

(A) $\frac{3}{5}$ (B) $\frac{-2}{5}$ (C) $\frac{-3}{5}$ (D) $\frac{2}{5}$

58. Calculate the value of : $\text{cosec}(58° + \theta) - \sec(32° - \theta) + \sin15°\sin35°\sec55°\sin30°\sec75°$
$\text{cosec}(58° + \theta) - \sec(32° - \theta) + \sin15°\sin35°\sec55°\sin30°\sec75°$ का मान ज्ञात करें।

(A) 2 (B) 1 (C) 0 (D) $\frac{1}{2}$

59. If $\tan3\theta = \sin45°.\cos45° + \cos60°$, and θ is an acute angle then find the value of $\sin4\theta$.
यदि $\tan3\theta = \sin45°.\cos45° + \cos60°$, जहां θ न्यून कोण है तो $\sin4\theta$ का मान ज्ञात करें।

(A) $\frac{1}{2}$ (B) $\frac{1}{\sqrt{2}}$ (C) $\frac{\sqrt{3}}{2}$ (D) 1

60. If $\tan\theta + \cot\theta = 3$, then what is the value of $\tan^2\theta + \cot^2\theta$?
यदि $\tan\theta + \cot\theta = 3$ है तो $\tan^2\theta + \cot^2\theta$ का मान ज्ञात करें।

(A) –1 (B) 7
(C) 1 (D) 11

61. If 5 tanA = 12, then what is the value of $\frac{13\sin A + 20\tan A}{15\tan A - 13\cos A}$? Where A is an acute angle.
यदि 5 tanA = 12 जहाँ A न्यून कोण है तो
$\frac{13\sin A + 20\tan A}{15\tan A - 13\cos A}$ का मान ज्ञात करें।

(A) $\frac{31}{41}$ (B) $1\frac{19}{41}$ (C) $1\frac{29}{31}$ (D) $\frac{41}{50}$

62. If $\text{cosec}A = 10$, then what is the value of $20\sin A + 9\sqrt{11}\sec A$? Where A is an acute angle.
यदि $\text{cosec}A = 10$, जहां A न्यून कोण है तो $20\sin A + 9\sqrt{11}\sec A$ का मान ज्ञात करो।

(A) 23 (B) 32
(C) 30 (D) 34

63. If $\sin^2x = 3\cos^2x$ and $0° \le x \le 90°$ then find the value of $\frac{x}{2}$.

यदि $\sin^2x = 3\cos^2x$, $0° \le x \le 90°$ तो $\frac{x}{2}$ का मान ज्ञात करो।

(A) 15° (B) 30°
(C) 22.5° (D) 45°

64. If $\sec\theta - \text{cosec}\theta = 0$, then what is the value of $\sec^2\theta + \text{cosec}^2\theta$? Where A is an acute angle.
यदि $\sec\theta - \text{cosec}\theta = 0$, जहाँ A न्यून कोण है तो $\sec^2\theta + \text{cosec}^2\theta$ का मान ज्ञात करो।

(A) 2 (B) 4
(C) 0 (D) 1

65. In ΔABC, $\angle A = 90°$, then $\sin\frac{B+C}{2}\cos\frac{B+C}{2} = ?$

ΔABC, $\angle A = 90°$ तो $\sin\frac{B+C}{2}\cos\frac{B+C}{2} = ?$

(A) $\sqrt{2}$ (B) $\frac{1}{2}$ (C) $\frac{1}{4}$ (D) $\frac{\sqrt{3}}{4}$

66. If $\tan A + \sec A = \frac{3}{2}$ and A is an acute angle, then what is the value of $\frac{10\cot A + 13\cos A}{12\tan A + 5\,\text{cosec}A}$

यदि $\tan A + \sec A = \frac{3}{2}$, जहां A न्यून कोण है तो $\frac{10\cot A + 13\cos A}{12\tan A + 5\,\text{cosec}A}$ का मान ज्ञात करें।

(A) 2 (B) 5
(C) 4 (D) 1

67. If $\frac{\text{cosec}\theta + \cot\theta}{\text{cosec}\theta - \cot\theta} = 7$, then find the value of $\frac{4\sin^2\theta + 5}{4\sin^2\theta - 1}$.

यदि $\frac{\text{cosec}\theta + \cot\theta}{\text{cosec}\theta - \cot\theta} = 7$ है, तो $\frac{4\sin^2\theta + 5}{4\sin^2\theta - 1}$ का मान ज्ञात करें।

(A) 9 (B) 12
(C) 15 (D) 3

68. If $5\sin^2\theta = 3(1 + \cos\theta)$ and $0° < \theta < 90°$ then find the value of $\text{cosec}\theta + \cot\theta$.
यदि $5\sin^2\theta = 3(1 + \cos\theta)$ और $0° < \theta < 90°$ है, तो $\text{cosec}\theta + \cot\theta$ का मान क्या होगा?

(A) $\sqrt{\left(\frac{7}{3}\right)}$ (B) $\sqrt{\left(\frac{3}{7}\right)}$ (C) $\frac{5}{\sqrt{21}}$ (D) $\frac{4}{\sqrt{21}}$

69. If $\cot\theta = \sqrt{2} + 1$ then find the value of $\text{cosec}\theta\sec\theta$
यदि $\cot\theta = \sqrt{2} + 1$, तो $\text{cosec}\theta\sec\theta$ का मान ज्ञात करो।

(A) $4\sqrt{2}$ (B) $2\sqrt{2}$ (C) $\frac{\sqrt{2}}{4}$ (D) $\frac{\sqrt{2}}{2}$

70. If $\tan A = \frac{11}{60}$ then what is the value of $(4\cos A - 7\sin A)$. Given that A is an acute angle.

यदि $\tan A = \frac{11}{60}$ जहाँ, A न्यून कोण है तो $(4\cos A - 7\sin A)$ का मान ज्ञात करें।

(A) $2\frac{14}{61}$ (B) $2\frac{41}{61}$ (C) $2\frac{14}{71}$ (D) $2\frac{41}{71}$

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71. If $0° < \theta < 90°$ then find the value of

$$\frac{(1-\sin\theta)(\sec\theta+\tan\theta)\tan\theta}{(\tan\theta+\sec\theta+1)(\cot\theta-\operatorname{cosec}\theta+1)}$$

यदि $0° < \theta < 90°$, तो

$\frac{(1-\sin\theta)(\sec\theta+\tan\theta)\tan\theta}{(\tan\theta+\sec\theta+1)(\cot\theta-\operatorname{cosec}\theta+1)}$ का मान ज्ञात करो।

(A) $\cos\theta$ (B) $\frac{\sin\theta}{2}$ (C) $\frac{\cos\theta}{2}$ (D) $\sin\theta$

72. Solve the following equation:

$2\cos^2\theta + (4+\sqrt{3})\sin\theta - 2(1+\sqrt{3}) = 0$, where θ is an acute angle.

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$2\cos^2\theta + (4+\sqrt{3})\sin\theta - 2(1+\sqrt{3}) = 0$ जहाँ θ न्यून कोण है।

(A) 60° (B) 15°
(C) 45° (D) 30°

73. If $\frac{3\sqrt{3}\sec\theta+4\tan\theta}{3\tan\theta+\sqrt{3}\sec\theta} = 2$ & $0° < \theta < 90°$ then find the value of $\cos\theta$?

यदि $\frac{3\sqrt{3}\sec\theta+4\tan\theta}{3\tan\theta+\sqrt{3}\sec\theta} = 2$ और $0° < \theta < 90°$ तो $\cos\theta$ का मान ज्ञात करो।

(A) $\frac{1}{4}$ (B) $\frac{1}{\sqrt{2}}$ (C) $\frac{\sqrt{3}}{2}$ (D) $\frac{1}{2}$

74. What number should be subtracted to get 2 by $4(\sin^4 60° + \cos^4 30°) - (\tan^2 45° - \cot^2 30°) + \cos^2 45° - \operatorname{cosec}^2 45° + \sec^2 60°$.

2 प्राप्त करने के लिए किस संख्या को $4(\sin^4 60° + \cos^4 30°) - (\tan^2 45° - \cot^2 30°) + \cos^2 45° - \operatorname{cosec}^2 45° + \sec^2 60°$ से घटाना चाहिए।

(A) 3 (B) 5
(C) 4 (D) 7

75. If $\cos\theta = \frac{2}{3}$, then find the value of $2\sec^2\theta + 2\tan^2\theta - 6$.

यदि $\cos\theta = \frac{2}{3}$, तो $2\sec^2\theta + 2\tan^2\theta - 6$ का मान ज्ञात करें।

(A) 1 (B) 0
(C) 4 (D) 2

76. If θ is an acute angle and $\sin\theta = \cos\theta$. Then find the value of $2\tan^2\theta + \sin^2\theta - 1$

यदि, $\sin\theta = \cos\theta$ जहां θ न्यून कोण है तो $(2\tan^2\theta + \sin^2\theta - 1)$ का मान ज्ञात करें।

(A) 3 (B) 1
(C) 3/2 (D) –7

77. The value A is between 45° to 540° and $\sin A = 0.5$, then find the value of A/3.

यदि A का मान 45° से 540° के मध्य है। $\sin A = 0.5$ तब A/3 का मान अंश में कितना होगा?

(A) 170° (B) 160°
(C) 165° (D) 175°

78. Find the value of

$$\frac{\tan^2 60° - 2\sin^2 45°}{\cos 24°\cos 37°\operatorname{cosec} 53°\cos 60°\operatorname{cosec} 66° + \sin^2 60°}$$

$$\frac{\tan^2 60° - 2\sin^2 45°}{\cos 24°\cos 37°\operatorname{cosec} 53°\cos 60°\operatorname{cosec} 66° + \sin^2 60°}$$

का मान ज्ञात करो।

(A) $1\frac{3}{5}$ (B) 1 (C) $1\frac{4}{5}$ (D) 2

79. Calculate the value of $\sin^2 x - 4\sin x + 3 = 0$, $0 \le x \le \frac{\pi}{2}$.

$\sin^2 x - 4\sin x + 3 = 0$, $0 \le x \le \frac{\pi}{2}$ का मान ज्ञात करो।

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{4}$

80. If $\tan\theta = 15$, then find the value of $\sec\theta$

यदि $\tan\theta = 15$ है, तो $\sec\theta$ का मान ज्ञात करो।

(A) $\frac{1}{\sqrt{224}}$ (B) $\sqrt{226}$

(C) $\sqrt{224}$ (D) $\frac{1}{\sqrt{226}}$

81. If $\tan\theta + \cot\theta = 4$, then find the ratio of $3(\tan^2\theta + \cot^2\theta)$ to $(2\operatorname{cosec}^2\theta\sec^2\theta - 4)$.

यदि $\tan\theta + \cot\theta = 4$, तो $3(\tan^2\theta + \cot^2\theta)$ का $(2\operatorname{cosec}^2\theta\sec^2\theta - 4)$ से अनुपात ज्ञात करें।

(A) 5 : 4 (B) 4 : 3
(C) 3 : 4 (D) 3 : 2

82. If Y = tan35° then what is value of (2tan55° + cot55°)?
यदि Y = tan35°, तो (2tan55° + cot55°) का मान ज्ञात करो।

(A) $\frac{2}{Y^2}$ (B) $\frac{2-Y^2}{Y}$ (C) $\frac{2+Y^2}{Y}$ (D) $\frac{2+Y}{Y^2}$

83. If $\tan^2x - 3\tan x + 2 = 0$ and $0° < x < 90°$. then find the value of x.
यदि $\tan^2x - 3\tan x + 2 = 0$ और $0° < x < 90°$ तो x का मान ज्ञात करो।

(A) 30° (B) 60°
(C) 90° (D) 45°

84. Find the value of

$$\frac{\sin33°\cos57°+\sec62°\sin28°+\cos33°\sin57°+\operatorname{cosec}62°\cos28°}{\tan15°\tan35°\tan60°\tan55°\tan75°}$$

$$\frac{\sin33°\cos57°+\sec62°\sin28°+\cos33°\sin57°+\operatorname{cosec}62°\cos28°}{\tan15°\tan35°\tan60°\tan55°\tan75°}$$

का मान ज्ञात करो।

(A) $\frac{\sqrt{3}}{3}$ (B) $2\sqrt{3}$ (C) $\sqrt{3}$ (D) 2

85. If A = 60° then What is value of $(4\cos^3A - 3\cos A)$?
यदि A = 60° है, तो $(4\cos^3A - 3\cos A)$ का मान ज्ञात करो।

(A) 1 (B) –1 (C) $\frac{-\sqrt{3}}{2}$ (D) $\frac{\sqrt{3}}{2}$

86. If $\sin\theta = \frac{12}{13}$, then $\frac{\sin^2\theta - \cos^2\theta}{2\cos\theta\sin\theta} \times \cot^2\theta = ?$

यदि $\sin\theta = \frac{12}{13}$ है, तो $\frac{\sin^2\theta - \cos^2\theta}{2\cos\theta\sin\theta} \times \cot^2\theta$ का मान ज्ञात करो।

(A) $\frac{595}{1152}$ (B) $\frac{118}{144}$ (C) $\frac{595}{3456}$ (D) $\frac{119}{864}$

87. If $(\cos^2\theta - 1)(2\sec^2\theta) + \sec^2\theta + 2\tan^2\theta = 2$, $0° < \theta < 90°$, then find the value of $\frac{\sec\theta + \sin\theta}{\operatorname{cosec}\theta - \cos\theta}$.

यदि $(\cos^2\theta - 1)(2\sec^2\theta) + \sec^2\theta + 2\tan^2\theta = 2$, $0° < \theta < 90°$ तो $\frac{\sec\theta + \sin\theta}{\operatorname{cosec}\theta - \cos\theta}$ का मान ज्ञात करो।

(A) 2 (B) –3
(C) –1 (D) 3

88. If $3(\sec^2\theta + \tan^2\theta) = 5$, $0° < \theta < 90°$, then find the value of $\operatorname{cosec}\theta$.
यदि $3(\sec^2\theta + \tan^2\theta) = 5$, $0° < \theta < 90°$ तो $\operatorname{cosec}\theta$ का मान ज्ञात करो।

(A) 2 (B) $\frac{1}{2}$ (C) $2\frac{\sqrt{3}}{3}$ (D) $\frac{1}{\sqrt{3}}$

89. If $21\tan\theta = 20$, then what is value of $(1 + \sin\theta - \cos\theta) : (1 - \sin\theta + \cos\theta)$.
यदि $21\tan\theta = 20$ है, तो $(1 + \sin\theta - \cos\theta) : (1 - \sin\theta + \cos\theta)$ का मान ज्ञात करो।

(A) 14 : 15 (B) 13 : 15
(C) 12 : 11 (D) 11 : 13

90. Calculate the value of $\cos^230° + \cos^240° + \cos^250° + \cos^260°$.
$\cos^230° + \cos^240° + \cos^250° + \cos^260°$ का मान ज्ञात करो।

(A) $\frac{5}{2}$ (B) $\frac{3}{2}$ (C) 2 (D) 1

91. If $5k = \tan\theta$ and $\frac{5}{k} = \sec\theta$, then what is the value of $10\left(k^2 - \frac{1}{k^2}\right)$?

यदि $5k = \tan\theta$ और $\frac{5}{k} = \sec\theta$, $10\left(k^2 - \frac{1}{k^2}\right)$ का मान ज्ञात करें।

(A) $\frac{-2}{5}$ (B) 2 (C) $\frac{2}{5}$ (D) –2

92. If $\sin\theta = \frac{11}{15}$, then what is the value of $(\sec\theta - \tan\theta)$?

यदि $\sin\theta = \frac{11}{15}$ तो $(\sec\theta - \tan\theta)$ का मान ज्ञात करो।

(A) $\frac{1}{\sqrt{26}}$ (B) $\frac{2\sqrt{26}}{13}$ (C) $\frac{4}{\sqrt{26}}$ (D) $\frac{\sqrt{26}}{13}$

93. If $\sin\theta(2\sin\theta + 3) = 2$, $0° < \theta < 90°$, then the value of $(\sec^2\theta + \cot^2\theta - \cos^2\theta)$
यदि $\sin\theta(2\sin\theta + 3) = 2$, $0° < \theta < 90°$ है, तो $(\sec^2\theta + \cot^2\theta - \cos^2\theta)$ का मान ज्ञात करो।

(A) $\frac{7}{2}$ (B) $\frac{43}{12}$ (C) $\frac{31}{12}$ (D) $\frac{13}{3}$

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94. What is the value of

$\frac{(1+\cos\theta)(\operatorname{cosec}\theta-\cot\theta)\sec\theta}{\sin\theta(1-\sin\theta)(\sec\theta+\tan\theta)}$

$\frac{(1+\cos\theta)(\operatorname{cosec}\theta-\cot\theta)\sec\theta}{\sin\theta(1-\sin\theta)(\sec\theta+\tan\theta)}$ का मान ज्ञात करो।

(A) $\cos^2\theta$ (B) $\sin^2\theta$
(C) $\sec^2\theta$ (D) $\operatorname{cosec}^2\theta$

95. Find the value of $\frac{3\cos^2 27°-5+3\cos^2 63°}{\tan^2 32°+4-\operatorname{cosec}^2 58°}$ + $\sin35°\cos55° + \cos35°\sin55°$.

$\frac{3\cos^2 27°-5+3\cos^2 63°}{\tan^2 32°+4-\operatorname{cosec}^2 58°} + \sin35°\cos55° + \cos35°\sin55°$ का मान ज्ञात करो।

(A) $\frac{1}{3}$ (B) $1\frac{2}{3}$ (C) $-\frac{1}{3}$ (D) $-\frac{1}{4}$

96. If $\sin\theta = \frac{2\sqrt{ab}}{a+b}$, $a > b > 0$, then find the value of

$\frac{\cos\theta+1}{\cos\theta-1}$.

यदि $\sin\theta = \frac{2\sqrt{ab}}{a+b}$, $a > b > 0$, $\frac{\cos\theta+1}{\cos\theta-1}$ का मान ज्ञात करें।

(A) $\frac{a}{b}$ (B) $-\frac{b}{a}$ (C) $\frac{b}{a}$ (D) $-\frac{a}{b}$

97. If $3\cos^2\theta - 4\sin\theta + 1 = 0$, $0° < \theta < 90°$, then find the value of $3\cos^2\theta + 5\tan^2\theta$.

यदि $3\cos^2\theta - 4\sin\theta + 1 = 0$, $0° < \theta < 90°$, तो $3\cos^2\theta + 5\tan^2\theta$ का मान ज्ञात करें।

(A) $5\frac{2}{3}$ (B) $6\frac{2}{3}$ (C) $5\frac{1}{5}$ (D) $5\frac{4}{3}$

98. Solve the following equation

$\theta : 2\sqrt{3}\sin^2\theta + \cos\theta - \sqrt{3} = 0$ where θ is an acute angle.

निम्न समीकरण को हल कीजिए-

$\theta : 2\sqrt{3}\sin^2\theta + \cos\theta - \sqrt{3} = 0$ जहाँ θ न्यून कोण है।

(A) 30° (B) 45°
(C) 60° (D) 15°

99. If $\sec\theta\left(90° - \frac{3\theta}{2}\right) = \sqrt{2}$, $0° < \theta < 90°$ then the value of $(2\sin\theta + 4\cos2\theta)$

यदि $\sec\theta\left(90° - \frac{3\theta}{2}\right) = \sqrt{2}$, $0° < \theta < 90°$ तो $(2\sin\theta + 4\cos2\theta)$ का मान ज्ञात करो।

(A) 4 (B) 2
(C) 6 (D) 3

100. If $\frac{\sin\theta+\cos\theta}{\sin\theta-\cos\theta} = 3$, then calculate $\sin^4\theta - \cos^4\theta$.

यदि $\frac{\sin\theta+\cos\theta}{\sin\theta-\cos\theta} = 3$ तो $\sin^4\theta - \cos^4\theta$ का मान ज्ञात करें।

(A) $\frac{3}{5}$ (B) $\frac{4}{5}$ (C) $\frac{2}{5}$ (D) $\frac{1}{5}$

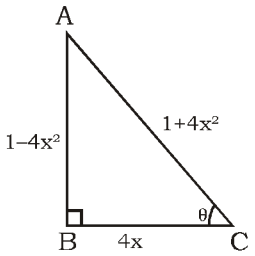
Solution

1. (C) $\sin A = \cos A$

$\Rightarrow \frac{\cos A}{\sin A} = 1$

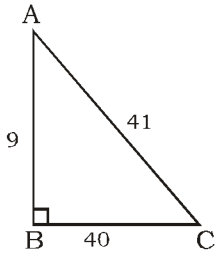
$\Rightarrow \cot A = \cot45° = 1$

2. (B)



$\sin\theta = \frac{1-4x^2}{1+4x^2}$

3. (B)



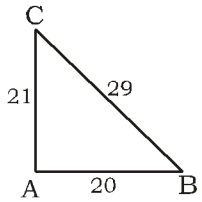
$\operatorname{cosec}\theta = \frac{41}{9}$

$5\tan\theta = 5 \times \frac{9}{40} = \frac{9}{8}$

4. (D) Put $\theta = 60°$ (By option)

$\Rightarrow 3 \times \frac{1}{\sqrt{3}} + \sqrt{3} - 2\sqrt{3} = 0$

5. (A)



$\sin B - \cot C$

$$\frac{21}{29} - \frac{21}{20}$$

$$\frac{420 - 619}{580} = \frac{-189}{580}$$

6. (C) $\theta = 30°$ satisfied

$\tan 2\theta + \operatorname{cosec} 3\theta - \sec 2\theta$

$= \tan 60° + \operatorname{cosec} 90° - \sec 60°$

$= \sqrt{3} + 1 - 2$

$= \sqrt{3} - 1$

7. (B) $\dfrac{\tan 50° + \sec 50°}{\tan 50° + \sec 50°} + \cos^2 65° + \sin^2 65° + \tan 30°$

$$= 1 + 1\ \frac{1}{\sqrt{3}} = \frac{2\sqrt{3}+1}{\sqrt{3}} = \frac{6+\sqrt{3}}{3}$$

8. (A) $\cos\theta = \cos 30°$

$\theta = 30°$

$$\Rightarrow \frac{2 - \frac{1}{4}}{1-3} + \left(\frac{4}{3} + 2\right)$$

$$\Rightarrow \frac{\frac{7}{4}}{-2} + \left(\frac{10}{3}\right) = \frac{-7}{8} + \left(\frac{10}{3}\right) = \frac{59}{24}$$

9. (C) $3x = 90° - 48°$

$x = 14°$

10.(A) $$\frac{3 \times 3 + \frac{4}{3} - \frac{1}{2}}{2\cos 15° \times 2\sec 15°} = \frac{9 + \frac{4}{3} - \frac{1}{2}}{4}$$

$$= \frac{\frac{31}{3} - \frac{1}{2}}{4} = \frac{59}{24}$$

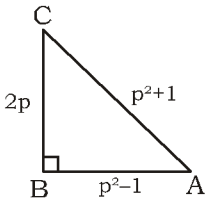
11.(B) $7\sin^2\theta + 3\cos^2\theta - 4 = 0$

$\Rightarrow 7\sin^2\theta + 3 - 3\sin^2\theta - 4 = 0$

$\Rightarrow 4\sin^2\theta = 1$

$\Rightarrow \sin\theta = \dfrac{1}{2}$, $\theta = 30°$

12.(A)



$$\operatorname{cosec}\theta = \frac{p^2+1}{2p}$$

13.(B) $1 + \tan^2\theta + (1 - \sqrt{3})\tan\theta - (1 + \sqrt{3}) = 0$

$\Rightarrow \tan^2\theta + (1 - \sqrt{3})\tan\theta - \sqrt{3} = 0$

$\Rightarrow \tan^2\theta + \tan\theta - \sqrt{3}\tan\theta - \sqrt{3} = 0$

$\Rightarrow \tan\theta = \sqrt{3}, -1$(x)

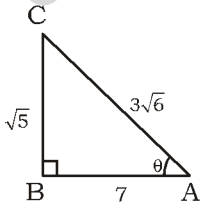
$\Rightarrow \theta = 60°$

14.(B) $$\frac{-3\sin^2 60° + 2\sec^2 30° - \tan 45°}{\frac{1}{3}\sin 90°}$$

$$\frac{-3 \times \frac{3}{4} + 2 \times \frac{4}{3} - 1}{\frac{1}{3}} = \frac{\frac{-9}{4} + \frac{8}{3} - 1}{\frac{1}{3}}$$

$$\frac{\frac{-27 + 32 - 12}{12}}{\frac{1}{3}} = \frac{-7 \times 3}{12} = \frac{-7}{4}$$

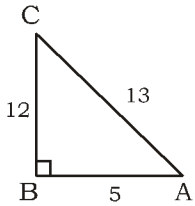
15.(D)



$$\cos\theta = \frac{7}{3\sqrt{6}} \qquad 27\sin^2\theta - \frac{3}{2}$$

$$27 \times \frac{5}{54} - \frac{3}{2} \Rightarrow \frac{5}{2} - \frac{3}{2} = 1$$

16.(D)



$$\sec A = \frac{13}{5}$$

$$\frac{1 + \sin A}{\cos B} = \frac{1 + \frac{12}{13}}{12/13} = \frac{12+13}{12} = \frac{25}{12}$$

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17.(A) $\dfrac{3+2\times1+3\times\frac{4}{3}}{4\times\frac{1}{2}+4-3-0} = \dfrac{9}{6-3} = 3$

18.(D) $\text{cosec}^2\theta \times (\cos^2\theta - 1) = k$

$\Rightarrow -\dfrac{1}{\sin^2\theta} \times \sin^2\theta = k$

$\Rightarrow k = -1$

19.(A) $\sin\theta + \dfrac{1}{\sin\theta} = 7$

$\Rightarrow \sin^3\theta + \dfrac{1}{\sin^3\theta} = 7^3 - 7 \times 3$

$= 343 - 21 = 322$

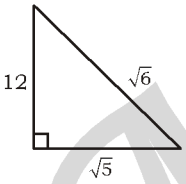
20.(A) $\tan^2\theta = \dfrac{3}{4}$

$\because \sec^2\theta = 1 + \tan^2\theta = 1 + \dfrac{3}{4}$

$\sec\theta = \dfrac{\sqrt{7}}{2}$

21.(B) $\dfrac{\cos^2 20^\circ + \sin^2 20^\circ}{1} - 1 = 1 - 1 = 0$

22.(B) $\dfrac{\sin^2\theta}{\sin^2\theta\tan^2\theta} = 5$



$\tan\theta = \dfrac{1}{\sqrt{5}}$

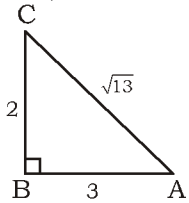
$\dfrac{24\cos^2\theta - 15\sec^2\theta}{6\,\text{cosec}^2\theta - 7\cot^2\theta} = \dfrac{24\times\frac{5}{6} - 15\times\frac{6}{5}}{6\times\frac{6}{1} - 7\times\frac{5}{1}} = 2$

23.(C) By C & D

$\dfrac{\cot\theta}{\cos\theta} = \dfrac{1}{k}$

$k = \sin\theta$

24.(A) $\sin\theta = \dfrac{2}{\sqrt{13}}$



$\dfrac{3\tan\theta + \sqrt{13}\sin\theta}{\sqrt{3}\cos\theta - 3\tan\theta}$

$\dfrac{3\times\frac{2}{3} + \sqrt{13}\times\frac{2}{\sqrt{13}}}{\sqrt{13}\times\frac{3}{\sqrt{13}} - 3\times\frac{2}{3}} = \dfrac{4}{1} = 4$

25.(B) $\cos^2\theta - 1 + \cos^2\theta - 3\cos\theta + 2 = 0$

$2\cos^2\theta - 3\cos\theta + 1 = 0$

$\Rightarrow \cos\theta = \dfrac{1}{2}, 1(x)$

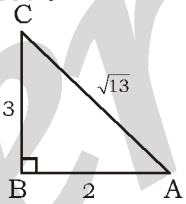
$\Rightarrow \sec 60^\circ - \cos 60^\circ = 2 - \dfrac{1}{2} = \dfrac{3}{2}$

26.(A) $\sin A = \cos B$

$\Rightarrow A, B = 45^\circ$

$\therefore \cos 45^\circ = \dfrac{1}{\sqrt{2}}$

27.(C) $9\sec^2\theta = 13\cot^2\theta$



$\cos\theta = \dfrac{3}{\sqrt{13}}$

$\dfrac{52\times\frac{9}{13} - 9\times\frac{4}{9}}{18\times\frac{13}{9} - 8\times\frac{9}{4}} = \dfrac{36-4}{26+18} = \dfrac{32}{44} = \dfrac{8}{11}$

28.(C) $\dfrac{\sin\theta}{\cos\theta} = \dfrac{5}{4}$ $\qquad \tan^2\theta = \dfrac{25}{16}$

$\sec\theta = \sqrt{1+\dfrac{25}{16}} = \dfrac{\sqrt{41}}{4}$

29.(A) $\sin 3\theta\cos\theta - \cos 3\theta\sin\theta = \dfrac{1}{2}$

$[\because \sin(A-B) = \sin A\cos B - \cos A\sin B]$

$\sin(3\theta - \theta) = \sin 30^\circ$

$\theta = 15^\circ$

30.(B) $\sin B = \dfrac{9}{41}$ $\qquad \cot B = \dfrac{40}{9}$

31.(C) $\dfrac{\cos 8^\circ \times \sin 8^\circ \times \sin 30^\circ \times \sin 24^\circ}{\cos 8^\circ \times \sin 8^\circ \times \sin 60^\circ \times \sin 24^\circ}$

$= \dfrac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \dfrac{1}{\sqrt{3}}$

32.(A) Put $\theta = 30°$

$$= \left(1 - \frac{1}{2} + \frac{\sqrt{3}}{2}\right) = \frac{1+\sqrt{3}}{2}$$

33.(C) $$= \frac{3(-1)}{2(1)} + \frac{2\left(\frac{1}{4}\right)}{1} = \frac{-3}{2} + \frac{1}{2} = -1$$

34.(B) $\tan\theta = \frac{4}{3}$

$$\frac{9\tan\theta + 12}{27 - 20\tan\theta} = \frac{9 \times \frac{4}{3} + 12}{27 - 20 \times \frac{4}{3}} = \frac{24 \times 3}{81 - 80} = 72$$

35.(A) $1 - \cos^2\theta - 3\cos^2\theta$

$\cos\theta = \frac{1}{2}$

$\theta = 60°$

36.(D) $2\cot\theta = \sqrt{3}\,\text{cosec}\theta$

$\cos\theta = \frac{\sqrt{3}}{2}$

$\theta = 30°$

$$\therefore \quad \frac{\frac{7}{2}\cot^2\theta - \frac{3}{4}\text{cosec}^2\theta}{4\sin^2\theta + \frac{3}{2}\tan^2\theta}$$

$$\frac{\frac{7}{2} \times 3 - \frac{3}{4} \times 4}{4 \times \frac{1}{4} + \frac{3}{2} \times \frac{1}{3}} = \frac{15}{3} = 5$$

37.(C) $$\sqrt{\frac{1}{2} \times \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} \times \frac{1}{2}} = 0$$

38.(D) $3\cos\theta = 2 - 2\cos^2\theta$

$2\cos^2\theta + 3\cos\theta - 2 = 0$

$\cos\theta = \frac{1}{2}, \theta = 60°$

$\therefore \tan^2 60° + \sec^2 60° - \text{cosec}^2 60°$

$$\Rightarrow \quad 3 + 4 - \frac{4}{3} = \frac{17}{3}$$

39.(B) $\cot^2 46° - \text{cosec}^2 46° + \left(22\frac{1}{2}\right)$

$= -1 + 22\frac{1}{2} = 21.5$

40.(C) $(1 + \cot^2\theta)(1 + \tan^2\theta) = K$

$\text{cosec}^2\theta \times \sec^2\theta = K$

$\sqrt{k} = \text{cosec}\theta\sec\theta$

41.(D) $$\frac{(\sin^2 27° + \cos^2 27°)}{(\cos^2 24° + \sin^2 24°)} - (\sin^2 69° + \cos^2 69°)$$

$= 1 - 1 = 0$

42.(B) $$\frac{\sec\theta\,\text{cosec}\theta}{\sec^2\theta\,\text{cosec}^2\theta} = \sin\theta\cos\theta$$

43.(C) $3 - 3\cos^2\theta + 4\cos^2\theta - 3 = 0$

$\cos\theta = 0$

$\theta = 90°$

$\Rightarrow \quad \cot 90° = 0$

44.(B) $3\text{cosec}\theta + 4\sin\theta - 4\sqrt{3} = 0$

$\Rightarrow \quad 3 + 4\sin^2\theta - 4\sqrt{3}\sin\theta = 0$

$\Rightarrow \quad 4\sin^2\theta - 4\sqrt{3}\sin\theta + 3 = 0$

$\Rightarrow \quad \sin\theta = \frac{\sqrt{3}}{2}, \theta = 60°$

45.(C) Put $\theta = 45°$

$2\sin^4 45° + \sin^2 45°$

$$= 2 \times \left(\frac{1}{\sqrt{2}}\right)^4 + \left(\frac{1}{\sqrt{2}}\right)^2$$

$= \frac{1}{2} + \frac{1}{2} = 1$

46.(D) $\text{cosec}A + \cot A = 2$

$\text{cosec}A - \cot A = \frac{1}{2}$

$2\text{cosec}A = \frac{5}{2}$

$\sin A = \frac{4}{5}$

$$\Rightarrow \quad \frac{9\tan A + 16\,\text{cosec}A}{5\sin A + 3\tan A} = \frac{9 \times \frac{4}{3} + 16 \times \frac{5}{4}}{5 \times \frac{4}{5} + 3 \times \frac{4}{3}}$$

$$\Rightarrow \quad = \frac{12 + 20}{4 + 4} = 4$$

47.(B) $$\frac{\cos^2 89° + \sin^2 89°}{\sin(90° - 30°)} = \frac{1}{\frac{\sqrt{3}}{2}} = \frac{2}{\sqrt{3}}$$

48.(B) $\tan^2\alpha = \frac{1}{3}$

$\alpha = 30°$

49.(D) $$\sin\alpha + \frac{1}{\sin\alpha} = \sqrt{3}$$

$$\sin^3\alpha + \frac{1}{\sin^3\alpha} = 3\sqrt{3} - 3\sqrt{3} = 0$$

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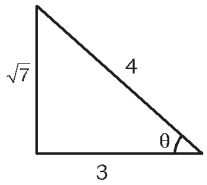
50.(A) $8\cos^2\theta - 2\cos\theta - 3 = 0$
$8\cos^2\theta + 4\cos\theta - 6\cos\theta - 3 = 0$

$\cos\theta = \frac{3}{4}, -\frac{1}{2}(x)$



$4\cos\theta - 6\cos\theta - 3 = 0$

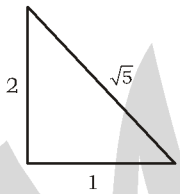
$\cos\theta = \frac{3}{4}, -\frac{1}{2}(x)$

$\tan^2\theta + \sec^2\theta - \sin^2\theta$

$\frac{7}{9} + \frac{16}{9} - \frac{7}{16}$

$\frac{23}{9} - \frac{7}{16} = \frac{368-63}{144} = \frac{305}{144}$

51.(B) $\text{cosec}\theta = \frac{9}{2}$



$\sec\theta + \tan\theta - \cot\theta\sin\theta$

$\sqrt{5} + 2 - \frac{1}{\sqrt{5}}$

$\frac{4}{\sqrt{5}} + 2$

$\Rightarrow 2 + \frac{4\sqrt{5}}{5}$

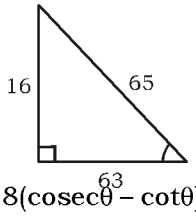
52.(C) $3\cot^2x - 7 - 7\cot^2x + 7 = 0$
$-4\cot^2x = 0$
$\cot x = 0$
$x = 90°$

53.(B) $= \frac{3}{4} + 1 + 2 - 4$

$\frac{3}{4} - 1 = \frac{-1}{4}$

54.(C) $2\tan x + 3\cot x = 5$
$4\tan^2x + 9\cot^2x + 12 = 25$
$4\tan^2x + 9\cot^2x = 13$

55.(C) $\sec\theta = \frac{65}{63}$



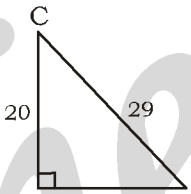
$\Rightarrow 8(\text{cosec}\theta - \cot\theta)$

$\Rightarrow 8 \times \left[\frac{65}{16} - \frac{63}{16}\right]$

$\Rightarrow \frac{2}{2} = 1$

56.(C) $2\cos\theta + \sec\theta - 2\sqrt{2} = 0$
By option $\theta = 45$ satisfied

57.(D)



$\frac{1+\sin A - \cos A}{1+\sin A + \cos A} = \frac{1+\frac{20}{29}-\frac{21}{29}}{1+\frac{20}{29}+\frac{21}{29}}$

$= \frac{\frac{28}{29}}{\frac{70}{29}} = \frac{28}{70} = \frac{2}{5}$

58.(D) $\text{cosec}(58+\theta) - \text{cosec}(58+\theta) + \frac{1}{2}$

$= \frac{1}{2}$

59.(C) $\tan3\theta = \frac{1}{2} + \frac{1}{2}$
$\tan3\theta = \tan45°$
$\theta = 15°$

$\therefore \sin4\theta = \sin60° = \frac{\sqrt{3}}{2}$

60.(B) $\tan\theta + \frac{1}{\tan\theta} = 3$

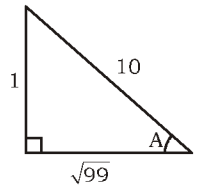
$\tan^2\theta + \frac{1}{\tan^2\theta} = 9 - 2 = 7$

61.(C) $\tan A = \frac{12}{5}$

$$\frac{13\sin A + 20\tan A}{15\tan A - 13\cos A} = \frac{13\times\frac{12}{13} + 20\times\frac{12}{5}}{15\times\frac{12}{5} - 13\times\frac{5}{13}}$$

$$= \frac{12+48}{36-5} = \frac{60}{31} = 1\frac{29}{31}$$

62.(B) $\operatorname{cosec} A = 10$



$20\sin A + 9\sqrt{11}\sec A$

$$20\times\frac{1}{10} + 9\sqrt{11}\times\frac{10}{\sqrt{99}}$$

$= 2 + 30 = 32$

63.(B) $\tan^2 x = 3 \quad \Rightarrow \quad \tan x = \sqrt{3}$

$x = 60° \quad \Rightarrow \frac{x}{2} = 30°$

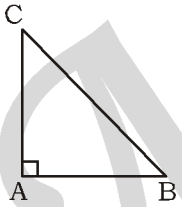
64.(B) $\sec\theta = \operatorname{cosec}\theta$

$\theta = 45°$

$\therefore \sec^2 45° + \operatorname{cosec}^2 45°$

$\Rightarrow \quad 2 + 2 = 4$

65. ()

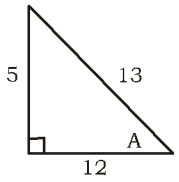


$\angle A = 90°$

$\angle B + \angle C = 90°$

$$\sin\frac{90}{2}\cos\frac{90}{2} \Rightarrow \frac{1}{\sqrt{2}}\times\frac{1}{\sqrt{2}} = \frac{1}{2}$$

66.(A)



$$\tan A + \sec A = \frac{3}{2}$$

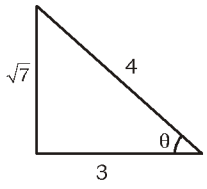
$$\sec A - \tan A = \frac{2}{3}$$

$$\sec A = \frac{13}{12}$$

$$\frac{10\cot A + 13\cos A}{12\tan A + 5\operatorname{cosec} A} = \frac{10\times\frac{12}{5} + 13\times\frac{12}{13}}{12\times\frac{5}{12} + 5\times\frac{13}{5}}$$

$$= \frac{24+12}{5+13} = \frac{36}{18} = 2$$

67.(A) By C & D $= \frac{\operatorname{cosec}\theta}{\cot\theta} = \frac{8}{6}$



$$\sec\theta = \frac{4}{3}$$

$$\frac{4\times\sin^2\theta + 5}{4\sin^2\theta - 1} = \frac{4\times\frac{7}{16} + 5}{4\times\frac{7}{16} - 1} = \frac{\frac{7}{4} + 5}{\frac{7}{4} - 1} = 9$$

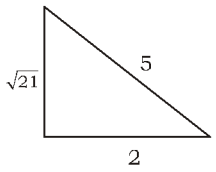
68.(A) $5\sin^2\theta = 3(1 + \cos\theta)$

$5 - 5\cos^2\theta - 3\cos\theta - 3 = 0$

$5\cos^2\theta + 3\cos\theta - 2 = 0$

$5\cos^2\theta + 5\cos\theta - 2\cos\theta - 2 = 0$

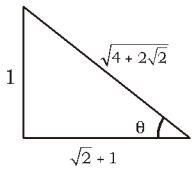
$\cos\theta = \frac{2}{5}, -1(x)$



$\therefore \quad \operatorname{cosec}\theta + \cot\theta =$

$$\frac{5}{\sqrt{21}} + \frac{2}{\sqrt{21}} \Rightarrow \frac{7}{\sqrt{21}} = \frac{7}{\sqrt{7}\times\sqrt{3}} = \sqrt{\frac{7}{3}}$$

69.(A)



$\cot\theta = \sqrt{2+1}$

$$\operatorname{cosec}\theta\sec\theta = \frac{\left(\sqrt{4+2\sqrt{2}}\right)}{1}\times\frac{\left(\sqrt{4+2\sqrt{2}}\right)}{\sqrt{2}+1}$$

$$= \frac{4+2\sqrt{2}}{\sqrt{2}+1}\times\frac{\sqrt{2}-1}{\sqrt{2}-1}$$

$= 4\sqrt{2} + 4 - 4 - 2\sqrt{2} = 2\sqrt{2}$

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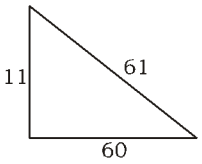
70.(B) 

$\tan A = \frac{11}{60}$

$4\cos A - 7\sin A$

$4 \times \frac{60}{61} - 7 \times \frac{11}{61}$

$\frac{1}{61}[240 - 77] = \frac{163}{61} = 2\frac{41}{61}$

71.(B) $\frac{(1-\sin\theta)(\sec\theta+\tan\theta)\tan\theta}{(\tan\theta+\sec\theta+1)(\cot\theta-\operatorname{cosec}\theta+1)}$

$\frac{\sin\theta\sec\theta(1-\sin\theta)(\sec\theta+\tan\theta)}{\left(\frac{\sin\theta}{\cos\theta}+\frac{1}{\cos\theta}+1\right)\left(\frac{\cos\theta}{\sin\theta}-\frac{1}{\sin\theta}+1\right)}$

$\Rightarrow \frac{\sin\theta(\sec\theta-\tan\theta)(\sec\theta+\tan\theta)}{(\sin\theta+\cos\theta+1)(\sin\theta+\cos\theta-1)} = \frac{\sin\theta(\sin\theta\cos\theta)}{(\sin\theta+\cos\theta)^2-1}$

$\frac{\sin\theta\cos\theta}{}$

$= \frac{\sin\theta}{2}$

72.(A) $2\cos^2\theta + (4 - \sqrt{3})\sin\theta - 2(1 + \sqrt{3}) = 0$

$\Rightarrow 2 - 2\sin^2\theta + (4 - \sqrt{3})\sin\theta - 2(1 + \sqrt{3}) = 0$

$\Rightarrow 2\sin^2\theta - (4 - \sqrt{3})\sin\theta + 2(1 + \sqrt{3}) - 2 = 0$

$\Rightarrow 2\sin^2\theta - (4 - \sqrt{3})\sin\theta + 2\sqrt{3}$

$\Rightarrow 2\sin^2\theta - 4\sin\theta + \sqrt{3}\sin\theta + 2\sqrt{3}$

$\Rightarrow 2\sin\theta(\sin\theta - 2) - \sqrt{3}(\sin\theta - 2)$

$\Rightarrow (\sin\theta - 2)(2\sin\theta - \sqrt{3})$

$\Rightarrow \sin\theta = \frac{\sqrt{3}}{2}, 2(x)$

$\Rightarrow \theta = 60°$

73.(D) $\frac{3\sqrt{3}\sec\theta + 4\tan\theta}{3\tan\theta + \sqrt{3}\sec\theta} = 2$

$\Rightarrow 3\sqrt{3}\sec\theta - 2\sqrt{3}\sec\theta = 6\tan\theta - 4\tan\theta$

$\Rightarrow \sqrt{3}\sec\theta = 2\tan\theta$

$\Rightarrow \sin\theta = \frac{\sqrt{3}}{2}$

$\Rightarrow \theta = 60°$

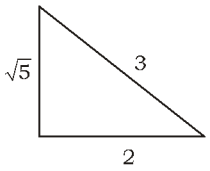
$\therefore \cos 60° = \frac{1}{2}$

74.(D) $4\left[\left(\frac{\sqrt{3}}{2}\right)^4 + \left(\frac{\sqrt{3}}{2}\right)^4\right] - (1 - 3) + \frac{1}{2} - 2 + 4$

