Mother's Education Hub®

SSC

MAINS (TIER-II)

• Trigonometry

2022

Only for MAINS Students

201, Himmat Nagar, Tonk Road, Jaipur-18

7073909991, 7300051112

Trigonometry

Part-I

Part-I
Exercise / अभ्यास प्रश्न

1. 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) $5/12$

2. If 5tanθ = 4 than find the value of (3sinθ – 2 cosθ) + (2sinθ + 3 cosθ).

यदि 5tanθ = 4 , है तो (3sinθ – 2 cosθ) + (2sinθ + 3 cosθ) का मान ज्ञात करो–

(A) $\frac{6}{23}$ (B) $\frac{2}{23}$ (C) $\frac{4}{23}$ (D) $\frac{5}{23}$

3. If secA = $17/8$, 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 secA = $17/8$ 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

4. If 5tan θ = 4, then $\frac{5\sin\theta-3\cos\theta}{5\sin\theta+2\cos\theta}$?

यदि 5 tanθ = 4 है, तो $\frac{5\sin\theta-3\cos\theta}{5\sin\theta+2\cos\theta}$ किसके बराबर है ?

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$ (C) $\frac{1}{4}$ (D) $\frac{1}{6}$

5. If sinθ = $\frac{3}{4}$, then the value of $16\cos^2\theta + \tan^2\theta$ is:

यदि sinθ = $\frac{3}{4}$ हो, तो $16\cos^2\theta + \tan^2\theta$ का मान ज्ञात करो।

(A) $\frac{58}{7}$ (B) $\frac{60}{7}$ (C) $\frac{55}{7}$ (D) $\frac{62}{7}$

6. If tanθ = $\sqrt{5}$, then the value of $\frac{\text{cosec}^2\theta+\sec^2\theta}{\text{cosec}^2\theta-\sec^2\theta}$ is:

यदि tanθ = $\sqrt{5}$, तो $\frac{\text{cosec}^2\theta+\sec^2\theta}{\text{cosec}^2\theta-\sec^2\theta}$ का मान ज्ञात करो।

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

7. If tanA= 1 then find the sum of all six trignometric ratio.

यदि tanA= 1 है, तो सभी छह त्रिकोणमितीय अनुपातों के मानों का योग कितना है ?

(A) $2 + 3\sqrt{2}$ (B) $\frac{6+3\sqrt{2}}{2}$

(C) 6 (D) $2 + 4\sqrt{2}$

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

यदि 5sinx=4 है, तो

$\left(\frac{\tan x-\cot x}{\sec x-\tan x}\right)\left(\frac{\cos^1 x-\sin^1 x}{2\cos^2 x-1}\right)$ का संख्यात्मक मान क्या है ?

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

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

यदि $(\text{cosec}^2\theta-1)=\frac{144}{25}$ 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) $\frac{13}{2\sqrt{15}}$

Mother's

10. If $\tan\alpha = 3 - 2\sqrt{2}$ then $\tan\alpha - \cot\alpha$

यदि $\tan\alpha = 3 - 2\sqrt{2}$ है, तो $\tan\alpha - \cot\alpha$ का मान क्या होगा ?

(A) -4 (B) $3 + 2\sqrt{2}$

(C) $-4\sqrt{2}$ (D) $-8\sqrt{2}$

11. 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) $\frac{1}{2}$

12. If A and B are acute angels 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 कीजिये ?

(A) $\frac{25}{261}$ (B) $\frac{322}{323}$ (C) 2 (D) $\frac{1}{261}$

13. If $\frac{1+\sin\phi}{1-\sin\phi} = \frac{p^2}{q^2}$ then $\sec\phi$ is equal to :

यदि $\frac{1+\sin\phi}{1-\sin\phi} = \frac{p^2}{q^2}$ है, तो $\sec\phi$ 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. If $0 < \theta < 90°$ and $\cot\theta = \sqrt{20 - \sqrt{20 - \sqrt{20}\ldots}}\ldots\infty$, then the value of $\text{cosec}^2\theta$ —

यदि $0 < \theta < 90°$ तथा $\cot\theta = \sqrt{20 - \sqrt{20 - \sqrt{20}\ldots}}\ldots\infty$ तो $\text{cosec}^2\theta$ का मान है—

(A) 15 (B) 17

(C) $\frac{17}{16}$ (D) $\frac{1}{17}$

15. If $\sec^2\theta = \sqrt{2\sqrt{2\sqrt{2}\ldots\ldots}}\infty$, $0 \le \theta \le 90°$, then the value of $\tan\theta + \cot\theta - 1$

यदि $\sec^2\theta = \sqrt{2\sqrt{2\sqrt{2}\ldots\ldots}}\infty$, $0 \le \theta \le 90°$, तो $\tan\theta + \cot\theta - 1$ का मान ज्ञात करें।

(A) 0 (B) 1

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

16. If $\cot\theta = \frac{15}{8}$ then $\frac{(3+3\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(4-4\cos\theta)}$ is equal to:

यदि $\cot\theta = \frac{15}{8}$, है, तो $\frac{(3+3\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(4-4\cos\theta)}$ का मान क्या होगा ?

(A) $3\frac{33}{64}$ (B) $2\frac{163}{256}$ (C) $\frac{63}{256}$ (D) $\frac{289}{64}$

17. If $\cot\theta = \frac{1}{\sqrt{3}}$, $0° < \theta° < 90°$, then the value of $\frac{2 - \sin^2\theta}{1 - \cos^2\theta} + (\text{cosec}^4\theta - \sec\theta)$ is:

यदि $\cot\theta = \frac{1}{\sqrt{3}}$, $0° < \theta° < 90°$, तब $\frac{2 - \sin^2\theta}{1 - \cos^2\theta} + (\text{cosec}^4\theta - \sec\theta)$ का मान ज्ञात करो-

(A) 5 (B) 0

(C) 1 (D) 2

18. If $\tan\theta = \frac{7}{24}$ and $\frac{\tan\theta - \sec\theta}{\sin\theta} = \frac{-p}{28}$ then what is the value of p?

यदि $\tan\theta = \frac{7}{24}$ है, तो $\frac{\tan\theta - \sec\theta}{\sin\theta} = \frac{-p}{28}$ में p का मान क्या होगा ?

(A) 25 (B) 75

(C) 50 (D) 100

19. If $\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta} = \frac{3}{5}$, then the value of $\frac{\text{cosec}\,\theta + \cot\theta}{\text{cosec}\,\theta - \cot\theta}$ is :

यदि $\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta} = \frac{3}{5}$ है, तो $\frac{\text{cosec}\,\theta + \cot\theta}{\text{cosec}\,\theta - \cot\theta}$ का मान बताइए।

(A) $31 + 8\sqrt{15}$ (B) $33 + 4\sqrt{15}$

(C) $27 + \sqrt{15}$ (D) $24 + \sqrt{15}$

Mother's

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

20. 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

21. If $\cos\theta = \frac{2p}{p^2+1}$ $(p \neq \pm 1)$ then cosecθ is equal to:

अगर $\cos\theta = \frac{2p}{p^2+1}$ $(p \neq \pm 1)$ है, तो cosecθ बराबर है :

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

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

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

23. ABC is a right angled triangle at B and AB : BC = 3 : 4. What is sinA + sinB + sinC equal to :
यदि ABC एक त्रिभुज है, जो B पर समकोण बनाता है और AB : BC = 3 : 4 है, तो sinA + sinB + sinC किसके बराबर है ?

(A) 2 (B) $\frac{11}{5}$ (C) $\frac{12}{5}$ (D) 3

24. If $\tan A = \frac{3}{4}$ than find the value of

$$\left\{\frac{1}{2}\right\} + \left\{\frac{(1+\cos A)(1-\cos A)}{(1+\sin A)(1-\sin A)}\right\} - 1 = ?$$

यदि $\tan A = \frac{3}{4}$ हो, तो $\left\{\frac{1}{2}\right\} + \left\{\frac{(1+\cos A)(1-\cos A)}{(1+\sin A)(1-\sin A)}\right\} - 1$ का मान ज्ञात कीजिए।

(A) $\frac{1}{16}$ (B) $\frac{12}{25}$ (C) $\frac{-9}{25}$ (D) $\frac{-1}{9}$

25. If $\cot = \frac{x}{y}$, then the value of $\frac{y\cos\theta - x\sin\theta}{y\cos\theta + x\sin\theta}$.

यदि $\cot = \frac{x}{y}$ हो तो $\frac{y\cos\theta - x\sin\theta}{y\cos\theta + x\sin\theta}$ = का मान है:

(A) 0 (B) $\frac{x^2-y^2}{x^2+y^2}$ (C) $\frac{x}{x^2+y^2}$ (D) $\frac{y}{x^2+y^2}$

26. If $\sin\theta = \frac{a}{\sqrt{a^2+b^2}}$, $0 < \theta < 90°$, then the value of $\sec\theta + \tan\theta$ is:

यदि $\sin\theta = \frac{a}{\sqrt{a^2+b^2}}$, $0 < \theta < 90°$, तो $\sec\theta + \tan\theta$ का मान है:

(A) $\frac{\sqrt{a^2+b^2}+a}{b}$ (B) $\frac{\sqrt{a^2+b^2}+b}{2a}$

(C) $\frac{\sqrt{a^2+b^2}+a}{2b}$ (D) $\frac{\sqrt{a^2+b^2}+b}{a}$

27. Let ABC be a triangle right angled at C, then what is tanA + tanB equal to ?
मान लीजिए ABC एक त्रिभुज है, जिसका C पर समकोण है, तो tanA + tanB किसके बराबर है ?

(A) $\frac{a}{bc}$ (B) $\frac{a^2}{bc}$ (C) $\frac{b^2}{ca}$ (D) $\frac{c^2}{ab}$

28. If $\text{coesc}^2\,\theta = 625/576$, then what is the value of $[(\sin\theta - \cos\theta)/(\sin\theta + \cos\theta)]$?
यदि $\text{coesc}^2\,\theta = 625/576$, तो $[(\sin\theta - \cos\theta)/(\sin\theta + \cos\theta)]$ का मान क्या होगा ?
(A) 1 (B) 31/17
(C) 17/31 (D) 14/25

29. If θ lies in the first quadrant and $\cot\theta = \frac{63}{16}$, then what is the value of $(\sin\theta + \cos\theta)$?

यदि θ, प्रथम चतुर्थांश में आता है और $\cot\theta = \frac{63}{16}$ है, तो $(\sin\theta + \cos\theta)$ का मान क्या है ?

(A) 1 (B) $\frac{69}{65}$ (C) $\frac{79}{65}$ (D) 2

30. 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) $19\sqrt{50}$

31. If $0 < \theta < 90°$, $\sin\theta = \frac{3}{5}$ and $x = \cot\theta$, then what is the value of $1 + 3x + 9x^2 + 27x^3 + 81x^4 + 243x^5$?

यदि $0 < \theta < 90°$, $\sin\theta = \frac{3}{5}$ और $x = \cot\theta$ हैं, तो $1 + 3x + 9x^2 + 27x^3 + 81x^4 + 243x^5$ का मान क्या हैं ?

(A) 941 (B) 1000
(C) 1220 (D) 1365

32. 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

33. 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) $\frac{39}{72}$

34. If $\frac{\sin A + \cos A}{\cos A} = \frac{17}{12}$, then the value of $\frac{1 - \cos A}{\sin A}$ is

यदि $\frac{\sin A + \cos A}{\cos A} = \frac{17}{12}$ है, तो $\frac{1 - \cos A}{\sin A}$ का मान ज्ञात कीजिये।

(A) $\frac{1}{5}$ (B) $\frac{5}{12}$ (C) –5 (D) 1

35. 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

36. 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) $\frac{1 - 4x^2}{4x^2}$

37. If $\frac{\tan\theta}{1 - \cot\theta} + \frac{\cot\theta}{1 - \tan\theta} = 1 + k$, then k = _____.

यदि $\frac{\tan\theta}{1 - \cot\theta} + \frac{\cot\theta}{1 - \tan\theta} = 1 + k$ हो, तो k = _____

(A) $\cot\theta + \sec\theta$ (B) $\tan\theta \operatorname{cosec}\theta$
(C) $\tan\theta + \sec\theta$ (D) $\operatorname{cosec}\theta \sec\theta$

38. 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) $\frac{2\sqrt{3}}{3}$

39. $\sqrt{\frac{\cot\theta + \cos\theta}{\cot\theta - \cos\theta}}$ 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) $\sec\theta - \tan\theta$

40. The value of $\sqrt{\frac{\operatorname{cosec}\phi - \cot\phi}{\operatorname{cosec}\phi + \cot\phi}} \div \frac{\sin\phi}{1 + \cos\phi}$ is equal to :

$\sqrt{\frac{\operatorname{cosec}\phi - \cot\phi}{\operatorname{cosec}\phi + \cot\phi}} \div \frac{\sin\phi}{1 + \cos\phi}$ का मान निम्नलिखित में से किसके बराबर है ?

(A) $\operatorname{cosec}\phi$ (B) $\frac{1}{2}$
(C) $\sec\phi$ (D) 1

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

41. Consider the following :
निम्नलिखित पर विचार कीजिए-

I. $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = \text{cosec}\theta - \cot\theta$

II. $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \text{cosec}\theta + \cot\theta$

Which of the above is/are true identity/ identities?
उपर्युक्त में से कौन-सी सर्वसमिका/सर्वसमिकाएँ सत्य है/हैं ?
(A) Only I (B) Only II
(C) Both I and II (D) Neither I nor II

42. If/यदि

$p = \sqrt{\frac{1-\sin x}{1+\sin x}}$, $q = \frac{1-\sin x}{\cos x}$ and/तथा $r = \frac{\cos x}{1+\sin x}$,

then which of the following is/are correct?
तो निम्नलिखित में से कौन-सा/से कथन सही है/हैं ?
I. $p = q = r$
II. $p^2 = qr$
Select the correct answer using the codes given below:
नीचे दिए गए कूट का प्रयोग कर सही उत्तर चुनिए :
(A) Only I (B) Only II
(C) Both I and II (D) Neither I nor II

43. If sinA = 3/5 and A is an acute angle, then tanA + secA is equal to?
यदि sinA = 3/5 तथा A न्यून कोण है, तो tanA + secA किसके तुल्य है ?
(A) 0 (B) 1
(C) 2 (D) –1

44. If $\sin\theta = \frac{x^2-y^2}{x^2+y^2}$, then which one of the following is correct?
यदि $\sin\theta = \frac{x^2-y^2}{x^2+y^2}$ है, तो निम्नलिखित में से कौनसा एक सही है ?
(A) $\cos\theta = \frac{2xy}{x^2-y^2}$ (B) $\cos\theta = \frac{2xy}{x^2+y^2}$
(C) $\cos\theta = \frac{x-y}{x^2+y^2}$ (D) $\cos\theta = \frac{xy(x-y)}{x^2+y^2}$

45. If $\tan\theta = \frac{5}{6}$ then what is the value of $\frac{12\sin\theta - 5\cos\theta}{12\sin\theta + 5\cos\theta}$.
यदि $\tan\theta = \frac{5}{6}$ है, तो $\frac{12\sin\theta - 5\cos\theta}{12\sin\theta + 5\cos\theta}$ का मान कितना होगा ?
(A) $\frac{2}{3}$ (B) $\frac{1}{3}$ (C) $\frac{3}{4}$ (D) $\frac{1}{4}$

Solution

1. (C)

2. (B) Given, $5\tan\theta = 4 \Rightarrow \tan\theta = \frac{4}{5}$

$$\Rightarrow \frac{3\sin\theta - 2\cos\theta}{2\sin\theta + 3\cos\theta}$$

$$\Rightarrow \frac{3\left(\frac{\sin\theta}{\cos\theta}\right) - 2\left(\frac{\cos\theta}{\cos\theta}\right)}{2\left(\frac{\sin\theta}{\cos\theta}\right) + 3\left(\frac{\cos\theta}{\cos\theta}\right)}$$

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

$$= \frac{\frac{12-10}{5}}{\frac{8+15}{5}} = \frac{2}{23}$$

3. (D)

4. (D) $\frac{\sin\theta}{\cos\theta} = \frac{4}{5} \Rightarrow \frac{5\times 4 - 3\times 5}{5\times 4 + 2\times 5} = \frac{20-15}{20+10} = \frac{5}{30} = \frac{1}{6}$

5. (A) Given, $\sin\theta = \frac{3}{4}$

$$16\cos^2\theta + \tan^2\theta = 16\cos^2\theta + \frac{\sin^2\theta}{\cos^2\theta}$$

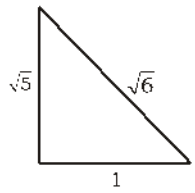
$$= 16(1-\sin^2\theta) + \frac{\sin^2\theta}{(1-\sin^2\theta)}$$

$$= 16\times\left(1-\frac{9}{16}\right) + \frac{9}{\left(1-\frac{9}{16}\right)}$$

$$= 16\times\left(\frac{7}{16}\right) + \frac{9}{\left(\frac{7}{16}\right)} = 7 + \frac{9}{7} = \frac{58}{7}$$

Mother's

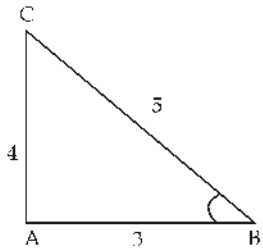
6. (C) $\tan\theta = \frac{\sqrt{5}}{1}$



$$\frac{\cos ec^2\theta + \sec^2\theta}{\cos ec^2\theta - \sec^2\theta} = \frac{\frac{6}{5}+\frac{6}{1}}{\frac{6}{5}-\frac{6}{1}} = \frac{36}{-24} = -\frac{3}{2}$$

7. (A)

8. (C) $\sin x = \frac{4}{5}$ $\quad \therefore \cos^2A + \sin^2A = 1$



$$\left(\frac{\tan x - \cot x}{\sec x - \tan x}\right)\left(\frac{\cos^4 x - \sin^4 x}{2\cos^2 x - 1}\right)$$

$$= \left(\frac{4-3}{\frac{3}{5}-\frac{4}{3}}\right)\cdot\frac{\left(\cos^2 x + \sin^2 x\right)\left(\cos^2 x - \sin^2 x\right)}{2\cos^2 x - 1}$$