$4\left(\frac{9}{16} + \frac{9}{16}\right) - (-2) + \frac{1}{2} + 2$

$\frac{9}{2} + \frac{1}{2} + 2 + 2 = 5 + 4 = 9$

To get $2 \Rightarrow \quad 9 - 7 = 2$

75.(A) 

$\cos\theta = \frac{2}{3}$

$2\sec^2\theta + 2\tan^2\theta - 6$

$2 \times \frac{9}{4} + 2 \times \frac{5}{4} - 6$

$\frac{9}{2} + \frac{5}{2} - 6$

$7 - 6 = 1$

76.(C) Given,

$\sin\theta = \cos\theta$

$\theta = 45°$

$\therefore \quad 2\tan^2 45° + \sin^2 45° - 1$

$\therefore \quad 2 + \frac{1}{2} - 1 = \frac{3}{2}$

77.(A) $\sin A = \frac{1}{2}$ and $45° < A < 540°$

$\sin A = \sin(510°)$

$A = 510°$

$\therefore \quad \frac{A}{3} = 170°$

78.(A)

$$\frac{\left(\sqrt{3}\right)^2 - 2\times\frac{1}{2}}{\sin 66°\operatorname{cosec}66°\sin 53°\operatorname{cosec}53°\cos 60° + \sin^2 60°}$$

$\Rightarrow \frac{3-1}{\frac{1}{2}+\frac{3}{4}} = \frac{2\times 4}{5} = 1\frac{3}{5}$

79.(A) $\sin^2 x - 4\sin x + 3 = 0$

$\sin^2 x - 3\sin x - \sin x + 3 = 0$

$\sin x(\sin x - 3) - 1(\sin x - 3) = 0$

$\sin x = 1, 3$ (not possible)

$x = 90° = \frac{\pi}{2}$

80.(B) $\tan\theta = 15$

$\therefore \sec\theta = \sqrt{1+\tan^2\theta}$

$= \sqrt{1+225} = \sqrt{226}$

81.(D) $\tan\theta + \cot\theta = 4$

$\tan^2\theta + \cot^2\theta = 16 - 2 = 14$ ..... (1)

and $\frac{\sin^2\theta}{\cos^2\theta} + \frac{\cos^2\theta}{\sin^2\theta} = 14$

$\Rightarrow \frac{1-2\sin^2\theta\cos^2\theta}{\sin^2\theta\cos^2\theta} = 14$

$\Rightarrow \sec^2\theta\,\text{cosec}^2\theta - 2 = 14$

$\Rightarrow 2\text{cosec}^2\theta\sec^2\theta - 4 = 14 \times 2$ .....(2)

by eq. (1) & (2)

Ratio of $\frac{3(\tan^2\theta + \cot^2\theta)}{2\,\text{cosec}^2\theta\sec^2 - x} = \frac{14\times 3}{14\times 2} = 3:2$

82.(C) $\tan35° = y$

$\Rightarrow 2\tan55° + \cot55°$

$\Rightarrow 2\cot35° + \tan35°$

$\Rightarrow \frac{2}{y} + y = \frac{2+y^2}{y}$

83.(D) $\tan^2x - 3\tan x + 2 = 0$

$\tan^2x - 2\tan x - \tan x + 2 = 0$

$\tan^2x - 2\tan x - \tan x + 2 = 0$

$(\tan x - 2)(\tan x - 1) = 0$

$\tan x = 1, 2$

$\because \quad 0 < x < 90°$

$x = 45°$

84.(C) $\frac{\sin^2 33° + 1 + \cos^2 33° + 1}{\sqrt{3}} = \frac{3}{\sqrt{3}} = \sqrt{3}$

85.(B) $A = 60°$

and $4\cos^3A - 3\cos A$

$= \cos3A$

$= \cos180° = -1$

86.(C) $\sin\theta = \frac{12}{13}$

$\Rightarrow \frac{\sin^2\theta - \cos^2\theta}{2\cos\theta\sin\theta} \times \cot^2\theta$

$\Rightarrow \frac{\frac{144}{169} - \frac{25}{169}}{2\times\frac{12}{13}\times\frac{5}{13}} \times \frac{25}{144} = \frac{\frac{144-25}{169}}{\frac{120}{169}} \times \frac{25}{144}$

$\Rightarrow \frac{119}{120} \times \frac{25}{144} = \frac{595}{3456}$

87.(D) $(\cos^2\theta - 1)(2\sec^2\theta) + \sec^2\theta + 2\tan^2\theta = 2$

$\Rightarrow 2 - 2\sec^2\theta + \sec^2\theta + 2\tan^2\theta = 2$

$\Rightarrow 2(\tan^2\theta - \sec^2\theta) + \sec^2\theta = 0$

$\Rightarrow \sec^2\theta = 2$

$\Rightarrow \sec\theta = \sqrt{2}$

$\Rightarrow \theta = 45°$

$\therefore \frac{\sec45° + \sin45°}{\text{cosec}45° - \cos46°} = \frac{\sqrt{2} + \frac{1}{\sqrt{2}}}{\sqrt{2} - \frac{1}{\sqrt{2}}} = \frac{3}{1} = 3$

88.(A) $1 + 2\tan^2\theta = \frac{5}{3} \qquad 2\tan^2\theta = \frac{2}{3}$

$\Rightarrow \tan^2\theta = \frac{1}{3}$

$\Rightarrow \tan\theta = \frac{1}{\sqrt{3}}$

$\Rightarrow \theta = 30°$

$\Rightarrow \text{cosec}30° = 2$

89.(A) $21\tan\theta = 20$

$\tan\theta = \frac{20}{21}$

$\frac{1+\sin\theta-\cos\theta}{1-\sin\theta+\cos\theta} = \frac{1+\frac{20}{29}-\frac{21}{29}}{1-\frac{20}{29}+\frac{21}{29}} = \frac{29-1}{29+1} = \frac{14}{15}$

90.(C) $\cos^230° + \cos^240° + \sin^240° + \cos^260°$

$= \frac{3}{4} + 1 + \frac{1}{4} = 2$

91.(A) Given

$\tan\theta = 5K$

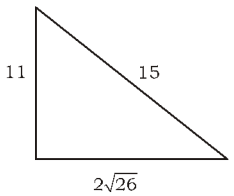
$\sec\theta = \frac{5}{K}$

$\tan^2\theta - \sec^2\theta = 25k^2 - \frac{25}{k^2}$

$25\left(k^2 - \frac{1}{k^2}\right) = -1$

$10\left(k^2 - \frac{1}{k^2}\right) = \frac{-10}{25} = \frac{-2}{5}$

92.(D)



$\sin\theta = \frac{11}{15}$

$\Rightarrow \sec\theta - \tan\theta$

$\Rightarrow \frac{15}{2\sqrt{26}} - \frac{11}{2\sqrt{6}} = \frac{4}{2\sqrt{26}} = \frac{\sqrt{26}}{13}$

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93.(B) $\sin\theta(2\sin\theta + 3) = 2$

$2\sin^2\theta + 3\sin\theta - 2 = 0$

$2\sin^2\theta + 4\sin\theta - \sin\theta - 2 = 0$

$2\sin\theta(\sin\theta + 2) - 1(\sin\theta + 2) = 0$

$\Rightarrow \sin\theta = \frac{1}{2}, -2$

$\Rightarrow \theta = 30°$

$\Rightarrow \sec^2 30° + \cot^2 30° - \cos^2 30°$

$= \frac{4}{3} + 3 - \frac{3}{4} = 3 + \frac{16-9}{12} = 3 + \frac{7}{12} = \frac{43}{12}$

94.(C) $\frac{(1+\cos\theta)\sec\theta(\operatorname{cosec}\theta - \cot\theta)}{\sin\theta(1-\sin\theta)(\sec\theta + \tan\theta)}$

$= \frac{(\operatorname{cosec}\theta - \cot\theta)(\operatorname{cosec}\theta + \cot\theta)}{(1-\sin\theta)(1+\sin\theta)}$

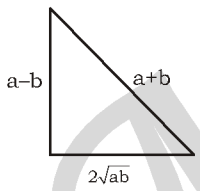
$= \frac{\operatorname{cosec}^2\theta - \cot^2\theta}{1-\sin^2\theta} = \frac{1}{\cos^2\theta} = \sec^2\theta$

95.(C) $\frac{3\cos^2 27° - 5 + 3\cos^2 63°}{\tan^2 32° + 4 - \operatorname{cosec}^2 58°} + \sin 35°\cos 55° + \cos 35°\sin 55°$

$\frac{3-5}{4-1} + \sin^2 35° + \cos^2 35°$

$\frac{-2}{3} + 1 = \frac{1}{3}$

96.(D)



$\sin\theta = \frac{2\sqrt{ab}}{a+b}$

$\cos\theta = \frac{a-b}{a+b}$

$= \frac{\frac{a-b}{a+b}+1}{\frac{a-b}{a+b}-1} = \frac{a-b+a+b}{a-b-a-b} = \frac{2a}{-2b} = \frac{-a}{b}$

97.(A) $3\cos^2\theta - 4\sin\theta + 1 = 0$

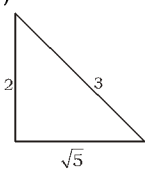
$\Rightarrow 3 - 3\sin^2\theta - 4\sin\theta + 1 = 0$

$\Rightarrow 3\sin^2\theta + 4\sin\theta - 4 = 0$

$\Rightarrow 3\sin^2\theta + 6\sin\theta - 2\sin\theta - 4 = 0$

$\Rightarrow 3\sin(\sin\theta + 2) - 2(\sin\theta + 2) = 0$

$\sin\theta = \frac{2}{3}, -2$



$3 \times \left(\frac{\sqrt{5}}{3}\right)^2 + 5 \times \left(\frac{2}{\sqrt{5}}\right)^2$

$= 3 \times \frac{5}{9} + 5 \times \frac{4}{5} = 5\frac{2}{3}$

98.(A) Given that

$2\sqrt{3}\sin^2\theta + \cos\theta - \sqrt{3} = 0$

$\Rightarrow 2\sqrt{3} - 2\sqrt{3}\cos^2\theta + \cos\theta - \sqrt{3} = 0$

$\Rightarrow 2\sqrt{3}\cos^2\theta - \cos\theta - \sqrt{3} = 0$

$\Rightarrow 2\sqrt{3}\cos^2\theta - 3\cos\theta + 2\cos\theta - \sqrt{3} = 0$

$\Rightarrow \sqrt{3}\cos\theta(2\cos\theta - \sqrt{3}) + 1(2\cos\theta - \sqrt{3}) = 0$

$\Rightarrow (\sqrt{3}\cos\theta + 1)(2\cos\theta - \sqrt{3}) = 0$

$\Rightarrow \cos\theta = \frac{-1}{\sqrt{3}}, \frac{\sqrt{3}}{2} \quad \Rightarrow \cos\theta = \frac{\sqrt{3}}{2}$

$\therefore \quad \theta = 30°$

99.(D) $\operatorname{Sec}\left(90 - \frac{3\theta}{2}\right) = \sqrt{2}, \ 0° < \theta < 90°$

$\Rightarrow \operatorname{cosec}\frac{3\theta}{2} = \operatorname{cosec} 45°$

$\Rightarrow \frac{3\theta}{2} = 45° \quad \Rightarrow \theta = 30°$

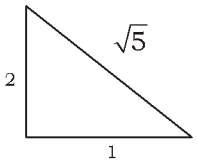
$\therefore \ 2\sin 30° + 4\cos 60°$

$= 2 \times \frac{1}{2} + 4 \times \frac{1}{2} = 3$

100.(A) $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = \frac{3}{1}$

$\Rightarrow \frac{\sin\theta}{\cos\theta} = \frac{4}{2}$

$\Rightarrow \tan\theta = 2$



$\Rightarrow \sin^4\theta - \cos^4\theta$

$\Rightarrow (\sin^2\theta - \cos^2\theta)$

$\Rightarrow \left(\frac{2}{\sqrt{5}}\right)^2 - \left(\frac{1}{\sqrt{5}}\right)^2$

$= \frac{3}{5}$

(SSC CHSL – 2019)

1. Find the value of $\frac{\cos 30° - \sin 30°}{\sin 60° + \cos 60°}$

$\frac{\cos 30° - \sin 30°}{\sin 60° + \cos 60°}$ का मान ज्ञात करें।

(A) $2+\sqrt{3}$ (B) $2-\sqrt{3}$
(C) $1+\sqrt{3}$ (D) $1-\sqrt{3}$

2. If $\text{cosec}\theta + \cot\theta = 2$, then $\sin\theta$ is :
यदि $\text{cosec}\theta + \cot\theta = 2$ है, तो $\sin\theta$ का मान ज्ञात करें।

(A) $\frac{3}{5}$ (B) $\frac{2}{5}$ (C) $\frac{3}{4}$ (D) $\frac{4}{5}$

3. $(\sin\theta + \cos\theta)^2 = 2$, $0° < \theta < 90°$, then the value of θ is :
$(\sin\theta + \cos\theta)^2 = 2$, $0° < \theta < 90°$ तो θ का मान ज्ञात करें।

(A) 0 (B) $\frac{\pi}{2}$ (C) π (D) $\frac{\pi}{4}$

4. If $\text{cosec}A = \frac{25}{7}$, then what is the value of tanA?

यदि $\text{cosec}A = \frac{25}{7}$ तो tanA का मान क्या होगा ?

(A) $\frac{7}{24}$ (B) $\frac{25}{24}$ (C) $\frac{7}{25}$ (D) $\frac{24}{25}$

5. Find x if $2\sin^2 x - 1 = 0$.
यदि $2\sin^2 x - 1 = 0$ है, तो x का मान ज्ञात करें।

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$ (C) 0 (D) π

6. If $\cot\theta = \frac{80}{39}$, find the value of $\text{cosec}\theta$.

यदि $\cot\theta = \frac{80}{39}$ तो $\text{cosec}\theta$ का मान ज्ञात करें।

(A) $\frac{39}{80}$ (B) $\frac{89}{39}$ (C) $\frac{39}{89}$ (D) $\frac{89}{80}$

7. If $\sin\theta = \frac{4}{5}$, find the value of $\sin 3\theta$.

यदि $\sin\theta = \frac{4}{5}$ तो $\sin 3\theta$ का मान ज्ञात करें।

(A) $\frac{32}{45}$ (B) $\frac{44}{125}$ (C) $\frac{64}{125}$ (D) $\frac{12}{25}$

8. If $\tan a = \frac{2}{\sqrt{13}}$, then the value of $\frac{\text{cosec}^2 a + 2\sec^2 a}{\text{cosec}^2 a - 3\sec^2 a}$ is :

यदि $\tan a = \frac{2}{\sqrt{13}}$ है, तो $\frac{\text{cosec}^2 a + 2\sec^2 a}{\text{cosec}^2 a - 3\sec^2 a}$ का मान ज्ञात कीजिए।

(A) 21 (B) 14
(C) 32 (D) 16

9. If $a\sin A + b\cos A = c$, then $a\cos A - b\sin A$ is equal to :
यदि $a\sin A + b\cos A = c$ है, तो $a\cos A - b\sin A$ का मान क्या है ?

(A) $\sqrt{a^2 - b^2 - c^2}$ (B) $\sqrt{a^2 + b^2 - c^2}$
(C) $\sqrt{a^2 + b^2 + c^2}$ (D) $\sqrt{a^2 - b^2 + c^2}$

10. $\frac{1-\tan A}{1+\tan A} = \frac{\tan 3° \tan 15° \tan 30° \tan 75° \tan 87°}{\tan 27° \tan 39° \tan 51° \tan 60° \tan 63°}$, then the value of cotA is :

$\frac{1-\tan A}{1+\tan A} = \frac{\tan 3° \tan 15° \tan 30° \tan 75° \tan 87°}{\tan 27° \tan 39° \tan 51° \tan 60° \tan 63°}$ है, तो cotA का मान ज्ञात कीजिए।

(A) 3 (B) 2
(C) 1 (D) 4

11. Find the value of $\sin(60 + \theta) - \cos(30 - \theta)$.
$\sin(60 + \theta) - \cos(30 - \theta)$ का मान ज्ञात करें।

(A) $\frac{1}{2}$ (B) 0 (C) –1 (D) 1

12. Find x if $\sin x = -\frac{1}{2}$.

यदि $\sin x = -\frac{1}{2}$ है, x का मान ज्ञात करें।

(A) $\frac{13\pi}{6}$ (B) $\frac{5\pi}{6}$ (C) $\frac{\pi}{6}$ (D) $\frac{7\pi}{6}$

13. If $\sin\theta - \cos\theta = \frac{1}{29}$ find the value of $\sin\theta + \cos\theta$.

यदि $\sin\theta - \cos\theta = \frac{1}{29}$ है, तो $\sin\theta + \cos\theta$ का मान ज्ञात करें।

(A) $\frac{41}{29}$ (B) $\frac{42}{29}$ (C) $\frac{22}{29}$ (D) $\frac{2}{29}$

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14. If $\cos x = \frac{3}{5}$, then find the value of $\sin x - \sin^3 x$.

यदि $\cos x = \frac{3}{5}$ है, तो $\sin x - \sin^3 x$ का मान ज्ञात करें।

(A) 0.476 (B) 0.389
(C) 0.358 (D) 0.288

15. If $\sin\theta = 0.96$, then find $\cot\theta$.
यदि $\sin\theta = 0.96$ तो $\cot\theta$ का मान ज्ञात करें।
(A) 0.4563 (B) 0.4876
(C) 0.2916 (D) 0.3456

16. The shadow of a tree is $\frac{1}{\sqrt{3}}$ times the length of the tree. Find the angle of elevation.
एक वृक्ष की छाया इसकी लंबाई की $\frac{1}{\sqrt{3}}$ गुनी है। उन्नयन कोण ज्ञात करें।
(A) 45° (B) 30°
(C) 90° (D) 60°

17. The value of $\frac{\sin 30^\circ \cos 60^\circ + \cos 45^\circ \sin 45^\circ}{\tan 60^\circ \cot 30^\circ}$ is:

$\frac{\sin 30^\circ \cos 60^\circ + \cos 45^\circ \sin 45^\circ}{\tan 60^\circ \cot 30^\circ}$ का मान ज्ञात करें।

(A) $\frac{1}{\sqrt{3}}$ (B) $\sqrt{3}$ (C) 2 (D) $\frac{1}{4}$

18. If $\frac{\sin x + \cos x}{\sin x - \cos x} = \frac{6}{5}$ then the value of $\frac{\tan^2 x + 1}{\tan^2 x - 1}$ is:

यदि $\frac{\sin x + \cos x}{\sin x - \cos x} = \frac{6}{5}$ है तो $\frac{\tan^2 x + 1}{\tan^2 x - 1}$ का मान ज्ञात करें।

(A) $\frac{61}{35}$ (B) $\frac{61}{60}$ (C) $\frac{35}{61}$ (D) $\frac{60}{61}$

19. If $\sin x = \frac{3}{5}$, $0 \le x \le 90^\circ$ then the value of cotx.secx is:

यदि $\sin x = \frac{3}{5}$, $0 \le x \le 90^\circ$ है तो cotx.secx का मान ज्ञात करें।

(A) $\frac{3}{5}$ (B) $\frac{5}{3}$ (C) $\frac{4}{5}$ (D) $\frac{3}{4}$

20. If $2\cot\theta = 3$ then $\frac{\sqrt{13}\cos\theta - 3\tan\theta}{3\tan\theta + \sqrt{13}\sin\theta}$ is:

यदि $2\cot\theta = 3$ हैं, तो $\frac{\sqrt{13}\cos\theta - 3\tan\theta}{3\tan\theta + \sqrt{13}\sin\theta}$ का मान क्या होगा?

(A) $\frac{3}{4}$ (B) $\frac{1}{4}$ (C) $\frac{2}{3}$ (D) $\frac{1}{5}$

21. If $2x = \sin\theta$ and $\frac{2}{x} = \cos\theta$, then the value of $4\left(x^2 + \frac{1}{x^2}\right)$ is:

यदि $2x = \sin\theta$ और $\frac{2}{x} = \cos\theta$ हैं तो $4\left(x^2 + \frac{1}{x^2}\right)$ का मान ज्ञात करें।

(A) 2 (B) 0
(C) 4 (D) 1

22. If $x = \tan 40^\circ$, then the value of $2\tan 50^\circ$ will be:
यदि $x = \tan 40^\circ$ हैं, तो $2\tan 50^\circ$ का मान ज्ञात करें।

(A) $\frac{1}{2x}$ (B) 2x (C) $\frac{1}{x}$ (D) $\frac{2}{x}$

23. $\frac{\sqrt{\text{cosec}x - 1}}{\sqrt{\text{cosec}x + 1}}$ is equal to :

$\frac{\sqrt{\text{cosec}x - 1}}{\sqrt{\text{cosec}x + 1}}$ का मान ज्ञात करें।

(A) sex – tanx (B) tanx – secx
(C) secx.tanx (D) tanx + secx

24. The value of

$\frac{\cos 29^\circ \,\text{cosec}\, 61^\circ \tan 45^\circ + 2\sin 35^\circ \sec 55^\circ}{3\sin^2 42^\circ + 3\sin^2 48^\circ}$ is :

$\frac{\cos 29^\circ \,\text{cosec}\, 61^\circ \tan 45^\circ + 2\sin 35^\circ \sec 55^\circ}{3\sin^2 42^\circ + 3\sin^2 48^\circ}$ का मान ज्ञात करें।

(A) 3 (B) 0
(C) 2 (D) 1

25. If $x\sin 30^\circ \cos 60^\circ = \sin 45 \cos 45$, then the value of x is :
यदि $x\sin 30^\circ \cos 60^\circ = \sin 45 \cos 45$ तो x का मान ज्ञात करें।

(A) 1 (B) 2
(C) 0 (D) 3

26. If $\cos(x-y)=\frac{\sqrt{3}}{2}$ and $\sin(x+y)=\frac{1}{2}$, then the value of x, $(0<x<90)$ is :

यदि $\cos(x-y)=\frac{\sqrt{3}}{2}$ और $\sin(x+y)=\frac{1}{2}$ है, तो x, $(0<x<90)$ का मान क्या होगा ?

(A) 15° (B) 60°
(C) 45° (D) 30°

27. The least value of $8\text{cosec}^2\theta + 25\sin^2\theta$ is :
$8\text{cosec}^2\theta + 25\sin^2\theta$ का न्यूनतम मान क्या होगा ?

(A) $30\sqrt{2}$ (B) $40\sqrt{2}$
(C) $10\sqrt{2}$ (D) $20\sqrt{2}$

28. If $\frac{\cos\theta+\sin\theta}{\cos\theta-\sin\theta}=8$, then the value of $\cot\theta$ is equal to :

यदि $\frac{\cos\theta+\sin\theta}{\cos\theta-\sin\theta}=8$ है, तो $\cot\theta$ का मान ज्ञात करें।

(A) $\frac{6}{5}$ (B) $\frac{9}{7}$ (C) $\frac{8}{7}$ (D) $\frac{7}{6}$

29. Find the value of $\frac{\tan 60^\circ-\tan 15^\circ}{1+\tan 60^\circ\tan 15^\circ}$

$\frac{\tan 60^\circ-\tan 15^\circ}{1+\tan 60^\circ\tan 15^\circ}$ का मान बताइए।

(A) $\frac{\sqrt{3}}{2}$ (B) 1 (C) $\frac{1}{2}$ (D) $\frac{1}{\sqrt{2}}$

30. If $3\sec^2x-4=0$, then the value of x $(0<x<90^\circ)$
यदि $3\sec^2x-4=0$ है, तो x $(0<x<90^\circ)$ का मान बताइये।

(A) 15° (B) 45°
(C) 30° (D) 60°

31. If $4\cos^2\theta-3\sin^2\theta+2=0$, then the value of $\tan\theta$ is (where $0\le\theta<90^\circ$)
यदि $4\cos^2\theta-3\sin^2\theta+2=0$ है, तो $\tan\theta$ का मान बताइए (जहां $0\le\theta<90^\circ$).

(A) $\sqrt{6}$ (B) 1
(C) $\sqrt{2}$ (D) $\frac{1}{\sqrt{3}}$

32. What is the value of $\sin^245^\circ+\cos^245^\circ$?
$\sin^245^\circ+\cos^245^\circ$ का मान है :

(A) 1 (B) 2
(C) -1 (D) 0

33. If $\tan\theta=\frac{20}{21}$, then the value of $\frac{\sin\theta-\cos\theta}{\sin\theta+\cos\theta}$ is :

यदि $\tan\theta=\frac{20}{21}$ है, तो $\frac{\sin\theta-\cos\theta}{\sin\theta+\cos\theta}$ का मान है :

(A) $\frac{-1}{41}$ (B) $\frac{27}{21}$ (C) $\frac{29}{35}$ (D) $\frac{-29}{31}$

34. In $\sin x=\frac{12}{37}$, then what is the value of tan x ?

यदि $\sin x=\frac{12}{37}$ है, तो tan x का मान है :

(A) $\frac{35}{37}$ (B) $\frac{12}{35}$ (C) $\frac{37}{12}$ (D) $\frac{35}{12}$

35. The value of $\left[\frac{\sqrt{3}+2\sin P}{1-2\cos P}\right]^3+\left[\frac{1+2\cos P}{\sqrt{3}-2\sin P}\right]^3$ is :

$\left[\frac{\sqrt{3}+2\sin P}{1-2\cos P}\right]^3+\left[\frac{1+2\cos P}{\sqrt{3}-2\sin P}\right]^3$ का मान ज्ञात करें।

(A) 0 (B) sinP cosP
(C) 2sinP cosP (D) 1

36. If $A=2(\sin^6\theta+\cos^6\theta)-3(\sin^4\theta+\cos^4\theta)$ then the value of 3α such that $\cos\alpha=\sqrt{\frac{3+A}{5+A}}$ is :

यदि $A=2(\sin^6\theta+\cos^6\theta)-3(\sin^4\theta+\cos^4\theta)$ है, तो $\cos\alpha=\sqrt{\frac{3+A}{5+A}}$ करने के लिए 3α का मान ज्ञात करें।

(A) 45° (B) 135°
(C) 180° (D) 90°

37. If $117\cos^2A+129\sin^2A=120$ and $170\cos^2B+158\sin^2B=161$, then the value of $\text{cosec}^2A\sec^2B$ is :
यदि $117\cos^2A+129\sin^2A=120$ है और $170\cos^2B+158\sin^2B=161$ है, तो $\text{cosec}^2A\sec^2B$ का मान ज्ञात करें।

(A) 1 (B) 9
(C) 4 (D) 16

38. If cosA, sinA, cotA are in geometric progression, then the value of $\tan^6A-\tan^2A$ is :
अगर cosA, sinA, cotA गुणोतर श्रेणी में है तो $\tan^6A-\tan^2A$ का मान क्या होगा ?

(A) $\frac{1}{2}$ (B) 3 (C) $\frac{1}{3}$ (D) 1

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39. If $\frac{(1+\sin\theta-\cos\theta)}{(1+\sin\theta+\cos\theta)}+\frac{(1+\sin\theta+\cos\theta)}{(1+\sin\theta-\cos\theta)}=4$, then which of the following values will be suitable for θ ?

अगर $\frac{(1+\sin\theta-\cos\theta)}{(1+\sin\theta+\cos\theta)}+\frac{(1+\sin\theta+\cos\theta)}{(1+\sin\theta-\cos\theta)}=4$ है, तो निम्नलिखित में से कौन सा मान θ के लिए सही होगा ?

(A) 90° (B) 60°
(C) 45° (D) 30°

40. If $\sec A=\frac{\sqrt{11}}{3}$, then tha value of $\frac{\text{cosec}^2A+\tan^2A}{\sin^2A+\cot^2A}$ is:

अगर $\sec A=\frac{\sqrt{11}}{3}$ है, तो $\frac{\text{cosec}^2A+\tan^2A}{\sin^2A+\cot^2A}$ का मान ज्ञात कीजिए।

(A) $\frac{9}{4}$ (B) $\frac{4}{9}$ (C) $\frac{11}{9}$ (D) $\frac{2}{11}$

41. If sin x – cos x = 0, then the value of $(\sin^3x-\cos^3x)$ is :
यदि sin x – cos x = 0 है, तो $(\sin^3x-\cos^3x)$ का मान ज्ञात कीजिए।

(A) 0 (B) 2
(C) 1 (D) 4

42. $\frac{\cot x}{1+\text{cosec}x}+\frac{1+\text{cosec}x}{\cot x}$ is equal to :

$\frac{\cot x}{1+\text{cosec}x}+\frac{1+\text{cosec}x}{\cot x}$ का मान ..... के बराबर होगा।

(A) 2secx (B) 2cosx
(C) 2cosecx (D) 2sinx

43. If $\tan x=\frac{m}{n}$ and $0°\le x\le 90°$, then the value of (sinx + cosx) is :

यदि $\tan x=\frac{m}{n}$ और $0°\le x\le 90°$ तो (sinx + cosx) का मान ज्ञात करें।

(A) $\frac{1}{\sqrt{m^2-n^2}}$ (B) $\frac{1}{\sqrt{m^2+n^2}}$

(C) $\frac{m+n}{\sqrt{m^2+n^2}}$ (D) $\sqrt{m^2-n^2}$

44. If $\cos x=\frac{24}{25}, 0\le x\le 90°$, then the value of cotx + cosecx is :

यदि $\cos x=\frac{24}{25}, 0\le x\le 90°$ है, तो cotx + cosecx का मान क्या होगा ?

(A) 0 (B) 1 (C) 7 (D) $\frac{7}{2}$

45. If secθ and sinθ (0 < θ < 90) are the roots of the equation $\sqrt{6}x^2-kx+\sqrt{6}=0$, then the value of k is :
यदि secθ और sinθ (0 < θ < 90) समीकरण $\sqrt{6}x^2-kx+\sqrt{6}=0$ के मूल हैं, तो k का मान ज्ञात करें।

(A) $\sqrt{3}$ (B) $3\sqrt{2}$
(C) $2\sqrt{3}$ (D) $3\sqrt{3}$

46. If $\tan x=\frac{3}{2}$, then the value of $\frac{3\sin x+2\cos x}{3\sin x-2\cos x}$ is :

यदि $\tan x=\frac{3}{2}$ है, तो $\frac{3\sin x+2\cos x}{3\sin x-2\cos x}$ का मान क्या होगा ?

(A) $\frac{1}{5}$ (B) $\frac{5}{13}$ (C) $\frac{13}{5}$ (D) 5

47. Which of the following values suits for A to make the equation $\frac{A\tan 62°\sec 28°\cot 38°}{\text{cosec}62°\tan 11°}=1$ true ?

समीकरण $\frac{A\tan 62°\sec 28°\cot 38°}{\text{cosec}62°\tan 11°}=1$ सही करने के लिए A का निम्नलिखित में से कौन सा मान उपयुक्त होगा ?

(A) $\frac{\tan 38°}{\tan 79°\tan 28°}$ (B) $\frac{\tan 28°\tan 79°}{\tan 38°}$

(C) $\frac{\tan 28°\tan 38°}{\tan 79°}$ (D) $\frac{\tan 38°\tan 79°}{\tan 28°}$

48. If A and B are acute angles and secA = 3; cotB = 4, then the value of $\frac{\text{cosec}^2A+\sin^2B}{\cot^2A+\sec^2B}$
यदि A और B न्यून कोण हैं और secA = 3; cotB = 4 है, तो $\frac{\text{cosec}^2A+\sin^2B}{\cot^2A+\sec^2B}$ का मान ज्ञात कीजिए।

(A) $\frac{25}{261}$ (B) $\frac{322}{323}$ (C) 2 (D) $\frac{1}{261}$

49. If $\tan^4x-\tan^2x=1$, then the value of $\sin^4x+\sin^2x$ is :
यदि $\tan^4x-\tan^2x=1$ है, तो $\sin^4x+\sin^2x$ का मान ज्ञात कीजिए।

(A) $\frac{3}{4}$ (B) $\frac{1}{2}$ (C) 1 (D) $\frac{3}{2}$

50. If $\sin\theta-\cos\theta=\frac{7}{17}$, then find the value of sinθ + cosθ.
यदि $\sin\theta-\cos\theta=\frac{7}{17}$ तो sinθ + cosθ का मान ज्ञात करें।

(A) $\frac{8}{17}$ (B) $\frac{23}{13}$ (C) $\frac{23}{17}$ (D) $\frac{8}{13}$

51. Find x if $\cos x = -\frac{1}{2}$.

यदि $\cos x = -\frac{1}{2}$ है, तो x का मान ज्ञात करें।

(A) $\frac{3\pi}{2}$ (B) $\frac{2\pi}{3}$ (C) $\frac{5\pi}{2}$ (D) $\frac{3\pi}{4}$

52. $\frac{\cos x}{1+\sin x}+\frac{1+\sin x}{\cos x}$ is equal to :

$\frac{\cos x}{1+\sin x}+\frac{1+\sin x}{\cos x}$ का मान ज्ञात करें।

(A) 2sinx (B) 2cosx
(C) 2cosecx (D) 2secx

53. If $\cos x = \frac{p}{q}$ and $0° < x < 90°$, then the value of tanx is:

यदि $\cos x = \frac{p}{q}$ और $0° < x < 90°$ है, तो tanx का मान है।

(A) $\frac{\sqrt{q^2-p^2}}{q}$ (B) $\frac{q}{\sqrt{q^2-p^2}}$

(C) $\frac{p}{\sqrt{p^2-q^2}}$ (D) $\frac{\sqrt{q^2-p^2}}{p}$

54. If $\sin x - \cos x = 0$, $0° < x < 90°$ then the value of $(\sec x + \operatorname{cosec} x)^2$ is :
यदि $\sin x - \cos x = 0$, $0° < x < 90°$ तो $(\sec x + \operatorname{cosec} x)^2$ का मान ज्ञात करें।
(A) 8 (B) 4
(C) 10 (D) 6

55. If $\sin x = \frac{2}{3}$, then find the value of cos3x.

यदि $\sin x = \frac{2}{3}$ है, तो cos3x का मान ज्ञात करें।

(A) 0.6735 (B) –0.8765
(C) –0.5797 (D) 0.5678

56. Find the value of $\sin^2 35 + \sin^2 55$.
$\sin^2 35 + \sin^2 55$ का मान ज्ञात करें।

(A) –1 (B) $\frac{1}{2}$ (C) 0 (D) 1

57. If $\tan\theta + \cot\theta = 6$, then find the value of $\tan^2\theta + \cot^2\theta$.
यदि $\tan\theta + \cot\theta = 6$ है, तो $\tan^2\theta + \cot^2\theta$ का मान ज्ञात करें।
(A) 26 (B) 34
(C) 24 (D) 36

58. Find the value of $\frac{\cos^2 30° - \sin^2 30°}{\sin^2 15° + \cos^2 15°}$

$\frac{\cos^2 30° - \sin^2 30°}{\sin^2 15° + \cos^2 15°}$ का मान ज्ञात कीजिए।

(A) $\frac{1}{2}$ (B) 1 (C) $1-\sqrt{3}$ (D) 0

59. If $\sec\theta - \tan\theta = 3$, then $\cos\theta$ is equal to :
यदि $\sec\theta - \tan\theta = 3$ है, तो $\cos\theta$ का मान ज्ञात कीजिए।

(A) $\frac{3}{7}$ (B) $\frac{2}{5}$ (C) $\frac{3}{5}$ (D) $\frac{4}{9}$

60. If $\tan^2 x - 3\sec^2 x + 3 = 0$, then the value of x $(0 \le x \le 90°)$ is :
यदि $\tan^2 x - 3\sec^2 x + 3 = 0$ है, x $(0 \le x \le 90°)$ का मान ज्ञात कीजिए।
(A) 60° (B) 0°
(C) 30° (D) 45°

61. If $\cos^2\theta + \cos^4\theta = 1$, then the value of $\sin\theta + \sin^2\theta$ is :
यदि $\cos^2\theta + \cos^4\theta = 1$ है, तो $\sin\theta + \sin^2\theta$ का मान बताइए।

(A) 0 (B) $\frac{1}{2}$ (C) 2 (D) 1

62. If $\cos(A + B) = 0$ and $\sin(A - B) = \frac{1}{2}$, then the value of B is : (Given $0° < A, B < 90°$)
यदि $\cos(A + B) = 0$ और $\sin(A - B) = \frac{1}{2}$ है, तो B का मान बताइए। (दिया है $0° < A, B < 90°$)
(A) 45° (B) 90°
(C) 60° (D) 30°

63. If $\operatorname{cosec}\theta = \frac{(x^2+y^2)}{(x^2-y^2)}$, then what will be the value of tanθ ?

यदि $\operatorname{cosec}\theta = \frac{(x^2+y^2)}{(x^2-y^2)}$ है, तो tanθ का मान क्या होगा ?

(A) $\frac{(x^2-y^2)}{(x^2+y^2)}$ (B) $\frac{2xy}{(x^2-y^2)}$

(C) $\frac{(x^2-y^2)}{2xy}$ (D) $\frac{(x^2+y^2)}{2xy}$

64. If $\sin\theta + \operatorname{cosec}\theta = 2$, then the value of $\sin^2\theta + \operatorname{cosec}^2\theta$ is:
यदि $\sin\theta + \operatorname{cosec}\theta = 2$ तो $\sin^2\theta + \operatorname{cosec}^2\theta$ का मान ज्ञात करें।
(A) 8 (B) 4
(C) 1 (D) 2

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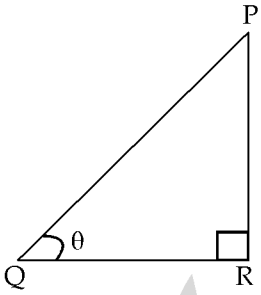
65. The value of $\sin20^\circ \cos70^\circ + \sin70^\circ \cos20^\circ$ is :
$\sin20^\circ \cos70^\circ + \sin70^\circ \cos20^\circ$ का मान ज्ञात करें।

(A) 1 (B) $\frac{1}{\sqrt{2}}$ (C) 0 (D) 2

66. If $\tan4A = \cot(A - 20^\circ)$, $0^\circ < \theta < 90^\circ$, then the value of A is :
यदि $\tan4A = \cot(A - 20^\circ)$, $0^\circ < \theta < 90^\circ$ है, तो A का मान ज्ञात करें।

(A) 22° (B) 80°
(C) 5° (D) 14°

67. In the given figure, if PQ = 13 cm and PR = 12 cm, then the value of $\sin\theta + \tan\theta$ = ?
दी गई आकृति में, यदि PQ = 13 cm और PR = 12 cm है, तो $\sin\theta + \tan\theta$ का मान क्या होगा ?



(A) $\frac{213}{5}$ (B) $\frac{218}{5}$ (C) $\frac{216}{13}$ (D) $\frac{216}{65}$

68. What is the value of $\cot35^\circ \cot40^\circ \cot45^\circ \cot50^\circ \cot55^\circ$?
$\cot35^\circ \cot40^\circ \cot45^\circ \cot50^\circ \cot55^\circ$ का मान ज्ञात करें।

(A) –1 (B) 2
(C) 1 (D) 0

69. Find the smallest positive angle which satisfies the given trigonometric equation.
वह छोटा से छोटा धन कोण ज्ञात करें, जो दिए गए त्रिकोणमितीय समीकरण को संतुष्ट करेगा।

$$2\sin^2x + \sqrt{3}\cos x + 1 = 0$$

(A) $\frac{\pi}{3}$ (B) $\frac{2\pi}{3}$ (C) $\frac{5\pi}{6}$ (D) $\frac{\pi}{6}$

70. The value of $\tan(63^\circ - \theta) - \cot(27^\circ + \theta) + \frac{\operatorname{cosec}^2 70 - \tan^2 20}{\sec^2 37 - \cot^2 53}$ is :

$\tan(63^\circ - \theta) - \cot(27^\circ + \theta) + \frac{\operatorname{cosec}^2 70 - \tan^2 20}{\sec^2 37 - \cot^2 53}$ का मान ज्ञात करें।

(A) 2 (B) 3
(C) 0 (D) 1

71. If $x = \operatorname{cosec}A + \cos A$ and $y = \operatorname{cosec}A - \cos A$, then find the value of $\left(\frac{2}{x+y}\right)^2 + \left(\frac{x-y}{2}\right)^2 - 1$.

यदि $x = \operatorname{cosec}A + \cos A$ और $y = \operatorname{cosec}A - \cos A$ है, तो $\left(\frac{2}{x+y}\right)^2 + \left(\frac{x-y}{2}\right)^2 - 1$ का मान ज्ञात करें।

(A) 3 (B) 0
(C) 2 (D) 1

72. If $0 < \theta < 90^\circ$, $3b\operatorname{cosec}\theta = a\sec\theta$ and $3a\sec\theta - b\operatorname{cosec}\theta = 8$, then the value of $9b^2 + a^2$ is :
यदि $0 < \theta < 90^\circ$, $3b\operatorname{cosec}\theta = a\sec\theta$ और $3a\sec\theta - b\operatorname{cosec}\theta = 8$ है, तो $9b^2 + a^2$ का मान ज्ञात करें।

(A) 6 (B) 8
(C) 9 (D) 7

73. If $\operatorname{cosec}^2x - 2 = 0$, then the value of x $(0 < x < 90^\circ)$ is :
यदि $\operatorname{cosec}^2x - 2 = 0$ है, तो x $(0 < x < 90^\circ)$ का मान ज्ञात करें।

(A) 15° (B) 45°
(C) 30° (D) 60°

74. If $\cos3\theta = \sin(\theta - 34^\circ)$, then the value of θ as an acute angle is :
यदि $\cos3\theta = \sin(\theta - 34^\circ)$ है, तो न्यून कोण के रूप में θ का मान ज्ञात करें।

(A) 34° (B) 31°
(C) 56° (D) 17°

75. If $\sqrt{3}\cos\theta = \sin\theta$, then the value of $\frac{4\sin^2\theta - 5\cos\theta}{3\cos\theta + 1}$ is:

यदि $\sqrt{3}\cos\theta = \sin\theta$ है, तो $\frac{4\sin^2\theta - 5\cos\theta}{3\cos\theta + 1}$ का मान ज्ञात करें।

(A) $\frac{1}{4}$ (B) $\frac{1}{5}$ (C) 5 (D) $\frac{2}{5}$

76. If $x\sin^3\theta + y\cos^3\theta = \sin\theta\cos\theta$ and $x\sin\theta = y\cos\theta$, then the value of $x^2 + y^2$ is :
यदि $x\sin^3\theta + y\cos^3\theta = \sin\theta\cos\theta$ और $x\sin\theta = y\cos\theta$ है, तो $x^2 + y^2$ का मान ज्ञात करें।

(A) 0 (B) 4
(C) 1 (D) 2

77. If θ is a positive acute angle and $\tan2\theta \tan3\theta = 1$, then the value of θ is :
यदि θ एक धनात्मक न्यून कोण है और $\tan2\theta \tan3\theta = 1$ है, तो θ का मान है :

(A) 45° (B) 18°
(C) 60° (D) 36°

78. If $\sin(A+B)=\cos(A-B)=\frac{\sqrt{3}}{2}$ and A and B are acute angles. The measures of angle A and B (in degrees) will be :

यदि $\sin(A+B)=\cos(A-B)=\frac{\sqrt{3}}{2}$ तथा A और B न्यूनकोण हैं, तो कोण A और B का माप (अंश में) ज्ञात करें।

(A) A = 45 and/और B = 15
(B) A = 45 and/और B = 45
(C) A = 15 and/और B = 45
(D) A = 60 and/और B = 30

79. If $\cot\theta=\frac{3}{\sqrt{5}}$, $0^\circ<\theta<90^\circ$, then the value of $\frac{6\sec^2\theta-\frac{5}{3}\operatorname{cosec}^2\theta}{\frac{3}{5}\sec^2\theta+\frac{4}{3}\operatorname{cosec}^2\theta}$ is equal to :

यदि $\cot\theta=\frac{3}{\sqrt{5}}$, $0^\circ<\theta<90^\circ$ है, तो $\frac{6\sec^2\theta-\frac{5}{3}\operatorname{cosec}^2\theta}{\frac{3}{5}\sec^2\theta+\frac{4}{3}\operatorname{cosec}^2\theta}$ का मान है :

(A) $\frac{2}{3}$ (B) 1 (C) $\frac{1}{2}$ (D) $\frac{1}{3}$

80. If $\cot A=\tan(2A-45^\circ)$, A is an acute angle then tanA is equal to :

यदि $\cot A=\tan(2A-45^\circ)$ जहाँ A एक न्यूनकोण है, तो tanA का मान ज्ञात करो ?