$\therefore \cos^2A + \sin^2A = 1$

$$= \left(\frac{7}{4}\right)\left(\frac{\frac{9}{25}-\frac{16}{25}}{\frac{18}{25}-1}\right) = \left(\frac{7}{4}\times\frac{-\frac{7}{25}}{-\frac{7}{25}}\right) = \frac{7}{4}$$

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

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

K = 13, L = 5, A = 12

$$\sqrt{\cot\theta + \tan\theta} = \sqrt{\frac{12}{5}+\frac{5}{12}} = \sqrt{\frac{169}{60}} = \frac{13}{2\sqrt{15}}$$

10.(C) Given, $\tan\alpha = 3 - 2\sqrt{2}$ ..... (i)

than, $\tan\alpha - \cot\alpha = ?$

$$= \tan\alpha - \frac{1}{\tan\alpha} \quad \text{from eq. (i)}$$

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

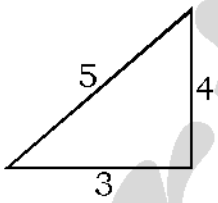
$$= \left(3-2\sqrt{2}\right) - \frac{\left(3+2\sqrt{2}\right)}{\left(3-2\sqrt{2}\right)\left(3+2\sqrt{2}\right)}$$

$$= \left(3-2\sqrt{2}\right) - \frac{\left(3+2\sqrt{2}\right)}{9-8}$$

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

$$= 3 - 2\sqrt{2} - 3 - 2\sqrt{2} = -4\sqrt{2}$$

11. (B)



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

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

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

Putting respective values at required equation

$$\Rightarrow \frac{4\left(\frac{4}{3}\right)-5\left(\frac{3}{5}\right)+1}{\frac{5}{3}+4\times\frac{3}{4}-1} = \frac{\frac{16}{3}-3+1}{\frac{5}{3}+2} = \frac{\frac{16}{3}-2}{\frac{5}{3}+2} = \frac{10}{11}$$

12.(B) $\sec A = 3$

$$\Rightarrow \operatorname{cosec} = \frac{3}{\sqrt{8}},\ \cot A = \frac{1}{\sqrt{8}}$$

$\cot B = 4$

$$\Rightarrow \sin B = \frac{1}{\sqrt{17}},\ \sec B = \frac{\sqrt{17}}{4}$$

$$\Rightarrow \text{So, } \frac{\operatorname{cosec}^2A + \sin^2B}{\cot^2A + \sec^2B} = \frac{\frac{9}{8}+\frac{1}{17}}{\frac{1}{8}+\frac{17}{16}}$$

$$= \frac{\frac{161}{8}\times 17}{\frac{19}{16}} = \frac{322}{323}$$

13.(B) Using C & D

$$\frac{2\sin\varphi}{2} = \frac{P^2-q^2}{P^2+q^2} \qquad \sin\varphi = \frac{P^2-q^2}{P^2+q^2}$$

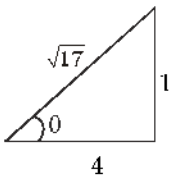
$$\Rightarrow \sec\varphi = \frac{p^2+q^2}{2Pq} \Rightarrow \frac{1}{2}\left[\frac{q}{p}+\frac{p}{q}\right]$$

Mother's

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

14.(A) $\cot\theta = \sqrt{20-\sqrt{20-\sqrt{20}}}\ldots\infty$

$\cot\theta = 4$



$\operatorname{cosec}^2\theta = \left(\frac{\sqrt{17}}{1}\right)^2 = 17$

15.(B) $\sec^2\theta = \sqrt{2\sec^2\theta}$

$\sec^4\theta = 2\sec^2\theta$

$\sec\theta = \sqrt{2}$

$\Rightarrow \quad \theta = 45°$

$\Rightarrow \tan\theta + \cot\theta - 1$

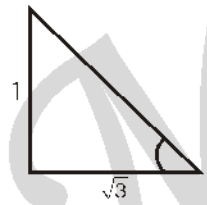
$\Rightarrow 1 + 1 - 1 = 1$

16. (B) $\frac{3(1+\sin\theta)(1-\sin\theta)}{4(1+\cos\theta)(1-\cos\theta)} = \frac{3}{4}\cdot\frac{1-\sin^2\theta}{1-\cos^2\theta}$

$= \frac{3}{4}\cdot\frac{\cos^2\theta}{\sin^2\theta} \quad \Rightarrow \quad \frac{3}{4}\left(\frac{15}{8}\right)^2$

$= \frac{3\times225}{4\times64} \Rightarrow \frac{675}{256} = 2\frac{163}{256}$

17. (C)



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

Put $\theta = 60°$

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

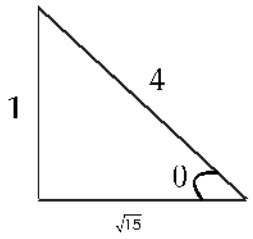
$\Rightarrow \frac{2-\frac{3}{4}}{1-\frac{1}{4}} + \left(\frac{4}{3}-2\right) \Rightarrow \frac{5}{3} - \frac{2}{3} = 1$

18.(B)

19. (A) $\frac{\sec\theta-\tan\theta}{\sec\theta+\tan\theta} = \frac{3}{5}$

$\Rightarrow \frac{1-\sin\theta}{1+\sin\theta} = \frac{3}{5} \quad \Rightarrow 5 - 5\sin\theta = 3 + 3\sin\theta$

$\Rightarrow \sin\theta = \frac{1}{4}$



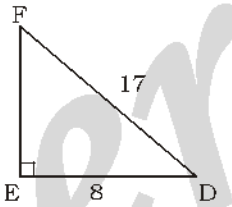
$\Rightarrow \operatorname{cosec}\theta = 4 \qquad \Rightarrow \cot\theta = \sqrt{15}$

$\frac{\operatorname{cosec}\theta+\cot\theta}{\operatorname{cosec}\theta-\cot\theta} = \frac{4+\sqrt{15}}{4-\sqrt{15}}$

$\frac{4+\sqrt{15}}{4-\sqrt{15}} \times \frac{4+\sqrt{15}}{4-\sqrt{15}} = 16+15+8\sqrt{15}$

$= 31+8\sqrt{15}$

20.(D)



$\text{Cos D} = \frac{8}{17}$

DE = 8 → 16

1 → 2

$\therefore$ DF = 17 → 17 × 2 = 34

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

$\operatorname{cosec}\theta = \frac{P^2+1}{P^2-1}$

22. **(A)** $\operatorname{cosec}\theta + 3\sec\theta = 5\operatorname{cosec}\theta$

$1 + 3\frac{\sec\theta}{\operatorname{cosec}\theta} = 5 \Rightarrow 1 + 3\tan\theta = 4$

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

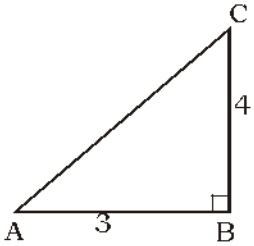
23.(C) In right angled Δ ABC, AB : BC = 3 : 4 or

$\frac{AB}{BC} = \frac{3}{4}$

Now, in Δ ABC, $AC^2 = AB^2 + BC^2$

$= 3^2 + 4^2 = 9 + 16 = 25$

$\Rightarrow \quad AC = 5 \quad \sin A = \frac{BC}{AC} = \frac{4}{5}$



Mother's

$\sin B = \sin 90^\circ = 1$ and $\sin C = \frac{AB}{AC} = \frac{3}{5}$

Now, $\sin A + \sin B + \sin C = \frac{4}{5} + 1 + \frac{3}{5}$

$= \frac{4+5+3}{5} = \frac{12}{5}$

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

24.(A) If $\tan A = \frac{3}{4}$

$\left\{\frac{1}{2}\right\} + \left\{\frac{(1+\cos A)(1-\cos A)}{(1+\sin A)(1-\sin A)}\right\} - 1 = ?$

$= \frac{1}{2} + \left\{\frac{(1-\cos^2 A)}{1-\sin^2 A}\right\} - 1 \Rightarrow \frac{1}{2} + \left\{\frac{\sin^2 A}{\cos^2 A}\right\} - 1$

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

$= \frac{1}{2} + \frac{9}{16} - 1 = \frac{8+9-16}{16}$

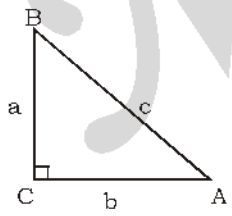
$= \frac{17-16}{16} \Rightarrow = \frac{1}{16}$

25. (A)

26.(A) $\sin\theta = \frac{L}{K} = \frac{a}{\sqrt{a^2+b^2}}$

$\sec\theta + \tan\theta = \frac{\sqrt{a^2+b^2}}{b} + \frac{a}{b} = \frac{\sqrt{a^2+b^2}+a}{b}$

27.(D)



$\tan A + \tan B \Rightarrow \frac{a}{b} + \frac{b}{a} = \frac{a^2+b^2}{ab} = \frac{c^2}{ab}$

28.(C) $\operatorname{cosec}^2\theta = \frac{625}{576}$; $\operatorname{cosec}\theta = \frac{25}{24}$

$\sin\theta = \frac{24}{25}$ $\cos\theta = \frac{7}{25}$

$= \left[\frac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta}\right] = \left[\frac{\frac{24-7}{25}}{\frac{24+7}{25}}\right] = \frac{17}{31}$

29.(C) $\cot\theta = \frac{\text{base}}{\text{perpendicular}} = \frac{63}{16}$

Now, here we have base = 63, perpendicular = 16, then with the help of Pythagoras theorem, we can find the hypotenuse as 65.

hypo = $\sqrt{\text{perp.}^2 + \text{base}^2}$

hypo = $\sqrt{16^2 + 63^2}$

Hypo = 65

30.(A)

31.(D) If $0 < \theta < 90^\circ$ then all the ratios will be positive.

Given that $\sin\theta = \frac{3}{5}$

$\Rightarrow x = \cot\theta = \sqrt{\operatorname{cosec}^2\theta - 1} = \sqrt{\frac{25}{9} - 1} = \frac{4}{3}$

$\Rightarrow 3x = 4$

So, $1 + 3x + 9x^2 + 27x^3 + 81x^4 + 243x^5$

$\Rightarrow 1 + 3x + (3x)^2 + (3x)^3 + (3x)^4 + (3x)^5$

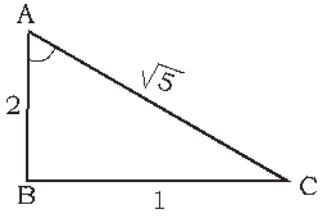
$\Rightarrow 1 + 4 + 4^2 + 4^3 + 4^4 + 4^5$

$\Rightarrow \frac{4^6 - 1}{4-1} \Rightarrow \frac{4095}{3} = 1365$

Then, $\sin\theta = \frac{16}{65}$ & $\cos\theta = \frac{63}{65}$

Then, $\sin\theta + \cos\theta = \frac{16}{65} + \frac{63}{65} = \frac{79}{65}$

32.(B)



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

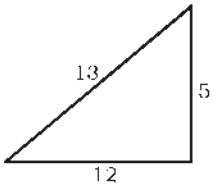
33.(A) $\frac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta} = \frac{209}{79}$

$= \frac{2\sec\theta}{2\tan\theta} = \frac{288}{130}$

$= \frac{1}{\sin\theta} = \frac{144}{65} \Rightarrow \sin\theta = \frac{65}{144}$

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

34. (A)



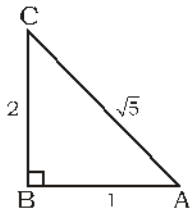
$$\frac{\sin A+\cos A}{\cos A}=\frac{17}{12}$$

$$\tan A+1=\frac{17}{12}$$

$$\tan A=\frac{5}{12}$$

$$\frac{1-\cos A}{\sin A}=\frac{1-\frac{12}{13}}{\frac{5}{13}}=\frac{1}{5}$$

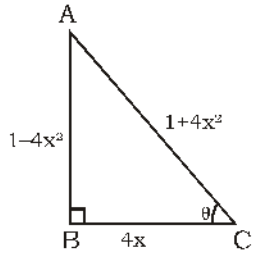
35. (B)



$$\Rightarrow \frac{\sin A(\cos C+\cos A)}{\cos C(\sin C-\sin A)}=\frac{\frac{2}{\sqrt{5}}\left(\frac{2}{\sqrt{5}}+\frac{1}{\sqrt{5}}\right)}{\frac{2}{\sqrt{5}}\left(\frac{1}{\sqrt{5}}-\frac{2}{\sqrt{5}}\right)}$$

$$\Rightarrow \frac{\frac{3}{\sqrt{5}}}{-\frac{1}{\sqrt{5}}}=-3$$

36. (B)



$$\sin\theta=\frac{1-4x^2}{1+4x^2}$$

37. (D) $\frac{\tan\theta}{1-\cot\theta}+\frac{\cot\theta}{1-\tan\theta}$

$$=\frac{\tan\theta}{1-\left(\frac{1}{\tan\theta}\right)}+\frac{1}{(\tan\theta)(1-\tan\theta)}$$

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

$$=\frac{\tan^3\theta-1}{(\tan\theta)(\tan\theta-1)}$$

Using formula a^3-b^3

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

$= \tan\theta + \cot\theta + 1$
$= 1 + k$ (Given)
$k = \tan\theta + \cot\theta$

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

$$=\frac{1}{\cos\theta\sin\theta}=\sec\theta\,\mathrm{cosec}\theta$$

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

Using C & D

$$\frac{\cos\theta}{\sin\theta}=\frac{\sqrt{3}}{1}\Rightarrow \mathrm{Cot}\,\theta=\sqrt{3}\Rightarrow\theta=30^\circ$$

$$\Rightarrow \mathrm{Sec}\ \theta=\mathrm{Sec}30^\circ=\frac{2}{\sqrt{3}}\text{ or }\frac{2\sqrt{3}}{3}$$

39.(A) $\sqrt{\frac{\cot\theta+\cos\theta}{\cot\theta-\cos\theta}}=\sqrt{\frac{1+\sin\theta}{1-\sin\theta}}$

$$=\frac{1+\sin}{\cos\theta}=(\sec\theta+\tan\theta)$$

40.(D) $\mathrm{cosec}\phi-\cot\phi\div\left(\frac{1-\cos\phi}{\sin\phi}\right)$

$$=\frac{\mathrm{cosec}\phi-\cot\phi}{\mathrm{cosec}\phi-\cot\phi}=1$$

Mother's

41.(C) I. $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = \sqrt{\frac{1-\cos\theta}{1+\cos\theta}\times\frac{1-\cos\theta}{1-\cos\theta}}$

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

$= \sqrt{\frac{(1-\cos\theta)^2}{\sin^2\theta}} = \frac{1-\cos\theta}{\sin\theta} = \text{cosec}\theta - \cot\theta$

Hence, Statement I is true.

II. $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \sqrt{\frac{1+\cos\theta}{1-\cos\theta}\times\frac{1+\cos\theta}{1+\cos\theta}}$

$= \sqrt{\frac{(1+\cos\theta)^2}{\sin^2\theta}} = \frac{1+\cos\theta}{\sin\theta} = \text{cosec}\theta + \cot\theta$

Hence, Statement II is true.

42.(C) Given, $p = \sqrt{\frac{1-\sin x}{1+\sin x}}$

$p = \sqrt{\frac{(1-\sin x)(1-\sin x)}{(1+\sin x)(1-\sin x)}} = \frac{1-\sin x}{\sqrt{1-\sin^2 x}}$

$= \frac{1-\sin x}{\cos x}$

$r = \frac{\cos x}{1+\sin x}\times\frac{(1-\sin x)}{(1-\sin x)} = \frac{\cos x(1-\sin x)}{1-\sin^2 x}$

$= \frac{\cos x(1-\sin x)}{\cos^2 x} = \frac{1-\sin x}{\cos x}$

$\therefore \quad p = q = r$

Now, $p^2 = \left(\frac{1-\sin x}{\cos x}\right)^2 = \frac{(1-\sin x)}{\cos x}\times\frac{(1-\sin x)}{\cos x}$

$\Rightarrow \quad p^2 = q \times r$

43. (C) Given that,

$\sin A = \frac{3}{5}$ [A is acute i.e. $0 \le A < 90°$]

Then, $\cos A = \sqrt{1-\sin^2 A}$

$= \sqrt{1-(3/5)^2} = \sqrt{1-9/25}$

$= \sqrt{16/25} = 4/5$

$\therefore \quad \tan A + \sec A = \frac{\sin A}{\cos A} + \frac{1}{\cos A} = \frac{1+\sin A}{\cos A}$

$= \frac{1+3/5}{4/5} = \frac{8/5}{4/5} = \frac{8}{4} = 2$

44. (B) Given that, $\sin\theta = \frac{x^2-y^2}{x^2+y^2}$

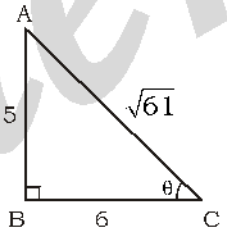
$\because \quad \cos^2\theta = 1 - \sin^2\theta = 1 - \left(\frac{x^2-y^2}{x^2+y^2}\right)^2$

$= \frac{(x^2+y^2)^2-(x^2-y^2)^2}{(x^2+y^2)^2}$

$= \frac{2x^2.2y^2}{(x^2+y^2)^2} = \frac{4x^2y^2}{(x^2+y^2)^2} = \left(\frac{2xy}{x^2+y^2}\right)^2$

$\therefore \quad \cos\theta = \frac{2xy}{x^2+y^2}$

45.(B) $\tan\theta = \frac{5}{6}$ है, तो $\frac{12\sin\theta - 5\cos\theta}{12\sin\theta + 5\cos\theta} = ?$



पाइथोगोरस प्रमेय से

$AC^2 = AB^2 + BC^2$

$AC^2 = 5^2 + 6^2$

$AC^2 = 61$

$AC = \sqrt{61}$

$\frac{12\sin\theta - 5\cos\theta}{12\sin\theta + 5\cos\theta}$

$\Rightarrow \quad \frac{12\times\frac{5}{\sqrt{61}} - 5\times\frac{5}{\sqrt{61}}}{12\times\frac{5}{\sqrt{61}} + 5\times\frac{5}{\sqrt{61}}}$

$\Rightarrow \quad \frac{\frac{60-30}{\sqrt{61}}}{\frac{60+30}{\sqrt{31}}} = \frac{\frac{30}{\sqrt{61}}}{\frac{90}{\sqrt{61}}} = \frac{30}{\sqrt{61}}\times\frac{\sqrt{61}}{90}$

$\Rightarrow \quad \frac{1}{3}$

Mothers

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

Trigonometry

Part-II

Part-II
Exercise / अभ्यास प्रश्न

1. If $\sec\theta + \tan\theta = 3.2$ then what is the value of $\sec\theta$
यदि $\sec\theta + \tan\theta = 3.2$ है, तो $\sec\theta$ का मान क्या है ?
(A) 2.28 (B) 1.6
(C) 1.75625 (D) 1.92625

2. If $\sec\theta - \tan\theta = P$, then $\operatorname{cosec}\theta$ is equal to:
यदि $\sec\theta - \tan\theta = P$, तो $\operatorname{cosec}\theta$ किसके बराबर है ?
(A) $\frac{2P}{1-P^2}$ (B) $\frac{1-P^2}{1+P^2}$
(C) $\frac{P^2+1}{P^2-1}$ (D) $\frac{2P}{1+P^2}$

3. If $\sec\theta + \tan\theta = 12.5$ then $\sec\theta - \tan\theta$ is equal to
यदि $\sec\theta + \tan\theta = 12.5$ तो $\sec\theta - \tan\theta$ किसके बराबर है ?
(A) 4 (B) 2 (C) 0.08 (D) $\frac{1}{2}$

4. If $\tan\theta + \sec\theta = \frac{(x-2)}{(x+2)}$ then what is the value of $\cos\theta$?
यदि $\tan\theta + \sec\theta = \frac{(x-2)}{(x+2)}$ है, तो $\cos\theta$ 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) $\frac{(x^2-2)}{(x^2+2)}$

5. If $\sec\theta + \tan\theta = p$, $(p > 1)$ then $\frac{\operatorname{cosec}\theta+1}{\operatorname{cosec}\theta-1} = ?$
यदि $\sec\theta + \tan\theta = p$, $(p > 1)$ है, तो $\frac{\operatorname{cosec}\theta+1}{\operatorname{cosec}\theta-1} =$
(A) $\frac{p+1}{p-1}$ (B) p^2 (C) $\frac{p-1}{p+1}$ (D) $2p^2$

6. If $\operatorname{cosec}\theta - \cot\theta = m$ then what is $\operatorname{cosec}\theta$ equal to ?
यदि $\operatorname{cosec}\theta - \cot\theta = m$ है, तो $\operatorname{cosec}\theta$ किसके बराबर है ?
(A) $m + \frac{1}{m}$ (B) $m - \frac{1}{m}$ (C) $\frac{m}{2} + \frac{2}{m}$ (D) $\frac{m}{2} + \frac{1}{2m}$

7. If $\operatorname{cosec}\theta - \sin\theta = P$ and $\sec\theta - \cos\theta = q$ then 'sinx'
यदि $\operatorname{cosec}\theta - \sin\theta = P$ और $\sec\theta - \cos\theta = q$ है, तो निम्न में से कौन सही है ?
(A) $(p^2q)^{\frac{2}{3}} - (pq^2)^{\frac{2}{3}} = 1$ (B) $\sin\theta\sec\theta = \frac{1}{P}$
(C) $\sin\theta\tan\theta = \frac{1}{q}$ (D) $(p^2q)^{\frac{2}{3}} + (pq^2)^{\frac{2}{3}} = 1$

8. If $\sin x + \cos x = \sqrt{2}\sin x$ then $\tan x$
यदि $\sin x + \cos x = \sqrt{2}\sin x$ है, तो $\tan x$ का मान क्या है ?
(A) $\sqrt{2} + 1$ (B) 1
(C) $\sqrt{2} - 1$ (D) $\sqrt{2}$

9. If $\sin\theta + \cos\theta = 1$, then the value of $\sec\theta + \tan\theta$ is:
यदि $\sin\theta + \cos\theta = 1$, है, तो $\sec\theta + \tan\theta$ का मान क्या होगा ?
(A) 0 (B) 1
(C) -1 (D) 2

10. If $\cos\theta + \sin\theta = m$, $\sec\theta + \operatorname{cosec}\theta = n$, then what is the value of $\frac{m}{n}$.
यदि $\cos\theta + \sin\theta = m$, $\sec\theta + \operatorname{cosec}\theta = n$ है, तो $\frac{m}{n}$ का मान क्या है ?
(A) 1 (B) $\cos\theta\sin\theta$
(C) $\sec\theta.\operatorname{cosec}\theta$ (D) $\cot\theta\tan\theta$

11. If $p = \sec\theta - \tan\theta$ and $q = \operatorname{cosec}\theta + \cot\theta$, then what is $p + q(p - 1)$ equal to ?
यदि $p = \sec\theta - \tan\theta$ और $q = \operatorname{cosec}\theta + \cot\theta$ है, तो $p + q(p - 1)$ किसके बराबर है ?
(A) -1 (B) 0
(C) 1 (D) 2

12. If $\sec\theta = 8x$ and $\tan\theta = \frac{8}{x}$ $(x \neq 0)$, then the value of 16 is:

Mother's

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) $\frac{1}{2}$

13. $(\sec\phi - \tan\phi)^2(1 + \sin\phi)^2 \div \cos\phi^4 = ?$

$(\sec\phi - \tan\phi)^2(1 + \sin\phi)^2 \div \cos\phi^2$ का मान ज्ञात कीजिए।

(A) 1 (B) –1

(C) $\cot^2\phi$ (D) $\cos^2\phi$

14. If $\tan A + \cot A = 2$ then the value of $\tan^2 A + \cot^2 A$

यदि $\tan A + \cot A = 2$ है, तो $\tan^2 A + \cot^2 A$ का मान ज्ञात कीजिए।

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

15. 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 $\tan\theta = \frac{4}{x}$, $(x \neq 0)$ हैं, 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) $\frac{1}{8}$

16. If $\operatorname{cosec}\theta = 3x$ and $\cot\theta = \frac{3}{x}$, $(x \neq 0)$ then the value of $6\left(x^2 - \frac{1}{x^2}\right)$ is:

यदि $\operatorname{cosec}\theta = 3x$ और $\cot\theta = \frac{3}{x}$, $(x \neq 0)$ 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) $\frac{1}{2}$

17. 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) $\frac{1}{16}$

18. If $\operatorname{cosec}\theta = \frac{1}{4x} + x$, then what is the value of $\operatorname{cosec}\theta + \cot\theta$?

यदि $\operatorname{cosec}\theta = \frac{1}{4x} + x$ है, तो $\operatorname{cosec}\theta + \cot\theta$ का मान क्या है?

(A) 3x (B) x

(C) 4x (D) 2x or 1/(2x)

19. If $\sec^2\theta + \tan^2\theta = 3\frac{1}{2}$, $0° < \theta < 90°$, then $(\cos\theta + \sin\theta)$ is equal to :

यदि $\sec^2\theta + \tan^2\theta = 3\frac{1}{2}$, $0° < \theta < 90°$,तो $(\cos\theta + \sin\theta)$ का मान क्या है?

(A) $\frac{9+2\sqrt{5}}{6}$ (B) $\frac{2+\sqrt{5}}{3}$

(C) $\frac{1+\sqrt{5}}{3}$ (D) $\frac{1+\sqrt{5}}{6}$

20. $\sec^4\theta - \tan^4\theta = 11$, $\sin\theta + \operatorname{cosec}\theta = ?$

$\sec^4\theta - \tan^4\theta = 11$, $\sin\theta + \operatorname{cosec}\theta = ?$ को हल करें:

(A) $\frac{65}{12}$ (B) $\frac{11}{\sqrt{30}}$

(C) 0 (D) 1

21. If $\sec^4\theta - \sec^2\theta = 3$ then $\tan^4\theta + \tan^2\theta = ?$

यदि $\sec^4\theta - \sec^2\theta = 3$ है, तो $\tan^4\theta + \tan^2\theta = ?$

(A) 2 (B) 0

(C) 3 (D) 1

22. If $6 + 8\tan\theta = \sec\theta$ and $8 - 6\tan\theta = k\sec\theta$, then what is the value of k^2 ?

यदि $6 + 8\tan\theta = \sec\theta$ और $8 - 6\tan\theta = k\sec\theta$ है, तो k^2 का मान क्या है ?

(A) 11 (B) 22

(C) 77 (D) 99

23. If $x = r\sin A\cos B$, $y = r\sin A\sin B$ and $z = r\cos A$, the find the value of $x^2 + y^2 + z^2$

यदि $x = r\sin A\cos B$, $y = r\sin A\sin B$ and $z = r\cos A$ हो, तो $x^2 + y^2 + z^2$ का मान ज्ञात कीजिए।

(A) $r^2(\cos^2 B + \cos^2 A)$ (B) $2r^2$

(C) $3/2r^2$ (D) r^2

24. If $a + b\tan\theta = \sec\theta$, $b - a\tan\theta = 3\sec\theta$, $a^2 + b^2 = ?$

यदि $a + b\tan\theta = \sec\theta$, $b - a\tan\theta = 3\sec\theta$ है, तो $a^2 + b^2 = ?$

(A) 9 (B) 10

(C) $3\sec^2\theta$ (D) $8\tan^2\theta$

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

25. Solve it : $\frac{\tan A}{(1+\tan^2 A)^2} + \frac{\cot A}{(1+\cot^2 A)^2}$

सरल कीजिए : $\frac{\tan A}{(1+\tan^2 A)^2} + \frac{\cot A}{(1+\cot^2 A)^2}$

(A) 2sinAcosA (B) sinA – cosA
(C) sinAcosA (D) (sinA + cosA)²

26. If $5\sin\theta - \cos\theta = 1$ and $x\sin\theta + \cos\theta = 1$ then the value of $5x - 1$ is:

यदि $5\sin\theta - \cos\theta = 1$ और $x\sin\theta + \cos\theta = 1$ तो $5x - 1$ का मान क्या होगा ?

(A) 24 (B) 19
(C) 1 (D) 0

27. Solve it : $\cos\theta(1 - \tan\theta) + \sin\theta(1 - \cot\theta)$

सरल करें : $\cos\theta(1 - \tan\theta) + \sin\theta(1 - \cot\theta)$

(A) $\sin\theta + \cos\theta$ (B) $\sin\theta - \cos\theta$
(C) 0 (D) $\tan\theta + \cot\theta$

28. If $\sec^6\theta = \tan^4\theta + 3\tan^y\theta\sec^y\theta + 1$, then find the value of $\sqrt{x^4 - y^4}$ is:

यदि $\sec^6\theta = \tan^4\theta + 3\tan^y\theta\sec^y\theta + 1$ है, तो $\sqrt{x^4 - y^4}$ का मान किसके बराबर है ?

(A) $2\sqrt{2}$ (B) $4\sqrt{2}$
(C) 6 (D) 4

29. If $\sin\theta + \cos\theta = \frac{\sqrt{7}}{2}$, then what is $\sin\theta - \cos\theta$ equal to :

यदि $\sin\theta + \cos\theta = \frac{\sqrt{7}}{2}$ है, तो $\sin\theta - \cos\theta$ किसके बराबर है ?

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

30. If $\sin^4\theta - \cos^4\theta - 3\sin\theta + 2 = 0$, $0° < \theta < 90°$, then what is the value of $1 + \sec\theta + \tan\theta$?

यदि $\sin^4\theta - \cos^4\theta - 3\sin\theta + 2 = 0$, $0° < \theta < 90°$, तो $1 + \sec\theta + \tan\theta$ का मान कितना होगा ?

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

31. If $7\sin^2\theta + 4\cos^2\theta = 5$, and θ is in first quadrant than 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) $2(\sqrt{2} - 1)$ (B) $2(1 + \sqrt{2})$
(C) $3\sqrt{2}$ (D) $4\sqrt{2}$

32. If $1 + 2\tan^2\theta + 2\sin\theta.\sec^2\theta = \frac{a}{b}$, $0° < \theta < 90°$ then what is the value of $\frac{a+b}{a-b}$:

यदि $1 + 2\tan^2\theta + 2\sin\theta.\sec^2\theta = \frac{a}{b}$, $0° < \theta < 90°$ है, तो $\frac{a+b}{a-b}$ क्या होगा ?

(A) $\sin\theta$ (B) $\operatorname{cosec}\theta$
(C) $\cos\theta$ (D) $\sec\theta$

33. 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 ज्ञात कीजिए जहाँ $0° < \theta < 90°$

(A) $2 - \sec\theta - \tan\theta$ (B) $2 + \sec\theta - \tan\theta$
(C) $2 - \sec\theta + \tan\theta$ (D) $2 + \sec\theta + \tan\theta$

34. What is the value of $\frac{1 + \cos\theta - \sin^2\theta}{\sin\theta(1 + \cos\theta)} \times \frac{\sqrt{\sec^2\theta + \operatorname{cosec}^2\theta}}{\tan\theta + \cot\theta}$, if $0° < \theta < 90°$.

$\frac{1 + \cos\theta - \sin^2\theta}{\sin\theta(1 + \cos\theta)} \times \frac{\sqrt{\sec^2\theta + \operatorname{cosec}^2\theta}}{\tan\theta + \cot\theta}$, $0° < \theta < 90°$ का मान इसमें से किसके बराबर है ?

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

35. If $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} \times \sqrt{\frac{\operatorname{cosec}\theta - \cot\theta}{\operatorname{cosec}\theta + \cot\theta}} = \frac{1-r}{1+r}$ then the value of r is :

अगर $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} \times \sqrt{\frac{\operatorname{cosec}\theta - \cot\theta}{\operatorname{cosec}\theta + \cot\theta}} = \frac{1-r}{1+r}$ है, तो r का मान होगा :

(A) $\sin\theta$ (B) $\operatorname{cosec}\theta$
(C) $\sec\theta$ (D) $\cos\theta$

Mother's

36. If $x = a\sec\theta + b\tan\theta$ and $y = a\tan\theta + b\sec\theta$ then find the value of $x^2 - y^2$?
यदि $x = a\sec\theta + b\tan\theta$ और $y = a\tan\theta + b\sec\theta$ तो $x^2 - y^2$ का मान ज्ञात कीजिए।
(A) $a^2 + b^2$ (B) $\sqrt{a^2 + b^2}$
(C) $a + b$ (D) $a^2 - b^2$

37. If $x\sin^5\theta + y\cos^5\theta = \frac{1-2\sin^2\theta\cos^2\theta}{\text{cosec}\theta\sec\theta}$ and $x\sin\theta - y\cos\theta = 0$ then find $x^2 + y^2 = ?$
यदि $x\sin^5\theta + y\cos^5\theta = \frac{1-2\sin^2\theta\cos^2\theta}{\text{cosec}\theta\sec\theta}$ और $x\sin\theta - y\cos\theta = 0$ तो $x^2 + y^2$ का मान ज्ञात करें।
(A) 0 (B) 1
(C) $\sqrt{3}$ (D) 4

38. $\text{cosec}^4A = 49 + \cot^4A$, then find $1 + \sin^2\theta$ is:
यदि $\text{cosec}^4A = 49 + \cot^4A$ तो $1 + \sin^2\theta$ का मान ज्ञात करें।
(A) $\frac{26}{25}$ (B) $\frac{23}{25}$
(C) $7\sqrt{2}$ (D) $4\sqrt{3}$

39. The expresssion $(\cos^6\theta + \sin^6\theta - 1)(\tan^2\theta + \cot^2\theta + 2) + 1$ is equal to : **[SSC CGL 2021**
व्यंजक $(\cos^6\theta + \sin^6\theta - 1)(\tan^2\theta + \cot^2\theta + 2) + 1$ निम्न में से किसके बराबर है ?
(A) 1 (B) 0
(C) –2 (D) –1

40. 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

41. 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

42. 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

43. 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) $\frac{2\sqrt{3}}{3}$

44. 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) $\frac{13}{4}$

45. If $3\sin^2\theta + 4\cos\theta - 4 = 0$, $0° < \theta < 90°$, then the value of $(\text{cosec}^2\theta + \cot^2\theta)$:
यदि $3\sin^2\theta + 4\cos\theta - 4 = 0$, $0° < \theta < 90°$ है तो $(\text{cosec}^2\theta + \cot^2\theta)$ का मान किसके बराबर है ? **[SSC CGL 2021]**
(A) $5/4$ (B) $25/3$
(C) $4/3$ (D) $17/9$

46. 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) $\frac{3}{8}$

47. 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

48. The value of
$$\frac{\cos^6\theta + \sin^6\theta + 3\sin^2\theta\cos^2\theta}{\text{cosec}\,\theta\sec\theta(\sin\theta + \cos\theta - 1)(\sin\theta + \cos\theta + 1)} \text{ is:}$$
$$\frac{\cos^6\theta + \sin^6\theta + 3\sin^2\theta\cos^2\theta}{\text{cosec}\,\theta\sec\theta(\sin\theta + \cos\theta - 1)(\sin\theta + \cos\theta + 1)}$$
का मान ज्ञात कीजिए ?
(A) 1 (B) 3
(C) $\frac{1}{2}$ (D) 2

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

49. If $\text{cosec}^5\theta - \text{cosec}^3\theta = 1$ then the value of $\text{cosec}^3\theta + \sin^5\theta - \tan^2\theta + \sin^2\theta$ is :
यदि $\text{cosec}^5\theta - \text{cosec}^3\theta = 1$ है, तो $\text{cosec}^3\theta + \sin^5\theta - \tan^2\theta + \sin^2\theta$ का मान ज्ञात करें:
(A) 1 (B) 0
(C) 2 (D) $\frac{1}{2}$