(A) $\frac{1}{2}$ (B) 3 (C) $\sqrt{3}$ (D) 1

81. The value of $\sin^2 38^\circ-\cos^2 52^\circ$ is :

$\sin^2 38^\circ-\cos^2 52^\circ$ का मान है :

(A) $\frac{1}{\sqrt{2}}$ (B) 1 (C) $\sqrt{2}$ (D) 0

82. If the value of secB + tanB = r, then the value of secB – tan B is equal to :

यदि secB + tanB = r है, तो secB – tan B का मान ..... के बराबर है।

(A) 0 (B) $\frac{1}{r}$ (C) r^2 (D) –r

83. If $\frac{\sin\theta+\cos\theta}{\sin\theta-\cos\theta}=3$ and θ is an acute angle, then the value of $\frac{3\sin\theta+4\cos\theta}{8\cos\theta-3\sin\theta}$ is :

यदि If $\frac{\sin\theta+\cos\theta}{\sin\theta-\cos\theta}=3$ है और θ एक न्यून कोण है, तो $\frac{3\sin\theta+4\cos\theta}{8\cos\theta-3\sin\theta}$ का मान है :

(A) 10 (B) $\frac{1}{2}$ (C) 5 (D) 2

84. If $\sin7x=\cos11x$, $0^\circ<x<90^\circ$, then the value of tan9x is :

यदि $\sin7x=\cos11x$, $0^\circ<x<90^\circ$ है, तो tan9x का मान है :

(A) $\frac{\sqrt{3}}{2}$ (B) 1 (C) $\frac{1}{\sqrt{3}}$ (D) $\sqrt{3}$

85. If $\frac{\cos A}{\operatorname{cosec}A+1}+\frac{\cos A}{\operatorname{cosec}A-1}=2$, $0^\circ\le A\le 90^\circ$, then A is equal to :

यदि $\frac{\cos A}{\operatorname{cosec}A+1}+\frac{\cos A}{\operatorname{cosec}A-1}=2$, $0^\circ\le A\le 90^\circ$ हो, तो A का मान ज्ञात करो ?

(A) 60° (B) 45°
(C) 90° (D) 30°

86. If $\frac{\sec\theta+\tan\theta}{\sec\theta+\tan\theta}=5$ and θ is an acute angle, then the value of $\frac{3\cos^2\theta+1}{3\cos^2\theta-1}$ is :

यदि $\frac{\sec\theta+\tan\theta}{\sec\theta+\tan\theta}=5$ और θ एक न्यून कोण है, तो $\frac{3\cos^2\theta+1}{3\cos^2\theta-1}$ का मान है :

(A) 3 (B) 2 (C) 1 (D) 4

87. If $\sin(\theta+30^\circ)=\frac{3}{\sqrt{12}}$, then the value of θ is equal to :

यदि $\sin(\theta+30^\circ)=\frac{3}{\sqrt{12}}$ है, तो θ का मान है :

(A) 60° (B) 15°
(C) 45° (D) 30°

88. If $\sin(A-B)=\frac{1}{2}$ and $\cos(A+B)=\frac{1}{2}$, where $A>B>0^\circ$ and A + B is an acute angle, then the value of A is :

यदि $\sin(A-B)=\frac{1}{2}$ और $\cos(A+B)=\frac{1}{2}$ है, जहाँ $A>B>0^\circ$ और A + B एक न्यून कोण है, तो A का मान है :

(A) 45° (B) 30°
(C) 15° (D) 60°

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89. If $\alpha+\beta=90°$ and $\alpha=2\beta$, then the value of $\cos^2\alpha+\sin^2\beta$ is :
यदि $\alpha+\beta=90°$ और $\alpha=2\beta$ है, तो $\cos^2\alpha+\sin^2\beta$ का मान है :
(A) $\frac{1}{3}$ (B) $\frac{1}{5}$ (C) 1 (D) $\frac{1}{2}$

90. If $\sec\theta+\tan\theta=2+\sqrt{5}$ and θ is an acute angle, then the value of $\sin\theta$ is :
यदि $\sec\theta+\tan\theta=2+\sqrt{5}$ और θ एक न्यूनकोण है तो $\sin\theta$ का मान ज्ञात करो।
(A) $\frac{2\sqrt{5}}{5}$ (B) $\frac{3}{5}$ (C) $\frac{\sqrt{5}}{5}$ (D) $\frac{1}{5}$

91. The elimination of θ from $x\cos\theta - y\sin\theta = 2$ and $x\sin\theta + y\cos\theta = 4$ will give :
यदि $x\cos\theta - y\sin\theta = 2$ और $x\sin\theta + y\cos\theta = 4$ से θ का विलोपन किया जाए तो क्या प्राप्त होगा ?
(A) $3x^2 - y^2 = 20$ (B) $x^2 + y^2 = 20$
(C) $3x^2 + y^2 = 20$ (D) $x^2 - y^2 = 20$

92. If $\tan\theta + \cot\theta = 2$ and θ is acute, then the value of $\tan^{100}\theta + \cot^{100}\theta$ is equal to:
यदि $\tan\theta + \cot\theta = 2$ और θ न्यून कोण है, तो $\tan^{100}\theta + \cot^{100}\theta$ का मान क्या होगा ?
(A) 2 (B) $\sqrt{3}$
(C) 1 (D) 0

93. If A is an acute angle and cot A + cosec A = 3, then the value of cosA is equal to :
यदि A एक न्यूनकोण है और cot A + cosec A = 3 है, तो cosA का मान क्या होगा ?
(A) $\frac{4}{5}$ (B) $\frac{2}{5}$ (C) $\frac{1}{5}$ (D) $\frac{3}{5}$

94. If $\operatorname{cosec}\theta = \frac{13}{12}$, then the value of $\frac{2\sin\theta - 3\cos\theta}{4\sin\theta - 9\cos\theta}$ is :
यदि $\operatorname{cosec}\theta = \frac{13}{12}$ है, तो $\frac{2\sin\theta - 3\cos\theta}{4\sin\theta - 9\cos\theta}$ का मान क्या होगा ?
(A) 2 (B) 4 (C) 1 (D) 3

95. If $\sin(2x-45°) = \cos x$ and angle x and $(2x-45°)$ (in degrees) are acute angles, then the value of cot x is :
यदि $\sin(2x-45°) = \cos x$ और कोण x और $(2x-45°)$ न्यून कोण है तो cot x का मान होगा।
(A) 0 (B) $\frac{1}{2}$ (C) 1 (D) $\frac{1}{\sqrt{2}}$

96. $\frac{\sec\theta+\tan\theta}{\sec\theta-\tan\theta}$ is equal to :s
$\frac{\sec\theta+\tan\theta}{\sec\theta-\tan\theta}$ बराबर हैं।
(A) $\frac{1}{\sec\theta-\tan\theta}$ (B) $\frac{1}{\sec\theta+\tan\theta}$
(C) $(\sec\theta+\tan\theta)^2$ (D) $(\sec\theta-\tan\theta)^2$

97. The value of
$$\frac{\sin 23°\cos 67°\tan 45° + \cos 23°\sin 67°\cot 45°}{2\sin 45°\cos 45°}$$ is ?
$$\frac{\sin 23°\cos 67°\tan 45° + \cos 23°\sin 67°\cot 45°}{2\sin 45°\cos 45°}$$
का मान हैं।
(A) 0 (B) 2 (C) 1 (D) $\frac{1}{\sqrt{2}}$

98. If $\cos 27° = x$, then the value of $\tan 63°$ is :
अगर $\cos 27° = x$ हो तो $\tan 63°$ का मान क्या होगा।
(A) $\frac{\sqrt{1+x^2}}{x}$ (B) $\frac{x}{\sqrt{1+x^2}}$
(C) $\frac{\sqrt{1-x^2}}{x}$ (D) $\frac{x}{\sqrt{1-x^2}}$

99. If x, y are acute angles, where $0 < x + y < 90°$ and $\sin(3x-40°) = \cos(3y+40°)$, then the value of $\tan(x+y)$ is equal to :
अगर x, y न्यून कोण हैं जहाँ $0 < x + y < 90°$ और $\sin(3x-40°) = \cos(3y+40°)$ हो तो $\tan(x+y)$ का मान ज्ञात करें।
(A) $\frac{1}{\sqrt{2}}$ (B) $\frac{1}{\sqrt{3}}$ (C) $\sqrt{3}$ (D) $\frac{1}{3}$

100. If $\tan\theta = \frac{2}{\sqrt{11}}$, $0 < \theta < 90°$, then the value of $\frac{2\operatorname{cosec}^2\theta - 3\sec^2\theta}{3\operatorname{cosec}^2\theta + 4\sec^2\theta}$ is equal to :
अगर $\tan\theta = \frac{2}{\sqrt{11}}$, $0 < \theta < 90°$ हो तो $\frac{2\operatorname{cosec}^2\theta - 3\sec^2\theta}{3\operatorname{cosec}^2\theta + 4\sec^2\theta}$ का मान ज्ञात करें।
(A) $\frac{11}{45}$ (B) $\frac{11}{49}$ (C) $\frac{13}{49}$ (D) $\frac{10}{49}$

Solution

1. (B) $\dfrac{\cos 30^\circ - \sin 30^\circ}{\sin 60^\circ + \cos 60^\circ} = \dfrac{\frac{\sqrt{3}}{2} - \frac{1}{2}}{\frac{\sqrt{3}}{2} + \frac{1}{2}} = \dfrac{\frac{\sqrt{3}-1}{2}}{\frac{\sqrt{3}+1}{2}}$

$= \dfrac{\left(\sqrt{3}-1\right)^2}{\left(\sqrt{3}+1\right)\left(\sqrt{3}-1\right)} = \dfrac{4-2\sqrt{3}}{2} = 2-\sqrt{3}$

2. (D) $\operatorname{cosec}\theta + \cot\theta = 2$

$\Rightarrow \operatorname{cosec}\theta - \cot\theta = \dfrac{1}{2}$

So, $\operatorname{cosec}\theta = \dfrac{5}{4}$

$\Rightarrow \sin\theta \dfrac{4}{5}$

3. (D) $(\sin\theta + \cos\theta)^2 = 2$

$\Rightarrow 1 + 2\sin\theta\cos\theta = 2$

$\Rightarrow \theta = 45^\circ = \dfrac{\pi}{4}$

4. (A) $\operatorname{cosec}A = \dfrac{25}{7}$

$\Rightarrow \sin A = \dfrac{7}{25}$, $\cos A = \dfrac{24}{25}$

$\tan A = \dfrac{7}{24}$

5. (A) $2\sin^2 x - 1 = 0$

$\Rightarrow \sin = \dfrac{1}{\sqrt{2}} = \sin 45^\circ$

So, $x = 45^\circ = \dfrac{\pi}{4}$

6. (B) $\cot\theta = \dfrac{80}{39}$

$\Rightarrow \operatorname{cosec}\theta = \sqrt{1+\left(\dfrac{80}{39}\right)^2} = \dfrac{89}{39}$

7. (B) $\sin\theta = \dfrac{4}{5}$

$\sin 3\theta = 3\sin\theta - 4\sin^3\theta = 3\times\dfrac{4}{5} - 4\times\dfrac{64}{125}$

$= \dfrac{300-256}{125} = \dfrac{44}{125}$

8. (A) $\tan a = \dfrac{2}{\sqrt{13}}$ $\quad \cot a = \dfrac{\sqrt{13}}{2}$

$\Rightarrow \dfrac{\operatorname{cosec}^2 a + 2\sec^2 a}{\operatorname{cosec}^2 a - 3\sec^2 a}$

$\Rightarrow \dfrac{1+\frac{13}{4}+2+\frac{8}{13}}{1+\frac{13}{4}-3-\frac{12}{13}} \Rightarrow \dfrac{357}{17} = 21$

9. (B) $a\sin A + b\cos A = c$

$a\cos A - b\sin A = \sqrt{a^2+b^2-c^2}$

10.(B) $\dfrac{1-\tan A}{1+\tan A} = \dfrac{1/\sqrt{3}}{\sqrt{3}} \Rightarrow \dfrac{1-\tan A}{1+\tan A} = \dfrac{1}{3}$

$\tan A = \dfrac{1}{2}$

$\cot A = 2$

11.(B) $\sin(60^\circ + \theta) - \cos(30^\circ - \theta)$

$\Rightarrow \sin(60^\circ + \theta) - \cos[90^\circ - (60^\circ + \theta)]$

$\Rightarrow \sin(60^\circ + \theta) - \sin(60^\circ + \theta)$

$\Rightarrow 0$

12.(D) $\sin x = -\dfrac{1}{2}$ $\quad \sin(210^\circ) = -\dfrac{1}{2}$

$210^\circ = \dfrac{7\pi}{6}$

13.(A) $(\sin\theta - \cos\theta)^2 = \dfrac{1}{841}$

$2\sin\theta\cos\theta = \dfrac{840}{841}$ ..... (i)

$(\sin\theta + \cos\theta)^2 = \sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta$

$= 1 + \dfrac{840}{841} = \dfrac{1681}{841}$

$\sin\theta + \cos\theta = \dfrac{41}{29}$

14.(D) $\cos x = \dfrac{3}{5}$ $\quad \sin x = \dfrac{4}{5}$

$\sin x - \sin^3 x$

$\Rightarrow \dfrac{4}{5} - \dfrac{64}{125}$

$\Rightarrow \dfrac{36}{125}$

$\Rightarrow 0.288$

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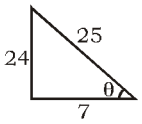
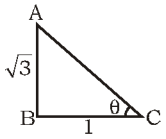
15.(C) $\sin\theta = \frac{96}{100} = \frac{24}{25}$



$\cot\theta = \frac{7}{24} = 0.2916$

16.(D)



$\tan\theta = \sqrt{3}$

$\theta = 60°$

17.(D) $\frac{\sin 30°\cos 60° + \cos 45°\sin 45°}{\tan 60°\cot 30°}$

$= \frac{\frac{1}{2}\times\frac{1}{2} + \frac{1}{\sqrt{2}}\times\frac{1}{\sqrt{2}}}{\sqrt{3}\times\sqrt{3}} = \frac{\frac{1}{4}+\frac{1}{2}}{3} = \frac{3}{12} = \frac{1}{4}$

18.(B) $\frac{\sin x + \cos x}{\sin x - \cos x} = \frac{6}{5}$

Using compendo & dividendo

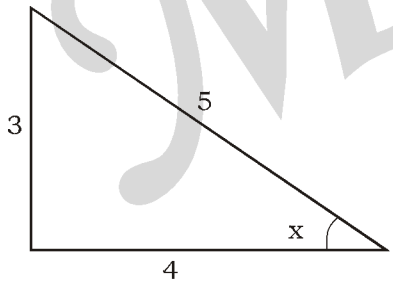
$\frac{\sin x}{\cos x} = \frac{6+5}{6-5}$

$\tan x = 11$

put value in equation

$\frac{\tan^2 x + 1}{\tan^2 x - 1} = \frac{121+1}{121-1} = \frac{122}{120} = \frac{61}{60}$

19.(B)



$\cot x.\sec x = \frac{4}{3}\times\frac{5}{4} = \frac{5}{3}$

20.(B) $\frac{\sqrt{13}\times\frac{3}{\sqrt{13}} - 3\times\frac{2}{3}}{3\times\frac{2}{3} + \sqrt{13}\times\frac{2}{\sqrt{13}}}$

$= \frac{3-2}{2+2} = \frac{1}{4}$

21.(D) $\sin^2\theta + \cos^2\theta = 4x^2 + \frac{4}{x^2}$

$1 = 4\left(x^2 + \frac{1}{x^2}\right)$

22.(D) $\tan 50° = \frac{1}{x}$

$2\tan 50° = 2\times\frac{1}{x} = \frac{2}{x}$

23.(A) $\frac{\sqrt{\operatorname{cosec} x - 1}}{\sqrt{\operatorname{cosec} x + 1}} \times \frac{\sqrt{\operatorname{cosec} x - 1}}{\sqrt{\operatorname{cosec} x - 1}}$

$\Rightarrow \frac{\operatorname{cosec} x - 1}{\sqrt{\operatorname{cosec}^2 x - 1}} \because \operatorname{cosec}^2 x - 1 = \cot^2 x$

$\Rightarrow \frac{\operatorname{cosec} x - 1}{\cot x}$

$\Rightarrow \sec x - \tan x$

24.(D) $\cos(90°-61°)\operatorname{cosec}61° + 2\sin(90°-55°)\sec 55°$

$\frac{\frac{\sin 61°}{\sin 61°} + 2\frac{\cos 55°}{\cos 55°}}{3\sin^2(90-48) + 3\sin^2 48°}$

$\Rightarrow \frac{1+2}{3}$

$\Rightarrow \frac{3}{3} = 1$

25.(B) $x \times \frac{1}{2}\times\frac{1}{2} = \frac{1}{\sqrt{2}}\times\frac{1}{\sqrt{2}}$

$\frac{x}{4} = \frac{1}{2}$

$x = 2$

26.(D) ATQ,

$\cos(x-y) = \frac{\sqrt{3}}{2} = \cos 30°$

$\Rightarrow (x-y) = 30°$

$\sin(x+y) = \frac{1}{2} = \sin 30°$

$\Rightarrow (x+y) = 30°$

So, $x = 30°$

27.(D) ATQ,

Min. Value $= 2\sqrt{8\times 25} = 20\sqrt{2}$

28.(B) $\frac{\cos\theta + \sin\theta}{\cos\theta - \sin\theta} = \frac{8}{1}$

$\Rightarrow$ Applying C & D

$\Rightarrow \quad \frac{\cos\theta}{\sin\theta} = \frac{8+1}{8-1} = \frac{9}{7}$

$\Rightarrow \quad \cot\theta = \frac{9}{7}$

29.(B) So,

$\frac{\tan60° - \tan15°}{1+\tan60°\tan15°} = \tan(60° - 15°) = \tan45° = 1$

30.(C) ATQ,

$3\sec^2x - 4 = 0$

$\Rightarrow \sec x = \frac{2}{\sqrt{3}} = \sec30°$

$\Rightarrow x = 30°$

31.(A) $4\cos^2\theta - 3\sin^2\theta + 2 = 0$

$\Rightarrow 7\cos^2\theta = 1$

$\Rightarrow \sec^2\theta = 7$

So, $\tan\theta = \sqrt{7-1} = \sqrt{6}$

32.(A) $\sin^245° + \cos^245° = \frac{1}{2} + \frac{1}{2} = 1$

33.(A) $\tan\theta = \frac{20}{21}$

So, $\frac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} = \frac{\tan\theta - 1}{\tan\theta + 1}$

$= \frac{\frac{20}{21} - 1}{\frac{20}{21} + 1} = \frac{-1}{41}$

34.(B) $\sin x = \frac{12}{37}$

$\Rightarrow \cos x = \sqrt{1 - \left(\frac{12}{37}\right)^2} = \frac{35}{37}$

So, $\tan x = \frac{12}{35}$

35.(A) $\left(\frac{\sqrt{3} + 2\sin P}{1 - 2\cos P}\right)^3 + \left(\frac{1 + 2\cos P}{\sqrt{3} - 2\sin P}\right)^3$

$= \left(\frac{\frac{\sqrt{3}}{2} + \sin P}{\frac{1}{2} - \cos P}\right)^3 + \left(\frac{\frac{1}{2} + \cos P}{\frac{\sqrt{3}}{2} - \sin P}\right)^3$

Put $\frac{\sqrt{3}}{2} = \cos30°, \frac{1}{2} = \sin30°$

$\Rightarrow \left(\frac{\cos30° + \sin P}{\sin30 - \cos P}\right)^3 + \left(\frac{\sin30° + \cos P}{\cos30° - \sin P}\right)^3$

$= \left(\frac{\cos30° + \cos(90° - P)}{\sin30° - \sin(90° - P)}\right)^3 + \left(\frac{\sin30° + \sin(90° - P)}{\cos30° - \cos(90° - P)}\right)^3$

$= \left(\frac{2\cos\left(60° - \frac{P}{2}\right)\cos\left(\frac{P}{2} - 30°\right)}{2\cos\left(60° - \frac{P}{2}\right)\sin\left(\frac{P}{2} - 30°\right)}\right)^3 + \left(\frac{2\sin\left(60° - \frac{P}{2}\right)\cos\left(\frac{P}{2} - 30°\right)}{2\sin\left(60° - \frac{P}{2}\right)\sin\left(30° - \frac{P}{2}\right)}\right)^3$

$= \cot^3\left(\frac{P}{2} - 30°\right) - \cot^3\left(\frac{P}{2} - 30°\right) = 0$

36.(B) $A = 2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta)$

$= 2(1 - 3\sin^2\theta\cos^2\theta) - 3(1 - 2\sin^2\theta\cos^2\theta)$

$= 2 - 6\sin^2\theta\cos^2\theta - 3 + 6\sin^2\theta\cos^2\theta = -1$

So,

$\cos\propto = \sqrt{\frac{3-1}{5-1}} = \frac{1}{\sqrt{2}} = \cos45°$

So,

$3\propto = 45 \times 3 = 135°$

37.(D) $117\cos^2A + 129\sin^2A = 120$

$\Rightarrow 117(\cos^2A + \sin^2A) + 12\sin^2A = 120$

$\Rightarrow \sin^2A = \frac{3}{12} = \frac{1}{4}$

$170\cos^2B + 158\sin^2B = 161$

$\Rightarrow 12\cos^2B + 158(\cos^2B + \sin^2B) = 161$

$\Rightarrow \cos^2B = \frac{1}{4}$

So,

$\operatorname{cosec}^2A \sec^2B = 4 \times 4 = 16$

38.(D) $\cos A \times \cot A = \sin^2A$

$\Rightarrow \sin^3A = \cos^2A$

$\Rightarrow \tan^3A = \sec A$

$\Rightarrow \tan^6A = \sec^2A$

So, $\tan^6A - \tan^2A = \sec^2A - \tan^2A = 1$

39.(D) $\left(\frac{1 + \sin\theta - \cos\theta}{1 + \sin\theta + \cos\theta}\right) + \left(\frac{1 + \sin\theta + \cos\theta}{1 + \sin\theta - \cos\theta}\right) = 4$

$\Rightarrow \frac{1 + \sin^2\theta + \cos^2\theta + 2\sin\theta - 2\cos\theta - 2\sin\theta\cos\theta + 1 + \sin^2\theta + \cos^2\theta + 2\sin\theta + 2\cos\theta + 2\sin\theta\cos\theta}{1 + \sin^2\theta + 2\sin\theta - \cos^2\theta} = 4$

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$$\Rightarrow \frac{2(2+\sin\theta)}{\sin\theta(2+\sin\theta)} = 4$$

$$\Rightarrow \sin\theta = \frac{1}{2} = \sin 30°$$

$$\Rightarrow \theta = 30°$$

40.(C) $\sec A = \frac{\sqrt{11}}{3}$

$$\Rightarrow \cos A = \frac{3}{\sqrt{11}}, \sin A = \frac{\sqrt{2}}{\sqrt{11}}$$

$$\tan A = \frac{\sqrt{2}}{3}, \cot A = \frac{3}{\sqrt{2}}$$

$$\operatorname{cosec} A = \frac{\sqrt{11}}{\sqrt{2}}$$

$$\text{So } \frac{\operatorname{cosec}^2 A + \tan^2 A}{\sin^2 A + \cot^2 A} = \frac{11/2 + 2/9}{2/11 + 9/2}$$

$$= \frac{103}{18} \times \frac{22}{103} = \frac{11}{9}$$

41.(A) $\sin x - \cos x = 0$

$\Rightarrow \sin x = \cos x$

So, $\sin^3 x = \cos^3 x$

$\Rightarrow \sin^3 x - \cos^3 x = 0$

42.(A) $$\frac{\cot x}{1+\operatorname{cosec}} + \frac{1+\operatorname{cosec} x}{\cot x}$$

$$= \frac{\cos x}{1+\sin x} + \frac{1+\sin x}{\cos x}$$

$$= \frac{\cos^2 x + 1 + \sin^2 x + 2\sin x}{\cos x(1+\sin x)}$$

$$= \frac{2(1+\sin x)}{\cos x(1+\sin x)} = 2\sec x$$

43.(C) $\tan x = \frac{m}{n}$

$$\Rightarrow \sin x = \frac{m}{\sqrt{m^2+n^2}}, \cos x = \frac{n}{\sqrt{m^2+n^2}}$$

$$\text{So, } (\sin x + \cos x) = \frac{m+n}{\sqrt{m^2+n^2}}$$

44.(C) $\cos x = \frac{24}{25}$

$$\Rightarrow \sin x = \frac{7}{25}$$

$$\text{So } \operatorname{cosec} x = \frac{25}{7}, \cot x = \frac{24}{7}$$

$$\Rightarrow \operatorname{cosec} x + \cot x = \frac{25}{7} + \frac{24}{7} = 7$$

45.(D) ATQ

$$\sec\theta + \sin\theta = \frac{k}{\sqrt{6}}$$

$\sec\theta \sin\theta = 1$

$\Rightarrow \tan\theta = 1 = \tan 45°$

$\Rightarrow \theta = 45°$

$$\text{So, } \sqrt{2} + \frac{1}{\sqrt{2}} = \frac{k}{\sqrt{6}}$$

$$\Rightarrow k = 3\sqrt{3}$$

46.(C) $\tan x = \frac{3}{2}$

So,

$$\frac{3\sin x + 2\cos x}{3\sin x - 2\cos x} = \frac{3\tan x + 2}{3\tan x - 2}$$

$$= \frac{9+4}{9-4} = \frac{13}{5}$$

47.(C) ATQ

$$\frac{A\tan 62° \sec 28° \cot 38°}{\operatorname{cosec} 62° \tan 11°} = 1$$

$$\Rightarrow A = \frac{\tan 11° \tan 38°}{\tan 62°} = \frac{\tan 28° \tan 38°}{\tan 79°}$$

48.(B) $\sec A = 3$

$$\Rightarrow \operatorname{cosec} A = \frac{3}{\sqrt{8}}, \cot A = \frac{1}{\sqrt{8}}$$

$\cot B = 4$

$$\Rightarrow \sin B = \frac{1}{\sqrt{17}}, \sec B = \frac{\sqrt{17}}{4}$$

$$\text{So } \frac{\operatorname{cosec}^2 A + \sin^2 B}{\cot^2 A + \sec^2 B} = \frac{9/8 + 1/17}{1/8 + 17/16}$$

$$= \frac{161/8 \times 17}{19/16} = \frac{322}{323}$$

49.(C) $\tan^4x + \tan^2x = 1$

$\Rightarrow \tan^4x = 1 + \tan^2x = \sec^2x$

$\Rightarrow \sin^4x = \cos^2x$

So $\sin^4x + \sin^2x = \cos^2x + \sin^2x = 1$

50.(C) $\sin\theta - \cos\theta = \frac{7}{17}$

$\Rightarrow 1 - 2\sin\theta\cos\theta = \frac{49}{289}$

$\Rightarrow \sin\theta\cos\theta = \frac{120}{289}$

So,

$\sin\theta + \cos\theta = \sqrt{1+\frac{240}{289}} = \frac{23}{17}$

51.(B) $\cos x = -\frac{1}{2} = \cos 120° = \cos 240°$

$\Rightarrow x = 120°, 240° = \frac{2\pi}{3}, \frac{4\pi}{3}$

52.(D) $\frac{\cos x}{1+\sin x} + \frac{1+\sin x}{\cos x}$

$= \frac{\cos^2 x + 1 + \sin^2 x + 2\sin x}{\cos x(1+\sin x)}$

$= \frac{2(1+\sin x)}{\cos x(1+\sin x)}$

$= 2\sec x$

53.(D) $\cos x = \frac{p}{q}$

$\Rightarrow \sec x = \frac{q}{p}$

So $\tan x = \sqrt{\left(\frac{q}{p}\right)^2 - 1} = \frac{\sqrt{q^2-p^2}}{p}$

54.(A) $\sin x - \cos x = 0$

$\Rightarrow \tan x = 1 = \tan 45°$

So $(\sec x + \operatorname{cosec} x)^2 = \left(\sqrt{2}+\sqrt{2}\right)^2 = 8$

55.(C) Given, $\sin x = \frac{2}{3}$

$\cos x = \sqrt{1-\sin^2 x}$

$\Rightarrow \cos x = \sqrt{\left(1-\frac{4}{9}\right)} = \sqrt{\left(\frac{5}{9}\right)} = \frac{\sqrt{5}}{3}$

$\Rightarrow \cos 3x = 4\cos^3 x - 3\cos x$

$\Rightarrow \cos 3x = 4 \times \left(\frac{\sqrt{5}}{3}\right)^3 - 3 \times \frac{\sqrt{5}}{3}$

$\Rightarrow \cos 3x = \frac{20\sqrt{5}}{27} - \sqrt{5}$

$\Rightarrow \cos 3x = -\frac{7\sqrt{5}}{27}$

$\Rightarrow \cos 3x = -0.5797$

56.(D) $\sin^2 35° + \sin^2 55°$

$\Rightarrow \sin^2 35° + \sin^2 (90° - 35°)$

$\Rightarrow \sin^2 35° + \cos^2 35°$

$\Rightarrow 1$

57.(B) $x = \tan\theta$

$x + \frac{1}{x} = 6$

$x^2 + \frac{1}{x^2} = 36 - 2$

$x^2 + \frac{1}{x^2} = 34$

$\tan^2\theta + \frac{1}{\tan^2\theta} = 34$

$\tan^2\theta + \cot^2\theta = 34$

58.(A) $\frac{\cos^2 30° - \sin^2 30°}{\sin^2 15° + \cos^2 15°} = \frac{3/4 - 1/4}{1} = \frac{1}{2}$

59.(C) $\sec\theta - \tan\theta = 3$

$\Rightarrow \sec\theta + \tan\theta = \frac{1}{3}$

$\Rightarrow \sec\theta = \frac{5}{3}$

So, $\cos\theta = \frac{3}{5}$

60.(B) $\tan^2 - 3\sec^2 + 3 = 0$

$\Rightarrow 2\sec^2 x = 2$

$\Rightarrow \sec x = 1 = \sec 0°$

So $x = 0°$

61.(D) $\cos^4\theta = 1 - \cos^2\theta$

$\cos^4\theta = \sin^2\theta$

$\sin\theta = \cos^2\theta$

ATQ

$\sin^2\theta = \sin^4\theta$

$\Rightarrow \sin\theta + \sin^2\theta = 1$

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62.(D) $\cos(A + B) = 0$

$A + B = 90°$ ..... (i)

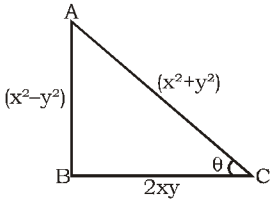
$\sin(A - B) = \frac{1}{2}$

$A - B = 30°$ ..... (ii)

from eq (i) and (ii)

$A = 60°, B = 30°$

63.(C)



$\tan\theta = \frac{x^2 - y^2}{2xy}$

64.(D) $\sin + \frac{1}{\sin\theta} = 2$

$\therefore \sin\theta = 1$

$\sin^2\theta + \frac{1}{\sin^2\theta}$

$\Rightarrow 1 + \frac{1}{1} = 2$

65.(A) $\sin20° \cos70° + \sin70° \cos20°$

$\Rightarrow \sin(90°-70°) \cos 70° + \sin70° \cos(90°-70°)$

$\Rightarrow \cos^2 70° + \sin^2 70°$

$\Rightarrow 1$

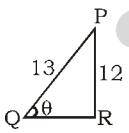
66.(A) $\tan 4A = \tan[90°-(A - 20°)]$

$4A = 90° - A + 20°$

$5A = 110°$

$A = 22°$

67.(D)



$QR = \sqrt{13^2 - 12^2}$

$= 5$ cm

$\sin\theta = \frac{12}{13}, \tan\theta = \frac{12}{5}$

ATQ

$\sin\theta + \tan\theta$

$\Rightarrow \frac{12}{13} + \frac{12}{5} \Rightarrow \frac{216}{65}$

68.(C) $\cot(90° - 55°) \cot(90° - 50°) \cot 45° \cot 50° \cot 55°$

$\Rightarrow \tan 55° \tan 50° \cot 45° \cot 50° \cot 55°$

$\Rightarrow 1$

69.(C) $2\sin^2x + \sqrt{3}\cos x + 1 = 0$

$\Rightarrow 2\cos^2x - \sqrt{3}\cos x - 3 = 0$

$\Rightarrow 2\cos^2x - 2\sqrt{3}\cos x + \sqrt{3}\cos x - 3 = 0$

$\Rightarrow 2\cos x\left(\cos x - \sqrt{3}\right) + \sqrt{3}\left(\cos x - \sqrt{3}\right) = 0$

$\Rightarrow (2\cos x + \sqrt{3})(\cos x - \sqrt{3}) = 0$

$\Rightarrow \cos x = \frac{-\sqrt{3}}{2}$ $[\because \cos x \neq \sqrt{3}]$

$\Rightarrow x = 150° = \frac{5\pi}{6}$

70.(D) $\tan(63° - \theta) - \cot(27° + \theta) + \frac{\text{cosec}^2 70° - \tan^2 20°}{\sec^2 37° - \cot^2 53°}$

$= \cot(27° + \theta) - \cot(27° + \theta) + \frac{\sec^2 20° - \tan^2 20°}{\sec^2 37° - \tan^2 37°}$

$0 + \frac{1}{1} = 1$

71.(B) ATQ,

$x = \text{cosec } A + \cos A$

$y = \text{cosec } A - \cos A$

$\Rightarrow x + y = 2\text{cosec}A$

$x - y = 2\cos A$

So,

$\left(\frac{2}{x+y}\right)^2 + \left(\frac{x-y}{2}\right)^2 - 1$

$= \sin^2A + \cos^2A - 1 = 0$

72.(C) ATQ,

$3b\,\text{cosec}\theta = a\sec\theta$

$\Rightarrow \tan\theta = \frac{3b}{a}$

So,

$\text{cosec}\theta = \frac{\sqrt{a^2 + 9b^2}}{3b}$, $\sec\theta = \frac{\sqrt{a^2 + 9b^2}}{a}$

So,

$\Rightarrow 3a\sec\theta - b\,\text{cosec}\theta = 8$

$\Rightarrow \frac{3a\sqrt{9b^2 + a^2}}{a} - \frac{b\sqrt{9b^2 + a^2}}{3b} = 8$

$\Rightarrow \frac{8\sqrt{9b^2 + a^2}}{3} = 8$

$\Rightarrow 9b^2 + a^2 = 9$

73.(B) $\text{cosec}^2x - 2 = 0$

$\Rightarrow \text{cosec}x = \sqrt{2} = \text{cosec}45°$

$\Rightarrow x = 45°$

74.(B) $\sin(90 - 3\theta) = \sin(\theta - 34°)$

$90 - 3\theta = \theta - 34$

$124 = 4\theta$

$\theta = \frac{124}{4}$

$\theta = 31°$

75.(B) $\tan\theta = \sqrt{3}$

$\theta = 60°$

$$\frac{4\left[\frac{\sqrt{3}}{2}\right]^2 - 5\left[\frac{1}{2}\right]}{3\left[\frac{1}{2}\right]+1} = \frac{4\times\frac{3}{4} - \frac{5}{2}}{\frac{5}{2}} = \frac{\frac{3}{1} - \frac{5}{2}}{\frac{5}{2}}$$

$$= \frac{1}{2}\times\frac{2}{5} = \frac{1}{5}$$

76.(C) put $\theta = 45°$

$x = y$ (i)

$$x\times\frac{1}{2\sqrt{2}} + y\times\frac{1}{2\sqrt{2}} = \frac{1}{2}$$

$x + y = \sqrt{2}$

$2x = \sqrt{2}$

$x = \frac{1}{\sqrt{2}}$

$y = \frac{1}{\sqrt{2}}$

$$x^2 + y^2 = \left(\frac{1}{\sqrt{2}}\right)^2 + \left(\frac{1}{\sqrt{2}}\right)^2$$

$$\frac{1}{2} + \frac{1}{2} = 1$$

77.(B) $\tan2\theta = \frac{1}{\tan3\theta}$

$\tan2\theta = \cot3\theta$

$5\theta = 90°$

$\theta = 18°$

78.(A) $A + B = 60°$

$A - B = 30°$

$2A = 90°$

$A = 45°$

$B = 15°$

79.(B) $B = 3, P = \sqrt{5}, H = \sqrt{14}$

$$\frac{6\times\frac{14}{9} - \frac{5}{3}\times\frac{14}{5}}{\frac{3}{5}\times\frac{14}{9} + \frac{4}{3}\times\frac{14}{5}}$$

$$\Rightarrow \frac{\frac{14}{3}}{\frac{14}{3}\left[\frac{1}{5} + \frac{4}{5}\right]}$$

$$\Rightarrow \frac{1+4}{5}$$

$$\Rightarrow \frac{5}{5} = 1$$

80.(D) $\tan(90 - A) = \tan(2A - 45)$

$90 - A = 2A - 45$

$90 + 45 = 3A$

$A = 45°$

$\tan45° = 1$

81.(D) $\sin^2 38° - \cos^2(90-38°)$

$\sin^2 38° - \sin^2 38°$

$= 0$

82.(B) $\sec B + \tan B = r$

$$\sec B - \tan B = \frac{1}{r}$$

83.(C) $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = 3$

$\frac{\sin\theta}{\cos\theta} = \frac{4}{2} = 2$

$\tan\theta = 2$

$\frac{3\tan\theta + 4}{8 - 3\tan\theta}$

$\frac{10}{2} = 5$

84.(B) $7x = 90 - 11x$

$18x = 90$

$x = 5°$

$\tan 9x = \tan 9 \times 5 = \tan 45 = 1$

85.(B) Put $A = 45°$

$$= \frac{\frac{1}{\sqrt{2}}}{\sqrt{2}+1} + \frac{\frac{1}{\sqrt{2}}}{\sqrt{2}-1}$$

$$= \frac{1}{\sqrt{2}}\times\left(\frac{\sqrt{2}-1+\sqrt{2}+1}{2-1}\right) = \frac{1}{\sqrt{2}}\times 2\sqrt{2} = 2$$

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86.(D) $\frac{\sec\theta+\tan\theta}{\sec\theta-\tan\theta}=5 \qquad \frac{\sec\theta}{\tan\theta}=\frac{5+1}{5-1}$

$\sin\theta=\frac{2}{3} \qquad \cos\theta=\frac{\sqrt{5}}{3}$

$\frac{3\cos^2\theta+1}{3\cos^2\theta-1}=\frac{3\times\frac{5}{9}+1}{3\times\frac{5}{9}-1}=\frac{8}{2}=4$

87.(D) $\sin(\theta+30°)=\frac{3}{2\sqrt{3}}=\frac{\sqrt{3}}{2}$

$\sin(\theta+30°)=\sin 60°$

$\theta+30°=60°$

$\theta=30°$

88.(A) $\sin(A-B)=\sin 30°$

$A-B=30°$

$\cos(A+B)=\frac{1}{2}=\cos 60°$

$A+B=60°$

$A=45°$

89.(D) $2\beta+\beta=90° \qquad \beta=\frac{90}{3}=30°$

$\alpha=60$

$\cos^2 60+\sin^2 30°\Rightarrow\frac{1}{4}+\frac{1}{4}=\frac{1}{2}$

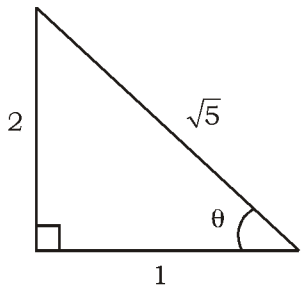
90.(A) $\sec\theta+\tan\theta=2+\sqrt{5}$ .....(i)

$\sec\theta-\tan\theta=\frac{1}{2+\sqrt{5}}\times\frac{\sqrt{5}-2}{\sqrt{5}-2}$

$\sec\theta-\tan\theta=\sqrt{5}-2$ .....(ii)

(1) + (2)

$2\sec\theta=2\sqrt{5}\Rightarrow\sec\theta=\frac{\sqrt{5}}{1}$



$\sin\theta=\frac{2}{\sqrt{5}}\times\frac{\sqrt{5}}{\sqrt{5}}=\frac{2\sqrt{5}}{5}$

91.(B) $x\cos\theta-y\sin\theta=2$ ..... (i)

$x\sin\theta+y\cos\theta=4$ .....(ii)

$(1)^2+(2)^2$

$x^2\cos^2\theta+y^2\sin^2\theta-2xy\sin\theta\cos\theta+x^2\sin^2\theta+y\cos^2\theta+2xy\sin\theta\cos\theta=20$

$x^2[\cos^2\theta+\sin^2\theta]+y^2[\cos^2\theta+\sin^2\theta]=20$

$x^2+y^2=20$

92.(A) Put $\theta=45°$

$\tan 45°+\cot 45°=2$

$\tan^{100}45°+\cot^{100}45°=(1)^{100}+(1)^{100}=2$

93.(A) $\operatorname{cosec}A+\cot A=3$ ... (i)

$\because \operatorname{cosec}^2A-\cot^2A=(\operatorname{cosec}A+\cot A)(\operatorname{cosec}A-\cot A)$

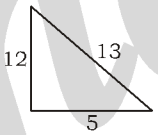
$\operatorname{cosec}A-\cot A=\frac{1}{3}$ ... (ii)

From eq. (i) & (ii)

$\operatorname{cosec}A=\frac{5}{3}; \qquad \sin A=\frac{3}{5}$

$\cos A=\frac{4}{5}$

94.(D)



$\tan\theta=\frac{12}{5}$

$\frac{2\tan\theta-3}{4\tan\theta-9}$

$\frac{2\times\frac{12}{5}-3}{4\times\frac{12}{5}-9}=\frac{\frac{9}{5}}{\frac{3}{5}}=3$

95.(C) $2x-45°=90-x$

$3x=135°$

$x=\frac{135}{3}$

$x=45°$

$\cot(45)=1$

96.(C) $\frac{\sec\theta+\tan\theta}{\sec\theta-\tan\theta}\times\frac{\sec\theta+\tan\theta}{\sec\theta+\tan\theta}$

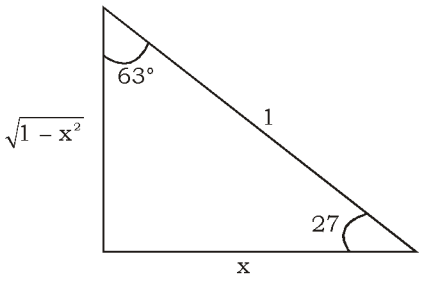
$\Rightarrow\frac{(\sec\theta+\tan\theta)^2}{\sec^2\theta-\tan^2\theta} \qquad \because \sec^2\theta-\tan^2\theta=1$

$(\sec\theta+\tan\theta)^2$

97.(C) $\dfrac{\sin(90-67)\cos 67 \tan 45 + \sin(90-67).\sin 67 \cot 45^\circ}{2 \times \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}}}$

$\dfrac{\cos^2 67 + \sin^2 67}{1} \Rightarrow 1$

98.(D)



$\tan 63 = \dfrac{x}{\sqrt{1-x^2}}$

99.(B) $\sin(3x - 40) = \cos(3y + 40)$

$3x - 40 = 90 - 3y - 40$

$3(x + y) = 90$

$x + y = 30$

$\tan(x + y) = \tan 30 = \dfrac{1}{\sqrt{3}}$

100. (D) $\tan\theta = \dfrac{2}{\sqrt{11}}$

So, $\sec^2\theta = 1 + \tan^2\theta = 1 + \dfrac{4}{11}$

And, $\cot\theta = \dfrac{\sqrt{11}}{2}$

So, $\operatorname{cosec}^2\theta = 1 + \dfrac{11}{4} = \dfrac{15}{4}$

$\therefore \quad \dfrac{2 \times \frac{15}{4} - 3 \times \frac{15}{11}}{3 \times \frac{15}{4} + 4 \times \frac{15}{11}} = \dfrac{\frac{30}{4} - \frac{45}{11}}{\frac{45}{4} + \frac{60}{11}}$

$= \dfrac{330 - 180}{495 + 240} = \dfrac{150}{735} = \dfrac{10}{49}$

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(SSC CHSL – 2018)

1. $\frac{\cot\theta}{(1-\sin\theta)(\sec\theta+\tan\theta)}$ is equal to/का मान बराबर है:

(A) cosecθ (B) sinθ
(C) secθ (D) 1

2. If $2\cos^2\theta - 5\cos\theta + 2 = 0$, $0° < \theta < 90°$, then the value of (cosecθ + cotθ) is :
यदि $2\cos^2\theta - 5\cos\theta + 2 = 0$, $0° < \theta < 90°$ है, तो (cosecθ + cotθ) का मान :

(A) $\frac{1}{\sqrt{3}}$ (B) $\sqrt{3}$ (C) $\frac{1}{3}$ (D) $2\sqrt{3}$

3. The value of /का मान

$\frac{\tan 13°\tan 37°\tan 45°\tan 53°\tan 77°}{2\,\text{cosec}^2 60°\left(\cos^2 60° - 3\cos 60° + 2\right)}$ is :

(A) 2 (B) 1 (C) $\frac{3}{2}$ (D) $\frac{1}{2}$

4. If $\cos^2\theta - \sin^2\theta - 3\cos\theta + 2 = 0$, $0° < \theta < 90°$, then what is the value of 4cosecθ + cotθ ?
यदि $\cos^2\theta - \sin^2\theta - 3\cos\theta + 2 = 0$, $0° < \theta < 90°$ है, तो 4cosecθ + cotθ का मान कितना है ?

(A) $3\sqrt{3}$ (B) 4
(C) $4\sqrt{3}$ (D) 3

5. $\frac{(\sec\theta+\tan\theta)(1-\sin\theta)}{\text{cosec}\theta(1+\cos\theta)(\text{cosec}\theta-\cot\theta)}$ is equal to :

$\frac{(\sec\theta+\tan\theta)(1-\sin\theta)}{\text{cosec}\theta(1+\cos\theta)(\text{cosec}\theta-\cot\theta)}$ बराबर है :

(A) sinθ (B) secθ
(C) cosθ (D) cosecθ

6. If $\cot\theta = \frac{1}{\sqrt{3}}$, then the value of $\frac{2-\sin^2\theta}{1-\cos^2\theta}$ + (cosec²θ + secθ) is :

यदि $\cot\theta = \frac{1}{\sqrt{3}}$, तो $\frac{2-\sin^2\theta}{1-\cos^2\theta}$ + (cosec²θ + secθ) का मान है :

(A) 4 (B) 6
(C) 7 (D) 5

7. If $\frac{1}{\sec\theta-\tan\theta} - \frac{1}{\cos\theta} = \sec\theta \times k$, $0° < \theta < 90°$, then k is equal to :

अगर $\frac{1}{\sec\theta-\tan\theta} - \frac{1}{\cos\theta} = \sec\theta \times k$, $0° < \theta < 90°$ है, तो k बराबर है :

(A) cosecθ (B) tanθ
(C) sinθ (D) cotθ

8. If cosec31° = x, then $\sin^2 59° + \frac{1}{\text{cosec}^2 31°} + \tan^2 59° + \frac{1}{\sin^2 59°\,\text{cosec}^2 59°}$ is equal to :

अगर cosec31° = x है, तो $\sin^2 59° + \frac{1}{\text{cosec}^2 31°} + \tan^2 59° + \frac{1}{\sin^2 59°\,\text{cosec}^2 59°}$ बराबर है :

(A) x + 1 (B) $x^2 - 1$
(C) x – 1 (D) $x^2 + 1$

9. The simplified value of / का सरलीकृत मान है

$\left(\frac{\sin^2 25° + \sin^2 65°}{\cos^2 24° + \cos^2 66°} + \sin^2 71° + \cos 71°\sin 19°\right)$

(A) 0 (B) 1
(C) 2 (D) 3

10. If $3\sin\theta = 2\cos^2\theta$, $0° < \theta < 90°$, then the value of (tanθ + cosθ + sinθ) is :
अगर $3\sin\theta = 2\cos^2\theta$, $0° < \theta < 90°$ है, तो (tanθ + cosθ + sinθ) का मान है :

(A) $\frac{5\sqrt{3}}{3}$ (B) $\frac{5\sqrt{3}}{6}$
(C) $\frac{3+5\sqrt{3}}{6}$ (D) $\frac{3+5\sqrt{3}}{3}$

11. If $3\cos^2 A + 6\sin^2 A = 3$, $0° \le A \le 90°$, then the value of A is :
यदि $3\cos^2 A + 6\sin^2 A = 3$, $0° \le A \le 90°$ है, तो A का मान है :

(A) 30° (B) 0°
(C) 90° (D) 45°

12. The value of / का मान है :

$$\frac{(\cos 9^\circ + \sin 81^\circ)(\sec 9^\circ + \operatorname{cosec} 81^\circ)}{\sin 56^\circ \sec 34^\circ + \cos 25^\circ \operatorname{cosec} 65^\circ}$$ is :

(A) $\frac{1}{2}$ (B) 4 (C) 2 (D) 1

13. A Simplified value of / का सरलीकृत मान है :

$$\left(\frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta}\right)\left(\frac{1}{\tan\theta + \cot\theta}\right)$$

(A) cosθ (B) 2sinθ
(C) sinθ (D) 2cosθ

14. If $3 - 2\sin^2\theta - 3\cos\theta = 0$, $0^\circ < \theta < 90^\circ$, then what is the value of (2cosecθ + tanθ) ?
अगर $3 - 2\sin^2\theta - 3\cos\theta = 0$, $0^\circ < \theta < 90^\circ$ है, तो (2cosecθ + tanθ) का मान क्या है ?

(A) $7\sqrt{3}$ (B) $5\sqrt{3}$ (C) $\frac{5\sqrt{3}}{3}$ (D) $\frac{7\sqrt{3}}{3}$

15. If $\cot\theta = \sqrt{6}$, then the value of $\frac{\operatorname{cosec}^2\theta + \sec^2\theta}{\operatorname{cosec}^2\theta - \sec^2\theta}$ is :

अगर $\cot\theta = \sqrt{6}$ है, तो $\frac{\operatorname{cosec}^2\theta + \sec^2\theta}{\operatorname{cosec}^2\theta - \sec^2\theta}$ का मान होगा :

(A) $\frac{49}{36}$ (B) $\frac{43}{36}$ (C) $\frac{7}{5}$ (D) $\frac{48}{35}$

16. If $\sin\theta \sec^2\theta = \frac{2}{3}$, $0^\circ < \theta < 90^\circ$, then the value of $(\tan^2\theta + \cos^2\theta)$ is :

यदि $\sin\theta \sec^2\theta = \frac{2}{3}$, $0^\circ < \theta < 90^\circ$ है, तो $(\tan^2\theta + \cos^2\theta)$ का मान होगा :

(A) $\frac{7}{6}$ (B) $\frac{11}{12}$ (C) $\frac{13}{12}$ (D) $\frac{5}{4}$

17. If $\frac{(\sin\theta - \operatorname{cosec}\theta)(\cos\theta - \sec\theta)}{\tan^2\theta - \sin^2\theta} = \gamma^3$, then $\gamma =$

अगर $\frac{(\sin\theta - \operatorname{cosec}\theta)(\cos\theta - \sec\theta)}{\tan^2\theta - \sin^2\theta} = \gamma^3$ है, तो $\gamma =$

(A) sinθ cosθ (B) tanθ
(C) cotθ (D) cosecθ secθ

18. If $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} \times \sqrt{\frac{\operatorname{cosec}\theta - \cos\theta}{\operatorname{cosec}\theta + \cos\theta}} = \frac{1-r}{1+r}$ then the value of r is :

अगर $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} \times \sqrt{\frac{\operatorname{cosec}\theta - \cos\theta}{\operatorname{cosec}\theta + \cos\theta}} = \frac{1-r}{1+r}$ है, तो r का मान होगा :

(A) sinθ (B) cosecθ
(C) secθ (D) cosθ

19. If $\frac{1}{1-\sin\theta} + \frac{1}{1+\sin\theta} = 4\sec\theta$, $0^\circ < \theta < 90^\circ$, then the value of (3cotθ + cosecθ) is :

यदि $\frac{1}{1-\sin\theta} + \frac{1}{1+\sin\theta} = 4\sec\theta$, $0^\circ < \theta < 90^\circ$ है, तो (3cotθ + cosecθ) का मान होगा :

(A) $\frac{5\sqrt{3}}{3}$ (B) $4\sqrt{3}$ (C) $5\sqrt{3}$ (D) $\frac{2\sqrt{3}}{3}$

20. The value of / का मान है :

$$\frac{4\tan^2 30^\circ + \frac{1}{4}\sin^2 90^\circ + \frac{1}{8}\cot^2 60^\circ + \sin^2 30^\circ \cos^2 45^\circ}{\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ}$$

(A) $1\frac{3}{4}$ (B) 4 (C) $2\frac{1}{2}$ (D) $3\frac{1}{2}$

21. If $\left(\frac{1}{1+\operatorname{cosec}\theta} - \frac{1}{1-\operatorname{cosec}\theta}\right)\cos\theta = 2$, $0^\circ < 90^\circ$, then the value of $\sin^2\theta + \cot^2\theta + \sec^2\theta$ is :

अगर $\left(\frac{1}{1+\operatorname{cosec}\theta} - \frac{1}{1-\operatorname{cosec}\theta}\right)\cos\theta = 2$, $0^\circ < 90^\circ$ है, तो $\sin^2\theta + \cot^2\theta + \sec^2\theta$ का मान है :

(A) 1 (B) $2\frac{1}{2}$ (C) $3\frac{1}{2}$ (D) 2

22. If $\tan x = \cot(60^\circ + 6x)$, then what is the value of x ?
यदि $\tan x = \cot(60^\circ + 6x)$ है, तो x का मान क्या होगा ?

(A) 10° (B) $\frac{30^\circ}{7}$
(C) $\frac{15^\circ}{2}$ (D) 12°

23. For θ being an acute angle, if $\operatorname{cosec}\theta = 1.25$, then the value of $\frac{4\tan\theta - 5\cos\theta}{\sec\theta + 4\cot\theta}$ is equal to :

θ के एक न्यून कोण होने पर, यदि $\operatorname{cosec}\theta = 1.25$ है, तो $\frac{4\tan\theta - 5\cos\theta}{\sec\theta + 4\cot\theta}$ का मान है :

(A) $\frac{3}{7}$ (B) $\frac{4}{7}$ (C) $\frac{1}{4}$ (D) $\frac{1}{2}$

24. For $0° < \theta < 90°$, if $2\cos^2\theta = 3\sin\theta$, then the value of $(\text{cosec}^2\theta - \cot^2\theta + \cos^2\theta)$ is equal to :
$0° < \theta < 90°$ के लिए, अगर $2\cos^2\theta = 3\sin\theta$ है, तो $(\text{cosec}^2\theta - \cot^2\theta + \cos^2\theta)$ का मान है :

(A) $1\frac{1}{2}$ (B) $2\frac{3}{4}$ (C) $1\frac{3}{4}$ (D) $2\frac{1}{4}$

25. For $0° < \theta < 90°$, if

$$\frac{\sec\theta(1-\sin\theta)(\sec\theta+\tan\theta)}{(\sec\theta-\tan\theta)^2} = \frac{1+k}{1-k}$$ then k is equal to :

$0° < \theta < 90°$ के लिए, अगर

$$\frac{\sec\theta(1-\sin\theta)(\sec\theta+\tan\theta)}{(\sec\theta-\tan\theta)^2} = \frac{1+k}{1-k}$$ है, तो k बराबर है:

(A) $\text{cosec}\theta$ (B) $\cos\theta$
(C) $\sec\theta$ (D) $\sin\theta$

26. If $\cos\theta = \frac{2p}{p^2+1}$, then $\sin\theta$ is equal to :

अगर $\cos\theta = \frac{2p}{p^2+1}$ है, तो $\sin\theta$ बराबर है :

(A) $\frac{p^2-1}{p^2+1}$ (B) $\frac{2p}{p^2-1}$

(C) $\frac{p^2+1}{p^2-1}$ (D) $\frac{2p}{p^2+1}$

27. If $\tan x = \cot(65° + 9x)$, then what is the value of x ?
यदि $\tan x = \cot(65° + 9x)$ है, तो x का मान क्या होगा ?
(A) 2.5° (B) 1.0°
(C) 2.0° (D) 1.5°

28. If $\cos\theta = \frac{2p}{p^2+1}$, $(p \neq 0)$ then $\tan\theta$ is equal to :

अगर $\cos\theta = \frac{2p}{p^2+1}$, $(p \neq 0)$ है, तो $\tan\theta$ बराबर है :

(A) $\frac{p^2+1}{p^2-1}$ (B) $\frac{p^2-1}{2p}$ (C) $\frac{2p}{p^2+1}$ (D) $\frac{2p}{p^2-1}$

29. If $2\sin^2\theta + 5\cos\theta - 4 = 0$, $0° < \theta < 90°$, then the value of $\tan\theta + \sin\theta$ is :
यदि $2\sin^2\theta + 5\cos\theta - 4 = 0$, $0° < \theta < 90°$ है, तो $\tan\theta + \sin\theta$ का मान है :

(A) $\frac{\sqrt{3}}{3}$ (B) $\frac{\sqrt{3}}{2}$ (C) $\frac{2}{\sqrt{3}}$ (D) $\frac{3\sqrt{3}}{2}$

30. If $\cos\theta = \frac{2p}{p^2+1}$ $(p \neq \pm 1)$ then $\text{cosec}\theta$ is equal to:

अगर $\cos\theta = \frac{2p}{p^2+1}$ $(p \neq \pm 1)$ है, तो $\text{cosec}\theta$ बराबर है :

(A) $\frac{2p}{p^2-1}$ (B) $\frac{2p}{p^2+1}$

(C) $\frac{p^2-1}{2p}$ (D) $\frac{p^2+1}{p^2-1}$

31. If $2\sin^2\theta + 5\cos\theta - 4 = 0$, $0° < \theta < 90°$, then the value of $\cot\theta + \text{cosec}\theta$ is :
अगर $2\sin^2\theta + 5\cos\theta - 4 = 0$, $0° < \theta < 90°$ है, तो $\cot\theta + \text{cosec}\theta$ का मान होगा :

(A) $\frac{3\sqrt{3}}{2}$ (B) $\sqrt{3}$ (C) $\frac{2}{\sqrt{3}}$ (D) $\frac{\sqrt{3}}{\sqrt{2}}$

32. If $12\cot^2\theta - 31\,\text{cosec}\theta + 32 = 0$, $0° < \theta < 90°$, then the values of $\sin\theta$ will be :
अगर $12\cot^2\theta - 31\,\text{cosec}\theta + 32 = 0$, $0° < \theta < 90°$ है, तो $\sin\theta$ के मान होंगे :

(A) $\frac{5}{4}, \frac{4}{3}$ (B) $\frac{2}{3}, \frac{1}{4}$ (C) $\frac{4}{5}, \frac{3}{4}$ (D) $\frac{1}{3}, \frac{3}{2}$

33. If $\cos x = \frac{-1}{2}$ and $\pi < x < \frac{3\pi}{2}$, then the value of $4\tan^2x + 3\text{cosec}^2x$ is :
अगर $\cos x = \frac{-1}{2}$ और $\pi < x < \frac{3\pi}{2}$ है, तो $4\tan^2x + 3\text{cosec}^2x$ का मान है :
(A) 16 (B) 8
(C) 4 (D) 10

34. If $6(\sec^2 59° - \cot^2 31°) + \frac{2}{3}\sin 90° - 3\tan^2 56° \, y \tan^2 34° = \frac{y}{3}$, then the value of y is :
अगर $6(\sec^2 59° - \cot^2 31°) + \frac{2}{3}\sin 90° - 3\tan^2 56° \, y \tan^2 34° = \frac{y}{3}$ है, तो y का मान है:

(A) $\frac{2}{3}$ (B) $\frac{-2}{3}$ (C) 2 (D) –2

35. If $\sec\theta = 4x$ and $\tan\theta = \frac{4}{x}$, $(x \neq 0)$ then the value of $8\left(x^2 - \frac{1}{x^2}\right)$ is :

अगर $\sec\theta = 4x$ और $\tan\theta = \frac{4}{x}$, $(x \neq 0)$ है, तो $8\left(x^2 - \frac{1}{x^2}\right)$ का मान है :

(A) $\frac{1}{16}$ (B) $\frac{1}{4}$ (C) $\frac{1}{2}$ (D) $\frac{1}{8}$

36. If $6(\sec^2 59° - \cot^2 31°) - \frac{2}{3}\sin 90° - 3\tan^2 56°$ $y\tan^2 34° = \frac{y}{3}$, then the value of y is :

यदि $6(\sec^2 59° - \cot^2 31°) - \frac{2}{3}\sin 90° - 3\tan^2 56° y\tan^2 34° = \frac{y}{3}$ है तो y का मान है :

(A) $\frac{8}{5}$ (B) $-\frac{8}{5}$ (C) $\frac{2}{3}$ (D) $-\frac{2}{3}$

37. If $\sec\theta = 3x$ and $\tan\theta = \frac{3}{x}$ $(x \neq o)$ then the value of $9\left(x^2 - \frac{1}{x^2}\right)$ is :

यदि $\sec\theta = 3x$ और $\tan\theta = \frac{3}{x}$ $(x \neq o)$ तो $9\left(x^2 - \frac{1}{x^2}\right)$ का मान है :

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) 1 (D) $\frac{1}{4}$

38. If $\cos x = \frac{-1}{2}$ and $x < x < \frac{3\pi}{2}$, then the value of $2\tan^2 x - 3\operatorname{cosec}^2 x$ is :

यदि $\cos x = \frac{-1}{2}$ और $x < x < \frac{3\pi}{2}$ तो $2\tan^2 x - 3\operatorname{cosec}^2 x$ का मान है:

(A) 2 (B) 10
(C) 8 (D) 4

39. If $2(\operatorname{cosec}^2 39° - \tan^2 51°) - \frac{2}{5}\sin 90° - \tan^2 56° y\tan^2 34° = \frac{y}{3}$, then the value of y is:

यदि $2(\operatorname{cosec}^2 39° - \tan^2 51°) - \frac{2}{3}\sin 90° - \tan^2 56° y\tan^2 34° = \frac{y}{3}$ है, तो y का मान ज्ञात कीजिये ?

(A) 1 (B) $\frac{2}{3}$ (C) $\frac{-2}{3}$ (D) -1

40. If $4(\operatorname{cosec}^2 65° - \tan^2 25°) - \sin 90° - \tan^2 63° y\tan^2 27° = \frac{y}{2}$, then the value of y is :

अगर $4(\operatorname{cosec}^2 65° - \tan^2 25°) - \sin 90° - \tan^2 63° y\tan^2 27° = \frac{y}{2}$ है, तब y का मान है :

(A) $\frac{-1}{2}$ (B) 2 (C) -1 (D) 1

41. If $\cos x = \frac{-\sqrt{3}}{2}$ and $\pi < x < \frac{3x}{2}$, then the value of $2\cot^2 x + 3\operatorname{cosec}^2 x$ is:

यदि $\cos x = \frac{-\sqrt{3}}{2}$ तथा $\pi < x < \frac{3x}{2}$, तो $2\cot^2 x + 3\operatorname{cosec}^2 x$ मान है:

(A) 14 (B) 16
(C) 8 (D) 18

42. If $7(\operatorname{cosec}^2 55° - \tan^2 35°) + 2\sin 90° - \tan^2 52° y\tan^2 38° = \frac{y}{2}$, then the value of y is:

यदि $7(\operatorname{cosec}^2 55° - \tan^2 35°) + 2\sin 90° - \tan^2 52° y\tan^2 38° = \frac{y}{2}$ है, तो y का मान ज्ञात कीजिये ?

(A) 2 (B) 6
(C) 3 (D) 1

43. If $\cos\theta = 4x$ and $\sin\theta = \frac{4}{x}$ $(x \neq 0)$, then the value of $(x^2 + \frac{1}{x^2})$ is:

यदि $\cos\theta = 4x$ और $\sin\theta = \frac{4}{x}$ $(x \neq 0)$ है, तो $\left(x^2 + \frac{1}{x^2}\right)$ का मान ज्ञात कीजिये ?

(A) $\frac{1}{4}$ (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) $\frac{1}{16}$

44. If $\cos x = \frac{-\sqrt{3}}{2}$ and $\pi < x < \frac{3\pi}{2}$, then the value of $4\cot^2 x - 3\operatorname{cosec}^2 x$ is :

यदि $\cos x = \frac{-\sqrt{3}}{2}$ और $\pi < x < \frac{3\pi}{2}$, तो $4\cot^2 x - 3\operatorname{cosec}^2 x$ का मान ज्ञात कीजिए :

(A) 8 (B) 0
(C) 2 (D) 1

45. If $7(\operatorname{cosec}^2 57° - \tan^2 33°) + 2\sin 90° - 4\tan^2 52° y\tan^2 38° = \frac{y}{2}$, then the value of y is:

यदि $7(\operatorname{cosec}^2 57° - \tan^2 33°) + 2\sin 90° - 4\tan^2 52° y\tan^2 38° = \frac{y}{2}$, है तो y का मान ज्ञात कीजिये:

(A) 2 (B) 4
(C) 1 (D) 3

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46. If $\sec\theta = 8x$ and $\tan\theta = \frac{8}{x}$ $(x \neq 0)$, then the value of $16\left(x^2 - \frac{1}{x^2}\right)$ is:

यदि $\sec\theta = 8x$ और $\tan\theta = \frac{8}{x}$ $(x \neq 0)$, तो $16\left(x^2 - \frac{1}{x^2}\right)$ का मान ज्ञात कीजिये।

(A) $\frac{1}{4}$ (B) $\frac{1}{16}$ (C) $\frac{1}{3}$ (D) $\frac{1}{2}$

47. If θ is an acute angle and it is given that $5\sin\theta + 12\cos\theta = 13$, then what is the value of $\tan\theta$?

यदि θ एक न्यून कोण है और $5\sin\theta + 12\cos\theta = 13$, दिया गया है, तो $\tan\theta$ का मान ज्ञात कीजिये ?

(A) $\frac{5}{13}$ (B) $\frac{13}{12}$ (C) $\frac{12}{13}$ (D) $\frac{5}{12}$

48. Which among the following increases continuously in the range $0° < \theta < 90°$?

निम्नलिखित में से कौन $0° < \theta < 90°$ की रेंज में निरंतर बढ़ता है ?

(A) $\cot\theta$ (B) $\operatorname{cosec}\theta$
(C) $\tan\theta$ (D) $\cos\theta$

49. For θ being an acute angle, it is given that, $3(\operatorname{cosec}^2\theta + \cot^2\theta) = 5$. Then θ is equal to:

अगर θ एक न्यून कोण है और $3(\operatorname{cosec}^2\theta + \cot^2\theta) = 5$ दिया गया है, तो θ किसके बराबर होगा ?

(A) 45° (B) 60°
(C) 0° (D) 30°

50. If $\frac{\cos\alpha}{\sin\alpha + \cos\beta} + \frac{\cos\beta}{\sin\beta - \cos\alpha} = \frac{x}{\sin\alpha - \cos\beta} + \frac{\cos\beta}{\sin\beta + \cos\alpha}$ then 'x' is equal to —

अगर $\frac{\cos\alpha}{\sin\alpha + \cos\beta} + \frac{\cos\beta}{\sin\beta - \cos\alpha} = \frac{x}{\sin\alpha - \cos\beta} + \frac{\cos\beta}{\sin\beta + \cos\alpha}$ है, तो 'x' बराबर है—

(A) $\cos\beta$ (B) $\cos\propto$
(C) $\sin\beta$ (D) $\sin\propto$

51. For θ being an acute angle, $4(2\sin^2\theta + 7\cos^2\theta) = 13$. What is the value of θ?

यदि θ कोई न्यून कोण है, और $4(2\sin^2\theta + 7\cos^2\theta) = 13$ है। θ का मान ज्ञात कीजिये ?

(A) 60° (B) 45°
(C) 30° (D) 0°

52. If $\sin\theta + \operatorname{cosec}\theta = 2$, then what is the value of $(\sin^{153}\theta + \operatorname{cosec}^{253}\theta)$?

अगर $\sin\theta + \operatorname{cosec}\theta = 2$ है, तो $(\sin^{153}\theta + \operatorname{cosec}^{253}\theta)$ का मान क्या है ?

(A) $\frac{1}{153 \times 253}$ (B) $\frac{253}{153}$
(C) 2 (D) $\frac{153}{253}$

53. What is the simplified value of / का सरलीकृत मान क्या होगा ?

$$\frac{\sin^3 21° + \cos^3 19°}{\sin 21° + \cos 19°} + \sin^2 69° + \cos^2 71° + \frac{1}{\sec 69° \operatorname{cosec} 71°}$$

(A) 3 (B) 1
(C) 4 (D) 2

54. Which among the following is an irrational quantity?

निम्नलिखित में से कौन सी एक अपरिमेय संख्या है ?

(A) $\tan 30°\tan 60°$ (B) $\sin 30°$
(C) $\tan 40°$ (D) $\cos 30°$
(A) B (B) A
(C) C (D) D

55. θ being an acute angle, it is given that $\sec^2\theta + 4\tan^2\theta = 6$. What is the value of θ?

θ एक न्यून कोण है और दिया गया है कि $\sec^2\theta + 4\tan^2\theta = 6$ है। θ का मान ज्ञात कीजिये ?

(A) 45° (B) 0°
(C) 30° (D) 60°

56. If $\theta = 9°$, then what is the value of $\cot\theta \cot 2\theta \cot 3\theta \cot 4\theta \cot 6\theta \cot 7\theta \cot 8\theta \cot 9\theta$?

यदि $\theta = 9°$ हो, तो $\cot\theta \cot 2\theta \cot 3\theta \cot 4\theta \cot 6\theta \cot 7\theta \cot 8\theta \cot 9\theta$ का मान क्या होगा ?

(A) $\sqrt{3} - 1$ (B) 1 (C) $\sqrt{3}$ (D) $\frac{1}{\sqrt{3}}$

57. For α and β both being acute angles, it is given that $\sin(\alpha + \beta) = 1$, $\cos(\alpha - \beta) = \frac{1}{2}$, The values of α and β are —

α और β दोनों न्यून कोण है और यह दिया गया है कि $\sin(\alpha + \beta) = 1$, $\cos(\alpha - \beta) = \frac{1}{2}$ है, तो α और β का मान क्या होगा ?

(A) 75°, 15° (B) 45°, 15°
(C) 75°, 45° (D) 60°, 30°

58. It is given that, $\sqrt{\frac{1 - \sin x}{1 + \sin x}} = a - \tan x$ then a is equal to —

यदि दिया गया है कि $\sqrt{\frac{1-\sin x}{1+\sin x}}$ = a – tanx है, तो a किसके समान होगा ?

(A) cosx (B) sinx
(C) cosecx (D) secx

59. What is the value (in degree) of $(a_1 + a_2 + a_3 + ... + a_{20})$ given $\sin\propto_1 + \sin\propto_2 + \sin\propto_3 + ... + \sin\propto_{20} = 20$
0° और 90° के बीच सभी ∝ s, (i = 1, 2, 3 ....., 20) के लिए, दिया गया है कि $\sin\propto_1 + \sin\propto_2 + \sin\propto_3 + ... + \sin\propto_{20} = 20$ तो $(a_1 + a_2 + a_3 + ... + a_{20})$ का मान (डिग्री में) क्या है?
(A) 1800 (B) 900
(C) 0 (D) 20

60. What is the value of $\text{cosec}^2 30° + \sin^2 45° + \sec^2 60° + \tan^2 30°$?
$\text{cosec}^2 30° + \sin^2 45° + \sec^2 60° + \tan^2 30°$ का मान ज्ञात कीजिये ?

(A) $\frac{53}{6}$ (B) 8 (C) $\frac{25}{3}$ (D) 9

61. For $0° \le \theta \le 90°$, what is θ, when $\sqrt{3}\cos\theta + \sin\theta = 1$?
$0° \le \theta \le 90°$ के लिए θ क्या है जबकि $\sqrt{3}\cos\theta + \sin\theta = 1$?
(A) 90° (B) 0°
(C) 45° (D) 30°

62. For all $\propto_1 s_1$ (i = 1, 2, 3, ..., 20) lying between 0° and 90°, it is given that, $\cos\alpha_1 + \cos\alpha_2 + \cos\alpha_3 + ... \cos\alpha_{20} = 20$. What is the value of $(\propto_1 + \propto_2 + \propto_3 + \cdots ... \propto_{20})$?
0° और 90° के बीच सभी $\propto_1 s_1$ (i = 1, 2, 3, ..., 20) के लिए दिया गया है कि, $\cos\alpha_1 + \cos\alpha_2 + \cos\alpha_3 + ... \cos\alpha_{20} = 20$ तो $(\propto_1 + \propto_2 + \propto_3 + \cdots ... \propto_{20})$ का मान क्या है ?
(A) 900° (B) 1800°
(C) 0° (D) 20°

63. For $0° < \theta < 90°$, $\tan\theta + \cot\theta = 2$. θ is equal to—
$0° < \theta < 90°$ के लिए $\tan\theta + \cot\theta = 2$ तो θ बराबर है—
(A) 30° (B) 60°
(C) 45° (D) 0°

64. What is the simplified value of/ का सरलीकृत मान क्या है ?

$$\left(\frac{\sin^2 31° + \sin^2 59°}{\sec^2 35° - \cot^2 55°} + \tan 29° \cot 61° - \text{cosec}^2 61°\right)$$

(A) 0 (B) –1 (C) $\frac{1}{2}$ (D) 1

65. $(\sin^2 36° + \tan^2 60° + \sec^2 30° + \sin^2 54°)$ is equal to:
$(\sin^2 36° + \tan^2 60° + \sec^2 30° + \sin^2 54°)$ किसके समान होगा ?

(A) 5 (B) $\frac{17}{3}$
(C) $\frac{14}{3}$ (D) $\frac{16}{3}$

66. If $2\sin^2\theta + 3\sin\theta - 2 = 0$, $(0° < \theta < 90°)$ then the value of θ is:
यदि $2\sin^2\theta + 3\sin\theta - 2 = 0$, $(0° < \theta < 90°)$ है, तो θ किसके समान होगा ?
(A) 45° (B) 30°
(C) 90° (D) 60°

67. If $\tan\theta = \frac{3}{5}$, $(0° < \theta < 90°)$ then $\sin\theta\cos\theta$ is equal to:
यदि $\tan\theta = \frac{3}{5}$, $(0° < \theta < 90°)$ हो, तो $\sin\theta\cos\theta$ किसके समान होगा ?

(A) $\frac{14}{\sqrt{34}}$ (B) $\sqrt{17}$
(C) $\frac{16}{\sqrt{34}}$ (D) $\frac{15}{34}$

68. If $\text{cosec}\,\theta = 3x$ and $\cot\theta = \frac{3}{x}$, $(x \ne 0)$ then the value of $6\left(x^2 - \frac{1}{x^2}\right)$ is:
यदि $\text{cosec}\,\theta = 3x$ और $\cot\theta = \frac{3}{x}$, $(x \ne 0)$ है, तो $6\left(x^2 - \frac{1}{x^2}\right)$ का मान है:

(A) $\frac{2}{3}$ (B) 1 (C) $\frac{1}{4}$ (D) $\frac{1}{2}$

69. If $\sin\theta = 3x$ and $\cos\theta = \frac{3}{x}$, $(x \ne 0)$ then the value of $6\left(x^2 + \frac{1}{x^2}\right)$ is:
यदि $\sin\theta = 3x$ और $\cos\theta = \frac{3}{x}$, $(x \ne 0)$ हो, तो $6\left(x^2 + \frac{1}{x^2}\right)$ का मान ज्ञात कीजिए ?

(A) $\frac{1}{4}$ (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) $\frac{1}{2}$

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70. If $\cos x = \frac{-\sqrt{3}}{2}$ and $\pi < x < \frac{3\pi}{2}$, then the value of $2\cot^2 x + 3\sec^2 x$ is:

यदि $\cos x = \frac{-\sqrt{3}}{2}$ और $\pi < x < \frac{3\pi}{2}$ है, तो $2\cot^2 x + 3\sec^2 x$ का मान ज्ञात कीजिये ?

(A) 10 (B) 4
(C) 8 (D) 16

71. If $4(\text{cosec}^2 66° - \tan^2 24°) + \frac{1}{2}\sin 90° - 4\tan^2 66°\text{y}$ $\tan^2 24° = \frac{y}{2}$, then the value of y is:

यदि $4(\text{cosec}^2 66° - \tan^2 24°) + \frac{1}{2}\sin 90° - 4$ $\tan^2 66°\text{y}\tan^2 24° = \frac{y}{2}$ है, तो y का मान ज्ञात कीजिए ?

(A) $\frac{1}{2}$ (B) 1 (C) $\frac{-1}{2}$ (D) –1

72. If $\cos x = \frac{-\sqrt{3}}{2}$ and $\pi < x < \frac{3\pi}{2}$, then the value of $2\cot^2 x - 3\sec^2 x$ is :

अगर $\cos x = \frac{-\sqrt{3}}{2}$ तथा $\pi < x < \frac{3\pi}{2}$ है, तो $2\cot^2 x - 3\sec^2 x$ का मान है :

(A) 6 (B) 4
(C) 8 (D) 2

73. If $\cot\theta = 5x$ and $\text{cosec}\theta = \frac{5}{x}(x \neq 0)$, then the value of $5\left(x^2 - \frac{1}{x^2}\right)$ is :

यदि $\cot\theta = 5x$ और $\text{cosec}\theta = \frac{5}{x}(x \neq 0)$ है, तो $5\left(x^2 - \frac{1}{x^2}\right)$ का मान है :

(A) $\frac{1}{5}$ (B) $\frac{1}{2}$ (C) $-\frac{1}{5}$ (D) $-\frac{1}{4}$

Solution

1. (A) $\sec\theta + \tan\theta = \frac{1+\sin\theta}{\cos\theta}$

$\Rightarrow \frac{\cot\theta\cos\theta}{(1-\sin\theta)(1+\sin\theta)} = \frac{\cot\theta\cos\theta}{\cos^2\theta}$

$= \text{cosec}\theta$

2. (B) $2\cos^2\theta - 5\cos\theta + 2 = 0$

By solving above equation

$\theta = 60°$

$\Rightarrow \text{cosec}60° + \cot 60° = \frac{2}{\sqrt{3}} + \frac{1}{\sqrt{3}} = \sqrt{3}$

3. (D) $\frac{1}{\left(2\times\frac{4}{3}\right)\left(\frac{1}{4}-\frac{3}{2}+2\right)} = \frac{1}{\left(\frac{8}{3}\right)\left(2-\frac{5}{4}\right)}$

$= \frac{1}{\frac{8}{3}\times\frac{3}{4}} = \frac{1}{2}$

4. (A) $\cos^2\theta - (1 - \cos^2\theta) - 3\cos\theta + 2 = 0$

$2\cos^2\theta - 3\cos\theta + 1 = 0$

$\Rightarrow \cos\theta = \frac{1}{2} \quad \Rightarrow \theta = 60°$

$\Rightarrow 4 \times \frac{2}{\sqrt{3}} + \frac{1}{\sqrt{3}} = \frac{8}{\sqrt{3}} + \frac{1}{\sqrt{3}} = \frac{9}{\sqrt{3}}$

$= 3\sqrt{3}$

5. (C) $\frac{(\sec\theta+\tan\theta)(1-\sin\theta)}{\text{cosec}\theta\,(1+\cos\theta)(\text{cosec}\theta-\cot\theta)}$

$= \frac{(1+\sin\theta)(1-\sin\theta)\sin\theta}{(\cos\theta)\,(\text{cosec}\theta)(1+\cos\theta)(1-\cos\theta)}$

$= \frac{(\cos^2\theta)\sin^2\theta}{\cos\theta\,(\sin^2\theta)} \Rightarrow \cos\theta$

6. (D) $\cot\theta = \frac{1}{\sqrt{3}} = \theta = 60°$

$= \frac{1+\cos^2\theta}{1-\cos^2\theta} + \text{cosec}^2\theta + \sec\theta$

$= \frac{5}{3} + \frac{4}{3} + 2 = 5$

7. (C) As we know,

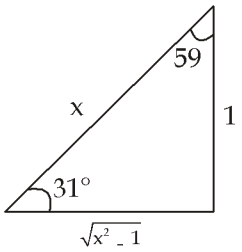
$\frac{1}{\sec\theta - \tan\theta} = \sec\theta + \tan\theta$

$\Rightarrow \sec\theta + \tan\theta - \sec\theta = \sec\theta \times k$

$\tan\theta = \sec\theta \times k$

$k = \frac{\sin\theta}{\cos\theta} \times \cos\theta \Rightarrow k = \sin\theta$

8. (D) $\text{cosec}31° = x \quad \Rightarrow \sin31° = \frac{1}{x}$



$\cos^2 31° + \sin^2 31° + \tan^2 59° + \frac{\sin^2 59°}{\sin^2 59°}$

$1 + \tan^2 59° + 1 \Rightarrow 1 + x^2 - 1 + 1$

$x^2 + 1$

9. (C) $\frac{\sin^2 25° + \cos^2 25°}{\sin^2 66° + \cos^2 66°} + \sin^2 71° + \cos 71° . \cos 71°$

$1 + \sin^2 71° + \cos^2 71°$

$\Rightarrow 2$

10.(C) $3\sin\theta = 2\cos^2\theta$

$\Rightarrow \theta = 30°$

$\tan\theta + \cos\theta + \sin\theta$

$\frac{1}{\sqrt{3}} + \frac{\sqrt{3}}{2} + \frac{1}{2} \Rightarrow \frac{2+3+\sqrt{3}}{2\sqrt{3}} = \frac{5+\sqrt{3}}{2\sqrt{3}} = \frac{5\sqrt{3}+3}{6}$

11.(B) $3(\cos^2 A + \sin^2 A) + 3\sin^2 A = 3$

$A = 0°$

12.(C) $\frac{2\cos 9° \times 2\sec 9°}{\sin 56°} + \frac{\cos 25°}{\cos 25°} = \frac{4}{2} = 2$

13.(D) $\left(\frac{(\sin\theta)(1-\cos\theta)}{(1+\cos\theta)(1-\cos\theta)} + \frac{(1+\cos\theta)}{\sin\theta}\right) \times \left(\frac{1}{\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}}\right)$

$\left(\frac{1-\cos\theta}{\sin\theta} + \frac{1+\cos\theta}{\sin\theta}\right) \times \frac{\sin\theta\cos\theta}{1}$

$\frac{2}{\sin\theta} \times \sin\theta\cos\theta$

$\Rightarrow 2\cos\theta$

14.(D) $2\sin^2\theta + 3\cos\theta - 3 = 0$

$2 - 2\cos^2\theta + 3\cos\theta - 3 = 0$

$2\cos^2\theta - 3\cos\theta + 1 = 0$

$\cos\theta = \frac{1}{2} \qquad \theta = 60°$

$\Rightarrow 2 \times \frac{2}{\sqrt{3}} + \sqrt{3} \Rightarrow \frac{4+3}{\sqrt{3}} = \frac{7}{\sqrt{3}} \Rightarrow \frac{7\sqrt{3}}{3}$

15.(C) $\cot\theta = \sqrt{6}$

$= \frac{\left(\frac{1}{\sin^2\theta} + \frac{1}{\cos^2\theta}\right)}{\left(\frac{1}{\sin^2\theta} - \frac{1}{\cos^2\theta}\right)} = \frac{1}{\cos^2\theta - \sin^2\theta}$

Divide by $\cos^2\theta$

$\frac{\sec^2\theta}{1 - \tan^2\theta} = \frac{1+\tan^2\theta}{1-\tan^2\theta} = \frac{1+\frac{1}{6}}{1-\frac{1}{6}} = \frac{7}{5}$

16.(C) $\sin\theta . \sec^2\theta = \frac{2}{3}$

$\theta = 30°$

$\tan^2\theta + \cos^2\theta = \frac{1}{3} + \frac{3}{4} \Rightarrow \frac{4+9}{12} = \frac{13}{12}$

17.(C) $\frac{(\sin^2\theta - 1)(\cos^2\theta - 1)}{(\sin\theta)(\cos\theta)(\sin^2\theta)(\tan^2\theta)}$

$= \frac{\sin\theta\cos\theta . \cos^2\theta}{\sin^4\theta}$

$\cot^3\theta = r^3 \Rightarrow r = \cot\theta$

18.(D) $\left(\frac{1-\cos\theta}{\sin\theta}\right)(\text{cosec}\theta - \cot\theta) = \frac{1-r}{1+r}$

$\left(\frac{1-\cos\theta}{\sin\theta}\right)\left(\frac{1-\cos\theta}{\sin\theta}\right)$

$\left(\frac{\text{cosec}\theta - \cot\theta}{\text{cosec}\theta + \cot\theta}\right) = \frac{1-r}{1+r} \Rightarrow \frac{\text{cosec}\theta}{\cot\theta} = \frac{1}{r}$

$\Rightarrow r = \cos\theta$

19.(A) $\frac{1-\sin\theta+1+\sin\theta}{\cos^2\theta} = 4\sec\theta$

$2\sec^2\theta = 4\sec\theta$

$\sec\theta = 2$

$\theta = 60°$

$\Rightarrow 3\cot 60 + \text{cosec}60$

$= 3 \times \frac{1}{\sqrt{3}} + \frac{2}{\sqrt{3}} = \frac{5}{\sqrt{3}} \Rightarrow \frac{5\sqrt{3}}{3}$

20.(D) $\frac{\frac{4}{3} + \frac{1}{4} + \frac{1}{24} + \frac{1}{4} \times \frac{1}{2}}{\frac{3}{4} - \frac{1}{4}} = \frac{\left(\frac{7}{4}\right)}{\left(\frac{2}{4}\right)} = \frac{7}{2} = 3\frac{1}{2}$

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21.(C) $\left(\frac{\sin\theta}{\sin\theta+1}-\frac{\sin\theta}{\sin\theta-1}\right)\cos\theta=2$

$(\sin\theta\cos\theta)\left(\frac{\sin\theta-1-\sin\theta-1}{\sin^2\theta-1}\right)=2$

$\frac{(-2)\sin\theta\cos\theta}{-\cos^2\theta}=2$

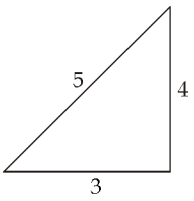
$\theta = 45°$

$\Rightarrow \frac{1}{2}+1+2 = 3\frac{1}{2}$

22.(B) $x + 60 + 6x = 90°$

$7x = 30° \Rightarrow x = \frac{30}{7}$

23.(D) $\text{cosec}\theta = \frac{5}{4}$ $\Rightarrow \sin\theta = \frac{4}{5}$



$\frac{4\times\frac{4}{3}-5\times\frac{3}{5}}{\frac{5}{3}+4\times\frac{3}{4}} = \frac{\left(\frac{16}{3}-\frac{15}{5}\right)}{\left(\frac{5}{3}+3\right)} = \frac{\left[\frac{(80-45)}{15}\right]}{\left[\frac{14}{3}\right]}$

$= \frac{35}{15}\times\frac{3}{14}=\frac{1}{2}$

24.(C) $2 - 2\sin^2\theta = 3\sin\theta$

$2\sin^2\theta + 3\sin\theta - 2 = 0$

$\theta = 30°$

$1 + \cos^2\theta = 1 + \frac{3}{4} = 1\frac{3}{4}$

25.(D) $\frac{(\sec\theta)(1-\sin\theta)(1+\sin\theta)}{(\cos\theta)(\sec\theta-\tan\theta)^2}=\frac{1+k}{1-k}$

$\frac{\cos^2\theta}{\cos^2\theta(\sec\theta-\tan\theta)^2}=\frac{1+k}{1-k}$

$\frac{1}{(\sec\theta-\tan\theta)^2}=\frac{1+k}{1-k}$

$\frac{\sec\theta+\tan\theta}{\sec\theta-\tan\theta}=\frac{1+k}{1-k}\Rightarrow\frac{\sec\theta}{\tan\theta}=\frac{1}{k}$

$\Rightarrow k = \sin\theta$

26.(A) $\cos\theta = \frac{2p}{p^2+1}$

$\Rightarrow \sin\theta = \frac{p^2-1}{p^2+1}$

27.(A) $x + 65 + 9x = 90$

$10x = 25$

$\Rightarrow x = 2.5°$

28.(B) $\cos\theta = \frac{2P}{p^2+1}$ $\tan\theta = \frac{P^2-1}{2p}$

29.(D) $2 - 2\cos^2\theta + 5\cos\theta - 4 = 0$

$2\cos^2\theta - 5\cos\theta + 2 = 0$

$2\cos^2\theta - 4\cos\theta - 2\cos\theta + 2 = 0$

$2\cos\theta(2\cos\theta - 2) - 1(\cos\theta + 2) = 0$

$\Rightarrow \cos\theta = \frac{1}{2} = \theta = 60°$

$\Rightarrow \tan60°\theta + \sin60°$

$\Rightarrow \sqrt{3}+\frac{\sqrt{3}}{2}=\frac{3\sqrt{3}}{2}$

30.(D) $\cos\theta = \frac{2P}{P^2+1}$ $\sin\theta = \frac{P^2-1}{P^2+1}$

$\text{cosec}\theta = \frac{P^2+1}{P^2-1}$

31.(B) $2 - 2\cos^2\theta + 5\cos\theta - 4 = 0$

$2\cos^2\theta - 5\cos\theta + 2 = 0$

$\Rightarrow \cos\theta = \frac{1}{2} \Rightarrow \theta = 60°$

putting value of θ in given equation of question

$\Rightarrow \cot60° + \text{cosec}60° = \frac{1}{\sqrt{3}}+\frac{2}{\sqrt{3}} = \sqrt{3}$

32.(C) $12(\text{cosec}^2\theta - 1) - 31\text{cosec}\theta + 32 = 0$

$12\text{cosec}^2\theta - 31\text{cosec}\theta + 20 = 0$

$\text{cosec}\theta = \frac{31\pm\sqrt{31^2-4\times20\times12}}{2\times12}$

$= \frac{31\pm1}{24}$ $= \text{cosec}\theta = \frac{32}{24}=\frac{4}{3}$

$= \frac{30}{24}=\frac{15}{12}=\frac{5}{4}$

33.(A) $\cos x = \frac{-1}{2}$ $x = \pi + \frac{\pi}{3}=\frac{4\pi}{3}$

$= 4\tan^2\frac{4\pi}{3}+3\text{cosec}^2\frac{4\pi}{3}$

$= 4 \times 3 + 3 \times \frac{4}{3} \Rightarrow 12 + 4 = 16$

34.(C) As cot31° = tan 59°
tan 34° = cot 56°
Applying both changes in given equation,

$$6(1) + \frac{2}{3} - 3y = \frac{y}{3}$$

$$\frac{20}{3} = \frac{10y}{3} \Rightarrow y = 2$$

35. (C) $8\left(\frac{\sec^2\theta}{16} - \frac{\tan^2\theta}{16}\right)$

$$= \frac{8}{16}(\sec^2\theta - \tan^2\theta) = \frac{1}{2}$$

36.(A) Converting
cot31° = tan59°
tan34° = cot56°
Putting these conversion into equation
We get

$$6 - \frac{2}{3} - 3y = \frac{y}{3}$$

$$\Rightarrow \frac{16}{3} = \frac{10y}{3} \Rightarrow y = \frac{16}{10} = \frac{8}{5}$$