50. If $\sec\theta + \sec^2\theta + \sec^3\theta = 1$ then the value of $\tan^6\theta + 8\tan^2\theta + 4\tan^4\theta + 3$ is :
यदि $\sec\theta + \sec^2\theta + \sec^3\theta = 1$ है, तो $\tan^6\theta + 8\tan^2\theta + 4\tan^4\theta + 3$ का मान ज्ञात करें:
(A) 0 (B) 1
(C) -1 (D) 3

51. If $\text{cosec}\theta + \sec\theta - \sqrt{2}\,(\text{cosec}\theta\sec\theta) = 0$ then the value of $\sin\theta - \cos\theta$ is:
यदि $\text{cosec}\theta + \sec\theta - \sqrt{2}\,(\text{cosec}\theta\sec\theta) = 0$ है, तो $\sin\theta - \cos\theta$ का मान ज्ञात करें:
(A) 0 (B) 1
(C) $\sqrt{2}$ (D) $\frac{1}{2}$

52. If x and y are real number such that $x\cos\theta + y\sin\theta = 8$ and $x\sin\theta - y\cos\theta = 6$ then the value of $(x + y)^2 - 2xy$ is:
यदि x और y वास्तविक संख्या इस प्रकार से हैं कि $x\cos\theta + y\sin\theta = 8$ और $x\sin\theta - y\cos\theta = 6$ है, तो $(x + y)^2 - 2xy$ का मान ज्ञात करें:
(A) 7 (B) 12
(C) 10 (D) $\sqrt{12}$

53. The value of $\frac{1}{\sec x - \tan x} - \frac{1}{\cos x}$, $0° < x < 90°$, is equal to:
$\frac{1}{\sec x - \tan x} - \frac{1}{\cos x}$, $0° < x < 90°$, का मान बराबर है:
(A) 2secx (B) tanx
(C) 2 cosx (D) cotx

54. What is $\sin^4\theta - \cos^4\theta$ equal to for any real number θ?
किसी वास्तविक संख्या θ के लिए $\sin^4\theta - \cos^4\theta$ किसके बराबर है ? [CDS 2018 I]
(A) 1 (B) $1 - 2\sin^2\theta$
(C) $2\cos^2\theta + 1$ (D) $1 - 2\cos^2\theta$

55. If $x\sin\theta = y\cos\theta = \frac{2z\tan\theta}{1 - \tan^2\theta}$, then what is $4z^2(x^2 + y^2)$ equal to ?
यदि $x\sin\theta = y\cos\theta = \frac{2z\tan\theta}{1 - \tan^2\theta}$ है, तो $4z^2(x^2 + y^2)$ किसके बराबर है ?
(A) $(x^2 + y^2)^3$ (B) $(x^2 - y^2)^2$
(C) $(x^2 - y^2)^3$ (D) $(x^2 + y^2)^2$

56. The value of expression $(\sin^4\theta + \cos^4\theta - 1)(\tan\theta + \cot\theta)$ is:
$(\sin^4\theta + \cos^4\theta - 1)(\tan\theta + \cot\theta)$ का मान बराबर है:
(A) $\sin2\theta$ (B) $\tan2\theta$
(C) $-\frac{2\cos\theta}{\text{cosec}\theta}$ (D) $2\sin\theta$

57. The value of given expression
$\frac{(1+\sin\theta)^2 + (1 - \sin^2\theta)}{(\sec^2\theta - 1)\cos^2\theta\,\text{cosec}\theta}$ is:
$\frac{(1+\sin\theta)^2 + (1 - \sin^2\theta)}{(\sec^2\theta - 1)\cos^2\theta\,\text{cosec}\theta}$ का मान बराबर है:
(A) $2\sec\theta(1 + \sec\theta)$ (B) $\sec\theta(1 + \sin\theta)$
(C) $2(\text{cosec}\theta + 1)$ (D) $2(1 + \sec\theta)$

58. $\frac{\cos^6\theta - \sin^6\theta}{1 - 2\sin^2\theta}$ is equal to :
$\frac{\cos^6\theta - \sin^6\theta}{1 - 2\sin^2\theta}$ का मान बराबर है:
(A) $\cos^4\theta - \sin^4\theta$ (B) $1 + \sin^2\theta\cos^2\theta$
(C) $1 - 3\sin^2\theta\cos^2\theta$ (D) $1 - \sin^2\theta\cos^2\theta$

----------Answer----------

1. (C)	**2.** (C)	**3.** (C)	**4.** (C)	**5.** (B)
6. (B)	**7.** (D)	**8.** (A)	**9.** (B)	**10.** (B)
11. (A)	**12.** (A)	**13.** (A)	**14.** (B)	**15.** (C)
16. (A)	**17.** (D)	**18.** (D)	**19.** (B)	**20.** (B)
21. (C)	**22.** (D)	**23.** (D)	**24.** (B)	**25.** (A)
26. (D)	**27.** (C)	**28.** (B)	**29.** (B)	**30.** (C)
31. (B)	**32.** (B)	**33.** (C)	**34.** (B)	**35.** (D)
36. (D)	**37.** (B)	**38.** (A)	**39.** (C)	**40.** (D)
41. (B)	**42.** (C)	**43.** (D)	**44.** (C)	**45.** (A)
46. (B)	**47.** (C)	**48.** (C)	**49.** (A)	**50.** (C)
51. (A)	**52.** (C)	**53.** (B)	**54.** (D)	**55.** (B)
56. (C)	**57.** (C)	**58.** (D)		

Mother's

Solution

1. (C) $\sec\theta + \tan\theta = 3.2 = \frac{32}{10} = \frac{16}{5} = \ldots\ldots\ldots$ (i)

Multyplying by $(\sec\theta - \tan\theta)$ in both sides of eq. (i)

$(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = \frac{16}{5}(\sec\theta - \tan\theta)$

$\therefore \quad [\sec^2\theta - \tan^2\theta] = 1$

$\sec\theta - \tan\theta = \frac{5}{16} \quad \ldots\ldots\ldots\ldots\ldots$ (ii)

By adding eq. (i) & (ii)

$2\sec\theta = \frac{16}{5} + \frac{5}{16} = \frac{281}{80}$

$\Rightarrow \quad 2\sec\theta = 3.5125$

$\Rightarrow \quad \sec\theta = \frac{3.5125}{2} = 1.75625$

2. (C) $\sec\theta - \tan\theta = P$

$\sec\theta + \tan\theta = \frac{1}{P}$

$\Rightarrow 2\sec\theta = p + \frac{1}{p} \Rightarrow 2\sec\theta = \frac{p^2+1}{p}$

$\cos\theta = \frac{2p}{p^2+1} = \frac{\text{base}}{\text{hyp.}}$

using pythagorus theorem

Perpendicular = $P^2 - 1$

$\Rightarrow \sin\theta = \frac{p^2-1}{p^2+1} \Rightarrow \text{cosec}\theta = \frac{p^2+1}{p^2-1}$

3. (C) $\sec\theta + \tan\theta = 12.5$

Multiplying both sides by $(\sec\theta - \tan\theta)$

$\sec^2\theta - \tan^2\theta = 12.5(\sec\theta - \tan\theta)$

$[\because \sec^2\theta - \tan^2\theta = 1]$

$1 = 12.5(\sec\theta - \tan\theta)$

Either, $\sec\theta - \tan\theta = \frac{1}{12.5}$

$\Rightarrow \quad \sec\theta - \tan\theta = 0.08$

4.(C) $\tan\theta + \sec\theta = \frac{x-2}{x+2}$

We know,

$\sec\theta - \tan\theta = \frac{x+2}{x-2}$

Add $2\sec\theta = \frac{x-2}{x+2} + \frac{x+2}{x-2}$

$= \frac{(x-2)^2 + (x+2)^2}{x^2-4} = \cos\theta = \frac{x^2-4}{x^2+4}$

5.(B) $\sec\theta + \tan\theta = P$

$\Rightarrow \quad \sec\theta - \tan\theta = \frac{1}{p} \quad \Rightarrow 2\sec\theta = \frac{p^2+1}{p}$

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

$$\Rightarrow \frac{\text{cosec}\theta + 1}{\text{cosec}\theta - 1} = \frac{\left(\frac{p^2+1}{p^2-1} + 1\right)}{\left(\frac{p^2+1}{p^2-1} - 1\right)}$$

$\Rightarrow \frac{2p^2}{2} = p^2$

6. (D) $\text{cosec}\theta - \cot\theta = m$

$\text{cosec}\theta + \cot\theta = \frac{1}{m}$

$2\text{cosec}\theta = m + \frac{1}{m}$

$\Rightarrow \quad \text{cosec}\theta = \frac{m}{2} + \frac{1}{2m}$

7. (D) Given

$\text{cosec}\theta - \sin\theta = P \qquad \sec\theta - \cos\theta = q$

$\therefore \frac{1}{\sin\theta} - \sin\theta = p \qquad \frac{1}{\cos\theta} - \cos\theta = q$

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

$\cos^2\theta = p\sin\theta \qquad \sin^2\theta = q\cos\theta$

$p = \frac{\cos^2\theta}{\sin\theta} \qquad q = \frac{\sin^2\theta}{\cos\theta}$

$p^2q = \frac{\cos^4\theta}{\sin^2\theta} \times \frac{\sin^2\theta}{\cos\theta}$

$p^2q = \cos^3\theta$

$(p^2q)^{\frac{1}{3}} = \cos\theta$

$(p^2q)^{\frac{2}{3}} = \cos^2\theta \quad \ldots\ldots\ldots\ldots$ (i)

Such that

$(q^2p)^{\frac{2}{3}} = \sin^2\theta \quad \ldots\ldots\ldots\ldots$ (ii)

Adding Eq. (i) and (ii)

$(p^2q)^{\frac{2}{3}} + (q^2p)^{\frac{2}{3}} = 1 \qquad [\because \sin^2\theta + \cos\theta = 1]$

Mother's

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

8. (A) $\sin x + \cos x = \sqrt{2}$

Both sides divided by cosx

$$\frac{\sin}{\cos x} + \frac{\cos x}{\cos x} = \frac{\sqrt{2}\sin x}{\cos x}$$

$\tan x + 1 = \sqrt{2}\tan x$

$1 = \tan x(\sqrt{2} - 1)$

$$\tan x = \frac{1}{\sqrt{2}-1}$$

$$\tan x = \frac{\sqrt{2}+1}{(\sqrt{2}-1)(\sqrt{2}+1)}$$

$\tan x = \sqrt{2} + 1$

9. (B) $\Rightarrow \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta} = \frac{1}{\cos\theta}$

$\Rightarrow \tan\theta + 1 = \sec\theta$

$\Rightarrow \sec\theta - \tan\theta = 1$

$\therefore \sec\theta + \tan\theta = 1$

10.(B) $\cos\theta + \sin\theta = m$ ..... (i)

and $\sec\theta + \operatorname{cosec}\theta = n$

$$\Rightarrow \frac{1}{\cos\theta} + \frac{1}{\sin\theta} = n$$

$$\Rightarrow \frac{\sin\theta + \cos\theta}{\cos\theta\sin\theta} = n$$

$$\Rightarrow \frac{m}{\cos\theta\sin\theta} = n$$

$[\because \cos\theta + \sin\theta = m]$ from eq. (i)

$$\Rightarrow \frac{m}{n} = \sin\theta\cos\theta$$

11.(A) Put $\theta = 45°$

$p = (\sqrt{2} - 1)$, $q = (\sqrt{2} + 1)$

$\therefore$ $p + pq - q =$

$(\sqrt{2} - 1) + (\sqrt{2} - 1)(\sqrt{2} + 1) - (\sqrt{2} - 1)$

$= \sqrt{2} - 1 + 2 - 1 - \sqrt{2} - 1$

$= -1$

12.(A) $16\left(\frac{\sec^2\theta}{64} - \frac{\tan^2\theta}{64}\right)$

$= \frac{1}{4}(\sec^2\theta - \tan^2\theta) = \frac{1}{4}$

13.(A)

14.(B) Given $\tan A + \cot A = 2$

Squaring on both sides

$(\tan A + \cot A)^2 = 4$

$\tan^2 A + \cot^2 A + 2\tan\cot A = 4$

$\tan^2 A + \cot^2 A + 2 \times 1 = 4$ $[\because \tan A \cot A = 1]$

$\tan^2 A + \cot^2 A = 4 - 2 = 2$

15. (C) $8\left(\frac{\sec^2\theta}{16} - \frac{\tan^2\theta}{16}\right) = \frac{8}{16}(\sec^2\theta - \tan^2\theta) = \frac{1}{2}$

16.(A) $6\left[\left(\frac{\operatorname{cosec}\theta}{3}\right)^2 - \left(\frac{\cot\theta}{3}\right)^2\right]$

$\frac{6}{9}(\operatorname{cosec}^2\theta - \cot^2\theta) = \frac{2}{3}$

17.(D) $x^2 + \frac{1}{x^2} = \left(\frac{\cos\theta}{4}\right)^2 + \left(\frac{\sin\theta}{4}\right)^2 = \frac{1}{16}$

18.(D) $\operatorname{cosec}\theta = \frac{1}{4x} + x$ ... (1)

$\operatorname{cosec}\theta + \cot\theta = ?$

Let $\operatorname{cosec}\theta + \cot\theta = y$

$$\operatorname{cosec}\theta - \cot\theta = \frac{1}{y}$$

$$2\operatorname{cosec}\theta = y + \frac{1}{y}$$

$$\operatorname{cosec}\theta = \frac{y}{2} + \frac{1}{2y}$$ ... (2)

(1) = (2)

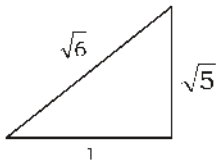
$$\frac{1}{4x} + x = \frac{y}{2} + \frac{1}{2y} \Rightarrow y + \frac{1}{y} = 2x + \frac{1}{2x}$$

$$y = 2x \text{ or } \frac{1}{2x}$$

$= \operatorname{cosec}\theta + \cot\theta = 2x$ or $\frac{1}{2x}$

19. (B)

20. (B)



$\sec^2\theta - \tan^2\theta = 1$

$\sec^2\theta + \tan^2\theta = 11$

$$\tan^2\theta = \frac{10}{2} = \frac{5}{1}$$

$\sin\theta + \operatorname{cosec}\theta$

$$\Rightarrow \frac{\sqrt{5}}{\sqrt{6}} + \frac{\sqrt{6}}{\sqrt{5}} = \frac{11}{\sqrt{30}}$$

21.(C) If $\sec^4\theta - \sec^2\theta = 3$

$\sec^2\theta(\sec^2\theta - 1) = 3$ $[\because \sec^2\theta - \tan^2\theta = 1]$

$(\tan^2\theta + 1)\tan^2\theta = 3$

$\tan^4\theta + \tan^2\theta = 3$

$\therefore$ $\tan^4\theta + \tan^2\theta = 3$

22.(D) $6 + 8\tan\theta = \sec\theta$ .....(i)

$8 - 6\tan\theta = k\sec\theta$ .....(ii)

$(i)^2 + (ii)^2$

$\Rightarrow 36 + 64\tan^2\theta + 96\tan\theta = \sec^2\theta$

Mother's

$\Rightarrow 64 + 36\tan^2\theta - 96\tan\theta = k^2\sec^2\theta$
$\Rightarrow 36(1 + \tan^2\theta) + 64(1 + \tan^2\theta) = \sec^2\theta(k^2 + 1)$
$\Rightarrow 36\sec^2\theta + 64\sec^2\theta = \sec^2\theta(k^2 + 1)$
$\Rightarrow 100\sec^2\theta = \sec^2\theta(k^2 + 1)$
$\Rightarrow k^2 = 100 - 1 = 99$

23.(D) Given, $x = r\sin A\cos B$,
$y = r\sin A\sin B$
and $z = r\cos A$,
$x^2 + y^2 + z^2 = (r\sin A\cos B)^2 + (r\sin A\sin B)^2 + (r\cos A)^2$
$= r^2\sin^2A\cos^2B + r^2\sin^2A\sin^2B + r^2\cos^2A$
$= r^4\sin^2A(\cos^2B + \sin^2B) + r^4\cos^2A$
$= r^2\sin^2A + r^2\cos^2A \quad [\because \sin^2B + \cos^2B = 1]$
$= r^2(\sin^2A + \cos^2A)$
$= r^2$

24. (B) $\Rightarrow a^2 + b^2\tan^2\theta + 2ab\tan\theta = \sec^2\theta$ ..... (i)
$\Rightarrow b^2 + a^2\tan^2\theta - 2ab\tan\theta = \sec^2\theta$ ..... (ii)
Add eq. (i) & (ii)
$a^2(1 + \tan^2\theta) + b^2(1 + \tan^2\theta) = 10\sec^2\theta$

$$a^2 + b^2 = \frac{10\sec^2\theta}{\sec^2\theta} = 10$$

25.(A) Given, $\dfrac{\tan A}{(1+\tan^2A)^2} + \dfrac{\cot A}{(1+\cot^2A)^2}$

$$= \frac{\frac{\sin A}{\cos A}}{(\sec^2A)^2} + \frac{\frac{\cos A}{\sin A}}{(\operatorname{cosec}^2A)^2}$$

$$= \frac{\sin A}{\cos A}\cos^4A + \frac{\cos A}{\sin A}\sin^4A$$
$= \sin A.\cos^3A + \cos A\sin^3A$
$= \sin A.\cos A(\cos^2 + \sin^2A)$
$= \sin A.\cos A \quad [\because \sin^2A + \cos^2A = 1]$

26. (D) $\Rightarrow \dfrac{5\sin\theta}{\sin\theta} + \dfrac{\cos\theta}{\sin\theta} = \dfrac{1}{\sin\theta}$
$\Rightarrow \operatorname{cosec}\theta + \cot\theta = 5$
and $x\dfrac{\sin\theta}{\sin\theta} + \dfrac{\cos\theta}{\sin\theta} = \dfrac{1}{\sin\theta}$
$\Rightarrow x = \operatorname{cosec}\theta - \cot\theta$
$\because \operatorname{cosec}^2\theta - \cot^2\theta = 1$
$5 \times x = 1$

$$\Rightarrow x = \frac{1}{5}$$

$$\Rightarrow 5 \times \frac{1}{5} - 1 = 0$$

27.(C) Given, $\cos\theta(1 - \tan\theta) + \sin\theta(1 - \cot\theta)$

$$= \cos\theta\left(1 - \frac{\sin\theta}{\cos\theta}\right) + \sin\theta\left(1 - \frac{\cos\theta}{\sin\theta}\right)$$

$$= \cos\theta - \cos\theta\frac{\sin\theta}{\cos\theta} + \sin\theta - \sin\theta\frac{\cos\theta}{\sin\theta}$$
$= \cos\theta - \sin\theta + \sin\theta - \cos\theta = 0$