37.(C) $9\left(\frac{\sec^2\theta}{9} - \frac{\tan^2\theta}{9}\right) = 1$

38.(A) $\cos x = \frac{-1}{2}$

$$x = \pi + \frac{\pi}{3} = \frac{4\pi}{3}$$

$$= 2\tan^2\frac{4\pi}{3} - 3\operatorname{cosec}^2\frac{4\pi}{3}$$

$$= 2\times\sqrt{(3)}^2 - 3\times\left(\frac{2}{\sqrt{3}}\right)^2 = 6 - 4 = 2$$

39.(A) Converting
tan51° = cot39°
tan34° = cot56°
Using conversion in given equation of question

$$\Rightarrow 2(1) - \frac{2}{3} - y = \frac{y}{3} \Rightarrow \frac{4y}{3} = \frac{4}{3} \Rightarrow y = 1$$

40.(B) Converting
tan25° = cot65°
tan27° = cot63°
using this conversion in question

$$4(1) - 1 - y = \frac{y}{2}$$

$$3 = \frac{3y}{2} \Rightarrow y = 2$$

41.(D) $\cos x = \frac{-\sqrt{3}}{2}$

$$\Rightarrow x = \pi + \frac{\pi}{6} = \frac{7\pi}{6}$$

$$2\cot^2\frac{7\pi}{6} + 3\operatorname{cosec}^2\frac{7\pi}{6}$$

$= 2(3) + 3 \times 4 \Rightarrow 6 + 12 = 18$

42.(B) Converting
tan35° = cot55°
tan38° = cot52°
Using this conversion in the given equation

$$7(1) + 2 - y = \frac{y}{2}$$

$$9 = \frac{3y}{2}$$

$$y = 6$$

43.(D) $x^2 + \frac{1}{x^2} = \left(\frac{\cos\theta}{4}\right)^2 + \left(\frac{\sin\theta}{4}\right)^2 = \frac{1}{16}$

44.(B) $\cos x = \frac{-\sqrt{3}}{2}$

$$x = \pi + \frac{\pi}{6} = \frac{7\pi}{6}$$

$$\Rightarrow 4\cot^2\frac{7\pi}{6} - 3\operatorname{cosec}^2\frac{7\pi}{6}$$

$\Rightarrow 4(3) - 3 \times 4$
$\Rightarrow 0$

45.(A) Converting
tan²33° = cot²57°
tan²38° = cot²52°
Using these conversions in the question and using trigonemetric identities

$$\Rightarrow 7(1) + 2(1) - 4y = \frac{y}{2}$$

$$\Rightarrow 9 - 4y = \frac{y}{2} \Rightarrow 9 = \frac{9y}{2}$$

$\Rightarrow y = 2$

46.(A) $16\left(\frac{\sec^2\theta}{64} - \frac{\tan^2\theta}{64}\right)$

$$= \frac{1}{4}(\sec^2\theta - \tan^2\theta) = \frac{1}{4}$$

47.(D) $5\sin\theta + 12\cos\theta = 13$

$$\frac{5}{13}\sin\theta + \frac{12}{13}\cos\theta = 1$$

$$\Rightarrow \sin\theta = \frac{5}{13} \quad \cos\theta = \frac{12}{13}$$

$$\Rightarrow \tan\theta = \frac{5}{12}$$

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48.(C) $\tan\theta$

49.(B) $1 + \cot^2\theta + \cot^2\theta = \frac{5}{3}$

$2\cot^2\theta = \frac{2}{3}$

$\theta = 60°$

50. (B)

51. (A) $4(2 + 5\cos^2\theta) = 13$

$5\cos^2\theta = \frac{13}{4} - 2$

$5\cos^2\theta = \frac{5}{4}$

$\Rightarrow \theta = 60°$

52.(C)

53.(D) $\sin^2 21 + \cos^2 19 - \sin 21\cos 19 + \sin^2 69 + \cos^2 71 + \cos 69 \sin 71$

$= 2$

54.(D)

55.(A) $1 + 5\tan^2\theta = 6$

$\Rightarrow \theta = 45°$

56.(B) $\theta = 9°$

$\cot.\cot 2\theta.\cot 3\theta.\cot 4\theta.\cot 6\theta.\cot 7\theta.\cot 8\theta.\cot 9\theta = \cot 9.\cot 18.\cot 27.\cot 36.\cot 54.\cot 63.\cot 72.\cot 81$

$= 1$

57.(A) $\alpha + \beta = 90°$ $\quad \alpha - \beta = 60°$

$\Rightarrow 2\alpha = 150°$

$\Rightarrow \alpha = 75°$ $\quad \Rightarrow \beta = 15°$

58.(D) $\frac{1-\sin x}{\cos x} = a - \tan x$

$\sec x - \tan x = a - \tan x$

$\Rightarrow a = \sec x$

59.(A) $\sin\alpha_1 + \sin\alpha_2 + \ldots\ldots + \sin\alpha_{20} = 20$

$\alpha_1 = \alpha_2 = \ldots\ldots\ldots = \alpha_{20} = 90°$

$\Rightarrow \alpha_1 + \alpha_2 + \ldots\ldots\ldots \alpha_{20} = 90 \times 20 = 1800$

60.(A) $4 + \frac{1}{2} + 4 + \frac{1}{3} \Rightarrow 8 + \frac{5}{6} = \frac{53}{6}$

61.(A) $\sqrt{3}\cos\theta + \sin\theta = 1$

$\Rightarrow \theta = 90°$

62.(C) $\alpha_1 = \alpha_2 = \alpha_3 = \ldots\ldots\ldots = \alpha_{20} = 0$

$\Rightarrow \alpha_1 + \alpha_2 + \ldots\ldots\ldots \alpha_{20} = 0$

63.(C) $\theta = 45°$

64.(A) $1 - 1 = 0$

65.(D) $\sin^2 36° + \tan^2 60° + \sec^2 30° + \sin^2 54°$

$\sin^2 36° + \tan^2 60° + \sec^2 30° + \cos^2 36°$

$\Rightarrow 1 + \left(\sqrt{3}\right)^2 + \left(\frac{2}{\sqrt{3}}\right)^2$

$1 + 3 + \frac{4}{3} = \frac{16}{3}$

66.(B) $2\sin^2\theta + 4\sin\theta - \sin\theta - 2$

$2\sin\theta(\sin\theta + 2) - (\sin\theta + 2)$

$\Rightarrow \sin\theta = \frac{1}{2}$ $\theta = 30°$

67.(D) $\sin\theta = \frac{3}{\sqrt{34}}$ $\cos\theta = \frac{5}{\sqrt{34}}$

$\sin\theta.\cos\theta = \frac{3}{\sqrt{34}} \times \frac{5}{\sqrt{34}} = \frac{15}{34}$

68.(A) $6\left[\left(\frac{\operatorname{cosec}\theta}{3}\right)^2 - \left(\frac{\cot\theta}{3}\right)^2\right]$

$\frac{6}{9}\left(\operatorname{cosec}^2\theta - \cot^2\theta\right) = \frac{2}{3}$

69. (C) $6\left[\left(\frac{\sin\theta}{3}\right)^2 + \left(\frac{\cos\theta}{3}\right)^2\right]$

$= \frac{6}{9}[\sin^2\theta + \cos^2\theta] = \frac{2}{3}$

70.(A) $\cos x = -\frac{\sqrt{3}}{2} \Rightarrow x = \frac{7\pi}{6}$

$2\cot^2\frac{7\pi}{6} + 3\sec^2\frac{7\pi}{6}$

$= 2 \times \left(\sqrt{3}\right)^2 + 3 \times \frac{4}{3} \Rightarrow 6 + 4 = 10$

71.(B) Converting

$\tan 24 = \cot 66$

Using this conversion in the given equation of question

$\Rightarrow 4(1) + \frac{1}{2} - 4y = \frac{y}{2}$

$\Rightarrow \frac{9}{2} = \frac{9y}{2} \Rightarrow y = 1$

72.(D) $\cos x = \frac{-\sqrt{3}}{2}$

$\Rightarrow x = \pi + \frac{\pi}{6} = \frac{7\pi}{6}$

$2\cot^2\frac{7\pi}{6} - 3\sec^2\frac{7\pi}{6}$

$= 2\times\left(\sqrt{3}\right)^2 - 3\times\frac{4}{3}$

$= 6 - 4 = 2$

73.(C) $5\left(\frac{\cot^2\theta}{25} - \frac{\operatorname{cosec}^2\theta}{25}\right)$

$= \left(\cot^2\theta - \operatorname{cosec}^2\theta\right) = \frac{-1}{5}$

(SSC CHSL – 2017)

1. What is the value of $\left(\frac{1}{3} - \cot 60°\right)$?

$\left(\frac{1}{3} - \cot 60°\right)$ का मान क्या है ?

(A) $\frac{2-\sqrt{3}}{2\sqrt{3}}$ (B) $\frac{\sqrt{2}-1}{\sqrt{2}}$

(C) $\frac{1-\sqrt{3}}{3}$ (D) $\frac{\sqrt{3}-4}{2\sqrt{3}}$

2. ΔXYZ is right angled at Y. If tanX = $\frac{15}{8}$, then what is the value of sinZ?

ΔXYZ में Y पर समकोण है। यदि tanX = $\frac{15}{8}$ तो sinZ का मान क्या है ?

(A) $\frac{15}{17}$ (B) $\frac{17}{8}$ (C) $\frac{17}{15}$ (D) $\frac{8}{17}$

3. What is the value of $\left(\tan 30° - \frac{\sqrt{3}}{2}\right)$

$\left(\tan 30° - \frac{\sqrt{3}}{2}\right)$ का मान क्या है ?

(A) $-\frac{1}{2\sqrt{3}}$ (B) $\frac{2\sqrt{3}-\sqrt{6}}{2\sqrt{2}}$

(C) $\frac{2\sqrt{3}}{2}$ (D) $\frac{1}{6}$

4. ΔDEF is right angled at E. If cotD = $\frac{5}{12}$, then what is the value of sinF?

ΔDEF में E पर समकोण है। यदि cotD = $\frac{5}{12}$, तो sinF का मान क्या है ?

(A) $\frac{5}{12}$ (B) $\frac{13}{5}$ (C) $\frac{5}{13}$ (D) $\frac{13}{12}$

5. What is the value of (1/3 – cosec30°)

(1/3 – cosec30°) का मान क्या है ?

(A) $\frac{\sqrt{6}-1}{\sqrt{3}}$ (B) $-\frac{1}{2}$ (C) $-\frac{5}{3}$ (D) $\frac{3}{2}$

6. In ΔDEF measure of angle E is 90°. If secD = $\frac{25}{7}$, and DE = 1.4 cm, then what is the length (in cm) of side DF?

ΔDEF में कोण E का माप 90° है। यदि secD = $\frac{25}{7}$ और DE = 1.4 सेमी. है, तो भुजा DF की लंबाई (सेमी. में) क्या है ?

(A) **5** (B) 4.8

(C) 4 (D) 5.6

7. What is the value of $\left(\text{cosec}30° - \frac{1}{\sqrt{3}}\right)$?

$\left(\text{cosec}30° - \frac{1}{\sqrt{3}}\right)$ का मान क्या है ?

(A) $\frac{2\sqrt{3}-1}{\sqrt{3}}$ (B) $\frac{\sqrt{3}-4}{2\sqrt{3}}$

(C) $-\frac{1}{\sqrt{3}}$ (D) $\frac{2}{\sqrt{3}}$ (A)

8. In ΔXYZ measure of angle Y is 90°. If cosecX = $\frac{13}{12}$, and XY = 1 cm, then what is the length (in cm) of side YZ?

ΔXYZ में कोण Y का माप 90° है। यदि cosecX = $\frac{13}{12}$ और XY = 1 सेमी. है, तो भुजा YZ की लंबाई (सेमी. में) क्या है ?

(A) 2.6 (B) 1.5 (C) 2.4 (D) 2

9. ΔABC is right angled at B. If m∠A = 45°, then find the value of (cosecC + $\frac{1}{\sqrt{3}}$).

ΔABC में B पर समकोण है। यदि m∠A = 45° है, तो (cosecC + $\frac{1}{\sqrt{3}}$) का मान ज्ञात करें।

(A) $\frac{3\sqrt{2}+1}{3}$ (B) $\frac{2+\sqrt{3}}{2}$

(C) $\frac{5}{\sqrt{3}}$ (D) $\frac{\sqrt{6}+1}{\sqrt{3}}$

10. In ΔUVW measure of angle V is 90°. If cosecU = $\frac{13}{12}$, and UV = 2.5 cm, then what is the length (in cm) of side VW?

ΔUVW में कोण V का माप 90° है। यदि cosecU = 13/12 और UV = 2.5 सेमी., तो भुजा VW की लंबाई (सेमी. में) क्या है ?

(A) 6.5 (B) 6 (C) 4 (D) 5.6

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11. What is the value of (cos45° + 1/3)?
(cos45° + 1/ 3) का मान क्या है ?

(A) $2+\sqrt{3}$ (B) $\frac{2\sqrt{2}+1}{\sqrt{2}}$
(C) $\frac{3+\sqrt{2}}{3\sqrt{2}}$ (D) $\frac{5}{\sqrt{3}}$

12. ΔDEF is right angled at E. If cosD = 8/17, then what is the value of secF?
ΔDEF में E पर समकोण है। यदि cosD = 8/17, तो secF का मान क्या है ?
(A) 17/8 (B) 8/17
(C) 17/15 (D) 15/17

13. What is the value of (2 – sin30°)
(2 – sin30°) का मान क्या है ?

(A) $\frac{3}{2}$ (B) $\frac{3}{\sqrt{2}}$ (C) $2-\sqrt{3}$ (D) $\frac{2\sqrt{3}-\sqrt{6}}{2\sqrt{2}}$

14. ΔPQR is right angled at Q. If cosP = 5/13, then what is the value of cosecR?
ΔPQR में Q पर समकोण है। यदि cosP = 5/13, तो cosecR का मान क्या है ?

(A) $\frac{13}{5}$ (B) $\frac{5}{12}$ (C) $\frac{5}{13}$ (D) $\frac{13}{12}$

15. What is the value of $\left(\cot 45^\circ - \sqrt{2}\right)$?
$\left(\cot 45^\circ - \sqrt{2}\right)$ का मान क्या है ?

(A) $\frac{\sqrt{3}-1}{2\sqrt{3}}$ (B) $\frac{\sqrt{3}-1}{2}$
(C) $1-\sqrt{2}$ (D) $1-\sqrt{3}$

16. In ΔDEF measure of angle E is 90°. If tanD = 4/3, and DE = 6cm, then what is the length (in cm) of side EF?
ΔDEF में कोण E का माप 90° है। यदि tanD = 4/3 और DE = 6 सेंटीमीटर है, तो भुजा EF की लंबाई (सेंटीमीटर में) क्या है ?
(A) 10 (B) 5 (C) 8 (D) 4

17. What is the value of (cosec45° + $\frac{\sqrt{3}}{2}$)?
(cosec45° + $\frac{\sqrt{3}}{2}$) का मान क्या है ?

(A) $\frac{5}{6}$ (B) $\frac{4+\sqrt{3}}{2\sqrt{3}}$
(C) $\frac{2\sqrt{2}+\sqrt{3}}{2}$ (D) $\frac{3\sqrt{3}}{2}$

18. ΔABC measure of angle B is 90°. If tanA = 15/8, and AB = 0.8 cm, then what is the length (in cm) of side AC?
ΔABC में कोण B का माप 90° है। यदि tanA = 15/8 और AB = 0.8 सेमी. है, तो भुजा AC की लंबाई (सेमी. में) क्या है ?
(A) 1.7 (B) 1.5 (C) 2 (D) 2.5

19. What is the value of $\left(\tan 60^\circ + \frac{1}{3}\right)$
$\left(\tan 60^\circ + \frac{1}{3}\right)$ का मान क्या है ?

(A) $\frac{2\sqrt{2}+1}{2}$ (B) $\frac{\sqrt{3}+1}{\sqrt{3}}$
(C) $\frac{3\sqrt{3}+1}{3}$ (D) $\frac{3+\sqrt{2}}{3\sqrt{2}}$

20. ΔPQR is right angled at Q. If cosP = 3/5, then what is the value of cosR?
ΔPQR में Q पर समकोण है। यदि cosP = 3/5 है, तो cosR का मान क्या है ?

(A) $\frac{3}{4}$ (B) $\frac{5}{3}$ (C) $\frac{4}{5}$ (D) $\frac{4}{3}$

21. ΔABC is right angled at B. If m∠A = 30°, then find the value of $\left(\sin C + \frac{1}{3}\right)$
ΔABC में B पर समकोण है। यदि m∠A = 30° तो $\left(\sin C + \frac{1}{3}\right)$ का मान ज्ञात करें।

(A) $\frac{4}{3}$ (B) $\frac{\sqrt{3}+1}{2}$
(C) $\frac{\sqrt{3}+2}{\sqrt{3}}$ (D) $\frac{3\sqrt{3}+2}{6}$

22. ΔDEF is right angled at E. If cosD = 5/13, then what is the value of tanF?
ΔDEF में E पर समकोण है। यदि cosD = 5/13, तो tanF का मान क्या है ?

(A) $\frac{5}{13}$ (B) $\frac{5}{12}$ (C) $\frac{13}{5}$ (D) $\frac{13}{12}$

23. What is the value of $\left(\frac{1}{2} - \cot 45^\circ\right)$?
$\left(\frac{1}{2} - \cot 45^\circ\right)$ का मान क्या है ?

(A) $\frac{\left(2\sqrt{2}-\sqrt{3}\right)}{2}$ (B) $\frac{3}{2}$
(C) $\frac{3\sqrt{3}-1}{2}$ (D) $-\frac{1}{2}$

24. In ΔABC measure of angle B is 90°. If sinA = $\frac{24}{25}$ and AB = 1.4 cm, then what is the length (in cm) of side BC?

ΔABC में कोण B का माप 90° है। यदि sinA = $\frac{24}{25}$ और AB = 1.4 सेमी. है, तो भुजा BC की लंबाई (सेमी. में) क्या है ?

(A) 4.8 (B) 5 (C) 3 (D) 5.6

25. ΔABC is right angled at B. If m∠A = 45°, then find the value of $\left(\tan C + \frac{\sqrt{3}}{2}\right)$.

ΔABC में B पर समकोण है। यदि m∠A = 45° है, तो $\left(\tan C + \frac{\sqrt{3}}{2}\right)$ का मान ज्ञात करें ?

(A) $\frac{4}{\sqrt{3}}$ (B) $\frac{2+\sqrt{3}}{2}$

(C) $\frac{\sqrt{2}+2}{2\sqrt{2}}$ (D) $\frac{2+\sqrt{3}}{3}$

26. In ΔXYZ measure of angle is 90°. If cotX = 5/12, and XY = 2.5 cm, then what is the length (in cm) of side XZ?

ΔXYZ में कोण Y का माप 90° है। यदि cotX = 5/12 और XY = 2.5 सेमी. है, तो भुजा XZ की लंबाई (सेमी. में) क्या है ?

(A) 6 (B) 4

(C) 5.6 (D) 6.5

27. What is the value of (tan60° – 1/3)?

(tan60° – 1/3) का मान क्या है ?

(A) $3-\sqrt{2}$ (B) $\frac{2\sqrt{2}-\sqrt{3}}{2}$

(C) $\frac{-1}{2\sqrt{3}}$ (D) $\frac{3\sqrt{3}-1}{3}$

28. In ΔUVW measure of angle V is 90°. If sinU = 24/25 and UV = 0.7 cm, then what is the length (in cm) of side VW?

ΔUVW में कोण V का माप 90° है। यदि sinU = 24/25 और UV = 0.7 सेंटीमीटर है, तो भुजा VW की लंबाई (सेंटीमीटर में) क्या है ?

(A) 2.5 (B) 3 (C) 2.4 (D) 4

29. ΔABC is right angled at B. If m∠A = 60°, then find the value of (secC + 2).

ΔABC में B पर समकोण है। यदि m∠A = 60°, तो (secC + 2) का मान ज्ञात करें।

(A) $\frac{2+2\sqrt{3}}{\sqrt{2}}$ (B) $\frac{4}{3}$

(C) $\frac{2+2\sqrt{3}}{\sqrt{3}}$ (D) $\frac{4}{\sqrt{3}}$

30. In ΔABC measure of angle B is 90°. If cosA = 5/13, and AB = 10cm, then what is the length (in cm) of side BC?

ΔABC में कोण B का माप 90° है। यदि cosA = 5/13 और AB = 10 सेमी. है, तो भुजा BC की लंबाई (सेमी. में) क्या है ?

(A) 26 (B) 24 (C) 25 (D) 5

31. What is the value of $(\sqrt{3}-\sec 60°)$?

$(\sqrt{3}-\sec 60°)$ का मान क्या है ?

(A) $\sqrt{3}-2$ (B) $\frac{1-\sqrt{6}}{\sqrt{2}}$

(C) $\frac{2\sqrt{3}-\sqrt{6}}{\sqrt{2}}$ (D) $\frac{1-3\sqrt{2}}{\sqrt{3}}$

32. ΔDEF is right angled at E. If cotD = 8/15, then what is the value of cotF?

ΔDEF में E पर समकोण है। यदि cotD = 8/15, तो cotF का मान क्या है ?

(A) $\frac{15}{8}$ (B) $\frac{15}{17}$ (C) $\frac{8}{17}$ (D) $\frac{17}{15}$

33. What is the value of $(\sin 60° - \frac{2}{\sqrt{3}})$?

$(\sin 60° - \frac{2}{\sqrt{3}})$ का मान क्या है ?

(A) $-\frac{1}{2\sqrt{3}}$ (B) $-\frac{1}{2}$

(C) $\frac{1}{\sqrt{3}}$ (D) $\frac{1-2\sqrt{3}}{2}$

34. ΔPQR is right angled at Q. If tanP = 24/7, then what is the value of cosR?

ΔPQR में Q पर समकोण है। यदि tanP = 24/7, तो cosR का मान क्या है ?

(A) $\frac{25}{7}$ (B) $\frac{24}{25}$ (C) $\frac{24}{7}$ (D) $\frac{7}{24}$

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35. What is the value of $(\cot 60° + \frac{1}{\sqrt{3}})$?
$(\cot 60° + \frac{1}{\sqrt{3}})$ का मान क्या है ?

(A) $\frac{4}{\sqrt{3}}$ (B) $\frac{2\sqrt{2}+\sqrt{3}}{2}$

(C) $\frac{2}{\sqrt{3}}$ (D) $\frac{2\sqrt{2}+1}{\sqrt{2}}$

36. ΔPQR is right angled at Q. If secP = 13/5, then what is the value of sinR?
ΔPQR में Q पर समकोण है। यदि secP = 13/5 है, तो sinR का मान क्या है ?

(A) 5/13 (B) 5/12
(C) 13/5 (D) 13/12

37. What is the value of (1/3 – sec45°)?
(1/3 – sec45°) का मान क्या है ?

(A) $\frac{(4\sqrt{3})}{2}$ (B) $\frac{(\sqrt{6}-1)}{3}$

(C) $\frac{(1-3\sqrt{2})}{3}$ (D) $\frac{(\sqrt{2}-1)}{\sqrt{2}}$

38. ΔABC is right angled at B. If secA = 5/3, then what is the value of cosecC?
ΔABC में B पर समकोण है। यदि secA = 5/3, तो cosecC का मान क्या है ?

(A) 5/3 (B) 3/4 (C) 4/5 (D) 4/3

39. What is the value of $\left(\frac{1}{\sqrt{3}}+\cot 60°\right)$?
$\left(\frac{1}{\sqrt{3}}+\cot 60°\right)$ का मान क्या है ?

(A) $\frac{3\sqrt{3}}{2}$ (B) $\frac{7}{2\sqrt{3}}$

(C) $\frac{4+\sqrt{3}}{2\sqrt{3}}$ (D) $\frac{2}{\sqrt{3}}$

40. ΔABC is right angled at B. If cotA = 7/24 then what is the value of cosecC?
ΔABC में B पर समकोण है। यदि cosA = 7/24 है, तो cosecC का मान क्या है ?

(A) $\frac{7}{25}$ (B) $\frac{25}{7}$ (C) $\frac{24}{7}$ (D) $\frac{7}{24}$

41. What is the value of (cos45° – 1/3)?
(cos45° – 1/3) का मान क्या है ?

(A) $2-\sqrt{3}$ (B) $\frac{2}{\sqrt{3}}$

(C) $\frac{3-\sqrt{2}}{3\sqrt{2}}$ (D) $\frac{1}{2\sqrt{3}}$

42. ΔUVW is right angled at V. If secU = 5/3, then what is the value of tanW?
ΔUVW में V पर समकोण है। यदि secU = 5/3 तो tanW का मान क्या है ?

(A) $\frac{3}{4}$ (B) $\frac{5}{3}$ (C) $\frac{4}{5}$ (D) $\frac{4}{3}$

43. ΔPQR is right angled at Q. If m∠R = 45°, then find the value of (tanP – 1/2).
ΔPQR में Q पर समकोण है। यदि m∠R = 45° है, तो (tanP – 1/2) का मान ज्ञात करें ?

(A) $\frac{2-\sqrt{3}}{\sqrt{3}}$ (B) $\frac{2\sqrt{3}-\sqrt{6}}{2\sqrt{2}}$

(C) $\frac{1}{2}$ (D) $\frac{\sqrt{6}-6}{3\sqrt{3}}$

44. ΔDEF is right angled at E. If secD = 25/7, then what is the value of cosecF?

ΔDEF में E पर समकोण है। यदि secD = 25/7, तो cosecF का मान क्या है ?

(A) $\frac{7}{25}$ (B) $\frac{24}{7}$ (C) $\frac{25}{7}$ (D) $\frac{7}{24}$

45. ΔXYZ is right angled at Y. If m∠Z = 45°, then find the value of $(\text{cosecX} - \frac{2}{\sqrt{3}})$.

ΔXYZ में Y पर समकोण है। यदि m∠Z = 45° है, तो $(\text{cosecX} - \frac{2}{\sqrt{3}})$ का मान ज्ञात करें।

(A) $\frac{2-\sqrt{3}}{2\sqrt{3}}$ (B) $\frac{1-\sqrt{6}}{\sqrt{2}}$

(C) $\frac{\sqrt{6}-2}{\sqrt{3}}$ (D) $-\frac{1}{\sqrt{3}}$

46. In ΔPQR measure of angle Q is 90°. If tanP = $\frac{4}{3}$, and PQ = 1.5 cm, then what is the length (in cm) of side PR?

ΔPQR में कोण Q का माप 90° है। यदि tanP = 4/3 और PQ = 1.5 सेंटीमीटर है, तो भुजा PR की लंबाई (सेंटीमीटर में) क्या है ?

(A) 2 (B) 2.5 (C) 3 (D) 4.8

47. ΔPQR is right angled at Q. If m∠P = 45°, then find the value of (cosecR + 1/3).

ΔPQR में Q पर समकोण है। यदि m∠P = 45° है, तो (cosecR + 1/3) का मान ज्ञात करें।

(A) $\frac{\sqrt{3}+2}{2\sqrt{3}}$ (B) $\frac{\sqrt{3}+2}{2}$

(C) $\frac{3\sqrt{2}+1}{3}$ (D) $\frac{2+2\sqrt{3}}{\sqrt{3}}$

48. In ΔPQR measure of angle Q is 90°. If cosP = 5/13 and PQ = 2.5 cm, then what is the length (in cm) of side PR?

ΔPQR में कोण Q का माप 90° है। यदि cosP = 5/13 और PQ = 2.5 सेंटीमीटर है, तो भुजा PR की लंबाई (सेंटीमीटर में) क्या है ?

(A) 6 (B) 6.5 (C) 4 (D) 5.6

49. ΔXYZ is right angled at Y. If m∠Z = 30°, then find the value of (sinX – $\frac{3}{\sqrt{2}}$).

ΔXYZ में Y पर समकोण है। यदि m∠Z = 30°, तो (sinX – $\frac{3}{\sqrt{2}}$) का मान ज्ञात करें।

(A) $\frac{\sqrt{6}-6}{2\sqrt{2}}$ (B) $\frac{\sqrt{2}-\sqrt{3}}{\sqrt{6}}$

(C) $-\frac{1}{2}$ (D) $\frac{1-2\sqrt{3}}{2}$

50. In ΔDEF measure of angle E is 90°. If cosD = 8/17, and DE = 16cm, then what is the length (in cm) of side DF?

ΔDEF में कोण E का माप 90° है। यदि cosD = 8/17 और DE = 16 सेंटीमीटर है, तो भुजा DF की लंबाई (सेंटीमीटर में) क्या है ?

(A) 30 (B) 20 (C) 26 (D) 34

51. ΔDEF is right angled at E. If m∠F = 45°, then find the value of (tanD – $\frac{\sqrt{3}}{2}$).

ΔDEF में E पर समकोण है। यदि m∠F = 45° है, तो (tanD – $\frac{\sqrt{3}}{2}$) का मान ज्ञात करें।

(A) $-\frac{\sqrt{3}}{2}$ (B) $-\frac{1}{2\sqrt{3}}$

(C) $\frac{2-\sqrt{3}}{2}$ (D) $\frac{3\sqrt{3}-1}{3}$

52. ΔUVW is right angled at V. If cosU = 8/17, then what is the value of sinW?

ΔUVW में V पर समकोण है। यदि cosU = 8/17, तो sinW का मान क्या है ?

(A) $\frac{15}{17}$ (B) $\frac{17}{8}$ (C) $\frac{8}{17}$ (D) $\frac{17}{15}$

53. What is the value of (sin30° + 1/3)?

(sin30° + $\frac{1}{3}$) का मान क्या है ?

(A) $\frac{2\sqrt{2}+\sqrt{3}}{2}$ (B) $\frac{\sqrt{6}+1}{\sqrt{3}}$

(C) $\frac{7}{3}$ (D) $\frac{5}{6}$

54. ΔDEF is right angled at E. If secD = 17/8 है, तो cosF का मान क्या है ?

ΔDEF में E पर समकोण है। यदि secD = 17/8 है, तो cosF का मान क्या है ?

(A) $\frac{15}{17}$ (B) $\frac{15}{8}$ (C) $\frac{8}{17}$ (D) $\frac{17}{15}$

55. The total surface area of a cube is 253.5 cm^2. Find its side (in cm).

एक घन के सतह का कुल क्षेत्रफल 253.5 वर्ग सेंटीमीटर है। इसकी भुजा (सेंटीमीटर में) ज्ञात करें।

(A) 7.5 (B) 5.5 (C) 6.5 (D) 8.5

56. ΔDEF is right angled at E. If m∠F = 30°, then find the value of (sinD – 1/3)

ΔDEF में E पर समकोण है। यदि m∠F = 30°, तो (sinD – 1/3) का मान ज्ञात करें।

(A) $-\frac{1}{2\sqrt{3}}$ (B) $\frac{3\sqrt{3}-2}{6}$

(C) $\frac{\sqrt{2}-\sqrt{3}}{\sqrt{6}}$ (D) $\frac{2\sqrt{2}-1}{\sqrt{2}}$

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57. ΔXYZ is right angled at Y. If m∠X= 45°, then find the value of (cosecZ + $\frac{1}{3}$)

ΔXYZ में Y पर समकोण है। यदि m∠X= 45°, है, तो (cosecZ + $\frac{\sqrt{3}}{2}$) का मान ज्ञात करें।

(A) $\frac{2\sqrt{2}+\sqrt{3}}{2}$ (B) $\frac{5}{6}$

(C) $\frac{1+2\sqrt{3}}{2}$ (D) $\frac{\sqrt{2}+1}{\sqrt{2}}$

58. ΔXYZ is right angled at Y. If sinX = 4/5, then what is the value of cosZ?
ΔXYZ में Y पर समकोण है। यदि sinX = 4/5 है, तो cosZ का मान क्या है ?
(A) 3/4 (B) 5/3 (C) 4/5 (D) 4/3

59. What is the value of (cos30° + 1/2)?

(cos30° + 1/2) का मान क्या है ?

(A) $\frac{\sqrt{3}+1}{\sqrt{3}}$ (B) $\frac{\sqrt{2}+1}{\sqrt{2}}$

(C) $\frac{\sqrt{3}+1}{2}$ (D) $\frac{2\sqrt{3}+1}{\sqrt{3}}$

60. ΔDEF is right angled at E. If cosecD = 5/4, then what is the value of cosecF?
ΔDEF में E पर समकोण है। यदि cosecD = 5/4, तो cosecF का मान क्या है ?
(A) 5/3 (B) 3/4 (C) 4/5 (D) 4/3

61. ΔABC is right angled at B. If m∠C = 45°, then find the value of (cosecA – $\sqrt{3}$).
ΔABC में B पर समकोण है। यदि m∠C = 45°, तो (cosecA – $\sqrt{3}$) का मान ज्ञात करें।

(A) $\frac{4-\sqrt{3}}{2}$ (B) $\sqrt{2}-\sqrt{3}$

(C) $-\frac{\sqrt{3}}{2}$ (D) $\frac{\sqrt{6}-1}{\sqrt{3}}$

62. In ΔPQR measure of angle Q is 90°. If sinP = 12/13 and PQ = 1 cm, then what is the length (in cm) of side QR?
ΔPQR में कोण Q का माप 90° है। यदि sinP = 12/13 और PQ = 1 सेंटीमीटर है, तो भुजा QR की लंबाई (सेंटीमीटर में) क्या है ?
(A) 2.6 (B) 3 (C) 2.4 (D) 4

63. What is the value of (2 - tan60°)?
(2 - tan60°) का मान क्या है ?

(A) $-\frac{1}{\sqrt{3}}$ (B) $\frac{\sqrt{3}-4}{2\sqrt{3}}$

(C) $-\frac{1}{2}$ (D) $2-\sqrt{3}$

64. ΔUVW is right angled at V. If sinU = 24/25, then what is the value of cosW?
ΔUVW में V पर समकोण है। यदि sinU = 24/25, तो cosW का मान क्या है ?

(A) $\frac{25}{7}$ (B) $\frac{24}{7}$ (C) $\frac{7}{24}$ (D) $\frac{24}{25}$

65. ΔPQR is right angled at Q. If m∠P = 60°, then find the value of (cotR + $\frac{\sqrt{3}}{2}$).
ΔPQR में Q पर समकोण है। यदि m∠P = 60°, तो (cotR + $\frac{\sqrt{3}}{2}$) का मान ज्ञात करें।

(A) $\frac{3\sqrt{3}}{2}$ (B) $1+\sqrt{3}$ (C) $\frac{2\sqrt{2}+1}{2}$ (D) $\frac{3\sqrt{3}+1}{6}$

66. ΔABC is right angled at B. If cotA = 8/15, then what is the value of cosC?
ΔABC में B पर समकोण है। यदि cotA = 8/15 है, तो cosC का मान क्या है ?

(A) $\frac{15}{8}$ (B) $\frac{8}{17}$ (C) $\frac{17}{15}$ (D) $\frac{15}{17}$

67. What is the value of (sin45° – $\sqrt{3}$)?

(sin45° – $\sqrt{3}$) का मान क्या है ?

(A) $\frac{1-\sqrt{6}}{\sqrt{2}}$ (B) $\frac{4-\sqrt{3}}{2\sqrt{3}}$

(C) $-\frac{1}{2\sqrt{3}}$ (D) $\frac{2-\sqrt{3}}{2\sqrt{3}}$

68. In ΔDEF measure of angle E is 90°. If cotD = 8/15, and DE = 16 cm, then what is the length (in cm) of side EF?
ΔDEF में कोण E का माप 90° है। यदि cotD = 8/15 और DE = 16 सेंटीमीटर है, तो भुजा EF की लंबाई (सेंटीमीटर में) क्या है ?
(A) 34 (B) 15 (C) 30 (D) 14

69. What is the value of $\left(\frac{1}{\sqrt{3}} - \sin 45°\right)$?

$\left(\frac{1}{\sqrt{3}} - \sin 45°\right)$ का मान क्या है ?

(A) $\frac{1}{2\sqrt{3}}$ (B) $\frac{\sqrt{2}-\sqrt{3}}{\sqrt{6}}$

(C) $1-\sqrt{2}$ (D) $\frac{4-\sqrt{3}}{2}$

70. In ΔPQR measure of angle Q is 90°. If cotP = 8/15, and PQ = 4 cm, then what is the length (incm) of side PR?
ΔPQR में कोण Q का माप 90° है। यदि cotP = 8/15 और PQ = 4 सेंटीमीटर है, तो भुजा PR की लंबाई (सेंटीमीटर में) क्या है ?
(A) 8.5 (B) 7.5 (C) 5 (D) 4

71. ΔDEF is right angled at E. If m∠F = 30°, then find the value of $\left(\cos D - \frac{1}{\sqrt{2}}\right)$
ΔDEF में E पर समकोण है। यदि m∠F = 30°, तो $\left(\cos D - \frac{1}{\sqrt{2}}\right)$ का मान ज्ञात करें।

(A) $-\frac{1}{2}$ (B) $\frac{\sqrt{6}-1}{\sqrt{3}}$

(C) $\frac{\sqrt{2}-2}{2\sqrt{2}}$ (D) $\sqrt{3}-2$

72. In ΔPQR measure of angle Q is 90°. If tanP = $\frac{24}{7}$ and PQ = 14 cm, then what is the length (in cm) of side QR?
ΔPQR में कोण Q का माप 90° है। यदि tanP = $\frac{24}{7}$ और PQ = 14 सेंटीमीटर है, तो भुजा QR की लंबाई (सेंटीमीटर में) क्या है ?
(A) 50 (B) 20 (C) 26 (D) 48

73. ΔPQR is right angled at Q. If m∠P = 60°, then find the value of (secR + 1/2).
ΔPQR में Q पर समकोण है। यदि m∠P = 60°, तो (secR + 1/2) का मान ज्ञात करें।

(A) $\frac{2\sqrt{2}+\sqrt{3}}{2}$ (B) $\frac{\sqrt{3}+4}{2\sqrt{3}}$

(C) $\sqrt{3}+2$ (D) $\frac{5}{6}$

74. In ΔPQR measure of angle Q is 90°. If cosecP = 17/15, and PQ = 0.8 cm, then what is the length (in cm) of side QR?
ΔPQR में कोण Q का माप 90° है। यदि cosecP = 17/15 और PQ = 0.8 सेंटीमीटर है, तो भुजा QR की लंबाई (सेंटीमीटर में) क्या है ?
(A) 1.7 (B) 2 (C) 2.5 (D) 1.5

75. What is the value of (cosec60° – 1/2)?
(cosec60° – 1/2) का मान क्या है ?

(A) $\frac{4-\sqrt{3}}{2\sqrt{3}}$ (B) $\frac{2\sqrt{3}-1}{\sqrt{3}}$

(C) $\frac{3\sqrt{3}-1}{3}$ (D) $\frac{1}{\sqrt{3}}$

76. In ΔDEF measure of angle E is 90°. If cotD = 5/12, and DE = 1 cm, then what is the length (in cm) of side EF?
ΔDEF में कोण E का माप 90° है। यदि cotD = 5/12 और DE = 1 सेंटीमीटर है, तो भुजा EF की लंबाई (सेंटीमीटर में) क्या है ?
(A) 2.4 (B) 2.6 (C) 1.5 (D) 2

77. What is the value of (2 + tan60°)?
(2 + tan60°) का मान क्या है ?

(A) 3 (B) $\frac{2}{\sqrt{3}}$ (C) $\frac{4}{\sqrt{3}}$ (D) $2+\sqrt{3}$

78. ΔXYZ is right angled at Y. If sinX = 12/13, then what isthe value of cosecZ?
ΔXYZ में Y पर समकोण है। यदि sinX = 12/13 है, तो cosecZ का मान क्या है ?

(A) $\frac{5}{12}$ (B) $\frac{5}{13}$ (C) $\frac{13}{5}$ (D) $\frac{13}{12}$

79. ΔPQR is right angled at Q. If m∠R = 30°, then find the value of $\left(\cos P - \frac{1}{3}\right)$.

ΔPQR में Q पर समकोण है। यदि m∠R = 30°, तो $\left(\cos P - \frac{1}{3}\right)$ का मान ज्ञात करें।

(A) $\frac{1}{6}$ (B) $\frac{2\sqrt{2}-1}{\sqrt{2}}$ (C) $-\frac{1}{\sqrt{3}}$ (D) $\frac{\sqrt{3}-4}{2\sqrt{3}}$

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80. In ΔABC measure of angle B is 90°. If cotA = $\frac{8}{15}$, and AB = 0.8, then what is the length (in cm) of side BC?

ΔABC में कोण B का माप 90° है। यदि cotA = $\frac{8}{15}$ और AB = 0.8 सेंटीमीटर है, तो भुजा BC की लंबाई (सेंटीमीटर में) क्या है ?

(A) 1.7 (B) 2 (C) 1.5 (D) 2.5

81. What is the value of $\left(\frac{1}{\sqrt{3}}+\cos 60°\right)$

$\left(\frac{1}{\sqrt{3}}+\cos 60°\right)$ का मान क्या है ?

(A) $\frac{2+2\sqrt{3}}{\sqrt{3}}$ (B) $\frac{2+\sqrt{3}}{2\sqrt{3}}$

(C) $\frac{7}{3}$ (D) $\frac{\sqrt{2}+1}{\sqrt{2}}$

82. ΔABC is right angled at B. If cosA = 8/17, then what is the value of cotC?

ΔABC में B पर समकोण है। यदि cosA = 8/17 है, तो cotC का मान क्या है ?

(A) $\frac{15}{8}$ (B) $\frac{15}{17}$ (C) $\frac{8}{17}$ (D) $\frac{17}{15}$

83. What is the value of (tan30° + $\frac{\sqrt{3}}{2}$)

(tan30° + $\frac{\sqrt{3}}{2}$) का मान क्या है ?

(A) $\frac{4+\sqrt{3}}{2}$ (B) $\frac{5}{2\sqrt{3}}$

(C) $\frac{4+\sqrt{3}}{2\sqrt{3}}$ (D) $\frac{\sqrt{3}+1}{\sqrt{3}}$

84. In ΔXYZ measure of angle Y is 90°. If secX = $\frac{17}{8}$, and XY = 0.8 cm, then what is the length (in cm) of side XZ?

ΔXYZ में कोण Y का माप 90° है। यदि secX = $\frac{17}{8}$ और XY = 0.8 सेमी. है, तो भुजा XZ की लंबाई (सेमी. में) क्या है ?

(A) 1.7 (B) 1.5 (C) 2 (D) 2.5

85. What is the value of (sec45° + $\frac{1}{\sqrt{3}}$)?

(sec45° + $\frac{1}{\sqrt{3}}$) का मान क्या है ?

(A) $\frac{2+\sqrt{3}}{2\sqrt{3}}$ (B) $\frac{2+2\sqrt{3}}{\sqrt{3}}$

(C) $\frac{2+2\sqrt{3}}{3}$ (D) $\frac{\sqrt{6}+1}{\sqrt{3}}$

86. In ΔABC measure of angle B is 90°. If cosA = $\frac{8}{17}$, and AB = 4 cm, then waht is the length (in cm) of side BC?

ΔABC में कोण B का माप 90° है। यदि cosA = $\frac{8}{17}$ और AB = 4 सेंटीमीटर है, तो भुजा BC की लंबाई (सेंटीमीटर में) क्या है ?

(A) 8.5 (B) 7.5 (C) 5 (D) 6

87. ΔDEF is right angled at E. If m∠D = 30° then find the value of (cosF + $\sqrt{3}$)

ΔDEF में E पर समकोण है। यदि m∠D = 30°, तो (cosF + $\sqrt{3}$) का मान ज्ञात करें।

(A) $\frac{7}{2\sqrt{3}}$ (B) $\frac{1+2\sqrt{3}}{2}$ (C) $\frac{4}{\sqrt{3}}$ (D) $\frac{\sqrt{3}+4}{2}$

88. ΔDEF is right angled at E. If sinD = $\frac{15}{17}$, then what is the value of cotF?

ΔDEF में E पर समकोण है। यदि sinD = $\frac{15}{17}$, तो cotF का मान क्या है ?

(A) $\frac{15}{17}$ (B) $\frac{8}{17}$ (C) $\frac{15}{8}$ (D) $\frac{17}{15}$

89. ΔXYZ is right angled at Y. If m∠Z = 30°, then find the value of $\left(\cos X-\frac{1}{\sqrt{3}}\right)$

ΔXYZ में Y पर समकोण है। यदि m∠Z = 30°, तो $\left(\cos X-\frac{1}{\sqrt{3}}\right)$ का मान ज्ञात करें।

(A) $\frac{3}{2}$ (B) $1-\sqrt{2}$ (C) $\frac{4-\sqrt{3}}{2\sqrt{3}}$ (D) $\frac{\sqrt{3}-2}{2\sqrt{3}}$

90. In ΔABC measure of angle B is 90°. If sinA = $\frac{15}{17}$, and AB = 0.8 cm, then what is the length (in cm) of side BC?

ΔABC में कोण B का माप 90° है। यदि sinA = $\frac{15}{17}$ और AB = 0.8 सेंटीमीटर है, तो भुजा BC की लंबाई (सेंटीमीटर में) क्या है ?