28.(B) We know that , $\sec^2\theta = 1 + \tan^2\theta$
$\sec^6\theta = (1 + \tan^2\theta)^3$
$= (1 + \tan^6\theta + 3\tan^2\theta(1 + \tan^2\theta)$
$= 1 + \tan^6\theta + 3\tan^2\theta\sec^2\theta$
By comparision
$x = 6, y = 2$
$\therefore \sqrt{x^2 - y^2} = \sqrt{36 - 4} = \sqrt{32} = 4\sqrt{2}$

29.(B) Given, $\sin\theta + \cos\theta = \dfrac{\sqrt{7}}{2}$
On squaring both sides, we get

$$(\sin\theta + \cos\theta)^2 = \left(\frac{\sqrt{7}}{2}\right)^2$$

$$\Rightarrow \sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = \frac{7}{4}$$

$$\Rightarrow \quad 1 + 2\sin\theta\cos\theta = \frac{7}{4}$$

$$\Rightarrow \quad 1 + 2\sin\theta\cos\theta = \frac{7}{4}$$

$$\Rightarrow \quad 2\sin\theta\cos\theta = \frac{7}{4} - 1$$

$$\Rightarrow \quad 2\sin\theta\cos\theta = \frac{3}{4}$$

Now, $(\sin\theta - \cos\theta)^2 = \sin^2\theta + \cos^2\theta - 2\sin\theta\cos\theta$

$$= 1 - \frac{3}{4} \quad \Rightarrow \quad \frac{4-3}{4}$$

$$\Rightarrow \quad (\sin\theta - \cos\theta)^2 = \frac{1}{4}$$

$$\therefore \quad (\sin\theta - \cos\theta) = \frac{1}{2}$$

30.(C)

31.(B) $7\sin^2\theta + 4 - 4\sin^2\theta = 5$
$3\sin^2\theta = 1$

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

$L = 1, K = \sqrt{3}, A = \sqrt{3-1} = \sqrt{2}$

$$\frac{\sqrt{3}\sec\theta + \tan\theta}{\sqrt{2}\cot\theta - \sqrt{3}\cos\theta} = \frac{\sqrt{3}.\frac{\sqrt{2}}{\sqrt{2}} + \frac{1}{\sqrt{2}}}{\sqrt{2}.\sqrt{2} - \sqrt{3}.\frac{\sqrt{2}}{\sqrt{3}}}$$

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

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

32.(B) $1+\frac{2\sin^2\theta}{\cos^2\theta}+\frac{2\sin\theta}{\cos^2\theta}=\frac{a}{b}$

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

$$\frac{(1+\sin\theta)^2}{(1-\sin\theta)(1+\sin\theta)}=\frac{a}{b}$$

$$\frac{1+\sin\theta}{1-\sin\theta}=\frac{a}{b}$$

$$\frac{1}{\sin\theta}=\frac{a+b}{a-b}=\operatorname{cosec}\theta$$

33.(C)

34.(B) $\frac{\cos\theta+\cos^2\theta}{\sin\theta(1+\cos\theta)}\times\frac{\sqrt{\frac{\sin^2\theta+\cos^2\theta}{\sin^2\theta\cos^2\theta}}}{\frac{\sin\theta}{\cos\theta}+\frac{\cos\theta}{\sin\theta}}$

$$\frac{\cos\theta}{\sin\theta}\times 1=\cot\theta$$

35.(D) $\left(\frac{1-\cos\theta}{\sin\theta}\right)(\operatorname{cosec}\theta-\cot\theta)=\frac{1-r}{1+r}$

$$\left(\frac{1-\cos\theta}{\sin\theta}\right)\left(\frac{1-\cos\theta}{\sin\theta}\right)\Rightarrow\left(\frac{\operatorname{cosec}\theta-\cot\theta}{\operatorname{cosec}\theta+\cot\theta}\right)=\frac{1-r}{1+r}$$

$$=\frac{\operatorname{cosec}\theta}{\cot\theta}=\frac{1}{r}\Rightarrow r=\cos\theta$$

36.(D) Given, $x=a\sec\theta+b\tan\theta$ & $y=a\tan\theta+b\sec\theta$

$x^2-y^2=?$

$x^2-y^2=(a\sec\theta+b\tan\theta)^2-(a\tan\theta+b\sec\theta)^2$

$=a^2\sec^2\theta+b^2\tan^2\theta+2ab\tan\theta.\sec\theta-a^2\tan^2\theta-b^2\sec^2\theta-2ab\tan\theta.\sec\theta$

$=a^2\sec^2\theta+b^2\tan^2\theta-a^2\tan^2\theta-b^2\sec^2\theta$

$=a^2(\sec^2\theta-\tan^2\theta)-b^2(\sec^2\theta-\tan^2\theta)$

$x^2-y^2=(a^2-b^2)(\sec^2\theta-\tan^2\theta)$

$x^2-y^2=(a^2-b^2)$ $[\because \sec^2\theta-\tan^2\theta=1]$

37.(B) $x\sin\theta=y\cos\theta$ ..... (i)

L.H.S.

$x\sin\theta.\sin^4\theta+y\cos^5\theta$

$y\cos\theta.\sin^4\theta+y\cos^5\theta$

$y\cos\theta(\sin^4\theta+y\cos^4\theta)$

$y\cos\theta(1-2\sin^2\theta\cos^2\theta=1-2\sin^2\theta\cos^2\theta\times\sin\theta\cos\theta$

$y\cos\theta=\sin\theta.\cos\theta=x$

$\therefore\ x^2+y^2=\sin^2\theta+\cos^2\theta=1$

38.(A) $\operatorname{cosec}^4A-\cot^4A=49$

$(\operatorname{cosec}^2A+\cot^2A)(\operatorname{cosec}^2A-\cot^2A)=49$

$\operatorname{cosec}^2A+\cot^2A=49$

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

$2\operatorname{cosec}^2A=50$

$\operatorname{cosec}^2A=25$

$\sin^2A=\frac{1}{25}\Rightarrow 1+\sin^2A=\frac{26}{25}$

39.(C)

40. (D) $\operatorname{cosec}\theta+\operatorname{cosec}^2\theta=1$

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

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

$(\cot^{12}\theta-3\cot^{10}\theta+3\cot^8\theta-\cot^6\theta)$

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

41. (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)

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

$1-1=0$

42. (C) $\sec^2\theta-\sec\theta=1$

$[\sec^2\theta=1+\tan^2\theta]$

$1+\tan^2\theta-\sec\theta=1$

$\tan^2\theta=\sec\theta$

$\sec^6\theta-3\sec^5\theta+3\sec^4\theta-\sec^3\theta$

$(\sec^2\theta-\sec\theta)^3$

$(1)^3=1$

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

Using C & D

$\frac{\cos\theta}{\sin\theta}=\frac{\sqrt{3}}{1}\Rightarrow\operatorname{Cot}\theta=\sqrt{3}\Rightarrow\theta=30^\circ$

44.(C) $7\sin^2\theta+3\cos^2\theta=4$

$7\sin^2\theta+3(1-\sin^2\theta)=4$

$4\sin^2\theta=1$

$\theta=30^\circ$

$\tan^260^\circ+\operatorname{cosec}^260^\circ=3+\frac{4}{3}=\frac{13}{3}$

$\Rightarrow \operatorname{Sec}\theta=\operatorname{Sec}30^\circ=\frac{2}{\sqrt{3}}$ or $\frac{2\sqrt{3}}{3}$

45. (A)

46.(B) $2\sin\theta+15\cos^2\theta=7$

$\Rightarrow 2\sin\theta+15-15\sin^2\theta=7$

$\Rightarrow 15\sin^2\theta-2\sin\theta-8=0$

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

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

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

47.(C) $\left(\cos^6\theta+\sin^6\theta-1\right)\left(\tan^2\theta+\cot^2\theta+2\right)$

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

$=-3$

Mother's

48.(C) $\dfrac{\left(\cos^2\theta\right)^3+\left(\sin^2\theta\right)^3+3\sin^2\theta\cos^2\theta}{\dfrac{1}{\sin\theta\cos\theta}\left[\left(\sin\theta+\cos\theta\right)^2-1\right]}$

$\dfrac{\left(\cos^2\theta+\sin^2\theta\right)\left[\left(\cos^4\theta+\sin^4\theta-\cos^2\theta.\sin^2\theta\right)+3\sin^2\theta\cos^2\theta\right]}{\dfrac{\sin^2\theta+\cos^2\theta+2\sin\theta\cos\theta-1}{\sin\theta.\cos\theta}}$

$\dfrac{\cos^4\theta+\sin^4\theta+2\sin^2\theta\cos^2\theta}{1+2\sin\theta\cos\theta-1}$

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

49.(A) $\operatorname{cosec}^3\theta(\operatorname{cosec}^2\theta-1)=1$

$\Rightarrow \quad \operatorname{cosec}^3\theta=\tan^2\theta$

$\Rightarrow \quad \dfrac{1}{\sin^3\theta}=\dfrac{\sin^2\theta}{\cos^2\theta}$

$\Rightarrow \quad \cos^2\theta=\sin^5\theta$

$\Rightarrow \quad \operatorname{cosec}^3\theta+\sin^5\theta-\tan^2\theta+\sin^2\theta$

$\Rightarrow \quad \tan^2\theta+\cos^2\theta-\tan^2\theta+\sin^2\theta$

$= 1$

50.(C) $\sec\theta(1+\sec^2\theta)=1-\sec^2\theta$

$\Rightarrow \quad \sec\theta(2+\tan^2\theta)=-\tan^2\theta$

$\Rightarrow \quad \sec^2\theta(4+\tan^4\theta+4\tan^2\theta)=\tan^4\theta$

$\Rightarrow \quad (1+\tan^2\theta)(4+\tan^4\theta+4\tan^2\theta)=\tan^4\theta$

$\Rightarrow \quad \tan^4\theta+4+4\tan^2\theta+4\tan^2\theta+\tan^6\theta+4\tan^4\theta=\tan^4\theta$

$\Rightarrow \quad \tan^6\theta+8\tan^2\theta+4\tan^4\theta+4=-1$

51.(A) $\Rightarrow \quad \operatorname{cosec}\theta+\sec\theta=\sqrt{2}\,(\operatorname{cosec}\theta\sec\theta)$

$\Rightarrow \quad \dfrac{\operatorname{cosec}\theta+\sec\theta}{\operatorname{cosec}\theta\sec\theta}=\sqrt{2}$

$\Rightarrow \quad \sin\theta+\cos\theta=\sqrt{2}$

$\therefore \quad \sin\theta-\cos\theta=\pm\sqrt{2-\left(\sqrt{2}\right)^2}=0$

52.(C) $\Rightarrow \because\ (x+y)^2-2xy=x^2+y^2$

$\therefore\ (x^2+y^2)(\sin^2\theta+\cos^2\theta)=\sqrt{8^2+6^2}=10$

53.(B) As we know $= \sec x-\tan x=\dfrac{1}{\sec x+\tan x}$

So $\sec x+\tan x-\sec x=\tan x$

54.(D) $\sin^4\theta-\cos^4\theta$

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

$=(\sin^2\theta+\cos^2\theta)(\sin^2\theta-\cos^2\theta)$

$[\because\ a^2-b^2=(a+b)(a-b)]$

$=1\times(\sin^2\theta-\cos^2\theta)$

$[\because \sin^2\theta+\cos^2\theta=1]$

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

$[\because \sin^2\theta=1-\cos^2\theta]$

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

55.(B) Let $x\sin\theta=y\cos\theta=\dfrac{2z\tan\theta}{1-\tan^2\theta}=k$

Taking $x\sin\theta=y\cos\theta$

$\Rightarrow \quad \dfrac{y}{x}=\tan\theta \qquad \ldots\ldots\ldots\ldots\ldots$ (i)

Now, $x=k\operatorname{cosec}\theta \qquad \ldots\ldots\ldots\ldots\ldots$ (ii)

$y=k\sec\theta \qquad \ldots\ldots\ldots\ldots\ldots$ (iii)

and $z=k\left(\dfrac{1-\tan^2\theta}{2\tan\theta}\right)=k\left(\dfrac{1-\dfrac{y^2}{x^2}}{2\dfrac{y}{x}}\right)$

$=k\left(\dfrac{x^2-y^2}{x^2}\times\dfrac{x}{2y}\right)=k\left(\dfrac{x^2-y^2}{2xy}\right) \qquad \ldots\ldots$ (iv)

From eq. (ii) & (iii)

$x^2+y^2=k^2(\operatorname{cosec}^2\theta+\sec^2\theta)$

$=k^2(\tan^2\theta+\cot^2\theta+2)$

$=k^2(\tan\theta+\cot\theta)^2$

$\Rightarrow \quad x^2+y^2=k^2\left(\dfrac{y}{x}+\dfrac{x}{y}\right)^2=k^2\left(\dfrac{x^2+y^2}{xy}\right)^2$

$\Rightarrow \quad k^2=\dfrac{x^2+y^2}{\left(\dfrac{x^2+y^2}{xy}\right)^2}$

$\Rightarrow \quad (x^2+y^2)\times\dfrac{x^2y^2}{(x^2+y^2)^2}=\dfrac{x^2y^2}{x^2+y^2}$

From Eq. (iv)

$z^2=\left(\dfrac{x^2y^2}{x^2+y^2}\right)\left(\dfrac{x^2-y^2}{2xy}\right)$

$\therefore\ 4z^2(x^2+y^2)$

$\Rightarrow \quad 4\left(\dfrac{x^2y^2}{x^2+y^2}\right)\left(\dfrac{x^2-y^2}{2xy}\right)^2(x^2+y^2)$

$\Rightarrow \quad (x^2-y^2)^2$

56.(C) $(1-2\sin^2\theta\cos^2\theta-1)\left(\dfrac{\sin\theta}{\cos\theta}+\dfrac{\cos\theta}{\sin\theta}\right)$

$\Rightarrow \quad (-2\sin^2\theta\cos^2\theta)\left(\dfrac{\sin^2\theta+\cos^2\theta}{\sin\theta\cos\theta}\right)$

$\Rightarrow \quad -2\sin\theta\cos\theta=-\dfrac{2\cos\theta}{\operatorname{cosec}\theta}$

57.(C) $\dfrac{1+\sin^2\theta+2\sin\theta+\cos^2\theta}{\tan^2\theta\times\dfrac{\cos^2\theta}{\sin\theta}}$

$\Rightarrow \quad \dfrac{2(1+\sin\theta)}{\sin\theta}=2\operatorname{cosec}\theta(1+\sin\theta)$

$=2(\operatorname{cosec}\theta+1)$

58.(D) $\dfrac{\cos^2\theta-\sin^2\theta\left(\cos^4\theta+\sin^4\theta+\cos^2\theta\sin^2\theta\right)}{\cos^2\theta-\sin^2\theta}$

$\Rightarrow \quad 1-2\sin^2\theta\cos^2\theta+\cos^2\theta\sin^2\theta$

$\Rightarrow \quad 1-\sin^2\theta\cos^2\theta$

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

Trigonometry

Part-III

Part-III
Exercise / अभ्यास प्रश्न

1. The value of $\frac{2\sin 30^\circ}{1+\cos 30^\circ} + \frac{1+\cos 30^\circ}{\sin 30^\circ}$ is equal to:

$\frac{2\sin 30^\circ}{1+\cos 30^\circ} + \frac{1+\cos 30^\circ}{\sin 30^\circ}$ का मान ज्ञात करें।

(A) 4 (B) 8

(C) $4 - 2\sqrt{3}$ (D) $6 - \sqrt{3}$

2. What is the value of $8\sqrt{3}\sin 30^\circ\tan 60^\circ - 3\cos 0^\circ + 3\sin^2 45^\circ + 2\cos^2 30^\circ$.

$8\sqrt{3}\sin 30^\circ\tan 60^\circ - 3\cos 0^\circ + 3\sin^2 45^\circ + 2\cos^2 30^\circ$ का मान ज्ञात करें।

(A) 12 (B) 15

(C) 9 (D) 1

3. $\frac{\tan 45^\circ}{1+\cos 45^\circ} + \frac{1+\sin 45^\circ}{\cot 45^\circ}$ का मान ज्ञात करें।

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

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

4. Find the value of :

$$\frac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$$

निम्न का मान ज्ञात कीजिए-

$$\frac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$$

(A) 1 (B) 2

(C) $\frac{49}{12}$ (D) $\frac{67}{12}$

5. If $\tan^2 45^\circ - \cos^2 60^\circ = x\sin 45^\circ\cos 45^\circ\cot 30^\circ$, then find the value of 'x'.

यदि $\tan^2 45^\circ - \cos^2 60^\circ = x\sin 45^\circ\cos 45^\circ\cot 30^\circ$, तो 'x' का मान ज्ञात कीजिए।

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

6. Find the value of $\tan^2 60^\circ - \tan^2 45^\circ - \cot^2 30^\circ + 2\sin^2 30^\circ + 3/4\operatorname{cosec}^2 45^\circ$.

$\tan^2 60^\circ - \tan^2 45^\circ - \cot^2 30^\circ + 2\sin^2 30^\circ + 3/4\operatorname{cosec}^2 45^\circ$ का मान ज्ञात करें:

(A) $-\frac{\sqrt{3}}{2}$ (B) 0

(C) 2 (D) –1

7. If $\operatorname{cosec}\alpha = \sqrt{2}$ the value of $\frac{2\sin^2\alpha + 3\cos^2\alpha}{\operatorname{cosec}^2\alpha + \cot^2\alpha}$ is:

यदि $\operatorname{cosec}\alpha = \sqrt{2}$ है, तो $\frac{2\sin^2\alpha + 3\cos^2\alpha}{\operatorname{cosec}^2\alpha + \cot^2\alpha}$ का मान ज्ञात करो।

(A) $\frac{5}{12}$ (B) $\frac{5}{3}$ (C) $\frac{5}{2}$ (D) $\frac{5}{6}$

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

(A) $\frac{8}{3}$ (B) $\frac{7}{3}$ (C) $\frac{10}{3}$ (D) $\frac{5}{4}$

9. The value of

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

$\frac{\sin^2 30^\circ + \cos^2 60^\circ - \sec 35^\circ.\sin 55^\circ}{\sec 60^\circ + \operatorname{cosec} 30^\circ}$ का मान ज्ञात करें।

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

10. The value of

$$\frac{4\tan^2 30^\circ + \frac{1}{4}\sin^2 90^\circ + \frac{1}{8}\cot^2 60^\circ + \sin^2 30^\circ.\cos^2 45^\circ}{\sin 60^\circ.\cos 30^\circ - \cos 60^\circ.\sin 30^\circ}$$

is :

Mother's

$$\frac{4\tan^2 30^\circ + \frac{1}{4}\sin^2 90^\circ + \frac{1}{8}\cot^2 60^\circ + \sin^2 30^\circ . \cos^2 45^\circ}{\sin 60^\circ . \cos 30^\circ - \cos 60^\circ . \sin 30^\circ}$$

का मान किसके बराबर है ?

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

11. If $A = \frac{\sin 45^\circ - \sin 30}{\cos 45^\circ + \cos 60^\circ}$ and

$B = \frac{\sec 45^\circ - \tan 45^\circ}{\text{cosec} 45^\circ + \cot 45^\circ}$ then which one of the following is correct?

यदि $A = \frac{\sin 45^\circ - \sin 30}{\cos 45^\circ + \cos 60^\circ}$ और $B = \frac{\sec 45^\circ - \tan 45^\circ}{\text{cosec} 45^\circ + \cot 45^\circ}$ है, तो निम्नलिखित में से कौन-सा सही है ?

(A) $A = B$ (B) $A > B > 0$
(C) $A < B$ (D) $B < A < 0$

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

(A) –1 (B) 0 (C) 1 (D) – 2

13. The value of

$$\frac{\sin 23^\circ \cos 67^\circ + \sec 52^\circ \sin 38^\circ + \cos 23^\circ \sin 67^\circ + \text{cosec} 52^\circ \cos 38^\circ}{\text{cosec}^2 20^\circ - \tan^2 70^\circ}$$ is :

$$\frac{\sin 23^\circ \cos 67^\circ + \sec 52^\circ \sin 38^\circ + \cos 23^\circ \sin 67^\circ + \text{cosec} 52^\circ \cos 38^\circ}{\text{cosec}^2 20^\circ - \tan^2 70^\circ}$$ का मान ज्ञात कीजिए-

(A) 4 (B) 0
(C) 3 (D) 2

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

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

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

15. If $x\sin 30^\circ \cos 60^\circ = \sin 45 \cos 45$, then the value of $\frac{x+1}{x-1}$ is :

यदि $x\sin 30^\circ \cos 60^\circ = \sin 45 \cos 45$ तो $\frac{x+1}{x-1}$ का मान ज्ञात करें।

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

16. If $\sin 3x = \cos(3x - 45^\circ)$, $0^\circ < 3x < 90^\circ$, then x is equal to :
यदि $\sin 3x = \cos(3x - 45^\circ)$, $0^\circ < 3x < 90^\circ$ है, तो x का मान ज्ञात करें ?

(A) 35° (B) 45°
(C) 22.5° (D) 27.5°

17. If $\tan(70^\circ - 3\theta) = \cot(9\theta - 280^\circ)$, then $\tan\frac{6\theta}{5} + \cos(\theta - 20^\circ) =$?

यदि $\tan(70^\circ - 3\theta) = \cot(9\theta - 280^\circ)$ है, तो $\tan\frac{6\theta}{5} + \cos(\theta - 20^\circ)$ का मान ज्ञात करें ?

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

18. If $0 \le \theta \le 90^\circ$, and $\sin(2\theta + 50^\circ) = \cos(4\theta + 16^\circ)$, then what is the value of θ (in degrees) ?
यदि $0 \le \theta \le 90^\circ$ और $\sin(2\theta + 50^\circ) = \cos(4\theta + 16^\circ)$ है, तो θ का मान (अंश में) ज्ञात कीजिए।

(A) 8° (B) 10°
(C) 12° (D) 4°

19. If $0 \le \theta \le 90^\circ$, and $\sec^{107}\theta + \cos^{107}\theta = 2$, then $(\sec\theta + \cos\theta)$ is equal to :
यदि $0 \le \theta \le 90^\circ$, 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) $\frac{1}{2}$

20. $\cos(A-B) = \frac{1}{2}$ and $\sin(A+B) = \frac{1}{2}$ then minimum positive value of A–

$\cos(A-B) = \frac{1}{2}$ और $\sin(A+B) = \frac{1}{2}$ तब A का सबसे कम धनात्मक मान क्या है—

(A) 135° (B) 60°
(C) 30° (D) 105°

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

21. 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) $\frac{43}{12}$

22. If $\sqrt{2}\ \sin(60° - \alpha) = 1$ where $0° < \alpha < 90°$, then the value of $\sin2\alpha$ will be?
यदि $\sqrt{2}\sin(60° - \alpha) = 1, 0° < \alpha < 90°$ है, तो $\sin2\alpha$ का मान क्या होगा ?

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

23. If $\cos3\theta = \sin(\theta - 34°)$, then the value of $(\sin3\theta - 3°)$ is :
यदि $\cos3\theta = \sin(\theta - 34°)$ है, तो $(\sin3\theta - 3°)$ का मान ज्ञात करें।

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

24. $\text{Sin}^2\theta = \frac{x^2 + y^2 + 1}{2x}$, where $\theta = \frac{\pi}{2}$ then the value of $x - 2y$ is :
यदि $\text{Sin}^2\theta = \frac{x^2 + y^2 + 1}{2x}$, जहां $\theta = \frac{\pi}{2}$ है, तो $x - 2y$ का मान ज्ञात करो।

(A) 1 (B) –3
(C) 0 (D) $1 + \sqrt{2}$

25. Which among the following is an irrational quantity?
निम्नलिखित में से कौन सी एक अपरिमेय संख्या है ?

(A) $\tan30°\tan60°$ (B) $\sin30°$
(C) $\tan45°$ (D) $\cos30°$

26. If $p = \sin^2\theta + \cos^4\theta$ for $0 \le \theta \le \frac{\pi}{2}$, then consider the following statements :
यदि $0 \le \theta \le \frac{\pi}{2}$ के लिए $p = \sin^2\theta + \cos^4\theta$ है, तो निम्नलिखित कथनों पर विचार कीजिए :

i. p can be less than $\frac{3}{4}$./ p, $\frac{3}{4}$ से कम हो सकता है।
ii. p can be more than 1./ p, 1 से अधिक हो सकता है।
Which of the above statements is/are correct ?
उपर्युक्त कथनों में से कौन-सा/से सही है/हैं ?

(A) i Only (B) ii Only
(C) Both i and ii (D) Neither i nor ii

27. Cosider the following inequalities :
निम्नलिखित असमिकाओं (इनइक्वालिटी) पर विचार कीजिए :
i. $\sin1° < \cos57°$ **(CDS-2021)**
ii. $\cos60° > \sin57°$
Which of the above is/are correct?
उपर्युक्त में से कौन-सा/से सही है/हैं ?

(A) i Only (B) ii Only
(C) Both i and ii (D) Neither i nor ii

28. Consider the following statement:
निम्नलिखित कथन पर विचार करें:

i. $\sin\theta = x + \frac{1}{x}$ is possible for some real value of x.
$\sin\theta = x + \frac{1}{x}$, x के कुछ वास्तविक मूल्य के लिए संभव हैं।

ii. $\cos\theta = x + \frac{1}{x}$ is possible for some real value of x.
$\cos\theta = x + \frac{1}{x}$, x के कुछ वास्तविक मूल्य के लिए संभव हैं।

What of the above statement is/are correct?
उपरोक्त कथन क्या हैं ?

(A) i Only (B) ii Only
(C) Both i and ii (D) Neither i nor ii

29. Cosider the following statements :
निम्नलिखित कथनों पर विचार करें।

i. The value of $\cos61° + \sin29°$ cannot exceed 1.
$\cos61° + \sin29°$ का मान 1 से अधिक नहीं हो सकता।
ii. The value of $\tan23° - \cot67°$ is less than 0.
$23° - \cot67°$ का मान 0 से कम हैं।

Which of the above statements is/are correct?
उपरोक्त कथनों में से कौन-सा सही है।

(A) i Only (B) ii Only
(C) Both i and ii (D) Neither i nor ii

30. Consider the following statements :
निम्नलिखित कथनों पर विचार कीजिए-

I. $\tan\theta$ increases faster than $\sin\theta$ as θ increases./θ के बढ़ने पर, $\sin\theta$ की अपेक्षा $\tan\theta$ तेजी से बढ़ता है।
II. The value of $\sin\theta + \cos\theta$ is always greater than 1./$\sin\theta + \cos\theta$ का मान सदैव 1 से अधिक होता है।
Which of the statement(s) given above is/ are correct?

(A) Only I (B) Only II
(C) Both I and II (D) Neither I nor II

31. If $\cos\left(\frac{1}{2}\right)^{\circ} = p$ and $\cos 89.5^{\circ} = q$, then which one of the following is correct?

यदि $\cos\left(\frac{1}{2}\right)^{\circ} = p$ और $\cos 89.5^{\circ} = q$ है तो निम्नांकित में से कौनसा सत्य है ?

(A) p is close to 0 and q is close to 1
(B) $p < q$ (C) $p = q$
(D) p is close to 1 and q is close to 0.

32. The value of $32\cot^2\left(\frac{\pi}{4}\right) - 8\sec^2\left(\frac{\pi}{3}\right) + 8\cos^3\left(\frac{\pi}{6}\right)$ is :

$32\cot^2\left(\frac{\pi}{4}\right) - 8\sec^2\left(\frac{\pi}{3}\right) + 8\cos^3\left(\frac{\pi}{6}\right)$ का मान किसके बराबर है ?

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

33. If $K = \sin\left(\frac{\pi}{18}\right)\sin\left(\frac{5\pi}{18}\right)\sin\left(\frac{7\pi}{18}\right)$, then value of K?

यदि $K = \sin\left(\frac{\pi}{18}\right)\sin\left(\frac{5\pi}{18}\right)\sin\left(\frac{7\pi}{18}\right)$ है तो K का मान किसके बराबर है ?

(A) $1/2$ (B) $1/4$ (C) $1/8$ (D) $1/16$

34. What is $\sin25^{\circ}\sin35^{\circ}\sec65^{\circ}\sec55^{\circ}$ equal to?
$\sin25^{\circ}\sin35^{\circ}\sec65^{\circ}\sec55^{\circ}$ किसके तुल्य है ?

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

35. 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 न्यूनकोण है, तो $(\cot^2\theta + \tan^2\theta)$ का मान क्या होगी ?

(A) 2 (B) 0
(C) 10/3 (D) 6

36. If $\frac{\cos^2\theta}{\cot^2\theta - \cos^2\theta} = 3$, where $0^{\circ} < \theta < 90^{\circ}$ then the value of θ is :

यदि $\frac{\cos^2\theta}{\cot^2\theta - \cos^2\theta} = 3$, जहाँ $0^{\circ} < \theta < 90^{\circ}$ है, तो θ का मान ज्ञात कीजिए।

(A) 30° (B) 60°
(C) 30° (D) 45°

37. If $2\cos^2\theta + 3\sin\theta = 3$, where $0^{\circ} < \theta < 90^{\circ}$, then what is the value of $\sin^2 2\theta + \cos^2\theta + \tan^2 2\theta + \operatorname{cosec}^2 2\theta$?
यदि $2\cos^2\theta + 3\sin\theta = 3$ जहाँ $0^{\circ} < \theta < 90^{\circ}$ है, तो $\sin^2 2\theta + \cos^2\theta + \tan^2 2\theta + \operatorname{cosec}^2 2\theta$ का मान क्या होगा ?

(A) $\frac{35}{12}$ (B) $\frac{29}{3}$ (C) $\frac{35}{6}$ (D) $\frac{29}{6}$

38. 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°

39. If $\cos(A - B) = \frac{\sqrt{3}}{2}$ and $\sec A = 2$, $0^{\circ} \le A\ 90^{\circ}$, $0^{\circ} \le B \le 90^{\circ}$, then what is the measure of B?

यदि $\cos(A - B) = \frac{\sqrt{3}}{2}$ और $\sec A = 2$, $0^{\circ} \le A\ 90^{\circ}$, $0^{\circ} \le B \le 90^{\circ}$ है, तो B का माप क्या है ?

(A) 90° (B) 30°
(C) 60° (D) 0°

40. If/यदि $A = 10^{\circ}$, what is the value of :

$$\frac{12\sin 3A + 5\cos(5A - 5^{\circ})}{9\sin\frac{9A}{2} - 4\cos(5A + 10^{\circ})}$$

का मान क्या होगा ?

(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) $\frac{(9-2\sqrt{2})}{(6\sqrt{2}+5)}$

----------Answer----------

1.	(D)	**2.**	(A)	**3.**	(A)	**4.**	(D)	**5.**	(A)
6.	(A)	**7.**	(D)	**8.**	(C)	**9.**	(C)	**10.**	(D)
11.	(A)	**12.**	(A)	**13.**	(D)	**14.**	(D)	**15.**	(D)
16.	(C)	**17.**	(A)	**18.**	(D)	**19.**	(C)	**20.**	(D)
21.	(D)	**22.**	(B)	**23.**	(B)	**24.**	(B)	**25.**	(D)
26.	(D)	**27.**	(A)	**28.**	(D)	**29.**	(A)	**30.**	(A)
31.	(D)	**32.**	(D)	**33.**	(C)	**34.**	(D)	**35.**	(C)
36.	(B)	**37.**	(C)	**38.**	(B)	**39.**	(A)	**40.**	(C)

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

Solution

1. (D) $\dfrac{2\sin 30^\circ}{1+\cos 30^\circ} + \dfrac{1+\cos 30^\circ}{\sin 30^\circ}$

$= \dfrac{2\sin^2 30^\circ + (1+\cos 30^\circ)^2}{\sin 30^\circ(1+\cos 30^\circ)}$

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

$= \dfrac{\frac{1}{2} + \frac{\left(2+\sqrt{3}\right)^2}{4}}{\frac{1}{2}\times\frac{\left(2+\sqrt{3}\right)}{2}} = \dfrac{2+7+4\sqrt{3}}{2+\sqrt{3}} = \dfrac{9+4\sqrt{3}}{2+\sqrt{3}}$

$= \dfrac{9+4\sqrt{3}}{2+\sqrt{3}} \times \dfrac{2-\sqrt{3}}{2-\sqrt{3}}$

$= \dfrac{18+8\sqrt{3}-9\sqrt{3}-12}{4-3} = 6-\sqrt{3}$

2. (A)

3. (A) $\dfrac{\tan 45^\circ}{1+\cos 45^\circ} + \dfrac{1+\sin 45^\circ}{\cot 45^\circ} = \dfrac{1}{1+\frac{1}{\sqrt{2}}} + \dfrac{1+\frac{1}{\sqrt{2}}}{1}$

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

$= \dfrac{2+2+1+2\sqrt{2}}{\sqrt{2}\left(\sqrt{2}+1\right)} = \dfrac{5+2\sqrt{2}}{\sqrt{2}\left(\sqrt{2}+1\right)}$

$= \dfrac{\left(5+2\sqrt{2}\right)}{\sqrt{2}\left(\sqrt{2}+1\right)} \times \dfrac{\sqrt{2}\left(\sqrt{2}-1\right)}{\sqrt{2}\left(\sqrt{2}-1\right)}$

$= \dfrac{10+4\sqrt{2}-5\sqrt{2}-4}{2(2-1)} = \dfrac{6-\sqrt{2}}{2} = 3-\dfrac{\sqrt{2}}{2}$

4. (D) $\dfrac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$

$[\because \sin^2\theta + \cos^2\theta = 1]$

$= \dfrac{5\times\left(\frac{1}{2}\right)^2 + 4\times\left(\frac{2}{\sqrt{3}}\right)^2 - (1)^2}{1}$

$= \dfrac{5\times\frac{1}{4} + 4\times\frac{4}{3} - 1}{1} = \dfrac{5}{4} + \dfrac{16}{3} - 1$

$= \dfrac{15+64-12}{12} = \dfrac{67}{12}$

5. (A) $\tan^2 45^\circ - \cos^2 60^\circ = x\sin 45^\circ\cos 45^\circ\cot 30^\circ$

$1 - \left(\frac{1}{2}\right)^2 = x \cdot \frac{1}{\sqrt{2}} \cdot \frac{1}{\sqrt{2}} \cdot \sqrt{3}$

$\frac{3}{4} = \frac{x}{2}\times\sqrt{3}$

$x = \dfrac{3}{2\sqrt{3}} = \dfrac{\sqrt{3}\times\sqrt{3}}{2\times\sqrt{3}} = \dfrac{\sqrt{3}}{2}$

6. (A) $\tan^2 60^\circ - \tan^2 45^\circ - \cot^2 30^\circ + 2\sin^2 30^\circ + 3/4$ $\operatorname{cosec}^2 45^\circ$ का मान

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

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

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

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

$= \dfrac{6-10+1+3}{2} = \dfrac{10-10}{2} = 0$

7. (D) $\operatorname{cosec}\alpha = \sqrt{2} = \operatorname{cosec} 45^\circ$

$\therefore \quad \alpha = 45^\circ$

$\dfrac{2\sin^2\alpha + 3\cos^2\alpha}{\operatorname{cosec}^2\alpha + \cot^2\alpha} = \dfrac{2\sin^2 45^\circ + 3\cos^2 45^\circ}{\operatorname{cosec}^2 45^\circ + \cot^2 45^\circ}$