(A) 1.5 (B) 1.7
(C) 2 (D) 2.5

91. What is the value of $\left(\frac{2}{\sqrt{3}} + \tan 45°\right)$?

$\left(\frac{2}{\sqrt{3}} + \tan 45°\right)$ का मान क्या है ?

(A) $\frac{1+\sqrt{6}}{\sqrt{3}}$ (B) $\frac{2+\sqrt{3}}{\sqrt{3}}$
(C) $\frac{4}{\sqrt{3}}$ (D) $\sqrt{3}+2$

92. ΔPQR is right angled at Q. If cotP = $\frac{5}{12}$, then what is the value of tanR?

ΔPQR में Q पर समकोण है। यदि cotP = $\frac{5}{12}$ है, तो tanR का मान क्या है ?

(A) $\frac{5}{13}$ (B) $\frac{5}{12}$ (C) $\frac{13}{5}$ (D) $\frac{13}{12}$

93. ΔXYZ is right angled at Y. If m∠X = 30°, then find the value of (cosZ + $\frac{1}{3}$).

ΔXYZ में Y पर समकोण है। यदि m∠X = 30° है, तो (cosZ + $\frac{1}{3}$) का मान ज्ञात करें।

(A) $\frac{2+\sqrt{3}}{2}$ (B) $\frac{2\sqrt{2}+\sqrt{3}}{2}$
(C) $1+\sqrt{3}$ (D) $\frac{5}{6}$

94. In ΔXYZ measure of angle Y is 90°. If tanX = $\frac{15}{8}$, and XY = 16 cm, then what is the length (in cm) of side YZ?

ΔXYZ में कोण Y का माप 90° है। यदि tanX = $\frac{15}{8}$ और XY = 16 सेंटीमीटर है, तो भुजा YZ की लंबाई (सेंटीमीटर में) क्या है ?

(A) 34 (B) 30 (C) 15 (D) 14

95. What is the value of $\left(\frac{\sqrt{2}}{3} - \text{cosec}60°\right)$ $\left(\frac{\sqrt{2}}{3} - \text{cosec}60°\right)$ का मान क्या है ?

(A) $\frac{\sqrt{6}-6}{3\sqrt{3}}$ (B) $\frac{2-2\sqrt{3}}{\sqrt{3}}$
(C) $\frac{1-\sqrt{6}}{\sqrt{2}}$ (D) $\frac{4-\sqrt{3}}{2\sqrt{3}}$

96. ΔXYZ is right angled at Y. If cotX = 5/12, then what is the value of secZ?

ΔXYZ में Y पर समकोण है। यदि cotX = 5/12 है, तो secZ?

(A) $\frac{5}{12}$ (B) $\frac{13}{5}$ (C) $\frac{13}{12}$ (D) $\frac{12}{5}$

97. ΔDEF is right angled at E. If m∠F = 60°, then find the value of $\left(\cot D - \frac{2}{\sqrt{3}}\right)$

ΔDEF में E पर समकोण है। यदि m∠F = 60° तो $\left(\cot D - \frac{2}{\sqrt{3}}\right)$ का मान ज्ञात करें।

(A) $1-\sqrt{2}$ (B) $\frac{1}{\sqrt{3}}$
(C) $\frac{2-\sqrt{3}}{2\sqrt{3}}$ (D) $\frac{2-2\sqrt{3}}{\sqrt{3}}$

98. ΔDEF is right angled at E. If tanD = $\frac{12}{5}$, then what is the value of secF?

ΔDEF में E पर समकोण है। यदि tanD = $\frac{12}{5}$ तो secF का मान क्या है ?

(A) $\frac{5}{12}$ (B) $\frac{13}{5}$ (C) $\frac{5}{13}$ (D) $\frac{13}{12}$

99. What is the value of (1/2 – sec30°)?

(1/2 – sec30°) का मान क्या है ?

(A) $\frac{\left(\sqrt{3}-1\right)}{2}$ (B) $\frac{\left(2-\sqrt{3}\right)}{\sqrt{3}}$
(C) $\frac{\left(1-\sqrt{6}\right)}{\sqrt{2}}$ (D) $\frac{\left(\sqrt{3}-4\right)}{2\sqrt{3}}$

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100. In ΔABC measure of angle B is 90°. If secA = 25/7, and AB = 14 cm, then what is the length (in cm) of side BC?
ΔABC में कोण B का माप 90° है। यदि secA = 25/7 और AB = 14 सेंटीमीटर है, तो भुजा BC की लंबाई (सेंटीमीटर में) क्या है ?
(A) 50 (B) 48 (C) 20 (D) 26

101. ΔXYZ is right angled at Y. If m∠Z = 60°, then find the value of (cotX – 1/3)
ΔXYZ में Y पर समकोण है। यदि m∠Z = 60° है, तो (cotX – 1/3) का मान ज्ञात करें।
(A) $\frac{3\sqrt{3}-1}{3}$ (B) $\frac{2\sqrt{3}-\sqrt{6}}{2\sqrt{2}}$
(C) $-\frac{5}{3}$ (D) $\frac{2-\sqrt{3}}{2\sqrt{3}}$

102. ΔPQR is right angled at Q. If sinP = 12/13, then what is the value of tanR?
ΔPQR में Q पर समकोण है। यदि sinP = 12/13, तो tanR का मान क्या है ?
(A) $\frac{5}{13}$ (B) $\frac{13}{5}$ (C) $\frac{13}{12}$ (D) $\frac{5}{12}$

103. What is the value of $(\frac{1}{3}$ + cosec30°)?
$(\frac{1}{3}$ + cosec30°) का मान क्या है ?
(A) $\frac{\sqrt{6}+1}{3}$ (B) $\frac{7}{3}$
(C) $\frac{4+\sqrt{3}}{2}$ (D) $\frac{\sqrt{3}+1}{2}$

104. In ΔDEF measure of angle E is 90°. If sinD = 15/17, and DE = 4 cm, then what is the length (in cm) of side EF?
ΔDEF में कोण E का माप 90° है। यदि sinD = 15/17 और DE = 4 सेंटीमीटर है, तो भुजा EF की लंबाई (सेंटीमीटर में) क्या है ?
(A) 8.5 (B) 7.5 (C) 5 (D) 6

105. ΔDEF is right angled at E. If m∠D = 45°, then find the value of (tanF + 1/3).
ΔDEF में E पर समकोण है। यदि m∠D = 45° है, तो (tanF + 1/3) का मान ज्ञात करें।
(A) $\frac{4}{3}$ (B) $\frac{3\sqrt{3}}{2}$ (C) $\frac{\sqrt{2}+1}{\sqrt{2}}$ (D) $\frac{3\sqrt{2}+1}{3}$

106. In ΔXYZ measure of angle Y is 90°. If cosecX = 17/15, and XY = 4cm, then what is the length (in cm) of side YZ?
ΔXYZ में कोण Y का माप 90° है। यदि cosecX = 17/15 और XY = 4 सेमी. है, तो भुजा YZ की लंबाई (सेमी. में) क्या है ?
(A) 7.5 (B) 8.5 (C) 5 (D) 6

107. ΔPQR is right angled at Q. If m∠R = 60°, then find the value of $\left(\sec P - \frac{1}{\sqrt{3}}\right)$.
ΔPQR में Q पर समकोण है। यदि m∠R = 60° है, तो $\left(\sec P - \frac{1}{\sqrt{3}}\right)$ का मान ज्ञात करें।
(A) $\frac{\sqrt{6}-6}{3\sqrt{3}}$ (B) $\frac{1-3\sqrt{2}}{3}$ (C) $\frac{1}{\sqrt{3}}$ (D) $\frac{2}{\sqrt{3}}$

108. ΔPQR is right angled at Q. If cosecP = 25/24, then what is the value of cotR?
ΔPQR में Q पर समकोण है। यदि cosecP = 25/24 है, तो cotR का मान क्या है ?
(A) $\frac{25}{7}$ (B) $\frac{24}{25}$ (C) $\frac{7}{24}$ (D) $\frac{24}{7}$

109. What is the value of $\left(\tan 45° - \frac{1}{\sqrt{2}}\right)$?
$\left(\tan 45° - \frac{1}{\sqrt{2}}\right)$ का मान क्या है ?
(A) $-\frac{\sqrt{3}}{2}$ (B) $\frac{2\sqrt{2}-1}{\sqrt{2}}$ (C) $\frac{2\sqrt{2}-\sqrt{3}}{2}$ (D) $\frac{\sqrt{2}-1}{\sqrt{2}}$

110. ΔUVW is right angled at V. If sinU = 4/5, then what is the value of cosecW?
ΔUVW में V पर समकोण है। यदि sinU = 4/5 है, तो cosecW का मान क्या है ?
(A) $\frac{3}{4}$ (B) $\frac{4}{5}$ (C) $\frac{5}{3}$ (D) $\frac{4}{3}$

111. ΔXYZ is right angled at Y. If m∠X = 60°, then find the value of (cotZ + 2).
ΔXYZ में Y पर समकोण है। यदि m∠X = 60°, तो (cotZ + 2) का मान ज्ञात करें ?
(A) $\frac{2\sqrt{2}+1}{2}$ (B) $\sqrt{3}+2$
(C) $\frac{\sqrt{6}+1}{\sqrt{3}}$ (D) $\frac{2\sqrt{2}+\sqrt{3}}{2}$

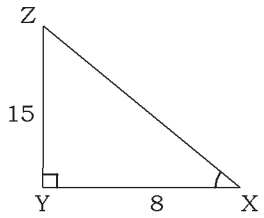
112. In ΔABC measure of angle B is 90°. If tanA = 12/5, and AB = 1 cm, then what is the length (in cm) of side BC?
ΔABC में कोण B का माप 90° है। यदि tanA = 12/5 और AB = 1 सेंटीमीटर है, तो भुजा BC की लंबाई (सेंटीमीटर में) क्या है ?
(A) 2.6 (B) 2.4 (C) 1.5 (D) 2

Solution

1. (C) $\frac{1}{3} - \frac{1}{\sqrt{3}} = \frac{\sqrt{3}-3}{3\sqrt{3}}$

$= \frac{\sqrt{3}\left(1-\sqrt{3}\right)}{3\sqrt{3}} = \frac{1-\sqrt{3}}{3}$

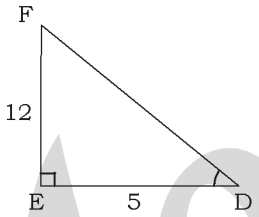
2. (D) $\tan x = \frac{15}{8}$



$\sin z = \frac{xy}{xz} = \frac{8}{\sqrt{15^2+8^2}} = \frac{8}{17}$

3. (A) $\frac{1}{\sqrt{3}} - \frac{\sqrt{3}}{2} = \Rightarrow \frac{2-3}{2\sqrt{3}} = -\frac{1}{2\sqrt{3}}$

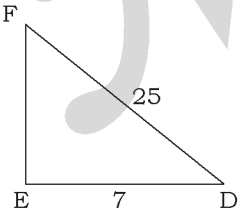
4. (C) $\text{Cot}D = \frac{5}{12}$



$\text{Sin}F = \frac{ED}{FD} = \frac{5}{\sqrt{12^2+5^2}} = \frac{5}{13}$

5. (C) $\frac{1}{3} - 2 = -\frac{5}{3}$

6. (A)



$\text{Sec } D = \frac{25}{7}$

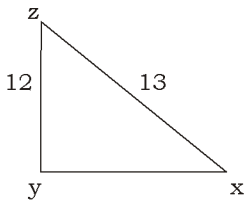
$\because$ DE = 7 $\rightarrow$ 1.4

1 $\rightarrow$ .2

$\therefore$ DF = 25 ×0.2 = 5

7. (A) $2 - \frac{1}{\sqrt{3}} = \frac{2\sqrt{3}-1}{\sqrt{3}}$

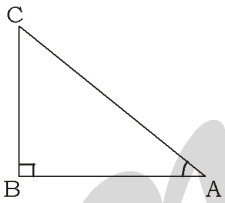
8. (C)



$\text{Cosec}x = \frac{13}{12}$ $\Rightarrow$ xy = 5 $\rightarrow$ 1

$\therefore$ 1 $\rightarrow$ $\frac{1}{5}$ $\Rightarrow$ yz = 12 $\rightarrow$ $\frac{12}{5}$ = 2.4

9. (D)

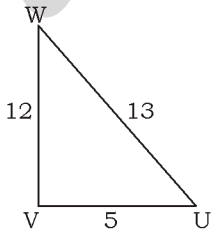


$\angle A = 45°$

$\text{Cosec}C = \text{Cosec}45° = \sqrt{2}$

$\therefore \sqrt{2} + \frac{1}{\sqrt{3}} \Rightarrow \frac{\sqrt{6}+1}{\sqrt{3}}$

10.(B)



UV = 2.5

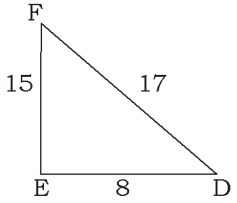
5 $\rightarrow$ 2.5

1 $\rightarrow$ .5

$\therefore$ VW = 12 $\rightarrow$ 12 × .5 = 6

11.(C) $\frac{1}{\sqrt{2}} + \frac{1}{3} = \frac{3+\sqrt{2}}{3\sqrt{2}}$

12.(C)



$\text{Cos}D = \frac{8}{17}$

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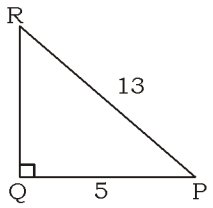
$EF = \sqrt{17^2 - 8^2} = 15$

$\therefore$ Sec F = $\frac{17}{15}$

13.(A) $2 - \frac{1}{2} = \frac{3}{2}$

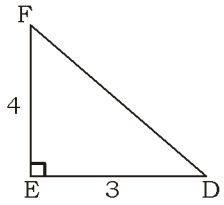
14.(A)



CosP = $\frac{5}{13}$, $\Rightarrow$ CosecR = $\frac{13}{5}$

15.(C) $Cot45° - \sqrt{2} = 1 - \sqrt{2}$

16.(C)



tanD = $\frac{4}{3}$

$\Rightarrow$ DE = 3 $\rightarrow$ 6

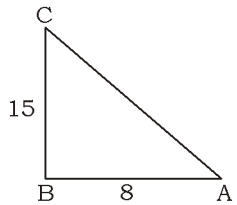
1 $\rightarrow$ 2

$\therefore$ EF = 4 $\rightarrow$ 4 × 2 = 8

17.(C) $Cosec45° + \sqrt{\frac{3}{2}} = \sqrt{2} + \sqrt{\frac{3}{2}}$

$= \frac{2+\sqrt{3}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} \Rightarrow \frac{2\sqrt{2}+\sqrt{6}}{2}$

18.(A) tanA = $\frac{15}{18}$



$AC = \sqrt{15^2+8^2} = 17$

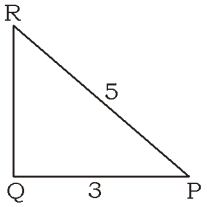
AB = 8 $\rightarrow$ 0.8

1 $\rightarrow$ 0.1

$\therefore$ 17 $\rightarrow$ 17 × 0.1 = 1.7

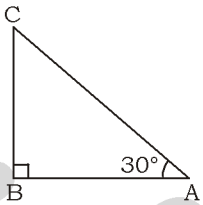
19.(C) $\tan60° + \frac{1}{3} = \sqrt{3} + \frac{1}{3} = \frac{3\sqrt{3}+1}{3}$

20.(C)



QR = 4 $\Rightarrow$ CosR = $\frac{4}{5}$

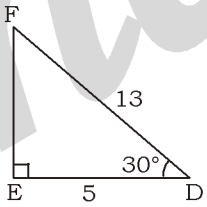
21.(D)



C = 60°

Sin60° = $\frac{\sqrt{3}}{2} \Rightarrow \frac{\sqrt{3}}{2} + \frac{1}{3} \Rightarrow \frac{3\sqrt{3}+2}{6}$

22.(B)

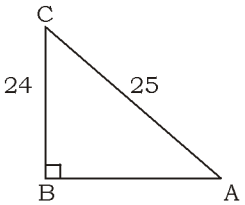


CosD = $\frac{5}{13}$ $\Rightarrow EF = \sqrt{13^2 - 5^2} = 12$

tanF = $\frac{5}{12}$

23.(D) $\frac{1}{2} - \cot45° \Rightarrow \frac{1}{2} - 1 \Rightarrow -\frac{1}{2}$

24.(A)



SinA = $\frac{24}{25}$

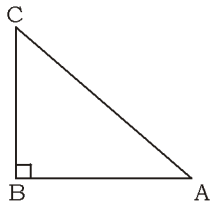
$AB = \sqrt{25^2 - 24^2} = 7$

AB = 7 $\rightarrow$ 1.4

1 $\rightarrow$ 0.2

$\therefore$ BC = 24 $\rightarrow$ 24 × 0.2 = 4.8

25.(B)

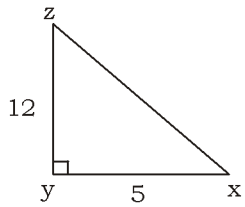


$\angle A = 45°, \angle C = 45°$

$\tan c + \frac{\sqrt{3}}{2} \Rightarrow \tan 45° + \frac{\sqrt{3}}{2}$

$\Rightarrow 1 + \frac{\sqrt{3}}{2} = \frac{2+\sqrt{3}}{2}$

26.(D)



$\text{Cot}x = \frac{5}{12} \Rightarrow xz = 13$

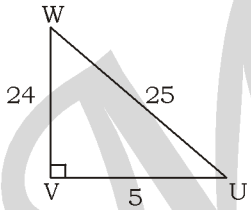
$xy = 5 \rightarrow 2.5$

$1 \rightarrow 0.5$

$\therefore \quad xz = 13 \rightarrow 13 \times 0.5 = 6.5$

27.(D) $\tan 60° - \frac{1}{3} = \sqrt{3} - \frac{1}{3} = \frac{3\sqrt{3}-1}{3}$

28.(*)



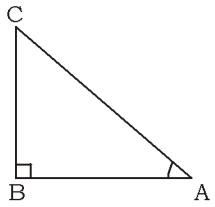
$\text{Sin}U = \frac{24}{25} \Rightarrow UV = \sqrt{25^2 - 24^2}$

$= 7 \rightarrow 0.7$

$= 1 \rightarrow 0.1$

$\therefore \quad VW = 24 \rightarrow 24 \times 0.1 = 2.4$

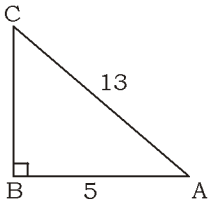
29.(C)



$\angle A = 60°, \angle C = 30°$

$\text{sec}c + 2 = \sec 30° + 2 = \frac{2}{\sqrt{3}} + 2 \Rightarrow \frac{2+2\sqrt{3}}{\sqrt{3}}$

30.(B)



$\text{Cos}A = \frac{5}{13}$

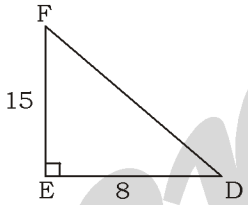
$AB = 5 \rightarrow 10$

$1 \rightarrow 2$

$\therefore \quad BC = 12 \rightarrow 12 \times 2 = 24$

31.(A) $\sqrt{3} - \sec 60° = \sqrt{3} - 2$

32.(A)



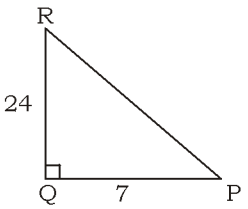
$\text{Cot}\ D = \frac{8}{15}$

$\text{Cot}\ F = \frac{EF}{ED} = \frac{15}{8}$

33. (A) $\text{Sin}60° - \frac{2}{\sqrt{3}} \Rightarrow \frac{\sqrt{3}}{2} - \frac{2}{\sqrt{3}}$

$\Rightarrow \frac{3-4}{2\sqrt{3}} = \frac{-1}{2\sqrt{3}}$

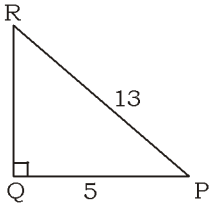
34. (B)



$\tan P = \frac{24}{7} \quad \text{Cos}R = \frac{24}{\sqrt{24^2+7^2}} = \frac{24}{25}$

35. (C) $\text{Cot}60° + \frac{1}{\sqrt{3}} \Rightarrow \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{3}} = \frac{2}{\sqrt{3}}$

36.(*)



$\text{Sec}P = \frac{13}{5}, \quad \text{Sin}R = \frac{5}{13}$

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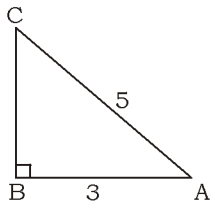
37.(C) $\frac{1}{3} - \sec 45° \Rightarrow \frac{1}{3} - \sqrt{2} \Rightarrow \frac{1-3\sqrt{2}}{3}$

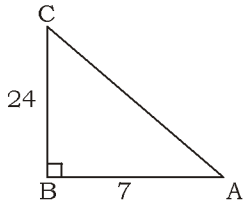
38.(A)



$\text{SecA} = \frac{5}{3}$ $\quad \text{CosecC} = \frac{AC}{AB} = \frac{5}{3}$

39.(D) $\frac{1}{\sqrt{3}} + \text{Cot}60° \Rightarrow \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{3}} = \frac{2}{\sqrt{3}}$

40.(B)

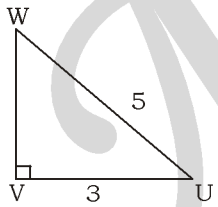


$\text{CotA} = \frac{7}{24}$

$\text{CosecC} = \frac{AC}{AB} = \frac{\sqrt{24^2+7^2}}{7} = \frac{25}{7}$

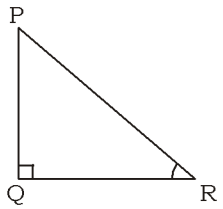
41.(C) $\text{Cos}45° - \frac{1}{3} \Rightarrow \frac{1}{\sqrt{2}} - \frac{1}{3} = \frac{3-\sqrt{2}}{3\sqrt{2}}$

42.(A)



$\text{SecU} = \frac{5}{3}$, $\text{tanW} = \frac{3}{4}$

43.(C)

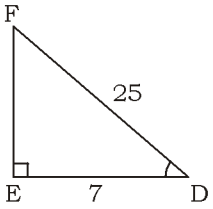


$\angle P = 45°, \angle R = 45°$

$\therefore \text{tan}45° - \frac{1}{2}$

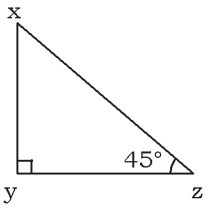
$\Rightarrow 1 - \frac{1}{2} = \frac{1}{2}$

44.(C)



$\text{secD} = \frac{25}{7}$, $\Rightarrow \text{cosecF} = \frac{25}{7}$

45.(C)

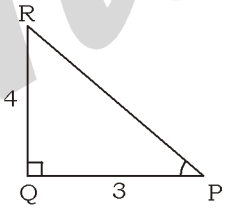


$z = 45°$, $\quad x = 45°$

$\Rightarrow \text{cosec}45° - \frac{2}{\sqrt{3}}$

$\Rightarrow \sqrt{2} - \frac{2}{\sqrt{3}} = \frac{\sqrt{6}-2}{\sqrt{3}}$

46. (*)



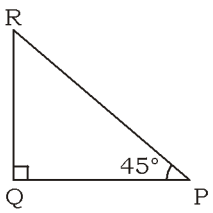
$\text{tanP} = \frac{4}{3}$

$PQ = 3 \rightarrow 1.5$

$1 \rightarrow 0.5$

$\therefore \quad PR = \sqrt{3^2+4^2} = 5 \rightarrow 5 \times .5 = 2.5$

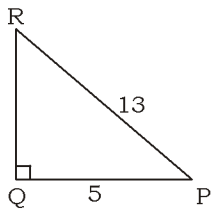
47.(C)



$\angle R = 45° \quad \Rightarrow \text{CosecR} + \frac{1}{3}$

$\Rightarrow \text{Cosec}45° + \frac{1}{3} \quad \Rightarrow \sqrt{2} + \frac{1}{3} = \frac{3\sqrt{2}+1}{3}$

48.(B)



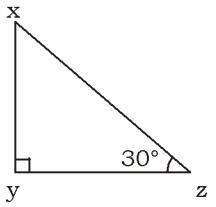
$\text{Cos}P = \frac{5}{13}$

$PQ = 5 \rightarrow 2.5$

$1 \rightarrow 0.5$

$\therefore \quad PR = 13 \rightarrow 13 \times .5 = 6.5$

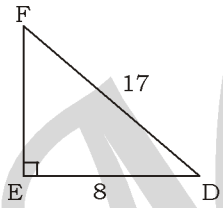
49.(*)



$\angle x = 90° - 30° = 60°$

$\left(\sin 60° - \frac{3}{\sqrt{2}}\right) = \frac{\sqrt{3}}{2} - \frac{3}{\sqrt{2}} = \frac{\sqrt{6}-6}{2\sqrt{2}}$

50.(D)



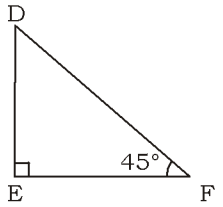
$\text{Cos}D = \frac{8}{17}$

$DE = 8 \rightarrow 16$

$1 \rightarrow 2$

$\therefore \quad DF = 17 \rightarrow 17 \times 2 = 34$

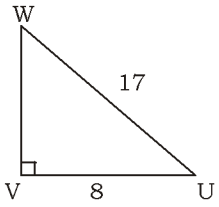
51.(*)



$\angle D = 45°$

$\text{tan}D - \frac{\sqrt{3}}{2} \qquad \Rightarrow 1 - \frac{\sqrt{3}}{2} = \frac{2-\sqrt{3}}{2}$

52.(C)



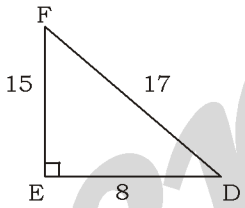
$VW = \sqrt{17^2 - 8^2} = 15$

$\text{sin}W = \frac{VW}{UW} = \frac{8}{17}$

53.(D) $\text{Sin}30° + \frac{1}{3}$

$\Rightarrow \frac{1}{2} + \frac{1}{3} = \frac{5}{6}$

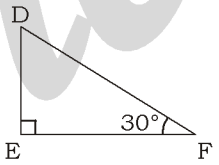
54.(A)



$\text{Sec}D = \frac{17}{18}, \qquad \Rightarrow \text{cos}F = \frac{15}{17}$

55. (*)

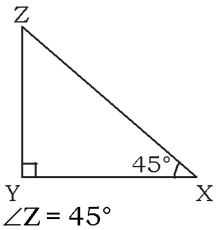
56.(B)



$\angle D = 60°$

$\therefore \text{sin}60° - \frac{1}{3} \qquad \Rightarrow \frac{\sqrt{3}}{2} - \frac{1}{3} = \frac{3\sqrt{3}-2}{6}$

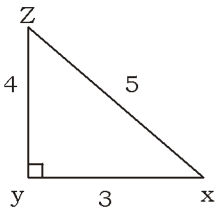
57. (*)



$\angle Z = 45°$

$\text{Cosec}45° + \frac{\sqrt{3}}{2} \qquad \Rightarrow \sqrt{2} + \frac{\sqrt{3}}{2} = \frac{2\sqrt{2}+\sqrt{3}}{2}$

58.(C)



$\text{Sin}x = \frac{4}{5}, \qquad \text{cos}z = \frac{4}{5}$

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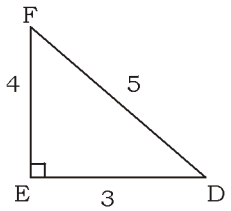
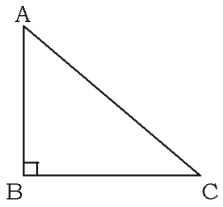
59.(C) $\text{Cos}30° + \frac{1}{2} \Rightarrow \frac{\sqrt{3}}{2} + \frac{1}{2} = \frac{\sqrt{3}+1}{2}$

60.(A)



$\text{CosecD} = \frac{5}{4}, \quad \Rightarrow \text{CosecF} = \frac{5}{3}$

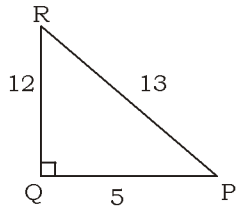
61.(B)



$\angle A = 45°$

$\text{Cosec}45° - \sqrt{3} = 2 - \sqrt{3}$

62.(C)



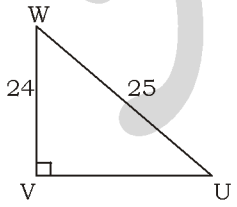
$PQ = 5 \rightarrow 1$

$1 \rightarrow \frac{1}{5}$

$\therefore \quad QR = 12 \rightarrow 12 \times \frac{1}{5} = 2.4$

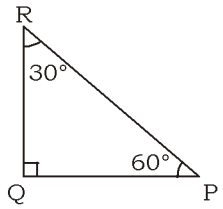
63.(D) $2 - \tan 60° \quad \Rightarrow 2 - \sqrt{3}$

64.(D)



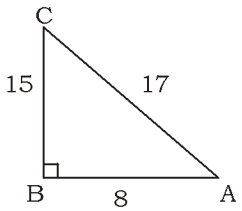
$\text{CosW} = \frac{VW}{WV} = \frac{24}{25}$

65.(A)



$\text{Cot}30° + \frac{\sqrt{3}}{2} \Rightarrow \sqrt{3} + \frac{\sqrt{3}}{2} = \frac{3\sqrt{3}}{2}$

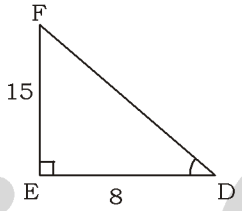
66.(D)



$\text{CosC} = \frac{15}{17}$

67.(A) $\text{Sin}45° - \sqrt{3} = \frac{1}{\sqrt{2}} - \sqrt{3} \Rightarrow \frac{1-\sqrt{6}}{\sqrt{2}}$

68.(C)



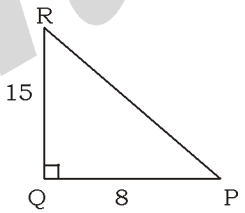
$DE = 8 \rightarrow 16$

$1 \rightarrow 2$

$\therefore \quad EF = 15 \rightarrow 2 \times 15 = 30 \text{ cm.}$

69. (*) $\frac{1}{\sqrt{3}} - \sin 45° \Rightarrow \frac{1}{\sqrt{3}} - \frac{1}{\sqrt{2}} \Rightarrow \frac{\sqrt{2}-\sqrt{3}}{\sqrt{6}}$

70.(A)



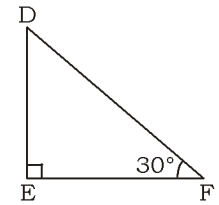
$PR = \sqrt{15^2 + 8^2} = 17$

$PQ = 8 \rightarrow 4$

$1 \rightarrow 1/2$

$\therefore \quad 17 \rightarrow 17 \times 1/2 = 8.5$

71.(C)

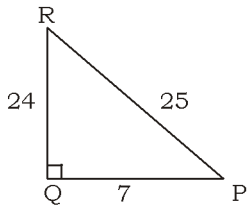


$\angle D = 90° - 30° = 60°$

$\Rightarrow \quad \text{CosD} - \frac{1}{\sqrt{2}} \quad \Rightarrow \text{Cos}60° - \frac{1}{\sqrt{2}}$

$\Rightarrow \quad \frac{1}{2} - \frac{1}{\sqrt{2}} = \frac{\sqrt{2}-2}{2\sqrt{2}}$

72.(D)

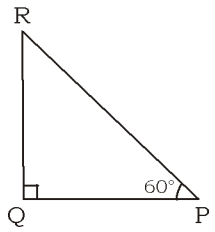


PQ = 7 → 14

1 → 2

∴ QR = 24 → 24 × 2 = 48

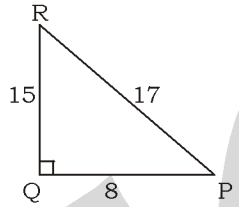
73.(B)



$\Rightarrow \left(\text{SecR} + \frac{1}{2}\right) \Rightarrow \text{Sec}30° + \frac{1}{2}$

$\Rightarrow \frac{2}{\sqrt{3}} + \frac{1}{2} = \frac{4+\sqrt{3}}{2\sqrt{3}}$

74.(D)



PQ = 8 → 0.8

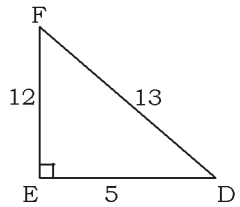
1 → 0.1

∴ QR = 15 → 15 × 0.1 = 1.5

75.(A) $\text{Cosec}60° - \frac{1}{2}$

$\Rightarrow \frac{2}{\sqrt{3}} - \frac{1}{2} = \frac{4-\sqrt{3}}{2\sqrt{3}}$

76.(A)



DE = 5 → 1

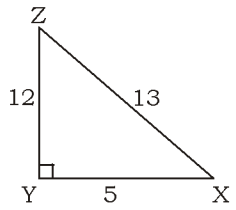
1 → $\frac{1}{5}$

∴ EF = 12 → $12 \times \frac{1}{5} = 2.4$

77.(D) 2 + tan60°

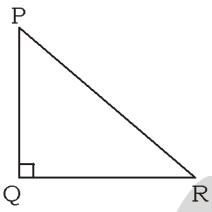
$= 2 + \sqrt{3}$

78.(C)



$\text{Cosecz} = \frac{XZ}{XY} = \frac{13}{5}$

79.(A)

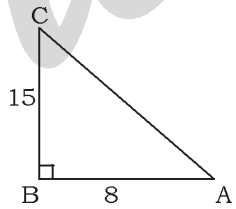


$\angle P = 90° - 30° = 60°$

$\therefore \text{CosP} - \frac{1}{3} = \text{Cos}60° - \frac{1}{3}$

$\Rightarrow \frac{1}{2} - \frac{1}{3} = \frac{1}{6}$

80.(C)



$\text{CotA} = \frac{8}{15}$

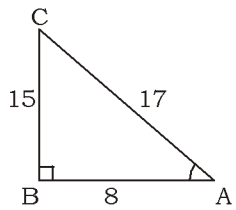
AB = 8 → 0.8

1 → 0.1

∴ BC = 15 → 15 × 0.1 = 1.5

81.(B) $\frac{1}{\sqrt{3}} + \text{Cos}60° \Rightarrow \frac{1}{\sqrt{3}} + \frac{1}{2} = \frac{2+\sqrt{3}}{2\sqrt{3}}$

82.(A)



$\text{CosA} = \frac{8}{17}$

$\text{CotC} = \frac{BC}{AB} = \frac{15}{18}$

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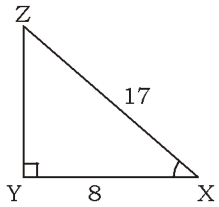
83.(B) $\tan30° + \frac{\sqrt{3}}{2} \Rightarrow \frac{1}{\sqrt{3}} + \frac{\sqrt{3}}{2} = \frac{2+3}{2\sqrt{3}} = \frac{5}{2\sqrt{3}}$

84.(A)



$\text{Sec}X = \frac{17}{8}$

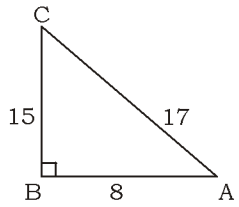
$XY = 8 \rightarrow 0.8$

$1 \rightarrow 0.1$

$\therefore\ XZ = 17 \rightarrow 17 \times 0.1 = 1.7$

85.(D) $\text{Sec}45° + \frac{1}{\sqrt{3}} \Rightarrow \sqrt{2} + \frac{1}{\sqrt{3}} = \frac{\sqrt{6}+1}{\sqrt{3}}$

86.(B)



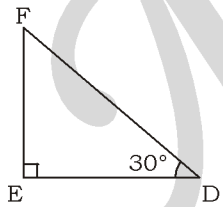
$\text{Cos}A = \frac{8}{17}$

$AB = 8 \rightarrow 4$

$1 \rightarrow \frac{1}{2}$

$\therefore\ BC = 15 \rightarrow 15 \times \frac{1}{2} = 7.5$

87.(B)

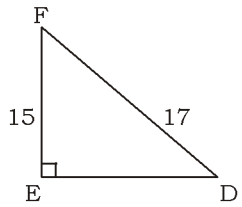


$\angle F = 90° - 60° = 30°$

$\therefore\ \text{Cos}F + \sqrt{3}$

$\Rightarrow \text{Cos}60° + \sqrt{3} = \frac{1}{2} + \sqrt{3} = \frac{1+2\sqrt{3}}{2}$

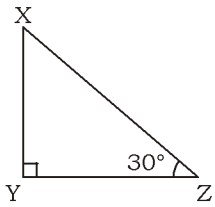
88.(C)



$ED = \sqrt{17^2 - 15^2} = 8$

$\therefore\ \text{Cot}F = \frac{EF}{ED} = \frac{15}{8}$

89.(D)

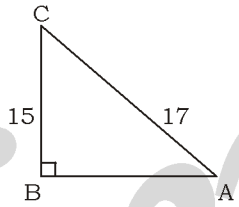


$\angle X = 90° - 30° = 60°$

$\therefore\ \text{Cos}X - \frac{1}{\sqrt{3}} = \text{Cos}60° - \frac{1}{\sqrt{3}}$

$\Rightarrow \frac{1}{2} - \frac{1}{\sqrt{3}} = \frac{\sqrt{3}-2}{2\sqrt{3}}$

90.(B)



$\text{Sin}A = \frac{15}{17}$

$AB = \sqrt{17^2 - 15^2} = 8$

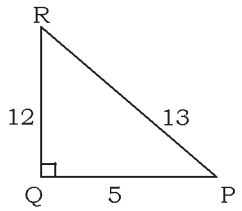
$AB = 8 \rightarrow 0.8$

$1 \rightarrow 0.1$

$\therefore\ BC = 15 \rightarrow 15 \times 0.1 = 1.5$

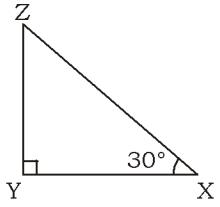
91.(B) $\frac{2}{\sqrt{3}} + \tan45° \Rightarrow \frac{2}{\sqrt{3}} + 1 \Rightarrow \frac{2+\sqrt{3}}{\sqrt{3}}$

92.(B)



$\text{tan}R = \frac{QP}{QR} = \frac{5}{12}$

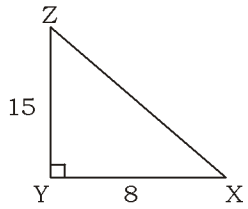
93.(D)



$\angle Z = 90° - 30° = 60°$

$\therefore\ \text{Cos}Z + \frac{1}{3} \Rightarrow \frac{1}{2} + \frac{1}{3} = \frac{5}{6}$

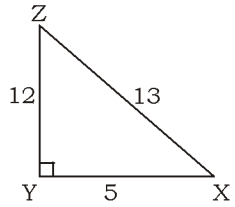
94.(B)



xy = 8 → 16
1 → 2
∴ yz = 15 × 2 = 30

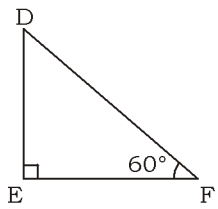
95.(A) $\frac{\sqrt{2}}{3} - \text{Cosec}60° \Rightarrow \frac{\sqrt{2}}{3} - \frac{2}{\sqrt{3}} = \frac{\sqrt{6}-6}{3\sqrt{3}}$

96.(C)



$\text{Sec}Z = \frac{XZ}{YZ} = \frac{13}{12}$

97.(B)



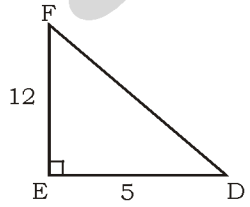
$\angle D = 90° - 60° = 30°$

$\therefore \quad \text{Cot}D - \frac{2}{\sqrt{3}}$

$= \quad \text{Cot}30° - \frac{2}{\sqrt{3}}$

$= \sqrt{3} - \frac{2}{\sqrt{3}} = \frac{3-2}{\sqrt{3}} = \frac{1}{\sqrt{3}}$

98.(D)



$\text{tan}D = \frac{12}{5}$

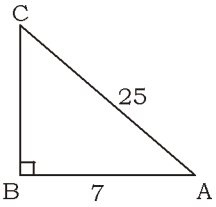
$DF = \sqrt{12^2 + 5^2} = 13$

$\text{sec}F = \frac{EF}{FD} = \frac{12}{13}$

99.(D) $\frac{1}{2} - \text{sec}30°$

$\Rightarrow \quad \frac{1}{2} - \frac{2}{\sqrt{3}} \quad \Rightarrow \quad \frac{\sqrt{3}-4}{2\sqrt{3}}$

100. (B)



$BC = \sqrt{25^2 - 7^2} = 24$

AB = 7 → 14
1 → 2
∴ BC = 1 → 24 × 2 = 48

101. (A)

102. (D)

103. (B)

104. (B)

105. (A)

106. (A)

107. (C)

108. (D)

109. (D)

110. (C)

111. (B)

112. (B)

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(SSC CGL (PRE) – 2021)

1. If $4\sin^2\theta = 3(1 + \cos\theta)$, $0° < \theta < 90°$, then what is the value of $(2\tan\theta + 4\sin\theta - \sec\theta)$?
यदि $4\sin^2\theta = 3(1 + \cos\theta)$ है, $0° < \theta < 90°$ है, तो $(2\tan\theta + 4\sin\theta - \sec\theta)$ का मान ज्ञात करें।
(A) $15\sqrt{3} + 3$ (B) $4\sqrt{15} - 3$
(C) $15\sqrt{3} - 4$ (D) $3\sqrt{15} - 4$

2. The value of

$$\frac{\sin 23°\cos 67° + \sec 52°\sin 38° + \cos 23°\sin 67° + \text{cosec}52°\cos 38°}{\text{cosec}^2 20° - \tan^2 70°}$$ is :

$$\frac{\sin 23°\cos 67° + \sec 52°\sin 38° + \cos 23°\sin 67° + \text{cosec}52°\cos 38°}{\text{cosec}^2 20° - \tan^2 70°}$$ का मान ज्ञात कीजिए-
(A) 4 (B) 0
(C) 3 (D) 2

3. The angle of elevation of the top of an unfinished tower at a point distant 78 m from its base is 30°. How much higher must the tower be raised (in m) so that the angle of elevation of the top of the finished tower at the same point will be 60°?
एक अधूरी मीनार के आधार से 78 मी. की दूरी से अधूरी मीनार के शिखर का उन्नयन कोण 30° है। मीनार को कितना ऊँचा (मी. में) बनाया जाना चाहिए ताकि उसी बिन्दु से तैयार मीनार के शिखर का उन्नयन कोण 60° हो जाए?
(A) $78\sqrt{3}$ (B) $26\sqrt{3}$
(C) 80 (D) $52\sqrt{3}$

4. A vertical pole and a vertical tower are on the same level of ground in such a way that from the top of the pole, the angle of elevation of the top of the tower is 60° and the angle of depression of the bottom of the tower is 30°. If the height of the tower is 76 m, then find the height (in m) of the pole.
एक उर्ध्वाधर खंभा और एक उर्ध्वाधर मीनार समतल जमीन पर इस प्रकार स्थिति है कि खंभे के शीर्ष से मीनार के शिखर का उन्नयन कोण 60° तथा मीनार के तेल का अवनमन कोण 30° है। यदि मीनार की ऊँचाई 76 मी. है, तो खंभे की ऊँचाई (मी. में) ज्ञात कीजिए-
(A) 19 (B) 57
(C) 38 (D) $19\sqrt{3}$

5. If $\cos(A - B) = \frac{\sqrt{3}}{2}$ and $\sec A = 2$, $0° \le A\ 90°$, $0° \le B \le 90°$, then what is the measure of B?
यदि $\cos(A - B) = \frac{\sqrt{3}}{2}$ और $\sec A = 2$, $0° \le A\ 90°$, $0° \le B \le 90°$ है, तो B का माप क्या है ?
(A) 90° (B) 30°
(C) 60° (D) 0°

6. What is the value of $8\sqrt{3}\sin 30°\tan 60° - 3\cos 0° + 3\sin^2 45° + 2\cos^2 30°$.
$8\sqrt{3}\sin 30°\tan 60° - 3\cos 0° + 3\sin^2 45° + 2\cos^2 30°$ का मान ज्ञात करें।
(A) 12 (B) 15
(C) 9 (D) 18

7. If $\sec A = {}^{17}/_{8}$, given that $A < 90°$, what is the value of the following $\frac{34\sin A + 15\cot A}{68\cos A - 16\tan A}$.
यदि $\sec A = {}^{17}/_{8}$ है, जबकि $A < 90°$ है, तो निम्नलिखित का मान क्या है ? $\frac{34\sin A + 15\cot A}{68\cos A - 16\tan A}$
(A) 30 (B) 38
(C) 23 (D) 19

8. If $\tan^2 A + 2\tan A - 63 = 0$ Given that $0 < A < \frac{\pi}{2}$ what is the value of $(2\sin A + 5\cos A)$?
यदि $\tan^2 A + 2\tan A - 63 = 0$ है, दिया गया है कि $0 < A < \frac{\pi}{2}$ है, तो $(2\sin A + 5\cos A)$ का मान ज्ञात करें।
(A) $\frac{19}{\sqrt{50}}$ (B) $\frac{15}{\sqrt{50}}$
(C) $15\sqrt{50}$ (D) $19\sqrt{50}$

9. If $3\sec^2\theta + \tan\theta - 7 = 0$, $0° < \theta < 90°$, then what is the value of $\left(\frac{2\sin\theta + 3\cos\theta}{\text{cosec}\theta + \sec\theta}\right)$ = ?
यदि $3\sec^2\theta + \tan\theta - 7 = 0$, $0° < \theta < 90°$ है तो $\left(\frac{2\sin\theta + 3\cos\theta}{\text{cosec}\theta + \sec\theta}\right)$ का मान कितना होगा ?
(A) $\frac{5}{2}$ (B) $4\sqrt{2}$ (C) $\frac{5}{4}$ (D) 10

10. If cotB = $12/5$, what is the value of secB ?

यदि cotB = $12/5$ है तो secB का मान कितना होगा ?