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

Mother's

$$= \frac{2\times\frac{1}{2}+3\times\frac{1}{2}}{2+1} = \frac{1+\frac{3}{2}}{3} = \frac{\frac{5}{2}}{3} = \frac{5}{2}\times\frac{1}{3} = \frac{5}{6}$$

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

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

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

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

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

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

10. (D) Sin(A – B) = Sin(60° – 30°)

$$= \text{Sin}30° = \frac{1}{2}$$

$$\Rightarrow \frac{\frac{4}{3}+\frac{1}{4}+\frac{1}{8}\times\frac{1}{3}+\frac{1}{4}\times\frac{1}{2}}{1/2}$$

$$\Rightarrow \frac{\frac{4}{3}+\frac{1}{24}+\frac{3}{8}}{1/2} = \frac{32+1+9}{24}\times 2 = \frac{42}{12} = \frac{7}{2}$$

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

11.(A) We have,

$$A = \frac{\sin 45° - \sin 30}{\cos 45° + \cos 60°} \Rightarrow A = \frac{\frac{1}{\sqrt{2}} - \frac{1}{2}}{\frac{1}{\sqrt{2}} + \frac{1}{2}} = \frac{\sqrt{2}-1}{\sqrt{2}+1}$$

$$B = \frac{\sec 45° - \tan 45°}{\text{cosec}45° + \cot 45°} \Rightarrow B = \frac{\sqrt{2}-1}{\sqrt{2}+1}$$

Hence A = B

12.(A) We know that

cosec (90 – θ) = secθ

$\tan^2 48 - \text{cosec}^2 42° + 0$

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

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

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

13.(D)

14.(D) $4(\text{cosec}^2 57° - \tan^2 33°) - \cos 90° - y\tan^2 +$

$66°\tan^2 24 = \frac{y}{2}$

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

$\tan^2(90°–66°) = \frac{y}{2}$

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

$4(1) — y = \frac{y}{2}$

$4 = \frac{3y}{2} \Rightarrow y = \frac{8}{3}$

15.(B) $x\times\frac{1}{2}\times\frac{1}{2} = \frac{1}{\sqrt{2}}\times\frac{1}{\sqrt{2}}$

$\frac{x}{4} = \frac{1}{2}$

$x = 2$

16. (C) $3x + 3x - 45° = 90$

$6x = 135°$

$x = 22.5°$

17. (A) $6\theta - 210° = 90°$

$\theta = 50°$

$$\Rightarrow \tan\frac{6\theta}{5} + \cos(\theta - 20°)$$

$$\Rightarrow \tan 60° + \cos 30°$$

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

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

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

$\Rightarrow 6\theta + 66° = 90°$

$\Rightarrow 6\theta = 24°$

$\Rightarrow \theta = 4°$

19.(C)

20.(D) $\cos(A–B) = \frac{1}{2}$

$\Rightarrow A - B = 60°$ ... (i)

$\sin(A+B) = \frac{1}{2}$

$\Rightarrow A + B = 150°$... (ii)

By equation (i) + (ii)

$2A = 210°$

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

$A = 105°$

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

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

$\Rightarrow \quad 18\theta = 90°$

$\Rightarrow \quad \theta = 5°$

$\Rightarrow \sin^2(6\theta) + \sec^2(9\theta) + \text{cosec}^2(12\theta)$

$= \sin^2 30° + \sec^2(45°) + \text{cosec}^2(60°)$

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

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

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

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

$$\sin(60 - \alpha) = \sin 45°$$

$$60 - \alpha = 45°$$

$$\alpha = 15°$$

$$\sin 2\alpha = \sin 30° = \frac{1}{2}$$

23.(B) $\sin(90 - 3\theta) = \sin(\theta - 34°)$

$90 - 3\theta = \theta - 34$

$124 = 4\theta$

$$\theta = \frac{124}{4}$$

$\theta = 31°$

$\sin(3\theta - 3°) = \sin(93° - 3°) = \sin 90° = 1$

24.(A) $\sin^2\theta = \dfrac{x^2 + y^2 + 1}{2x}$

$\Rightarrow \quad \dfrac{x^2 + y^2 + 1}{2x} = 1$ **[$\because$ sin 90° = 1]**

$\Rightarrow \quad x^2 + y^2 + 1 = 2x$

$\Rightarrow \quad x^2 - 2x + 1 + y^2 = 0$

$\Rightarrow \quad (x - 1)^2 + y^2 = 0$

then $x - 1 = 0$ $x = 1$

and $y = 0$ $\Rightarrow \quad x - 2y = 1$

25.(D)

26.(D) $p = \sin^2\theta + \cos^4\theta$

$= 1 - \cos^2\theta + \cos^4\theta$

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

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

$$= 1 - \frac{\sin^2 2\theta}{4}$$

$= 1$, if $\theta \le 0°$

$$= \frac{3}{4}, \text{ if } \theta \le 45°$$

27.(A) only 1

i. $\sin 1° < \cos 57°$

$\sin 1° < \cos 57° \Rightarrow \cos 89° < \cos 57°$ correct

ii. $\cos 60° > \sin 57°$

$\Rightarrow \cos 60° > \cos 43°$ incorrect

28. (D) $\sin\theta = x + \dfrac{1}{x}$

$-1 \le \sin\theta \le 1$

$\cos\theta$

$\theta \le \cos\theta \le 1$

for any value of x both statement is not satisfied

(D) Neither i or nor ii.

29.(A) Statement – (i)

$\cos 61° + \sin 29°$

$= 2 \sin 29°$

$\sin 29°$ Is less 0.5

Statement (i) is correct

Statement – (ii)

$\tan 23° - \cot 67°$

$\tan 23° - \tan 23° = 0$

Statement (ii) is wrong.

30. (A) Only statement I is correct as $\tan\theta$ increases faster than $\sin\theta$ as θ increases while Statement II is wrong as the value of $\sin\theta + \cos\theta$ is not always greater than I. It may also be equal to 1.

31. (D) We know that the value of $\cos\theta$ is decreasing from 0 to 90°.

$$\therefore \quad \cos\left(\frac{1}{2}\right)^\circ > \cos 89.5^\circ \quad \Rightarrow \quad p > q$$

Also, $\cos\left(\dfrac{1}{2}\right)^\circ$ is close to 1 and $\cos 89.5^\circ$ is close to 0

32. (D) We have, $32\cot^4\left(\dfrac{\pi}{4}\right) - 8\sec^4\left(\dfrac{\pi}{3}\right) + 8\cos^3\left(\dfrac{\pi}{6}\right)$

$$= 32.(1) - 8.(2)^2 + 8.\left(\frac{\sqrt{3}}{2}\right)^3$$

$$= 32 - 8.(4) + 8.\frac{3\sqrt{3}}{8} = 32 - 32 + 3\sqrt{3} = 3\sqrt{3}$$

33. (C)

34. (D) $\sin25°\sin35°\sec65°\sec55°$

$= \sin25°.\sin35°.\frac{1}{\cos65°}.\frac{1}{\cos55°}$

$= \sin25°.\sin35°.\frac{1}{\cos(90-25°)}.\frac{1}{\cos(90-35°)}$

$= \sin25°.\sin35°.\frac{1}{\sin25°}.\frac{1}{\sin35°} = 1$

35. (C) $4\sin^2\theta - 3 = 0 \qquad \sin\theta = \frac{\sqrt{3}}{2}$

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

36.(B) $\frac{\cos^2\theta}{\frac{\cos^2\theta}{\sin^2\theta} - \cos^2\theta} = 3 \Rightarrow \frac{\sin^2\theta}{1-\sin^2\theta} = 3$

$\frac{\sin^2\theta}{\cos^2\theta} = 3 \Rightarrow \tan^2\theta = 3 \Rightarrow \tan\theta = \sqrt{3}$

$\theta = 60°$

37.(C) $2\cos^2\theta + 3\sin\theta = 3 \qquad 0 < \theta < 90$

$2 - 2\sin^2\theta + 3\sin\theta = 3$

$\Rightarrow 2\sin^2\theta - 3\sin\theta + 1 = 0$

$\Rightarrow \theta = 30°$

$\Rightarrow \sin^260 + \cos^230 + \tan^260 + \text{cosec}^260$

$\frac{3}{4} + \frac{3}{4} + 3 + \frac{4}{3} \Rightarrow \frac{3}{2} + 3 + \frac{4}{3} = \frac{9+18+8}{6} = \frac{35}{6}$

38.(B) $A + B = 60° \qquad A - B = 30°$

$\Rightarrow A = 45° \qquad B = 15°$

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

$= 90 + 45 = 135$

39.(A)

40.(C)

Mother's

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

Trigonometry

Part-IV

Part-IV
Exercise / अभ्यास प्रश्न

1. What is the value of tan(315°)?
tan(315°) का मान क्या है ?

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

2. Value of cos(–780°) is ..... .
cos(–780°) का मान ..... है।

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

3. Solve cosec1500° is equal to:
cosec1500° का मान ज्ञात करें।

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

4. What is the value of tan(1125°)?
tan(1125°) का मान क्या है ?
(A) 1 (B) –1 (C) 0 (D) ∞

5. If $\sec 21\frac{1}{2}^0 = \frac{q}{p}$ then value of sec68.5° is:

यदि $\sec 21\frac{1}{2}^0 = \frac{q}{p}$ तो sec68.5° का मान ज्ञात करें।

(A) $\frac{p}{\sqrt{q^2+p^2}}$ (B) $\frac{q}{\sqrt{q^2-p^2}}$

(C) $\frac{q^2-p^2}{q}$ (D) $\frac{q^2-p^2}{p}$

6. If cot52° = b, then sin38° is equal to.
यदि cot52° = b है, तो sin38° किसके बराबर होगा ?

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

(C) –b (D) None of these

7. tan7°. tan11°. tan23°. tan30°. tan45°. tan67° . tan79°. tan83° = ?
का मान ज्ञात करें।

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

8. Find the value of sin120°sin240°sin270°
sin120°sin240°sin270° का मान ज्ञात कीजिए।
(A) –1/8 (B) –1/2
(C) 3/4 (D) 1/8

9. Find the value of $\sin\frac{7\pi}{4}\sin\frac{\pi}{4}\sin\frac{3\pi}{4}\sin\frac{5\pi}{4}$

$\sin\frac{7\pi}{4}\sin\frac{\pi}{4}\sin\frac{3\pi}{4}\sin\frac{5\pi}{4}$ का मान ज्ञात कीजिए।

(A) $\frac{1}{4}$ (B) $\frac{1}{8}$ (C) $\frac{1}{16}$ (D) $\frac{3}{16}$

10. What is the value of $\frac{3}{2}\left(\frac{\cos 39°}{\sin 51°}\right) - \sqrt{\sin^2 39° + \sin^2 51°}$ = ?

$\frac{3}{2}\left(\frac{\cos 39°}{\sin 51°}\right) - \sqrt{\sin^2 39° + \sin^2 51°}$° का मान ज्ञात करें।

(A) $\frac{1}{2}$ (B) $\frac{5}{2}$ (C) 0 (D) Both (A) & (B)

11. $\frac{\sin 37°}{\cos 53°} + \frac{2\tan 49°}{\cot 41°} - 5(\cot 11°.\cot 31°.\cot 45°.$
$\cot 59°.\cot 79°) + 3\left(\sin^2 76.5 + \sin^2\frac{3\pi}{40}\right).$

$\frac{\sin 37°}{\cos 53°} + \frac{2\tan 49°}{\cot 41°} - 5(\cot 11°.\cot 31°.\cot 45°.$
$\cot 59°.\cot 79°) + 3\left(\sin^2 76.5 + \sin^2\frac{3\pi}{40}\right)$ का मान है।

(A) 1 (B) 0
(C) –1 (D) 2

12. The value of
$\frac{\tan 13°.\tan 37°.\tan 45°.\tan 53°.\tan 77°}{2\,\mathrm{cosec}^2 60°(\cos^2 60° - 3\cos 60° + 2)}$

$\frac{\tan 13°.\tan 37°.\tan 45°.\tan 53°.\tan 77°}{2\,\mathrm{cosec}^2 60°(\cos^2 60° - 3\cos 60° + 2)}$ का मान है।

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

Mother's

13. solve it : $\cos18° + \cos162° + \sin126° + \sin234°$
सरल करें : $\cos18° + \cos162° + \sin126° + \sin234°$
(A) 2 (B) 1
(C) –2 (D) 0

14. What is the value of

$$\frac{4\tan^2 30 + \sin^2 30\cos^2 45 + \sec^2 48 - \cot^2 42}{\cos 37\sin 53 + \sin 37\cos 53 + \tan 18\tan 72}$$

$\frac{4\tan^2 30 + \sin^2 30\cos^2 45 + \sec^2 48 - \cot^2 42}{\cos 37\sin 53 + \sin 37\cos 53 + \tan 18\tan 72}$ का मान क्या होगा ?

(A) $\frac{35}{24}$ (B) $\frac{35}{48}$ (C) $\frac{59}{48}$ (D) $\frac{49}{24}$

15. What is the value of

$$\frac{3(\cot^2 47 - \sec^2 43) - 2(\tan^2 23 - \operatorname{cosec}^2 67)}{\operatorname{cosec}^2(68+\theta) - \tan(\theta+61) - \tan^2(22-\theta) + \cot(29-\theta)}$$

$\frac{3(\cot^2 47 - \sec^2 43) - 2(\tan^2 23 - \operatorname{cosec}^2 67)}{\operatorname{cosec}^2(68+\theta) - \tan(\theta+61) - \tan^2(22-\theta) + \cot(29-\theta)}$
का मान क्या होगा ?
(A) 0 (B) 5
(C) 1 (D) –1

16. solve it : $\sin780°\sin480° + \cos120°\sin30°$
सरल करें : $\sin780°\sin480° + \cos120°\sin30°$
(A) 2/3 (B) 1/3
(C) 0 (D) 1/2

17. $\frac{\sin1080° - \tan225° - \cos120°\sin150°}{\tan135° + \cot270°}$ is equal to:

$\frac{\sin1080° - \tan225° - \cos120°\sin150°}{\tan135° + \cot270°}$ का मान ज्ञात करें।

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

18. The value of the expression

$$\frac{\cot(30°-\theta) - \sec(60°-\theta) + \operatorname{cosec}(30°+\theta) - \tan(60°+\theta)}{\sin85°\operatorname{cosec}95° + \cos35°\operatorname{cosec}55°}$$ is

$\frac{\cot(30°-\theta) - \sec(60°-\theta) + \operatorname{cosec}(30°+\theta) - \tan(60°+\theta)}{\sin85°\operatorname{cosec}95° + \cos35°\operatorname{cosec}55°}$
का मान ज्ञात करें।
(A) 0 (B) 1
(C) 2 (D) Undifine

19. Find the value of $\frac{\tan495°}{\cot855°}$

$\frac{\tan495°}{\cot855°}$ का मान ज्ञात करें।

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

20. 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।

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

21. What is the value of

$$\frac{\tan^2 25°}{\operatorname{cosec}^2 65°} + \frac{\cot^2 25°}{\sec^2 65°} + 2\tan20°\tan45°\tan70°?$$

$\frac{\tan^2 25°}{\operatorname{cosec}^2 65°} + \frac{\cot^2 25°}{\sec^2 65°} + 2\ \tan20°\tan45°\tan70°$
का मान क्या है ?
(A) 1 (B) 2
(C) 3 (D) 4

22. $\frac{\cos780° + \sin1950° + \sec1200°}{\tan300° + \operatorname{cosec}510° - \cot270°}$ is equal to :

$\frac{\cos780° + \sin1950° + \sec1200°}{\tan300° + \operatorname{cosec}510° - \cot270°}$ का मान किसके बराबर है ?

(A) $\sqrt{3}+2$ (B) $\sqrt{3}-2$
(C) 0 (D) None of these

23. 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

24. The value of

$$\left[\frac{\sin^2 24° + \sin^2 66°}{\cos^2 24° + \cos^2 66°} + \sin^2 61° + \cos61°\sin29°\right]$$

is equal to:
का मान निम्नलिखित में से किसके बराबर होगा ?
(A) 2 (B) 3
(C) 1 (D) 0

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

25. What is $\frac{\cos^2(45^\circ+\theta)+\cos^2(45^\circ-\theta)}{\tan(60^\circ+\theta)\tan(30^\circ-\theta)}$ equal to ?

$\frac{\cos^2(45^\circ+\theta)+\cos^2(45^\circ-\theta)}{\tan(60^\circ+\theta)\tan(30^\circ-\theta)}$ किसके तुल्य है ?