(A) $13/5$ (B) $12/13$

(C) $13/12$ (D) $5/12$

11. A vertical pole and a vertical tower are on the same level ground in such a way that, from the top of the pole, the angle of elevation of the top of the tower is 60° and the angle of depression of the bottom of the tower is 30°. If the height of the pole is 24 m, then find the height of the tower (in m).

एक ऊर्ध्वाधर खम्भा और एक ऊर्ध्वाधर मीनार एक ही समतल जमीन पर इस प्रकार है कि खम्भे के शिखर से मीनार के शिखर का उन्नयन कोण 60° है तथा मीनार के तल का अवनमन कोण 30° है। यदि खम्भे की ऊँचाई 24 मी. है, तो मीनार की ऊँचाई (मी. में) ज्ञात कीजिए।

(A) $24\left(\sqrt{3}+1\right)$ (B) $24\sqrt{3}\left(\sqrt{3}+1\right)$

(C) 96 (D) 72

12. The value of $1+\sqrt{\frac{\cot\theta+\cos\theta}{\cot\theta-\cos\theta}}$, if $0° < \theta < 90°$, is equal to :

यदि $0° < \theta < 90°$ है, तो $1+\sqrt{\frac{\cot\theta+\cos\theta}{\cot\theta-\cos\theta}}$ का मान ज्ञात कीजिए-

(A) $1 - \sec\theta + \tan\theta$ (B) $1 + \sec\theta - \tan\theta$

(C) $1 - \sec\theta - \tan\theta$ (D) $1 + \sec\theta + \tan\theta$

13. The value of $\left(\frac{1-\cot\theta}{1-\tan\theta}\right)^2 - 1$ when $0° < \theta < 90°$, is equal to :

$\left(\frac{1-\cot\theta}{1-\tan\theta}\right)^2 - 1$ का मान ज्ञात कीजिए, यदि $0° < \theta < 90°$ है।

(A) $\sin^2\theta - 1$ (B) $\sec^2\theta + 1$

(C) $\cos^2\theta - 1$ (D) $\cot^2\theta - 1$

14. $\tan^2A + 5\sec A = 13$, where $0 < A < 90°$. Solve for A (in degrees).

$\tan^2A + 5\sec A = 13$ है, जहाँ $0 < A < 90°$ है। A का माप (डिग्री में) बताइए।

(A) 30 (B) 60

(C) 0 (D) 45

15. If $2k\sin30°\cos30°\cot60° = \frac{\cot^2 30°\sec 60°\tan 45°}{\text{cosec}^2 45°\,\text{cosec}\,30°}$, then find the value of k.

यदि $2k\sin30°\cos30°\cot60° = \frac{\cot^2 30°\sec 60°\tan 45°}{\text{cosec}^2 45°\,\text{cosec}\,30°}$ है, तो k का मान ज्ञात कीजिए।

(A) 1 (B) $3/2$

(C) 3 (D) 6

16. From a point P on a level ground, the angle of elevation of the top of a tower is 30°. If the tower is $110\sqrt{3}$ m high, what is the distance (in m) of point P from the foot of the tower?

समतल भूमि पर किसी बिन्दु P से एक मीनार के शीर्ष का उन्नयन कोण 30° है। यदि मीनार $110\sqrt{3}$ मी. ऊँची है, तो मीनार के पाद से बिन्दु P की दूरी (मी. में) क्या है ?

(A) 110 (B) 330

(C) 220 (D) 115

17. If $5\sin\theta - 4\cos\theta = 0$, $0° < \theta < 90°$, then the value of $\frac{5\sin\theta+2\cos\theta}{5\sin\theta+3\cos\theta}$ is :

यदि $5\sin\theta - 4\cos\theta = 0$, $0° < \theta < 90°$ है, तो $\frac{5\sin\theta+2\cos\theta}{5\sin\theta+3\cos\theta}$ का मान बताइए।

(A) $4/7$ (B) $2/7$

(C) $3/7$ (D) $6/7$

18. Find the value of the following expression :

$$\frac{\tan^3 45° + 4\cos^3 60°}{2\,\text{cosec}^2 45° - 3\sec^2 30° + \sin 30°}$$

निम्नलिखित व्यंजक का मान ज्ञात कीजिए।

$$\frac{\tan^3 45° + 4\cos^3 60°}{2\,\text{cosec}^2 45° - 3\sec^2 30° + \sin 30°}$$

(A) $3/4$ (B) $1+\sqrt{2}$

(C) $4/3$ (D) 3

19. The expression $(\cos^6\theta + \sin^6\theta - 1)(\tan^2\theta + \cot^2\theta + 2) + 3$ is equal to :

व्यंजक $(\cos^6\theta + \sin^6\theta - 1)(\tan^2\theta + \cot^2\theta + 2) + 3$ का मान ज्ञात कीजिए।

(A) 0 (B) –1

(C) 2 (D) 1

20. If $5\sin\theta - 4\cos\theta = 0$, $0° < \theta < 90°$, then the value of $\frac{5\sin\theta - \cos\theta}{5\sin\theta + 3\cos\theta}$ is :

यदि $5\sin\theta - 4\cos\theta = 0$, $0° < \theta < 90°$ है, तो $\frac{5\sin\theta - \cos\theta}{5\sin\theta + 3\cos\theta}$ का मान ज्ञात कीजिए।

(A) $\frac{6}{7}$ (B) $\frac{3}{7}$

(C) $\frac{4}{7}$ (D) $\frac{2}{7}$

21. If $\sin^2\theta - \cos^2\theta - 3\sin\theta + 2 = 0$, $0° < \theta < 90°$, then what is the value of $1 + \sec\theta + \tan\theta$?

यदि $\sin^2\theta - \cos^2\theta - 3\sin\theta + 2 = 0$, $0° < \theta < 90°$, तो $1 + \sec\theta + \tan\theta$ का मान कितना होगा ?

(A) $-1 - \sqrt{3}$ (B) $-1 + \sqrt{3}$

(C) $1 + \sqrt{3}$ (D) $1 - \sqrt{3}$

22. The length of ths shadow on the ground of a tall tree of height 45 m is $15\sqrt{3}$ m. What is the angle (in degrees) of elevation of the sun?

45 मी. ऊँचाई वाले एक पेड़ की जमीन पर छाया की लम्बाई $15\sqrt{3}$ मी. है। सूर्य का उन्नयन कोण (डिग्री में) क्या है ?

(A) 60° (B) 90°

(C) 45° (D) 30°

23. $(\sec\phi - \tan\phi)^2 (1 + \sin\phi)^2 \div \cos\phi^2 = ?$

$(\sec\phi - \tan\phi)(1 + \sin\phi)^2 \div \cos\phi^2$ का मान ज्ञात कीजिए।

(A) 1 (B) –1

(C) $\cot^2\phi$ (D) $\cos^2\phi$

24. If $A = 60°$, what is the value of :

$$\frac{[8\cos A + 7\sec A - \tan^2 A]}{10\sin\frac{A}{2}}$$

यदि $A = 60°$ है, तो $\frac{[8\cos A + 7\sec A - \tan^2 A]}{10\sin\frac{A}{2}}$ का मान ज्ञात करें।

(A) 3 (B) 15

(C) 5 (D) 10

25. If $\sec^2\theta + \tan^2\theta = 3\frac{1}{2}$, $0° < \theta < 90°$, then $(\cos\theta + \sin\theta)$ is equal to :

यदि $\sec^2\theta + \tan^2\theta = 3\frac{1}{2}$, $0° < \theta < 90°$ है, तो $(\cos\theta + \sin\theta)$ का मान इनमें से किसके बराबर है ?

(A) $\frac{9 + 2\sqrt{5}}{6}$ (B) $\frac{2 + \sqrt{5}}{3}$

(C) $\frac{1 + \sqrt{5}}{3}$ (D) $\frac{1 + \sqrt{5}}{6}$

26. The expresssion $(\cos^6\theta + \sin^6\theta - 1)(\tan^2\theta + \cot^2\theta + 2) + 1$ is equal to :

व्यंजक $(\cos^6\theta + \sin^6\theta - 1)(\tan^2\theta + \cot^2\theta + 2) + 1$ का मान ज्ञात कीजिए।

(A) 1 (B) 0

(C) –2 (D) –1

27. The value of $2 - \sqrt{\frac{\cot\theta + \cos\theta}{\cot\theta - \cos\theta}}$, when $0° < \theta < 90°$ is equal to :

$2 - \sqrt{\frac{\cot\theta + \cos\theta}{\cot\theta - \cos\theta}}$ का मान बताइए, जबकि $0° < \theta < 90°$ है।

(A) $2 - \sec\theta - \tan\theta$ (B) $2 + \sec\theta - \tan\theta$

(C) $2 - \sec\theta + \tan\theta$ (D) $2 + \sec\theta + \tan\theta$

28. A poster is on top of a building. A person is standing on the ground at a distnace of 50 m from the building. The angles of elevation to the top of the poster and bottom of the poster are 45° and 30°, respectively. What is 200% of the height (in m) of the poster?

एक इमारत के शीर्ष पर एक पोस्टर लगा है। एक व्यक्ति इमारत से 50m की दूरी पर जमीन पर खड़ा है। पोस्टर के ऊपरी और पोस्टर के निचले सिरे के उन्नयन कोण क्रमश: 45° और 30° है। पोस्टर की ऊंचाई (मी. में) का 200% कितना है ?

(A) $\frac{50}{3}(3 - \sqrt{3})$ (B) $\frac{100}{3}(3 - \sqrt{3})$

(C) $\frac{25}{3}(3 - \sqrt{3})$ (D) $\frac{75}{3}(3 - \sqrt{3})$

29. From the top of a 195-m high cliff, the angles of depression of the top and bottom of a tower are 30° and 60°, respectively. Find the height of the tower (in m).
एक 195 m ऊंची चट्टान की चोटी से, एक मीनार के शीर्ष और पाद के अवनमन कोण क्रमश: 30° और 60° हैं। मीनार की ऊँचाई (m में) ज्ञात कीजिए।
(A) 65 (B) 195
(C) 130 (D) $195\sqrt{3}$

30. If A = 10°, what is the value of :

$$\frac{12\sin 3A + 5\cos(5A - 5°)}{9\sin\frac{9A}{2} - 4\cos(5A + 10°)}?$$

यदि A = 10° है तो $\frac{12\sin 3A + 5\cos(5A - 5°)}{9\sin\frac{9A}{2} - 4\cos(5A + 10°)}$ का मान ज्ञात करें।

(A) $\frac{6\sqrt{2}+5}{(9+2\sqrt{2})}$ (B) $\frac{6\sqrt{2}-5}{(9-2\sqrt{2})}$

(C) $\frac{6\sqrt{2}+5}{(9-2\sqrt{2})}$ (D) $\frac{(9-2\sqrt{2})}{(6\sqrt{2}+5)}$

31. If $2\sin^2\theta + 3\cos\theta = 3, 0° < \theta < 90°$, then the value of $(\sec^2\theta + \cot^2\theta)$ is.
यदि $2\sin^2\theta + 3\cos\theta = 3, 0° < \theta < 90°$ है, तो $(\sec^2\theta + \cot^2\theta)$ का मान ज्ञात कीजिए।
(A) $4\frac{1}{3}$ (B) $4\frac{1}{2}$ (C) $3\frac{2}{3}$ (D) $3\frac{1}{3}$

32. The length of the shadow on the ground of a tall tree of height 30 m is $10\sqrt{3}$ m. What is the angle (in degrees) of elevation of the sun?
30 m ऊंचे पेड़ की जमीन पर निर्मित छाया की लंबाई $10\sqrt{3}$ है। सूर्य का उन्नयन कोण (डिग्री में) क्या है ?
(A) 60 (B) 15
(C) 30 (D) 45

33. If A = 60°, what is the value of

$$\frac{10\sin\frac{A}{2} + 8\cos A}{7\sin\frac{3A}{2} - 12\cos A}?$$

यदि A = 60° है, तो $\frac{10\sin\frac{A}{2} + 8\cos A}{7\sin\frac{3A}{2} - 12\cos A}$ का मान ज्ञात करें।

(A) 10 (B) 12
(C) 9 (D) 7

34. If $3\sin^2\theta + 4\cos\theta - 4 = 0, 0° < \theta < 90°$, then the value of $(\text{cosec}^2\theta + \cot^2\theta)$ is :
यदि $3\sin^2\theta + 4\cos\theta - 4 = 0, 0° < \theta < 90°$ है तो $(\text{cosec}^2\theta + \cot^2\theta)$ का मान ज्ञात कीजिए।
(A) $5/4$ (B) $25/3$ (C) $4/3$ (D) $17/9$

35. A 20m long ladder rests against a wall so that the angle between the ladder and the wall is 30°. How far (in m) is the base of the ladder from the wall ?
एक 20 m लंबी सीढ़ी एक दीवार के सहारे इस प्रकार से टिकी हुई है कि सीढ़ी और दीवार के बीच का कोण 30° है। सीढ़ी का आधार दीवार से कितनी दूरी (m में) पर है ?
(A) $10\sqrt{3}$ (B) $20\sqrt{3}$
(C) 20 (D) 10

36. If $\cos B = \frac{5}{7}$, What is the value of cosec B + cot B?
Given that $0 < B < \frac{\pi}{2}$
यदि $\cos B = \frac{5}{7}$ है, तो cosec B + cot B का मान ज्ञात करें।
दिया गया कि $0 < B < \frac{\pi}{2}$ है।

(A) $\frac{5}{\sqrt{6}}$ (B) $\frac{\sqrt{6}}{12}$ (C) $\frac{7}{\sqrt{6}}$ (D) $\sqrt{6}$

37. If $\cos 53° = \frac{x}{y}$, then sec 53° + cot37° is equal to:
यदि $\cos 53° = \frac{x}{y}$ है, तो sec 53° + cot37° का मान क्या है ?

(A) $\frac{x + \sqrt{y^2 - x^2}}{y}$ (B) $\frac{x + \sqrt{y^2 - x^2}}{x}$

(C) $\frac{y + \sqrt{y^2 - x^2}}{x}$ (D) $\frac{y + \sqrt{y^2 - x^2}}{y}$

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38. Simplify the following expression :
निम्नलिखित व्यंजक का मान बताइए:

$$\frac{\cos A}{1-\tan A}+\frac{\sin A}{1-\cot A}-\sin A$$

(A) 1+cosA (B) (1+sinA)cosA
(C) 1+sinA (D) cosA

39. What is the angle of elevation of the sun when the shadow of a 9-m high pole is $3\sqrt{3}$ m long?
9 m ऊंचे खंभे की छाया $3\sqrt{3}$ m लंबी होने पर सूर्य का उन्नयन कोण क्या होगा ?
(A) 30° (B) 45°
(C) 60° (D) 90°

40. If $\cot^2\alpha + \tan^2\alpha = 2$, $0° \le \alpha \le 90°$, then find the value of α
यदि $\cot^2\alpha + \tan^2\alpha = 2$ जहाँ $0° \le \alpha \le 90°$ है, तो α का मान ज्ञात कीजिए।
(A) 0° (B) 45°
(C) 60° (D) 90°

41. The tops of two poles of heights 18m and 30.5 m are connected by a wire. if the wire makes angle of 30° with the horizontal, what is the length (in m) of the wire?
18 m और 30.5 m ऊँचाई वाले दो खंभों के शीर्ष एक तार से जुड़े हुए हैं। यदि तार क्षैतिज से 30° का कोण बनाता है, तो तार की लंबाई (m में) क्या है ?
(A) 20 (B) 25
(C) 28 (D) 36

42. Simplify the following expression :
निम्नांकित व्यंजक का मान ज्ञात कीजिए:
$\text{cosec}^4A(1-\cos^4A) - 2\cot^2A - 1$
(A) $\sin^2A$ (B) cosec^2A
(C) 1 (D) 0

43. If 6 tanA(tanA + 1) = 5 – tanA, Given that $0 < A < \frac{\pi}{2}$ what is the value of (sinA + cosA)?
यदि 6 tanA (tanA + 1) = 5 – tanA है, दिया गया है कि $0 < A < \frac{\pi}{2}$ है, तो (sinA + cosA) का मान ज्ञात करें।
(A) $3\sqrt{5}$ (B) $\frac{5}{\sqrt{3}}$ (C) $5\sqrt{3}$ (D) $\frac{3}{\sqrt{5}}$

44. If $\tan B = \frac{5}{3}$, what is the value of $\frac{\text{cosec}B + \sin B}{\cos B - \sec B}$?
यदि $\tan B = \frac{5}{3}$ है, तो $\frac{\text{cosec}B + \sin B}{\cos B - \sec B}$ का मान क्या है ?
(A) $-\frac{177}{125}$ (B) $-\frac{59}{15}$ (C) $\frac{59}{15}$ (D) $\frac{177}{125}$

45. A and B are two points on the same side of a ground, 50 metres apart. The angles of elevation of these points to the top of a tree are 60° and 30°, respectively. What is 40% of the height of the tree (in m)?
A और B किसी पेड़ के एक ही तरफ स्थित दो बिंदु हैं, जिनके बीच की दूरी 50 मीटर है। इन बिंदुओं से पेड़ की चोटी के उन्नयन कोण क्रमश: 60° और 30° हैं। पेड की ऊँचाई का 40% (मीटर में) कितना है ?
(A) $10\sqrt{3}$ (B) $15\sqrt{3}$
(C) $5\sqrt{3}$ (D) $25\sqrt{3}$

46. If $\tan^2 A - 6\tan A + 9 = 0$, $0 < A < 90°$, What is the value of $6\cot A + 8\sqrt{10}\cos A$?
यदि $\tan^2 A - 6\tan A + 9 = 0$, $0 < A < 90°$ है, तो $6\cot A + 8\sqrt{10}\cos A$ का मान ज्ञात करें।
(A) $10\sqrt{10}$ (B) 14
(C) 10 (D) $8\sqrt{10}$

47. If A = 30°, what is the value of. $\frac{[8\sin A + 11\text{cosec}A - \cot^2 A]}{10\cos 2A}$?
यदि A = 30° है, तो $\frac{[8\sin A + 11\text{cosec}A - \cot^2 A]}{10\cos 2A}$ का मान ज्ञात करें।
(A) $5\frac{1}{5}$ (B) $4\frac{3}{5}$ (C) $4\frac{2}{5}$ (D) $3\frac{4}{5}$

48. If (2cosA + 1)(2cosA–1) = 0, $0° < A \le 90°$, then find the value of A.
यदि (2cosA + 1)(2cosA–1) = 0, $0° < A \le 90°$ है, तो A का मान ज्ञात कीजिए।
(A) 90° (B) 45°
(C) 30° (D) 60°

49. If cosec A = secB, where A and B are acute angles, then what is the value of (A + B)?
यदि cosec A = secB है, जहाँ A और B न्यून कोण हैं, तो (A + B) का मान क्या है ?
(A) 0° (B) 135°
(C) 90° (D) 45°

50. If $\frac{\sin^2\phi - 3\sin\phi + 2}{\cos^2\phi} = 1$, where $0° < \phi < 90°$, then what is the value of $(\cos2\phi - \sin3\phi + \text{cosec}2\phi)$

यदि $\frac{\sin^2\phi - 3\sin\phi + 2}{\cos^2\phi} = 1$ है, जहां $0° < \phi < 90°$ है, तो $(\cos2\phi - \sin3\phi + \text{cosec}2\phi)$ का मान क्या है ?

(A) $\frac{-3 - 4\sqrt{3}}{6}$ (B) $\frac{-3 + 4\sqrt{3}}{6}$

(C) $\frac{3 + 4\sqrt{3}}{6}$ (D) $\frac{3 - 4\sqrt{3}}{6}$

51. A ladder 18m long rests aginst a wall so that the angle between the ladder and the wall is 30°. How far (in m) is the base of the ladder from the wall?

एक 18 m लंबी सीढ़ी किसी दीवार के सहारे ऐसे टिकी हुई है कि सीढ़ी और दीवार के बीच का कोण 30° है। सीढ़ी का आधार दीवार से कितनी दूर (m में) है ?

(A) 18 (B) $9\sqrt{3}$

(C) 9 (D) $18\sqrt{3}$

52. If $\sec^2\alpha + 4\cos^2\alpha = 4$ and $0° \le \alpha \le 90°$, then find the value of α.

यदि $\sec^2\alpha + 4\cos^2\alpha = 4$ और $0° \le \alpha \le 90°$ है, तो a का मान ज्ञात कीजिए।

(A) 30° (B) 0°

(C) 45° (D) 60°

53. If $\tan A = \frac{2.4}{0.7}$ what is the value of $(50\cos A + 24\cot A)$?

यदि $\tan A = \frac{2.4}{0.7}$ है, तो $(50\cos A + 24\cot A)$ का मान ज्ञात करें।

(A) 21 (B) 37

(C) 26 (D) 34

54. The length of the shadow of a vertical tower on level ground increases by 8.4 cm when the altitude of the sun changes from 45° to 30°. What is the height of the tower (in m)?

जब सूर्य का उन्नयन कोण 45° से 30° हो जाता है, तो समतल भूमि पर एक ऊर्ध्वाधर मीनार की छाया की लंबाई 8.4 cm बढ़ जाती है। मीनार की ऊँचाई (m में) कितनी है ?

(A) $4.2\left(\sqrt{3} - 1\right)$ (B) $8.4\left(\sqrt{3} + 3\right)$

(C) $4.2\left(\sqrt{3} + 3\right)$ (D) $4.2\left(\sqrt{3} + 1\right)$

Solution

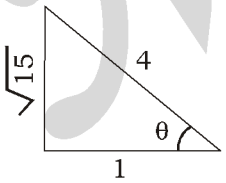
1. (D) $4\sin^2\theta = 3(1+\cos\theta)$

$\Rightarrow 4 - 4\cos^2\theta - 3 - 3\cos\theta = 0$

$\Rightarrow 4\cos^2\theta + 3\cos\theta - 1 = 0$

$\cos\theta = \frac{1}{4}, -1(x)$

$\Rightarrow \cos\theta = \frac{1}{4}$



$\therefore 2\tan\theta + 4\sin\theta - \sec\theta$

$= 2\times\sqrt{15} + 4\times\frac{\sqrt{15}}{4} - \frac{4}{1}$

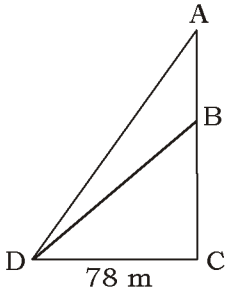
$= 2\sqrt{15} + \sqrt{15} - 4$

$= 3\sqrt{15} - 4$

2. (C) $= \frac{\sin23°.\sin23° + \text{cosec}\,38°.\sin38° + \cos23°.\cos23° + \sec38°.\cos38°}{\text{Sec}^2 70° - \tan^2 70°}$

$= \frac{\sin^2 23° + \cos^2 23° + 1 + 1}{1} = \frac{3}{1} = 3$

3. (D) DC = 78m (given)



AB : BC = 1 : 2

$\Rightarrow BC = \frac{78}{\sqrt{3}} = 26\sqrt{3}$

$AB = 52\sqrt{3}$

4. (A) BD = 76m (given)

$AB = EC = x\sqrt{3}$

$\tan60° = \sqrt{3} = \frac{DC}{EC}$

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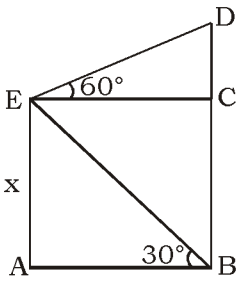


$\Rightarrow DC = \sqrt{3} \times x\sqrt{3}$

$DC = 3x$

ATQ,

$3x + x = 76$

$\Rightarrow x = 19$

$\therefore$ height of pole = 19m.

5. (B) $A - B = 30°$

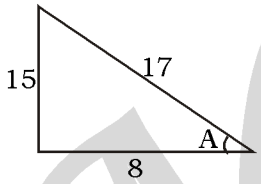
$A = 60°$

$\Rightarrow B = 30°$

6. (A) $= 8\sqrt{3} \times \frac{1}{2} \times \sqrt{3} - 3 + \frac{3}{2} + 2 \times \frac{3}{4}$

$= 9 + \frac{3}{2} + \frac{3}{2} \Rightarrow 12$

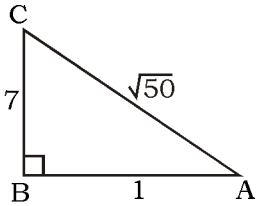
7. (D) $\sec A = \frac{17}{8}, \frac{34\sin A + 15\cot A}{68\cos A - 16\tan A}$



$$= \frac{34 \times \frac{15}{17} + 15 \times \frac{8}{15}}{68 \times \frac{8}{17} - 16 \times \frac{15}{8}}$$

$$= \frac{30 + 8}{32 - 30} = \frac{38}{2} = 19$$

8. (A) $\tan^2 A + 2\tan A - 63 = 0$



$\Rightarrow (\tan + 97)(\tan A - 7) = 0$

$\tan A = 7$

$\therefore 2\sin A + 5\cos A$

$= 2 \times \frac{7}{\sqrt{50}} + 5 \times \frac{1}{\sqrt{50}} = \frac{19}{\sqrt{50}}$

9. (C) $3\sec^2\theta + \tan\theta - 7 \Rightarrow 0$

$3(1 + \tan^2\theta) + \tan\theta - 7 \Rightarrow 0$

$3\tan^2\theta + \tan\theta - 4 = 0$

$3\tan^2\theta + 4\tan\theta - 3\tan\theta - 4$

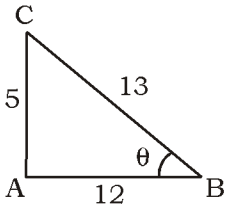
$\tan\theta(3\tan\theta + 4) - 1(3\tan\theta + 4)$

$\tan\theta \Rightarrow 1$

$\theta = 45°$

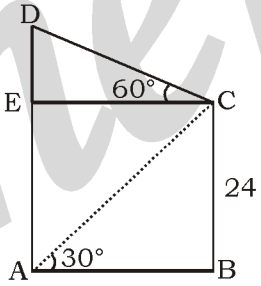
$$\frac{2\sin\theta + 3\cos\theta}{\operatorname{cosec}\theta + \sec\theta} \Rightarrow \frac{2 \times \frac{1}{\sqrt{2}} + \frac{3}{\sqrt{2}}}{2\sqrt{2}} \Rightarrow \frac{5}{4}$$

10. (A)



$\cot B \Rightarrow \frac{12}{5}\left(\frac{A}{L}\right)$ $\sec B = \frac{13}{5}\left(\frac{K}{L}\right)$

11. (C)



(Pole) $BC \Rightarrow 24$

(Tower) $AD \Rightarrow ?$ $(AE + ED)$

ΔABC

$$\text{Tan } 30° \Rightarrow \frac{BC}{AB} \Rightarrow \frac{1}{\sqrt{3}} \Rightarrow \frac{24}{AB}$$

$AB \Rightarrow 24\sqrt{3} = CE$

ΔDEC

$$\text{Tan } 60° \Rightarrow \frac{DE}{EC}$$

$$\sqrt{3} \Rightarrow \frac{DE}{24\sqrt{3}}$$

Height of Tower $\Rightarrow 72 + 24 \Rightarrow 96$

12. (D) $1 + \sqrt{\frac{\cot\theta + \cos\theta}{\cot\theta - \cos\theta}}$

$$\Rightarrow 1 + \sqrt{\frac{\frac{\cos\theta}{\sin\theta} + \cos\theta}{\frac{\cos\theta}{\sin\theta} - \cos\theta}}$$

$$\Rightarrow 1+\sqrt{\frac{1+\sin\theta}{1-\sin\theta}\times\frac{(1+\sin\theta)}{(1+\sin\theta)}}$$

$$= 1+\sqrt{\frac{(1+\sin\theta)^2}{\cos^2\theta}} \Rightarrow 1+\sec\theta+\tan\theta$$

13. (D) $\left(\frac{1-\cot\theta}{1-\tan\theta}\right)^2-1$

$$\left(\frac{1-\cot\theta}{1-\frac{1}{\cot\theta}}\right)^2-1 \Rightarrow \left(\frac{1-\cot\theta}{\frac{\cot-1}{\cot}}\right)^2-1$$

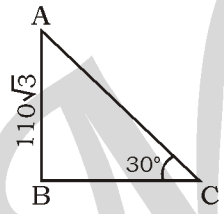
$\cot^2\theta - 1$

14. (B) $\tan^2A + 5\sec A = 13$
$\sec^2A + 5\sec A - 14 = 0$
$(\sec A-2)(\sec A+7)$
$\sec A = 2$
$A = 60°$

15. (C) $K=\frac{\cot^2 30°\sec 60°\times\tan 45}{2\times\text{cosec}^2 45.\text{cosec}30°.\cos 30°.\cot 60°\times\sin 30°}$

$$K = \frac{3\times2\times1}{2\times2\times\frac{\sqrt{3}}{2}\times\frac{1}{\sqrt{3}}} = 3$$

16. (B)



$$\tan 30° = \frac{110\sqrt{3}}{BC} \Rightarrow \frac{1}{\sqrt{3}} = \frac{110\sqrt{3}}{BC}$$

$BC = 330$

17. (D) $5\sin\theta = 4\cos\theta \Rightarrow \frac{\sin\theta}{\cos\theta} = \frac{4}{5}$

$$\frac{(5\sin\theta+2\cos\theta)\times\frac{1}{\cos\theta}}{(5\sin\theta+3\cos\theta)\times\frac{1}{\cos\theta}} \Rightarrow \frac{5\frac{\sin\theta}{\cos\theta}+2}{5\frac{\sin\theta}{\cos\theta}+3}$$

$$\Rightarrow \frac{5\left(\frac{4}{5}\right)+2}{5\left(\frac{4}{5}\right)+3} \Rightarrow \frac{4+2}{4+3} = \frac{6}{7}$$

18. (D) $\frac{(1)^3+4\left(\frac{1}{2}\right)^3}{2\left(\sqrt{2}\right)^2-3\left(\frac{2}{\sqrt{3}}\right)^2+\frac{1}{2}} \Rightarrow \frac{1+\frac{1}{2}}{4-4+\frac{1}{2}} \Rightarrow \frac{1\frac{1}{2}}{\frac{1}{2}} = 3$

19. (A) $(\cos^6\theta + \sin^6\theta - 1)(\tan^2\theta + \cot^2\theta + 2) + 3$
We know that,
$\Rightarrow \sin^6\theta + \cos^6\theta = (\sin^2\theta+\cos^2\theta)^3 - 3\sin^2\theta.\cos^2\theta$
$\Rightarrow (1 - 3\sin^2\theta.\cos^2\theta - 1)(\tan\theta + \cot\theta)^2 + 3$
$\Rightarrow (-3.\sin^2\theta.\cos^2\theta)(\tan\theta + \cot\theta)^2 + 3$

$$\Rightarrow -3(\sin^2\theta.\cos^2\theta)\left(\frac{\sin^2\theta+\cos^2\theta}{\cos\theta.\sin\theta}\right)^2+3$$

$$\Rightarrow -3(\sin^2\theta.\cos^2\theta)\left(\frac{1}{\sin^2\theta.\cos^2\theta}\right)+3$$

20. (B) $5\sin\theta = 4\cos\theta \Rightarrow \frac{\sin\theta}{\cos\theta} = \frac{4}{5}$

$$\frac{(5\sin\theta-\cos\theta)\frac{1}{\cos\theta}}{(5\sin\theta+3\cos\theta)\frac{1}{\cos\theta}} \Rightarrow \frac{5(4/5)-1}{5(4/5)+3}$$

$$\Rightarrow \frac{4-1}{4+3} = \frac{3}{7}$$

21. (C) $(\sin^2\theta - \cos^2\theta) - 3\sin\theta + 2 = 0$
$(\sin^2\theta - 1 + \sin^2\theta) - 3\sin\theta + 2 = 0$
$\Rightarrow 2\sin^2\theta - 1 - 3\sin\theta + 2 = 0$
$\Rightarrow 2\sin^2\theta - 3\sin\theta + 1 = 0$

$$\sin\theta = -\frac{-(-3)+\sqrt{9-4(2)(1)}}{2(2)}, \frac{-(-3)-\sqrt{9-4(2)(1)}}{2(2)}$$

$$\Rightarrow \frac{1}{2}, 1$$

$\because \theta = 0° < \theta < 90°$

So, $\sin\theta = \frac{1}{2}$

$\theta = 30°$
$1 + \sec 30° + \tan 30°$

$$\Rightarrow 1+\frac{2}{\sqrt{3}}+\frac{1}{\sqrt{3}} \Rightarrow \frac{\sqrt{3}+3}{\sqrt{3}}$$

$$\Rightarrow 1+\sqrt{3}$$

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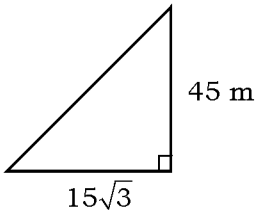
22. (A)



$\tan\theta = \frac{45}{15\sqrt{3}} = \sqrt{3}$

$\theta = 60°$

23. (A) $(\sec\phi - \tan\phi)^2 . \frac{(1+\sin\phi)^2}{\cos\phi^2}$

$\Rightarrow (\sec\phi - \tan\phi)^2 . (\sec\phi + \tan\phi)^2$

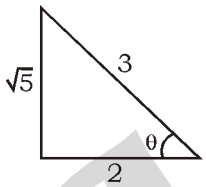
$\Rightarrow \sec\phi - \tan\phi = \frac{1}{\sec\phi + \tan\phi}$

$= \frac{1}{(\sec\phi + \tan\phi)^2} \times (\sec\phi + \tan\phi)^2 = 1$

24. (A) $\frac{(8\cos 60 + 7\sec 60° - \tan^2 60)}{10\sin 30°}$

$\frac{4 + 14 - 3}{5} \Rightarrow 3$

25. (B)



$(1+\tan^2\theta)+\tan^2\theta \Rightarrow 3\frac{1}{2}$

$2\tan^2\theta = \frac{5}{2} \Rightarrow \tan\theta = \frac{\sqrt{5}}{2}$

$\cos\theta + \sin\theta \Rightarrow \frac{2}{3} + \frac{\sqrt{5}}{3} \Rightarrow \frac{2+\sqrt{5}}{3}$

26. (C) If $\theta = 45°$

$(\cos 645° + \sin 6\,45 - 1)$ $(\tan^2 45° + \cot^2 45 + 2) + 1$

$\frac{-3}{4} \times 4 + 1$

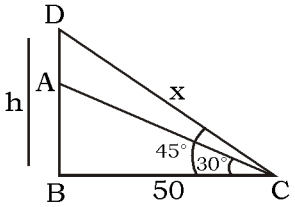
-2

27. (A) $2 - \sqrt{\frac{\frac{\cos\theta}{\sin\theta} + \cos\theta}{\frac{\cos\theta}{\sin\theta} - \cos\theta}}$

$\Rightarrow 2 - \sqrt{\frac{1+\sin\theta}{1-\sin\theta} \times \frac{1+\sin\theta}{1+\sin\theta}}$

$\Rightarrow 2 - \frac{1+\sin\theta}{\cos\theta} = 2 - \sec\theta - \tan\theta$

28. (B)



ΔABC

$\tan 30° = \frac{1}{\sqrt{3}} = \frac{AB}{50} \Rightarrow AB = \frac{50}{\sqrt{3}}$

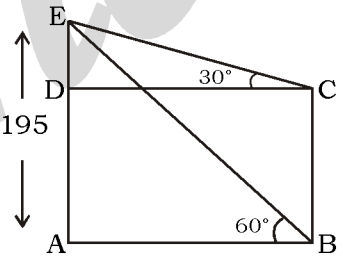
ΔDBC

$\tan 45° = 1 = \frac{BD}{50} \Rightarrow 1 = \frac{\frac{50}{\sqrt{3}} + h}{50}$

$h = 50 - \frac{50}{\sqrt{3}} \Rightarrow 200 = \frac{100(3-\sqrt{3})}{3}$

$h = \frac{(50)(3-\sqrt{3})}{3}$

29. (C)



AE $\Rightarrow$ 195

$\tan 60° = \frac{195}{AB} = \sqrt{3}$

$AB = \frac{195}{\sqrt{3}}\left(\frac{\sqrt{3}}{\sqrt{3}}\right) \Rightarrow 65\sqrt{3}$ (DC)

$\tan 30° = \frac{h}{65\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

$h = 65$

$195 - 65 \Rightarrow 130$

30. (C) $A = 10°$

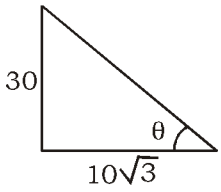
$\frac{12\sin 30° + 5\cos 45°}{9\sin 45° - 4\cos 60°}$

$\frac{6 + \frac{5}{\sqrt{2}}}{\frac{9}{\sqrt{2}} - 2} = \frac{6\sqrt{2}+5}{9-2\sqrt{2}}$

31. (A) $2(1-\cos^2\theta) + 3\cos\theta = 3$
$2\cos^2\theta - 3\cos+1 = 0$
$(2\cos\theta-1)(\cos\theta-1)$
$\theta = 60°$

$(4)+\frac{1}{3} \Rightarrow 4\frac{1}{3}$

32. (A)



$\frac{P}{B} \Rightarrow \frac{30}{10\sqrt{3}} \Rightarrow \sqrt{3}$

$\tan q \Rightarrow \sqrt{3} = \theta \Rightarrow 60°$

33. (C) $\frac{10\sin 30° + 8\cos 60°}{7\sin 90° - 12\cos 60°} \Rightarrow$

$\frac{5+4}{7-6} \Rightarrow 9$

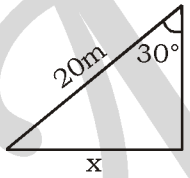
34. (A) $3(1-\cos^2\theta)+4\cos\theta - 4 = 0$
$3-3\cos^2\theta+4\cos\theta-4 = 0$
$3\cos^2\theta - 4\cos\theta-1 = 0$
$(3\cos\theta-1)(\cos\theta-1) = 0$

$\cos\theta = \frac{1}{3}$

$\operatorname{cosec}^2\theta + \cot^2\theta$

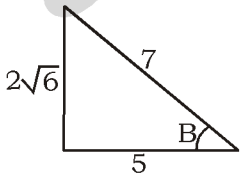
$\Rightarrow \left(\frac{3}{\sqrt{8}}\right)^2 + \left(\frac{1}{\sqrt{8}}\right)^2 \Rightarrow \frac{9}{8} + \frac{1}{8} \Rightarrow \frac{5}{4}$

35. (D)



$\sin 30° = \frac{x}{20} = \frac{1}{2} \Rightarrow x = 10m$

36. (D)



$\cos B = \frac{5}{7}$

$\operatorname{cosec} B + \cot B \Rightarrow \frac{7}{2\sqrt{6}} + \frac{5}{2\sqrt{6}}$

$\Rightarrow \frac{12}{2\sqrt{6}} = \sqrt{6}$

37. (C) $\sec 53° + \cot 37°$

$\Rightarrow \frac{1}{\cos 53°} + \tan 53° \Rightarrow \frac{1+\sin 53°}{\cos 53°}$

$= \frac{1+\frac{\sqrt{y^2-x^2}}{y}}{\frac{x}{y}} = \frac{\left(y+\sqrt{y^2-x^2}\right)}{yx}$

$\Rightarrow \frac{y+\sqrt{y^2-x^2}}{x}$

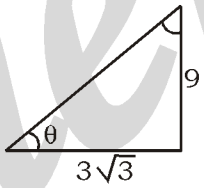
38. (D) $\frac{\cos\theta}{1-\frac{\sin\theta}{\cos\theta}} + \frac{\sin\theta}{1-\frac{\cos\theta}{\sin\theta}} - \sin\theta$

$= \frac{\cos^2\theta}{\cos\theta-\sin\theta} - \frac{\sin^2\theta}{\cos\theta-\sin\theta} - \sin\theta$

$= \frac{(\cos^2\theta-\sin^2\theta)}{(\cos\theta-\sin\theta)} - \sin\theta$

$= \cos\theta + \sin\theta - \sin\theta = \cos\theta$

39. (C)



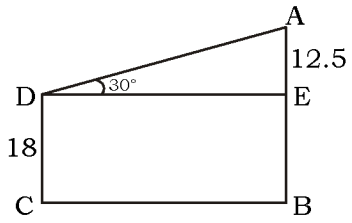
$\tan\theta = \frac{9}{3\sqrt{3}}$

$\Rightarrow \tan\theta = \frac{3}{\sqrt{3}} = \sqrt{3}$

$\Rightarrow \theta = 60°$

40. (B) $\cot^2 2 + \tan^2\alpha = 2$
put $\alpha = 45°$

41. (B)



AB = 30.5m
CD = 18 m
$\Rightarrow$ AE = 12.5

$\Rightarrow \sin 30° = \frac{12.5}{x}$

$\Rightarrow \frac{1}{2} = \frac{12.5}{x}$

$\Rightarrow$ x = 25 m
$\therefore$ length of wire = 25 m

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42. (D) $\text{cosec}^4a\,(1-\cos^4A)-2\cot^2A-1$

Put $A = 45°$

$$= 4\left(1-\frac{1}{4}\right)-2-1$$

$$= 4-1-3 = 0$$

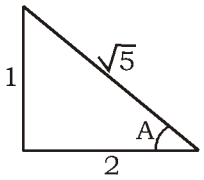
43. (D) $6\tan A(\tan A+1) = 5-\tan A$

$\Rightarrow 6\tan^2A+7\tan A-5=0$

$\Rightarrow 6\tan^2A+10\tan A-3\tan A-5=0$

$\Rightarrow 2\tan A(3\tan A+5)-1(3\tan A+5)=0$

$$\Rightarrow \tan A = \frac{1}{2}$$



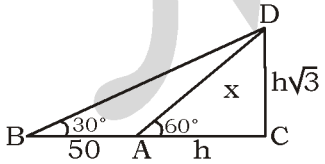
$$\therefore \sin A+\cos A=\frac{1}{\sqrt{5}}+\frac{2}{\sqrt{5}}=\frac{3}{\sqrt{5}}$$

44. (A) $\tan B = \frac{5}{3}$

$$\Rightarrow \frac{\text{cosec}B+\sin B}{\cos B-\sec B}=\frac{\frac{\sqrt{34}}{5}+\frac{5}{\sqrt{34}}}{\frac{3}{\sqrt{34}}-\frac{\sqrt{34}}{3}}$$

$$=\frac{\frac{34+25}{5\sqrt{34}}}{\frac{9-34}{3\sqrt{34}}}=\frac{-59\times3}{25\times5}=\frac{-177}{125}$$

45. (A)



let AC = h

$\therefore$ CD = $h\sqrt{3}$

$$\Rightarrow \frac{1}{\sqrt{3}}=\frac{h\sqrt{3}}{h+50}$$

$\Rightarrow h = 25$

height of tree = $25\sqrt{3}$

$$\Rightarrow 40\%\text{ of }25\sqrt{3} = \frac{2}{5}\times25\sqrt{3} = 10\sqrt{3}$$

46. (C) $\tan^2A-6\tan A+9=0$

$\Rightarrow (\tan A-3)^2=0$

$\tan A = 3$

$$\therefore 6\cot A+8\sqrt{10}\cos A = 6\times\frac{1}{3}+8\sqrt{10}\times\frac{1}{\sqrt{10}}$$

$= 2 + 8 = 10$

47. (B) $\dfrac{8\sin30°+11\text{cosec}30°-\cot^230°}{10\cos60°}$

$$\Rightarrow \frac{8\left(\frac{1}{2}\right)+11(2)-\left(\sqrt{3}\right)^2}{10\left(\frac{1}{2}\right)}\Rightarrow\frac{4+22-3}{5}$$

$$\Rightarrow \frac{23}{5}\Rightarrow 4\frac{3}{5}$$

48. (D) $(2\cos A+1)(2\cos A-1)=0$

So either $2\cos A+1=0$ or $2\cos A-1=0$

$\therefore A = 0 < A < 90°$

So, $2\cos A-1=0$ $\cos A=\frac{1}{2}$

So, $A = 60°$

49. (C) $\text{cosec}A = \sec B \Rightarrow \text{cosec}A = \text{cosec}(90-B)$

$\Rightarrow A = 90-B$ Þ $A+B = 90°$

50. (B) $\sin^2\phi-3\sin\phi+2=\cos^2\phi$

$\Rightarrow \sin^2\phi-3\sin\phi+2=1-\sin^2\phi$

$\Rightarrow 2\sin^2\phi-3\sin\phi+1=0$

$\Rightarrow 2\sin^2\phi-2\sin\phi-\sin\phi+1=0$

$\Rightarrow 2\sin\phi(\sin\phi-1)-1(\sin\phi-1)=0$

$\Rightarrow (\sin\phi-1)(2\sin\phi-1)=0$

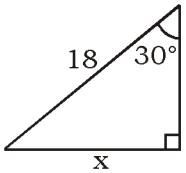
$\sin\phi = 1, \frac{1}{2}$ $\qquad \phi = 30°$

$\cos60°-\sin90°+\text{cosec}60°$

$$\Rightarrow \frac{1}{2}-1+\frac{2}{\sqrt{3}} \qquad \Rightarrow \frac{2}{\sqrt{3}}-\frac{1}{2}$$

$$\Rightarrow \frac{4-\sqrt{3}}{2\sqrt{3}} \qquad \Rightarrow \frac{4\sqrt{3}-3}{6}$$

51. (C)



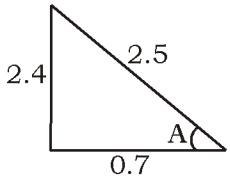
$\sin 30° = \frac{x}{18} = \frac{1}{2} \Rightarrow x = 9m$

52. (C) $\frac{1}{\cos^2\alpha} + 4\cos^2\alpha = 4 \Rightarrow 2\cos^2\alpha + \frac{1}{2\cos^2\alpha} = 2$

So, $2\cos^2\alpha = 1 \Rightarrow \cos^2\alpha = \frac{1}{2}$

$\Rightarrow \cos\alpha = \frac{1}{\sqrt{2}} \Rightarrow \alpha = 45°$

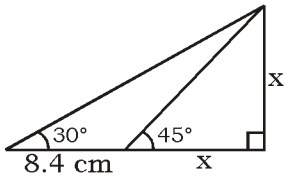
53. (A)



$\tan A = \frac{2.4}{0.7}$

So $\left(\frac{.7}{2.5}\right) + 24\left(\frac{.7}{2.4}\right) \Rightarrow 14 + 7 = 21$

54. (D)



$\tan 30° = \frac{1}{\sqrt{3}} = \frac{x}{x + 8.4}$

$\Rightarrow x + 8.4 = \sqrt{3}x$

$\Rightarrow 8.4 = \left(\sqrt{3} - 1\right)x$

$\Rightarrow x = \frac{8.4}{\left(\sqrt{3} - 1\right)} \text{ Þ } \frac{8.4\left(\sqrt{3} + 1\right)}{2}$

$\Rightarrow x = 4.2\left(\sqrt{3} + 1\right)$

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(SSC CGL (PRE) – 2020)

1. If $\frac{\cos^2\theta}{\cot^2\theta+\sin^2\theta-1}=3$, $0°<\theta<90°$, then the value of $(\tan\theta+\operatorname{cosec}\theta)$ is :

यदि $\frac{\cos^2\theta}{\cot^2\theta+\sin^2\theta-1}=3$, $0°<\theta<90°$, तो $(\tan\theta+\operatorname{cosec}\theta)$ का मान ज्ञात करो।

(A) $\frac{5\sqrt{3}}{3}$ (B) $3\sqrt{3}$ (C) $2\sqrt{3}$ (D) $\frac{4\sqrt{3}}{3}$

2. $\frac{\operatorname{cosec}\theta}{\operatorname{cosec}\theta-1}+\frac{\operatorname{cosec}\theta}{\operatorname{cosec}\theta+1}-\tan^2\theta$, $0°<\theta<90°$, is equal to.

$\frac{\operatorname{cosec}\theta}{\operatorname{cosec}\theta-1}+\frac{\operatorname{cosec}\theta}{\operatorname{cosec}\theta+1}-\tan^2\theta$, $0°<\theta<90°$ के बराबर है।

(A) $\sec^2\theta+1$ (B) $\sec^2\theta$
(C) $2\sec^2\theta$ (D) $1-\tan^2\theta$

3. Find the value of $\cot25°\cot35°\cot45°\cot55°\cot65°$.
$\cot25°\cot35°\cot45°\cot55°\cot65°$ का मान ज्ञात कीजिए।

(A) $\frac{1}{\sqrt{3}}$ (B) $\sqrt{3}$ (C) $\frac{\sqrt{3}}{2}$ (D) 1

4. Find the value of
$\frac{8\sin30°\sin^260°-4\sin90°-\sec^245°}{\tan^245°-\cot^230°}$
$\frac{8\sin30°\sin^260°-4\sin90°-\sec^245°}{\tan^245°-\cot^230°}$ का मान ज्ञात कीजिए।

(A) $-\frac{1}{2}$ (B) $\frac{5}{2}$ (C) $\frac{3}{4}$ (D) $\frac{3}{2}$

5. The value of
$\frac{2\sin^230°\tan60°-3\cos^260°\sec^230°}{4\cot^245°-\sec^260°+\sin^260°+\cos^290°}$
$\frac{2\sin^230°\tan60°-3\cos^260°\sec^230°}{4\cot^245°-\sec^260°+\sin^260°+\cos^290°}$ का मान ज्ञात करो।

(A) $\frac{2(\sqrt{3}-2)}{3}$ (B) $\frac{(\sqrt{3}+2)}{3}$
(C) $\frac{2(\sqrt{3}+2)}{3}$ (D) $\frac{(\sqrt{3}-2)}{3}$

6. If $2\cos^2\theta=3\sin\theta$, $0°<\theta<90°$, then the value of $(\sec^2\theta-\tan^2\theta+\cos^2\theta)$ is:
यदि $2\cos^2\theta=3\sin\theta$, $0°<\theta<90°$ तो $(\sec^2\theta-\tan^2\theta+\cos^2\theta)$ का मान है:

(A) $\frac{9}{4}$ (B) $\frac{5}{4}$ (C) $\frac{3}{4}$ (D) $\frac{7}{4}$

7. If $3\tan\theta=2\sqrt{3}\sin\theta$, $0°<\theta<90°$, then find the value of $2\sin^22\theta-3\cos^23\theta$.
यदि $3\tan\theta=2\sqrt{3}\sin\theta$, $0°<\theta<90°$, तो $2\sin^22\theta-3\cos^23\theta$ का मान ज्ञात करो।

(A) $-\frac{3}{2}$ (B) $\frac{1}{2}$ (C) $\frac{3}{2}$ (D) 1

8. If $3\sec\theta+4\cos\theta-4\sqrt{3}=0$, where θ is an acute angle then the angle of θ is:
यदि $3\sec\theta+4\cos\theta-4\sqrt{3}=0$ जहाँ θ एक न्यून कोण है, तो θ का मान है।

(A) 45° (B) 60°
(C) 20° (D) 30°

9. The value of $\frac{\tan(45°-\alpha)}{\cot(45+\alpha)}-\frac{(\cos19°+\sin71°)(\sec19°+\operatorname{cosec}71°)}{\tan12°\tan24°\tan66°\tan78°}$

$\frac{\tan(45°-\alpha)}{\cot(45+\alpha)}-\frac{(\cos19°+\sin71°)(\sec19°+\operatorname{cosec}71°)}{\tan12°\tan24°\tan66°\tan78°}$ का मान है।

(A) –3 (B) 2
(C) –2 (D) 0

10. $1+2\tan^2\theta+2\sin\theta\sec^2\theta$, $0°<\theta<90°$, is equal to:
$1+2\tan^2\theta+2\sin\theta\sec^2\theta$, $0°<\theta<90°$, बराबर है।

(A) $\frac{1-\cos\theta}{1+\cos\theta}$ (B) $\frac{1+\cos\theta}{1-\cos\theta}$
(C) $\frac{1-\sin\theta}{1+\sin\theta}$ (D) $\frac{1+\sin\theta}{1-\sin\theta}$

11. If $\frac{\cos ec\theta + \cot\theta}{\cos ec\theta - \cot\theta} = 7$, then the value of $\frac{4\sin^2\theta - 1}{4\sin^2\theta + 5}$ is:

यदि $\frac{\cos ec\theta + \cot\theta}{\cos ec\theta - \cot\theta} = 7$ तो $\frac{4\sin^2\theta - 1}{4\sin^2\theta + 5}$ का मान है:

(A) $-\frac{1}{9}$ (B) $\frac{1}{3}$ (C) $-\frac{1}{3}$ (D) $\frac{1}{9}$

12. If $3\cos^2\theta - 4\sin\theta + 1 = 0$, $0° < \theta < 90°$, then $\tan\theta + \sec\theta = ?$

यदि $3\cos^2\theta - 4\sin\theta + 1 = 0$, $0° < \theta < 90°$ तो $\tan\theta + \sec\theta = ?$

(A) $2\sqrt{5}$ (B) $2\sqrt{3}$

(C) $3\sqrt{3}$ (D) $\sqrt{5}$

13. $\frac{\cot^3\theta}{\cos ec^2\theta} + \frac{\tan^3\theta}{\sec^2\theta} + 2\sin\theta\cos\theta = ?$

$\frac{\cot^3\theta}{\cos ec^2\theta} + \frac{\tan^3\theta}{\sec^2\theta} + 2\sin\theta\cos\theta$ का मान ज्ञात करो।

(A) $\cos ec\theta\sec\theta$ (B) $\sin\theta\cos\theta$

(C) $\cos ec^2\theta\sec^2\theta$ (D) $\sin^2\theta\cos\theta$

14. If $2\sin(3x - 15)° = 1$, $0° < (3x - 15) < 90°$, then find the value of $\cos^2(2x + 15)° + \cot^2(x + 15)°$

यदि $2\sin(3x - 15)° = 1$, $0° < (3x - 15) < 90°$ है, तो $\cos^2(2x + 15)° + \cot^2(x + 15)°$ का मान ज्ञात करो।

(A) $\frac{7}{2}$ (B) 1 (C) $-\frac{7}{2}$ (D) $\frac{5}{2}$

15. If $\sin\left(\frac{2A+B}{2}\right) = \cos\left(\frac{2A-B}{2}\right) = \frac{\sqrt{3}}{2}$, $0° < \frac{2A+B}{2} < 90°$ and $0° < \frac{2A-B}{2} < 90°$, then find the value of $\sin[3(A - B)]$.

यदि $\sin\left(\frac{2A+B}{2}\right) = \cos\left(\frac{2A-B}{2}\right) = \frac{\sqrt{3}}{2}$, $0° < \frac{2A+B}{2} < 90°$ और $0° < \frac{2A-B}{2} < 90°$ तो $\sin[3(A - B)]$ का मान है।

(A) $\frac{\sqrt{3}}{2}$ (B) $\frac{1}{\sqrt{2}}$

(C) $\frac{1}{2}$ (D) 1

16. The value of $4(\sin^4 30° + \cos^4 30°) - 3(\sin^2 45° - 2\cos^2 45°)$ is:

$4(\sin^4 30° + \cos^4 30°) - 3(\sin^2 45° - 2\cos^2 45°)$ का मान है।

(A) 0 (B) 4

(C) 2 (D) 1

17. The value of

$$\frac{\tan^2 30° + \sin^2 90° + \cot^2 60° + \sin^2 30°\cos^2 45°}{\sin 60°\cos 30° - \cos 60°\sin 30°}$$

$$\frac{\tan^2 30° + \sin^2 90° + \cot^2 60° + \sin^2 30°\cos^2 45°}{\sin 60°\cos 30° - \cos 60°\sin 30°}$$

का मान है।

(A) $\frac{47}{12}$ (B) $\frac{37}{12}$ (C) $\frac{43}{12}$ (D) $\frac{25}{12}$

18. Find the value of $\frac{3}{4}\cot^2 30° + \cos^2 30° - 3\cos ec^2 60° + \tan^2 60°$.

$\frac{3}{4}\cot^2 30° + \cos^2 30° - 3\cos ec^2 60° + \tan^2 60°$ का मान है।

(A) –4 (B) 10 (C) $\frac{\sqrt{3}}{4}$ (D) 2

19. $\sqrt{\sec^2\theta + \cos ec^2\theta}\left(\frac{\sin\theta(1+\cos\theta)}{1+\cos\theta-\sin^2\theta}\right)$, $0° < \theta < 90°$ is equal to:

$\sqrt{\sec^2\theta + \cos ec^2\theta}\left(\frac{\sin\theta(1+\cos\theta)}{1+\cos\theta-\sin^2\theta}\right)$, $0° < \theta < 90°$ बराबर है।

(A) $\sec^2\theta$ (B) $\cos ec^2\theta$

(C) $\cot\theta$ (D) $\tan\theta$

20. If $\cos(A - B) = \frac{\sqrt{3}}{2}$ and $\cot(A + B) = \frac{1}{\sqrt{2}}$, where A – B and A + B are acute angles, then (2A – 3B) is equal to:

यदि $\cos(A - B) = \frac{\sqrt{3}}{2}$ और $\cot(A + B) = \frac{1}{\sqrt{2}}$ जहाँ A – B और A + B न्यून कोण हैं, तो (2A – 3B) बराबर हैं।

(A) 45° (B) 30°

(C) 15° (D) 60°

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21. If $\sin A = \frac{1}{2}$, A is an acute angle, then find the value of $\frac{\tan A - \cot A}{\sqrt{3}(1+\operatorname{cosec} A)}$.

यदि $\sin A = \frac{1}{2}$, A न्यून कोण है, तो $\frac{\tan A - \cot A}{\sqrt{3}(1+\operatorname{cosec} A)}$ का मान है ?

(A) $\frac{4\sqrt{3}}{9}$ (B) $\frac{2}{9}$ (C) $-\frac{2}{9}$ (D) $-\frac{4\sqrt{3}}{9}$

22. For $0° < \theta < 90°$, $\frac{1}{\cos\theta} + \frac{1}{\tan\theta - \sec\theta}$, is equal to:

$0° < \theta < 90°$ के लिए, $\frac{1}{\cos\theta} + \frac{1}{\tan\theta - \sec\theta}$ बराबर है-

(A) $\sec\theta$ (B) $-\sec\theta$
(C) $-\tan\theta$ (D) $\tan\theta$

23. If $\cos\theta - \sin\theta = \sqrt{3}(90° - \theta)$, $0° < \theta < 90°$, then find the value of $\tan\theta - \cot\theta$.

यदि $\cos\theta - \sin\theta = \sqrt{3}(90° - \theta)$, $0° < \theta < 90°$, है, तो $(\tan\theta - \cot\theta)$ का मान ज्ञात करो।

(A) $\frac{3-2\sqrt{3}}{1+\sqrt{3}}$ (B) $-\frac{3+2\sqrt{3}}{1+\sqrt{3}}$

(C) $-\frac{3+2\sqrt{3}}{1-\sqrt{3}}$ (D) $\frac{3+2\sqrt{3}}{1+\sqrt{3}}$

24. If $7\cos^2\theta + 5\sin^2\theta - 6 = 0$, $(0° < \theta < 90°)$, then what is the value of $\sqrt{\frac{\operatorname{cosec}\theta + \tan\theta}{\sec\theta - \cot\theta}}$

यदि $7\cos^2\theta + 5\sin^2\theta - 6 = 0$, $(0° < \theta < 90°)$, है, तो $\sqrt{\frac{\operatorname{cosec}\theta + \tan\theta}{\sec\theta - \cot\theta}}$ का मान है।

(A) $\sqrt{2} + 1$ (B) $\sqrt{2} - 1$
(C) $\sqrt{3} + 1$ (D) $\sqrt{3} - 1$

25. If $4\sin^2(2x - 10)° = 3$, $0 \le (2x - 10) \le 90$, then find the value of :

$$\frac{\sin^4(x-5°) + \cos^4 x(x-5°)}{1 - 2\sin^2(3x-15)°\cos^2(3x-15)°}$$

यदि $4\sin^2(2x - 10)° = 3$, $0 \le (2x - 10) \le 90$, है, तो

$$\frac{\sin^4(x-5°) + \cos^4 x(x-5°)}{1 - 2\sin^2(3x-15)°\cos^2(3x-15)°}$$ का मान ज्ञात करो।

(A) $\frac{5}{8}$ (B) -1 (C) 1 (D) $-\frac{5}{8}$

26. The value of $\frac{\sqrt{2}\tan(60° - \theta)\tan(30° + \theta)}{\sin^2(45° + \theta) + \sin^2(45° - \theta)}$ is:

$\frac{\sqrt{2}\tan(60° - \theta)\tan(30° + \theta)}{\sin^2(45° + \theta) + \sin^2(45° - \theta)}$ का मान है:

(A) $\sqrt{2}$ (B) 2
(C) 1 (D) $\frac{1}{\sqrt{2}}$

27. If $3\sin^2\theta - \cos\theta - 1 = 0$, $0° < \theta < 90°$, then what is the value of $\cot\theta + \operatorname{cosec}\theta$?

यदि $3\sin^2\theta - \cos\theta - 1 = 0$, $0° < \theta < 90°$ है, तो $\cot\theta + \operatorname{cosec}\theta$ का मान ज्ञात करें।

(A) $\frac{3\sqrt{2}}{2}$ (B) $2\sqrt{3}$
(C) $\sqrt{5}$ (D) $2\sqrt{5}$

28. The value of $(\sin37°\cos53° + \cos37°\sin53°) - \frac{4\cos^2 37° - 7 + 4\cos^2 53°}{\tan^2 47° - \operatorname{cosec}^2 43°}$ is:

$(\sin37°\cos53° + \cos37°\sin53°) - \frac{4\cos^2 37° - 7 + 4\cos^2 53°}{\tan^2 47° - \operatorname{cosec}^2 43°}$ का मान है।

(A) -2 (B) 0
(C) 1 (D) 2

29. The value of $\sin^4 30° + \cos^4 30° - \sin25°\cos65° - \sin65°\cos25°$.

$\sin^4 30° + \cos^4 30° - \sin25°\cos65° - \sin65°\cos25°$ का मान क्या होगा ?

(A) $-\frac{3}{8}$ (B) 0 (C) $\frac{5}{8}$ (D) $\frac{13}{8}$

30. If $\tan\theta = \sqrt{5}$, then the value of $\frac{\operatorname{cosec}^2\theta + \sec^2\theta}{\operatorname{cosec}^2\theta - \sec^2\theta}$ is:

यदि $\tan\theta = \sqrt{5}$, तो $\frac{\operatorname{cosec}^2\theta + \sec^2\theta}{\operatorname{cosec}^2\theta - \sec^2\theta}$ का मान ज्ञात करो।

(A) $-\frac{7}{5}$ (B) $\frac{7}{5}$ (C) $-\frac{3}{2}$ (D) $\frac{3}{2}$

31. If $5\sin^2\theta - 4\cos\theta - 4 = 0$, $0° < \theta < 90°$, then the value of $\cot\theta + \operatorname{cosec}\theta$ is:
$3\cot\theta + \tan\theta - 2\sqrt{3} = 0$, $0° < \theta < 90°$.
यदि $5\sin^2\theta - 4\cos\theta - 4 = 0$, $0° < \theta < 90°$, है, तो $\cot\theta + \operatorname{cosec}\theta$ का मान ज्ञात करें।
(A) $\frac{\sqrt{6}}{2}$ (B) $\frac{\sqrt{6}}{3}$ (C) $\frac{3}{2}$ (D) $\frac{2}{3}$

32. In ΔPQR, $\angle Q = 90°$. If $\tan R = \frac{1}{3}$, then what is the value of $\frac{\sec P(\cos R + \sin P)}{\operatorname{cosec} R(\sin R - \operatorname{cosec} P)}$.
यदि ΔPQR में, $\angle Q = 90°$, $\tan R = \frac{1}{3}$ है, तो $\frac{\sec P(\cos R + \sin P)}{\operatorname{cosec} R(\sin R - \operatorname{cosec} P)}$ का मान ज्ञात करो।
(A) $\frac{18}{7}$ (B) $-\frac{18}{7}$ (C) $-\frac{2}{7}$ (D) $\frac{2}{7}$

33. If $\sin(A + B) = 1$ and $\cos(A - B) = \frac{\sqrt{3}}{2}$, $A + B \le 90°$ and $A > B$, then the value of $\frac{5\sin^2 B + 4\tan^2 A}{2\sin B \cos A}$ is :
यदि $\sin(A + B) = 1$, $\cos(A - B) = \frac{\sqrt{3}}{2}$, $A + B \le 90°$, $A > B$ है, तो $\frac{5\sin^2 B + 4\tan^2 A}{2\sin B \cos A}$ का मान ज्ञात करो।
(A) $16\frac{1}{2}$ (B) 18 (C) 20 (D) $26\frac{1}{2}$

34. If $\sin^6\theta + \cos^6\theta = \frac{1}{3}$, $0° < \theta < 90°$,. then what is the value of $\sin\theta\cos\theta$?
यदि $\sin^6\theta + \cos^6\theta = \frac{1}{3}$, $0° < \theta < 90°$, है तो $\sin\theta\cos\theta$ का मान ज्ञात करो।
(A) $\frac{\sqrt{2}}{3}$ (B) $\frac{\sqrt{6}}{6}$ (C) $\frac{\sqrt{2}}{\sqrt{3}}$ (D) $\frac{2}{9}$

35. $(\sec\theta + \tan\theta)^2 + \frac{1+\operatorname{cosec}\theta}{1-\operatorname{cosec}\theta}$, $0° < \theta < 90°$ is :
$(\sec\theta + \tan\theta)^2 + \frac{1+\operatorname{cosec}\theta}{1-\operatorname{cosec}\theta}$, $0° < \theta < 90°$ है :
(A) 0 (B) –2 (C) 1 (D) 2

36. If $\sec(5\alpha - 15°) = \operatorname{cosec}(15° - 2\alpha)$, then the value of $\cos\alpha + \sin 2\alpha + \tan(1.5\alpha)$ is:
यदि $\sec(5\alpha - 15°) = \operatorname{cosec}(15° - 2\alpha)$ है, तो $\cos\alpha + \sin 2\alpha + \tan(1.5\alpha)$ का मान है:
(A) $\sqrt{3} + 1$ (B) $\sqrt{2} - 1$
(C) $\sqrt{3} - 1$ (D) $\sqrt{2} + 1$

37. If $(\sin 20 + x)° = \cos 60°$, $0 \le (20 + x)$, then find the value of $2\sin^2(3x + 15)° - \operatorname{cosec}^2(2x + 10)°$
यदि $(\sin 20 + x)° = \cos 60°$, $0 \le (20 + x)$ है, तो $2\sin^2(3x + 15)° - \operatorname{cosec}^2(2x + 10)$ का मान ज्ञात कीजिए।
(A) 3 (B) –3
(C) $\frac{-1}{3}$ (D) –2

38. Find the value of $\tan 35°\cot 40°\tan 45°\cot 50°\tan 55°$.
$\tan 35°\cot 40°\tan 45°\cot 50°\tan 55°$ का मान ज्ञात कीजिए।
(A) $\frac{1}{\sqrt{2}}$ (B) $\frac{1}{2}$
(C) –1 (D) 1

39. If $2\cos^2\theta - 5\cos\theta + 2 = 0$, $0° < \theta < 90°$, then the value of $(\sec\theta + \tan\theta)$ is:
यदि $2\cos^2\theta - 5\cos\theta + 2 = 0$, $0° < \theta < 90°$ है, तो $(\sec\theta + \tan\theta)$ का मान ज्ञात करो।
(A) $2 + \sqrt{3}$ (B) $1 - \sqrt{3}$
(C) $1 + \sqrt{3}$ (D) $2 - \sqrt{3}$

40. If $\cot\theta = \frac{15}{8}$, θ is an acute angle, then find the value of $\frac{(1 - \cos\theta)(2 + 2\cos\theta)}{(2 - 2\sin\theta)(1 + \sin\theta)}$.
यदि $\cot\theta = \frac{15}{8}$, θ एक न्यून कोण है, तो $\frac{(1 - \cos\theta)(2 + 2\cos\theta)}{(2 - 2\sin\theta)(1 + \sin\theta)}$ का मान ज्ञात कीजिए।
(A) $\frac{225}{64}$ (B) $\frac{64}{225}$ (C) $\frac{16}{15}$ (D) $\frac{8}{15}$

41. If $\cos(2\theta + 54°) = \sin\theta$, $0° < (2\theta + 54°) < 90°$, then what is the value of $\frac{1}{\cot 5\theta + \sec\frac{5\theta}{2}}$?
यदि $\cos(2\theta + 54°) = \sin\theta$, $0° < (2\theta + 54°) < 90°$ है, तो $\frac{1}{\cot 5\theta + \sec\frac{5\theta}{2}}$ का मान क्या होगा ?
(A) $\frac{\sqrt{3}}{2}$ (B) $\frac{2\sqrt{3}}{3}$ (C) $\frac{\sqrt{3}}{3}$ (D) $\frac{1}{3}$

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42. The value of

$\frac{\tan 13^\circ \tan 36^\circ \tan 45^\circ \tan 54^\circ \tan 77^\circ}{2\sec^2 60^\circ(\sin^2 60^\circ - 3\cos 60^\circ + 2)}$ is:

$\frac{\tan 13^\circ \tan 36^\circ \tan 45^\circ \tan 54^\circ \tan 77^\circ}{2\sec^2 60^\circ(\sin^2 60^\circ - 3\cos 60^\circ + 2)}$ का मान है।

(A) $\frac{1}{10}$ (B) $\frac{-1}{4}$ (C) $\frac{1}{4}$ (D) $\frac{-1}{10}$

43. The value of $\sin^2 60^\circ \cos^2 45^\circ + 2\tan^2 60^\circ - \text{cosec}^2 30^\circ$ is equal to

$\sin^2 60^\circ \cos^2 45^\circ + 2\tan^2 60^\circ - \text{cosec}^2 30^\circ$ का मान बराबर है-

(A) $\frac{17}{24}$ (B) $\frac{19}{8}$ (C) $-\frac{17}{24}$ (D) $-\frac{19}{8}$

44. The value of $\sec^2\theta(1 - \sin^4\theta) - 2\tan^2\theta$ is:

$\sec^2\theta(1 - \sin^4\theta) - 2\tan^2\theta$ का मान है-

(A) $\frac{1}{2}$ (B) 1

(C) –1 (D) 0

45. If $\frac{\sin^2\theta}{\tan^2\theta - \sin^2\theta} = 5$, θ is an acute angle, then the value of $\frac{24\sin^2\theta - 15\sec^2\theta}{6\text{cosec}^2\theta - 7\cot^2\theta}$ is:

यदि $\frac{\sin^2\theta}{\tan^2\theta - \sin^2\theta} = 5$, θ एक न्यून कोण है तो

$\frac{24\sin^2\theta - 15\sec^2\theta}{6\text{cosec}^2\theta - 7\cot^2\theta}$ का मान है:

(A) –2 (B) 2

(C) 14 (D) –14

46. If $0^\circ < \theta < 90^\circ$, $\sqrt{\frac{\sec^2\theta + \text{cosec}^2\theta}{\tan^2\theta - \sin^2\theta}}$ is equal to :

यदि $0^\circ < \theta < 90^\circ$ है, तो $\sqrt{\frac{\sec^2\theta + \text{cosec}^2\theta}{\tan^2\theta - \sin^2\theta}}$ का मान है-

(A) $\sec^3\theta$ (B) $\text{cosec}^3\theta$

(C) $\sin^2\theta$ (D) $\sec^2\theta$

47. (cosecA – cotA)(1 + cosA) = ?

(cosecA – cotA)(1 + cosA) का मान ज्ञात करो।

(A) cosA (B) sinA

(C) cotA (D) cosecA

48. If $\frac{1}{1-\sin\theta} + \frac{1}{1+\sin\theta} = 4\sec\theta$, $0^\circ < \theta < 90^\circ$, then the value of $\cot\theta + \text{cosec}\theta$ is :

यदि $\frac{1}{1-\sin\theta} + \frac{1}{1+\sin\theta} = 4\sec\theta$, $0^\circ < \theta < 90^\circ$ है, तो $\cot\theta + \text{cosec}\theta$ का मान है।

(A) $\frac{4\sqrt{3}}{3}$ (B) $\sqrt{3}$ (C) $\frac{5\sqrt{3}}{3}$ (D) $3\sqrt{3}$

49. Find the value of $\text{cosec}(60^\circ + A) - \sec(30^\circ - A) + \frac{\text{cosec}\,49^\circ}{\sec 41^\circ}$.

$\text{cosec}(60^\circ + A) - \sec(30^\circ - A) + \frac{\text{cosec}\,49^\circ}{\sec 41^\circ}$ का मान है।

(A) 1 (B) 0

(C) –1 (D) 2

50. If $\sin\alpha + \sin\beta = \cos\alpha + \cos\beta = 1$, then $\sin\alpha + \cos\alpha = ?$

यदि $\sin\alpha + \sin\beta = \cos\alpha + \cos\beta = 1$ है, तो $\sin\alpha + \cos\alpha = ?$

(A) –1 (B) 0

(C) 1 (D) 2

51. If $\tan\theta + 3\cot\theta - 2\sqrt{3} = 0$, $0^\circ < \theta < 90^\circ$, then what is the value of $(\text{cosec}^2\theta + \cos^2\theta)$?

यदि $\tan\theta + 3\cot\theta - 2\sqrt{3} = 0$, $0^\circ < \theta < 90^\circ$ है, तो $(\text{cosec}^2\theta + \cos^2\theta)$ का मान है।

(A) $\frac{2}{3}$ (B) $\frac{19}{12}$ (C) $\frac{14}{3}$ (D) $\frac{11}{12}$

52. In ΔABC, right angled at B. If $\cot A = \frac{1}{2}$, then the value of $\frac{\sin A(\cos C + \cos A)}{\cos C(\sin C - \sin A)}$.

ΔABC में, B पर समकोण है, यदि $\cot A = \frac{1}{2}$ है तो $\frac{\sin A(\cos C + \cos A)}{\cos C(\sin C - \sin A)}$ का मान है-

(A) 3 (B) –3

(C) –2 (D) 2

53. Simplify $\sec^2\alpha + \left(1 + \frac{1}{\text{cosec}\alpha}\right)\left(1 - \frac{1}{\text{cosec}\alpha}\right)$

सरल कीजिए : $\sec^2\alpha + \left(1 + \frac{1}{\text{cosec}\alpha}\right)\left(1 - \frac{1}{\text{cosec}\alpha}\right)$

(A) $\tan^4\alpha$ (B) $\sin^2\alpha$

(C) 1 (D) –1

54. If $\sin^2\theta = 2\sin\theta - 1, 0° \le \theta \le 90°$, then find the value of $\frac{1+\text{cosec}\theta}{1-\cos\theta}$.

यदि $\sin^2\theta = 2\sin\theta - 1, 0° \le \theta \le 90°$ है, तो $\frac{1+\text{cosec}\theta}{1-\cos\theta}$ का मान ज्ञात कीजिए।

(A) –2 (B) 1
(C) 2 (D) –1

55. The value of $\frac{\sec^2 60°\cos^2 45° + \text{cosec}^2 30°}{\cot 30°\sec^2 45° - \text{cosec}^2 30°\tan 45°}$ is:

$\frac{\sec^2 60°\cos^2 45° + \text{cosec}^2 30°}{\cot 30°\sec^2 45° - \text{cosec}^2 30°\tan 45°}$ का मान है ?

(A) $-3\left(2+\sqrt{3}\right)$ (B) $3\left(2-\sqrt{3}\right)$
(C) $-3\left(2-\sqrt{3}\right)$ (D) $3\left(2+\sqrt{3}\right)$

56. Find the value of $\sin^2 60° + \cos^2 30° - \sin^2 45° - 3\sin^2 90°$.

$\sin^2 60° + \cos^2 30° - \sin^2 45° - 3\sin^2 90°$ का मान ज्ञात कीजिए-

(A) $\frac{1}{3}$ (B) $-1\frac{3}{4}$
(C) $-2\frac{1}{2}$ (D) –2

57. If $\frac{\sin\theta+\cos\theta}{\sin\theta-\cos\theta} = 5$, then the value of $\frac{4\sin^2\theta+3}{2\cos^2\theta+2}$ is:

यदि $\frac{\sin\theta+\cos\theta}{\sin\theta-\cos\theta} = 5$ है, तो $\frac{4\sin^2\theta+3}{2\cos^2\theta+2}$ का मान ज्ञात करो।

(A) $\frac{75}{17}$ (B) $\frac{75}{34}$ (C) $\frac{1}{2}$ (D) $\frac{3}{2}$

58. Simplify : $\frac{(\sin\theta + \sec\theta)^2+(\cos\theta + \text{cosec}\theta)^2}{(1 + \sec\theta\text{cosec}\theta)^2}$, $(0° < \theta < 90°)$.

सरल कीजिए : $\frac{(\sin\theta + \sec\theta)^2+(\cos\theta + \text{cosec}\theta)^2}{(1 + \sec\theta\text{cosec}\theta)^2}$, $(0° < \theta < 90°)$.

(A) 0 (B) 1
(C) –1 (D) 2

59. If $\sec 31° = x$, then $\sin^2 59° + \frac{1}{\sec^2 31°} - \frac{1}{\sin^2 59°\,\text{cosec}^2 59°}$ is equal to :

यदि $\sec 31° = x$ है, तो $\sin^2 59° + \frac{1}{\sec^2 31°} - \frac{1}{\sin^2 59°\,\text{cosec}^2 59°}$ बराबर है।

(A) $\frac{x^2-2}{x^2}$ (B) $\frac{2-x^2}{x}$
(C) $\frac{2-x^2}{x^2}$ (D) $\frac{x^2-2}{x}$

Solution

1. (A) $\frac{\cos^2\theta}{\cot^2\theta + \sin^2\theta - 1} = 3$

$\Rightarrow \frac{1}{\text{cosec}^2\theta + \tan^2\theta - \sec^2\theta} = 3$

$\Rightarrow \frac{1}{\text{cosec}^2\theta - 1} = 3$

$\Rightarrow \tan^2\theta = 3 \quad \Rightarrow \tan\theta = \sqrt{3}$

$\Rightarrow \theta = 60°$

$\therefore \tan 60° + \text{cosec}\,60°$

$\Rightarrow \sqrt{3} + \frac{2}{\sqrt{3}} = \frac{5\sqrt{3}}{3}$

2. (A) $\frac{\sec\theta}{\text{cosec}\theta - 1} + \frac{\sec\theta}{\text{cosec}\theta + 1} - \tan^2\theta$

$\Rightarrow \frac{\text{cosec}\theta(\text{cosec}\theta + 1 + \text{cosec}\theta - 1)}{(\text{cosec}\theta - 1)(\text{cosec}\theta + 1)} - \tan^2\theta$

$\Rightarrow \frac{2\,\text{cosec}^2\theta}{\cot^2\theta} - \tan^2\theta$

$\Rightarrow 2\sec^2\theta - (\sec^2\theta - 1)$

$\Rightarrow 2\sec^2\theta - \sec^2\theta + 1$

$\Rightarrow \sec^2\theta + 1$

3. (D) $\cot 25°\cot 35°\cot 45°\cot 55°\cot 65°$

$\left[\begin{matrix} A + B = 90° \\ \cot A.\cot B = 1 \end{matrix}\right]$

$\Rightarrow 1 \times 1 \times 1 = 1$

4. (D) $\frac{8 \times \frac{1}{2} \times \frac{3}{4} - 4 \times 1 - 2}{1-3} = \frac{3-4-2}{-2} = \frac{3}{2}$

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5. (A) $\dfrac{2\times\frac{1}{4}\times\sqrt{3}-3\times\frac{1}{4}\times\frac{4}{3}}{4\times1-4+\frac{3}{4}+0}=\dfrac{\frac{\sqrt{3}}{2}-\frac{3}{4}\times\frac{4}{3}}{4-4+\frac{3}{4}}$

$$=\frac{\frac{\sqrt{3}}{2}-1}{\frac{3}{4}}=\frac{2\left(\sqrt{3}-2\right)}{3}$$

6. (D) $2-2\sin^2\theta-3\sin\theta=0$

$\Rightarrow 2\sin^2\theta+3\sin\theta-2=0$

$\Rightarrow (\sin\theta+2)(2\sin\theta-1)=0$

$\Rightarrow \sin\theta=\frac{1}{2},\ \theta=30°$

$\therefore \sec^2 30°-\tan^2 30°+\cos^2 30°$

$\Rightarrow \frac{4}{3}-\frac{1}{3}+\frac{3}{4}=1+\frac{3}{4}=\frac{7}{4}$

7. (C) $3\tan\theta=2\sqrt{3}\sin\theta$

$\Rightarrow \cos\theta=\frac{3}{2\sqrt{3}}=\frac{\sqrt{3}}{2}$

$\Rightarrow \theta=30°$

$\therefore 2\sin^2 60°-3\cos^2 90°$

$\Rightarrow 2\times\frac{3}{4}-0=\frac{3}{2}$

8. (D) $3\sec\theta+4\cos\theta-4\sqrt{3}=0$

$\Rightarrow 3\sec\theta+4\cos\theta=4\sqrt{3}$

$\Rightarrow \theta=30°$ satisfied

9. (A) $\tan(45-\alpha)\tan(45+\alpha)-\dfrac{1+\cos 19°\operatorname{cosec}71°+\sin 71°\sec 19°+1}{1}$

$\Rightarrow 1-\dfrac{1+1+1+1}{1}$ $\quad\left[\begin{matrix}a+b=90°\\ \tan a\tan b=1\end{matrix}\right]$

$=-3$

10.(D) $1+2\tan^2\theta+2\sin\theta\sec^2\theta$

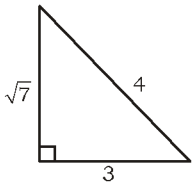
$\Rightarrow 1+\tan^2\theta+\tan^2\theta+2\tan\theta\sec\theta$

$\Rightarrow (\tan\theta+\sec\theta)^2$

$\Rightarrow \dfrac{(1+\sin\theta)^2}{\cos^2\theta}=\dfrac{(1+\sin\theta)^2}{(1-\sin\theta)(1+\sin\theta)}=\dfrac{1+\sin\theta}{1-\sin\theta}$

11.(D) $\dfrac{\operatorname{cosec}\theta+\cot\theta}{\operatorname{cosec}\theta-\cot\theta}=\dfrac{7}{1}$ $\qquad\dfrac{\operatorname{cosec}\theta}{\cot\theta}=\dfrac{8}{6}$

$\therefore \sec\theta=\frac{4}{3}$ $\qquad\therefore \cos\theta=\frac{3}{4}$



$\therefore \dfrac{4\sin^2\theta-1}{4\sin^2\theta+5}=\dfrac{4\times\frac{7}{16}-1}{4\times\frac{7}{16}+5}=\dfrac{28-16}{28+80}=\dfrac{1}{9}$

12.(D) $3\cos^2\theta-4\sin\theta+1=0$

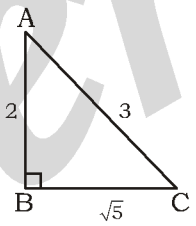
$\Rightarrow 3-3\sin^2\theta-4\sin\theta+1=0$

$\Rightarrow 3\sin^2\theta+4\sin\theta-4=0$

$\Rightarrow 3\sin^2\theta+6\sin\theta-2\sin\theta-4=0$

$\Rightarrow (3\sin\theta-2)(\sin\theta+2)=0$

$\Rightarrow \sin\theta=-2\ (\times),\ \frac{2}{3}$



$\therefore \tan\theta+\sec\theta\Rightarrow\dfrac{2}{\sqrt{5}}+\dfrac{3}{\sqrt{5}}=\sqrt{5}$

13.(A) $\dfrac{\cot^3\theta}{\operatorname{cosec}^2\theta}+\dfrac{\tan^3\theta}{\sec^2\theta}+2\sin\theta\cos\theta$

$\Rightarrow \dfrac{\cot^3\theta\sec^2\theta+\tan^3\theta\operatorname{cosec}^2\theta}{\operatorname{cosec}^2\theta\sec^2\theta}+2\sin\theta\cos\theta$

$\Rightarrow$ Put $\theta=45°$

$=\dfrac{1\times2+1\times2}{4}+2\times\dfrac{1}{2}\Rightarrow\dfrac{4}{4}+1=2$

Option (A) $\operatorname{cosec}\theta\sec\theta=\sqrt{2}\times\sqrt{2}=2$

14.(A) $\sin(3x-15°)=\frac{1}{2}$

$\Rightarrow \sin(3x-15°)=\cos 60°$

$\Rightarrow (3x-15°)+60°=90°$

$\Rightarrow x=15°$

$\therefore \cos^2(30+15)+\cot^2(15+15)$

$\Rightarrow \cos^2(45°)+\cot^2(30°)$

$\Rightarrow \frac{1}{2}+3=\frac{7}{2}$

15.(B) $\sin\left(\frac{2A+B}{2}\right) = \sin 60°$

$\Rightarrow$ $2A + B = 120°$ ..... (1)

and $\cos\left(\frac{2A-B}{2}\right) = \cos 30°$

$\Rightarrow$ $2A - B = 60°$ ..... (2)

From Eq.(1) & (2)

$2A + B = 120°$

$2A - B = 60°$

$\Rightarrow$ $A = 45°$

$\Rightarrow$ $B = 30°$

$\therefore$ $\sin(3(45° - 30°)) = \sin 45° = \frac{1}{\sqrt{2}}$

16.(B) $4\left[\left(\frac{1}{2}\right)^4 + \left(\frac{\sqrt{3}}{2}\right)^4\right] - 1\left(\frac{1}{2} - 1\right)$

$= 4\left[\frac{1}{16} + \frac{9}{16}\right] + \frac{3}{2} \Rightarrow \frac{10}{4} + \frac{6}{4} = 4$

17.(C) $\frac{\frac{1}{3} + 1 + \frac{1}{3} + \frac{1}{4} \times \frac{1}{2}}{\frac{1}{2}} = \frac{\frac{2}{3} + 1 + \frac{1}{8}}{\frac{1}{2}}$

$= \frac{2(43)}{24} = \frac{43}{12}$

18.(D) $\frac{3}{4} \times 3 + \frac{3}{4} - 3 \times \frac{4}{3} + 3$

$= \frac{9}{4} + \frac{3}{4} - 4 + 3$

$= 3 - 4 + 3 = 2$

19.(A) $\sqrt{\frac{\sin^2\theta + \cos^2\theta}{\sin^2\theta \cos^2\theta}} \times \frac{\sin\theta(1 + \cos\theta)}{1 + \cos\theta - 1 + \cos^2\theta}$

$= \frac{1}{\sin\theta\cos\theta} \times \frac{\sin\theta}{\cos\theta} = \sec^2\theta$

20.(A) $\cos(A - B) = \cos 30°$

and $\cot(A + B) = \frac{1}{\sqrt{3}} = \cot 60°$

$\Rightarrow$ $A + B = 60°$

$\Rightarrow$ $A - B = 30°$

$\Rightarrow$ $A = 45°, B = 15°$

$\therefore$ $2A - 3B = 90° - 45° = 45°$

21.(C) $\sin A = \frac{1}{2}$ $A = 30°$

$\Rightarrow \frac{\tan 30° - \cot 30°}{\sqrt{3}(1 + \operatorname{cosec} 30°)} = \frac{\frac{1}{\sqrt{3}} - \sqrt{3}}{\sqrt{3}(1+2)} = \frac{\frac{-2}{\sqrt{3}}}{\sqrt{3}(3)} = \frac{-2}{9}$

22.(C) $\frac{1}{\cos\theta} - \tan\theta - \sec\theta$

$\left[\because \quad \sec^2\theta - \tan^2\theta = 1 \right.$
$\left. \sec\theta + \tan\theta = \frac{1}{\sec\theta - \tan\theta}\right]$

$\Rightarrow$ $\sec\theta - \tan\theta - \sec\theta$

$\Rightarrow$ $-\tan\theta$

23.(B) $\cos\theta - \sin\theta = \sqrt{3}\sin\theta$

$\Rightarrow$ $\cot\theta = \sqrt{3} + 1$

and $\tan\theta = \frac{1}{\sqrt{3}+1}$

ATQ, $\tan\theta - \cot\theta = \frac{1}{\sqrt{3}+1} - \sqrt{3} - 1$

$= \frac{1 - 3 - \sqrt{3} - \sqrt{3} - 1}{\sqrt{3}+1}$

$= \frac{-3 - 2\sqrt{3}}{1 + \sqrt{3}} = -\frac{3 + 2\sqrt{3}}{1 + \sqrt{3}}$

24.(A) $7\cos^2\theta + 5\sin^2\theta - 6 = 0$

$7\cos^2\theta + 5 - 5\cos^2\theta - 6 = 0$

$\Rightarrow$ $2\cos^2\theta - 1 = 0$

$\Rightarrow$ $\cos\theta = \frac{1}{\sqrt{2}}, \theta = 45°$

$\therefore$ $\sqrt{\frac{(\sqrt{2}+1)}{(\sqrt{2}-1)}} = (\sqrt{2}+1)$

25.(A) $4\sin^2(2x - 10)° = 3$

$\Rightarrow$ $\sin(2x - 10)° = \frac{\sqrt{3}}{2} = \sin 60°$

$\Rightarrow$ $x = 35°$

$\therefore$ $\frac{\sin^4(30°) + \cos^4(30°)}{1 - 2\sin^2(90°)\cos^2(90°)} = \frac{\frac{1}{16} + \frac{9}{16}}{1} = \frac{5}{8}$

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