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

26. The value of

$$\frac{\sin(78^\circ+\phi)-\cos(12^\circ-\phi)+(\tan^2 70^\circ-\operatorname{cosec}^2 20^\circ)}{\sin 25^\circ\cos 65^\circ+\cos 25^\circ\sin 65^\circ}$$

is :

$$\frac{\sin(78^\circ+\phi)-\cos(12^\circ-\phi)+(\tan^2 70^\circ-\operatorname{cosec}^2 20^\circ)}{\sin 25^\circ\cos 65^\circ+\cos 25^\circ\sin 65^\circ}$$

का मान है :

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

27. If cosec39° = x, then the value of $\frac{1}{\operatorname{cosec}^2 51^\circ}$ + $\sin^2 39^\circ + \tan^2 51^\circ - \frac{1}{\sin^2 51^\circ \sec^2 39^\circ}$ is :

यदि cosec39° = x है, तो $\frac{1}{\operatorname{cosec}^2 51^\circ}$ + $\sin^2 39^\circ$ + $\tan^2 51^\circ - \frac{1}{\sin^2 51^\circ \sec^2 39^\circ}$ का मान ज्ञात कीजिए।

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

28. If tan 2A = cot(A – 18°) and 2A is .... then find the value of 'A'
यदि tan 2A = cot(A – 18°) है और 2A एक न्यून कोण है, तो 'A' का मान ज्ञात कीजिए।

(A) 36° (B) 24°
(C) 28° (D) 18°

29. If x = sec57°, then $\cot^2 33^\circ + \sin^2 57^\circ + \sin^2 33^\circ + \operatorname{cosec}^2 57^\circ \cos^2 33^\circ + \sec^2 33^\circ \sin^2 57^\circ$ is equal to:
यदि x = sec57° है, तो $\cot^2 33^\circ + \sin^2 57^\circ + \sin^2 33^\circ + \operatorname{cosec}^2 57^\circ \cos^2 33^\circ + \sec^2 33^\circ \sin^2 57^\circ$ ..... के बराबर है।

(A) x^2+2 (B) $2x^2+1$
(C) x^2+1 (D) $\frac{1}{x^2+1}$

30. The value of (tan51°cot39° – sec51°cosec39°) + $\cot^2 54^\circ$ + ($\sin^2 1^\circ + \sin^2 3^\circ + \sin^2 5^\circ$ ..... + $\sin^2 89^\circ$) – $\sec^2 36^\circ$ is :
(tan51°cot39° – sec51°cosec39°) + $\cot^2 54^\circ$ + ($\sin^2 1^\circ + \sin^2 3^\circ + \sin^2 5^\circ$ ..... + $\sin^2 89^\circ$) – $\sec^2 36^\circ$ का मान ज्ञात करो–

(A) $20\frac{1}{2}$ (B) 21 (C) $22\frac{1}{2}$ (D) 22

31. What is the value of tan 1° tan 2°tan 3° ..... tan 89° ?
tan 1° tan 2°tan 3° ..... tan 89° का मान क्या हैं ?

(A) 0 (B) 1
(C) 2 (D) ∞

32. What is cot1°cot23°cot45°cot67°cot89° equal to?
cot1°cot23°cot45°cot67°cot89° किसके बराबर है ?

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

33. What is the value of $\sin^2 15^\circ + \sin^2 20^\circ + \sin^2 25^\circ$ + ... + $\sin^2 75^\circ$?
$\sin^2 15^\circ + \sin^2 20^\circ + \sin^2 25^\circ$ + ... + $\sin^2 75^\circ$ का मान क्या है ?

(A) $\tan^2 15^\circ + \tan^2 20^\circ + \tan^2 25^\circ + ... + \tan^2 75^\circ$
(B) $\cos^2 15^\circ + \cos^2 20^\circ + \cos^2 25^\circ + ... + \cos^2 75^\circ$
(C) $\cot^2 15^\circ + \cot^2 20^\circ + \cot^2 25^\circ + ... + \cot^2 75^\circ$
(D) $\sec^2 15^\circ + \sec^2 20^\circ + \sec^2 25^\circ + ... + \sec^2 75^\circ$

34. What is the value of cos1°cos2° cos3° ..... cos99°?
cos1°cos2° cos3° ..... cos99° का मान क्या है ?

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

35. The value of $\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 15^\circ$ + ... $\sin^2 90^\circ$ is :
$\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 15^\circ$ + ... $\sin^2 90^\circ$ का मान है ?

(A) 9 (B) $^{19}/_{2}$ (C) 8 (D) $^{17}/_{2}$

36. The value of $\operatorname{cosec}^2 67^\circ + \sec^2 57^\circ - \cot^2 33^\circ - \tan^2 23^\circ$ is :
$\operatorname{cosec}^2 67^\circ + \sec^2 57^\circ - \cot^2 33^\circ - \tan^2 23^\circ$ का मान क्या है ?

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

37. What is the value of tan24°.tan48°.tan42°. tan66°

tan24°.tan48°.tan42°.tan66° का मान है-

(A) 0 (B) 1

(C) 1/2 (D) 2

38. What is the value of expression

(tan0°.tan1°.tan2°.tan3°.tan3° .... .tan89°)

निम्नलिखित व्यंजक (expression) का मान क्या है ?

(tan0°.tan1°.tan2°.tan3°.tan3° .... .tan89°)

(A) 0 (B) 1

(C) 2 (D) 1/2

39. If $P = \tan\left(-\frac{11\pi}{6}\right)$, $q = \tan\left(\frac{21\pi}{4}\right)$ and $r = \cot\left(\frac{283\pi}{6}\right)$ then which of the following is/are correct?

यदि $P = \tan\left(-\frac{11\pi}{6}\right)$, $q = \tan\left(\frac{21\pi}{4}\right)$ और $r = \cot\left(\frac{283\pi}{6}\right)$ है, तो निम्न में से कौन-सा कथन सत्य है ?

I. The value of p × r is 2.

II. p, q and r are in GP

Select the correct answer using the code given below :

निम्नांकित में से सही कोड का चयन कीजिए।

(A) Only I (B) Only II

(C) Both I and II (D) Neither I nor II

40. solve it : cos5° + cos24° + cos175° + cos204° + cos300°

सरल करें : cos5° + cos24° + cos175° + cos204° + cos300°

(A) 1/2 (B) 1

(C) −1/2 (D) 0

ANSWER

1. (B)	**2.** (C)	**3.** (D)	**4.** (A)	**5.** (B)	**21.** (C)	**22.** (A)	**23.** (A)	**24.** (A)	**25.** (C)
6. (D)	**7.** (B)	**8.** (C)	**9.** (A)	**10.** (A)	**26.** (B)	**27.** (D)	**28.** (A)	**29.** (A)	**30.** (A)
11. (A)	**12.** (D)	**13.** (D)	**14.** (C)	**15.** (D)	**31.** (B)	**32.** (B)	**33.** (B)	**34.** (B)	**35.** (B)
16. (D)	**17.** (B)	**18.** (A)	**19.** (A)	**20.** (D)	**36.** (B)	**37.** (B)	**38.** (A)	**39.** (B)	**40.** (A)

Solution

1. (B) Given, tan(315°) = tan(360° – 45°)

= –tan45° [∵ tan(360° – θ) = –tanθ]

= –1

2. (C) Cos(–780°) = Cos780° [∵ Cos(–θ) = Cosθ]

= Cos (2 × 360° + 60°)

$= \text{Cos}60° = \frac{1}{2}$

3. (D) ⇒ cosec(1500°)

= cosec(4 × 360° + 60°)

$= \text{cosec}60° = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

4. (A) Given, tan(1125°)

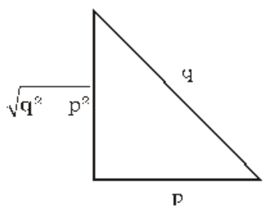
= tan(3 × 360° + 45°)

= tan45° [∵ tan(n × 360° + θ) = tanθ]

= 1

5. (B) Given that

$\sec 21\frac{1}{2}^{0} = \frac{q}{p}$



$\sec 68.5° = \frac{q}{\sqrt{q^2 - p^2}}$

6. (D)

7. (B) tan7°.tan11°.tan23°.tan30°.tan45°.tan67° .tan79°.tan83°

$1 \times 1 \times 1 \times 1 \times \frac{1}{\sqrt{3}} = \frac{1}{\sqrt{3}}$

8. (C) Given, sin120°sin240°sin270°

⇒ sin(90° + 30°)sin(180° + 60°)sin(180° + 90°)

⇒ cos30°(–sin60°)(–sin90°)

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

9. (A) Given, $\sin\frac{7\pi}{4}\sin\frac{\pi}{4}\sin\frac{3\pi}{4}\sin\frac{5\pi}{4}$

$= \sin\left(\pi + \frac{3\pi}{4}\right)\sin\frac{\pi}{4}\sin\frac{3\pi}{4}\sin\left(\pi + \frac{\pi}{4}\right)$

$= \left(-\sin\frac{3\pi}{4}\right)\sin\frac{\pi}{4}\sin\frac{3\pi}{4}\left(-\sin\frac{\pi}{4}\right)$

$= \sin\frac{3\pi}{4}\sin\frac{\pi}{4}\sin\frac{3\pi}{4}\sin\frac{\pi}{4}$

Mother's

$$= \sin\left(\pi-\frac{\pi}{4}\right)\sin\frac{\pi}{4}\sin\left(\pi-\frac{\pi}{4}\right)\sin\frac{\pi}{4}$$

$$= \sin\frac{\pi}{4}\sin\frac{\pi}{4}\sin\frac{\pi}{4}\sin\frac{\pi}{4}$$

$$= \frac{1}{\sqrt{2}}\times\frac{1}{\sqrt{2}}\times\frac{1}{\sqrt{2}}\times\frac{1}{\sqrt{2}} = \frac{1}{4}$$

10.(A) $\frac{3}{2}\frac{\cos 39^\circ}{\sin 51^\circ} - \sqrt{\sin^2 39^\circ + \sin^2 51^\circ}$

$\Rightarrow \frac{3}{2}\cdot\frac{\cos 39^\circ}{\sin 39^\circ} - \sqrt{\sin^2 39^\circ + \cos^2 39^\circ}$

$\Rightarrow \frac{3}{2} - 1 = \frac{1}{2}$

11.(A) $1 + 2 - 5(\cot 11^\circ.\cot 31^\circ.\cot 45^\circ.\cot 59^\circ.\cot 79^\circ) + 3(\sin^2 76.5^\circ + \sin^2 13.5^\circ)$
$= 1 + 2 - 5 + 3 = 1$

12.(D) $\frac{\tan 13^\circ.\tan 37^\circ.\tan 45^\circ.\tan 53^\circ.\tan 77^\circ}{2\,\text{cosec}^2 60^\circ(\cos^2 60^\circ - 3\cos 60^\circ + 2)}$

$\Rightarrow \frac{1}{2\times\frac{4}{3}.\left[\frac{1}{4}-\frac{3}{2}+2\right]} = \frac{1}{\frac{8}{3}\times\frac{3}{4}} = \frac{1}{2}$

13.(D) $\cos 18^\circ + \cos 162^\circ + \sin 126^\circ + \sin 234^\circ$
$= \cos 18^\circ + \cos(180^\circ - 18^\circ) + \sin 126^\circ + \sin(360^\circ - 126^\circ)$
$= \cos 18^\circ + (-\cos 18^\circ) + (\sin 126^\circ) + (-\sin 126^\circ)$
$= \cos 18^\circ - \cos 18^\circ + \sin 126^\circ - \sin 126^\circ$
$= 0$

14.(C) $\frac{4\times\frac{1}{3}+\frac{1}{4}\times\frac{1}{2}+1}{1+1}$

[$\because$ $\cos\theta\sin(90-\theta) = \cos^2\theta$]
[$\because$ $\sec^2\theta = \text{cosec}^2(90-\theta)$
$\tan\theta.\tan(90-\theta) = 1$]

$\frac{4+\frac{1}{3}+\frac{1}{8}+1}{2} = \frac{32+3+24}{48} \Rightarrow \frac{59}{48}$

15.(D) $\frac{3\times(-1)-2(-1)}{\sec^2(22-\theta)-\tan^2(22-\theta)} \Rightarrow \frac{-1}{1} = -1$

$-\tan(\theta+61)+\tan(61+\theta)$

16.(D) $\sin 780^\circ\sin 480^\circ + \cos 120^\circ\sin 30^\circ$
$= \sin(2\times 360^\circ\times 60^\circ)\sin(360^\circ + 120^\circ) + \cos 120^\circ\sin 30^\circ$
$= \sin 60^\circ\sin(120)^\circ + \cos 120^\circ\sin 30^\circ$
$= \sin 60^\circ\sin(90^\circ + 30^\circ) + \cos(90^\circ + 30^\circ)\sin 30^\circ$
$= \sin 60^\circ\cos 30^\circ - \sin 30^\circ\sin 30^\circ$

$= \frac{\sqrt{3}}{2}\times\frac{\sqrt{3}}{2} - \frac{1}{2}\times\frac{1}{2} \Rightarrow \frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$

17. (B)

$$\frac{\sin(90^\circ\times 12)-\tan(180^\circ+45^\circ)-\cos(90^\circ+30^\circ)\sin(90^\circ+60^\circ)}{\tan(180^\circ-45^\circ)+\cot(180^\circ+90^\circ)}$$

$$= \frac{0-1-\left(-\frac{1}{2}\right)\left(\frac{1}{2}\right)}{-1+0} = \frac{-1+\frac{1}{4}}{-1} = \frac{3}{4}$$

18. (A)

$$\frac{\tan(60^\circ+\theta)-\text{cosec}(30^\circ+\theta)+\text{cosec}(30^\circ+\theta)-\tan(60^\circ+\theta)}{\cos 5^\circ\sec 5^\circ+\cos 35^\circ\sec 35^\circ}$$

$$= \frac{0}{2} = 0$$

19. (A) $\Rightarrow$ $\tan 495^\circ = \tan(360^\circ + 135^\circ) = -1$
and $\cot 855^\circ = \cot(720^\circ + 135^\circ) = -1$

$\Rightarrow$ $\frac{\tan 495^\circ}{\cot 855^\circ} = \frac{-1}{-1} = 1$

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

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

21. (C) $\frac{\tan^2 25}{\text{cosec}^2 65^\circ} + \frac{\cot^2 25}{\sec^2 65^\circ} + 2\tan 20^\circ\tan 45\tan 70^\circ$

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

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

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

22. (A)

23.(A) $\sec 12\sin 12\tan 38\tan 78\tan 52$

$\frac{\sin 12}{\cos 12}\cot(90-38)\tan 78\tan 52$

$\tan 12\cot 52\tan 78\tan 52$

$\cot(90-12)\cot 52\tan 78\tan 52$

$\cot 78\cot 52\tan 78\tan 52 = 1$

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

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

25. (C) $\frac{\cos^2(45^\circ+\theta)+\cos^2(45^\circ-\theta)}{\tan(60^\circ+\theta)\tan(30^\circ-\theta)}$

$\Rightarrow$ $\frac{\cos^2(45+\theta)+\sin^2(45+\theta)}{\tan(60+\theta)\cot(60+\theta)} \Rightarrow \frac{1}{1} = 1$

Mother's

26.(B) $\frac{\sin(78°+\phi)-\sin(78°+\phi)+\tan^2 70°-\sec^2 70°}{\sin^2 25°+\cos^2 25°}$

$= \frac{-1}{1} = -1$

27.(D) $\frac{1}{\text{cosec}^2 51°} + \sin^2 39° + \tan^2 51° - \frac{1}{\sin^2 51°.\sec^2 39°}$

$= \sin^2 51° + \cos^2 51° + \tan^2 51° - \frac{1}{\sin^2 51°.\text{cosec}^2 51°}$

$1 + \tan^2 51° - 1$

$= \tan^2 51$

$= \text{cosec}39° = x, \quad \sec 51° = x$

$\tan 51° = \sqrt{x^2-1} \Rightarrow \tan^2 51° = \left(\sqrt{x^2-1}\right)^2 = (x^2-1)$

28.(A) $\tan 2A = \cot(A - 18°)$

$\cot(90 - 2A) = \cot(A - 18°)$

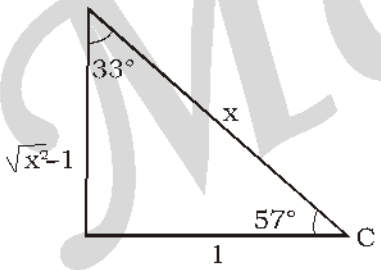
$90° - 2A = A - 18°$ $[\because \cot(90° - \theta) = \tan\theta]$

$108° = 3A$

$A = 36°$

29.(A) $x = \sec 57°$

$\cot^2 33° + \sin^2 57 + \sin^2 33 + \text{cosec}^2 57.\cos^2 33 + \sec^2 33.\sin^2 57$



$x^2 + 1 + \frac{x^4-1}{x^2} + \frac{1}{x^2} + \frac{x^4}{x^2-1} \times \frac{x^2-1}{x^2} + \frac{x^4}{x^2-1} \times \frac{x^2-1}{x^2}$

$= x^2 + 2$

30.(A) $(\tan^2 51° - \sec^2 51°) + \tan^2 36° - \sec^2 36° + 22\frac{1}{2}$

$= -1 - 1 + 22\frac{1}{2} = 20\frac{1}{2}$

31.(B) $\tan 1° \cdot \tan 89° = \tan 1° \cdot \cot 1° = 1$

similarly,

$\tan 2° \cdot \tan 88° = \tan 2° \cdot \cot 2° = 1$

$\tan 3° \cdot \tan 87° = \tan 3° \cdot \cot 3° = 1$

hence the equation will reduce to $\tan 45° = 1$

32.(B) $\cot 1° \cot 23° \cot 45° \cot 67° \cot 89°$

$\cot 1°.\tan(90° - 23°)\cot 45°\cot 67°.\tan(90° - 89°)$ $[\because \tan(90° - \theta) = \cot\theta]$

$\cot 1°.\tan 67°.\cot 45°.\cot 67°.\tan 1° = \cot 45°$ $[\because \tan\theta.\cot\theta = 1]$

$= 1$ $[\because \cot 45° = 1]$

33. (B) $\sin^2 15° + \sin^2 20° + \sin^2 25° + \ldots\ldots + \sin^2 75°$

$= \sin^2(90° - 75°) + \sin^2(90° - 70°) + \ldots\ldots + \sin^2(90° - 15°)$

$= \cos^2 75° + \cos^2 70° + \ldots\ldots + \cos^2 15°$

34. (B) $\because \cos 90° = 0$

$\therefore \cos 1° \cos 2° \cos 3° \ldots\ldots \cos 99° = 0$

35.(B)

36.(B) $\text{cosec}^2 67° + \sec^2 57° - \cot^2 33° - \tan^2 23°$

$= \text{cosec}^2(90° - 23°) + \sec^2(90° - 33°) - \cot^2 33° - \tan^2 23°$

$= \sec^2 23° + \text{cosec}^2 33° - \cot^2 33° - \tan^2 23°$

$= 1 + \tan^2 23° + 1 + \cot^2 33° - \cot^2 33° - \tan^2 23°$

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

$= 2$

37.(B) $\tan 24°.\tan 48°.\tan 42°.\tan 66°$

$= \tan 24°.\tan 48°.\tan(90° - 48°).\tan(90° - 24°)$

$= \tan 24°.\tan 48°.\cot 48°.\cot 24°$ $\{\because \tan(90° - \theta) = \cot\theta\}$

$= 1$

38.(A) $\because \tan 0° = 0$

$\therefore \tan 0°.\tan 1°.\tan 2°.\tan 3°.\tan 3° \ldots \tan 89° = 0$

39. (B)

40.(A) $\cos 5° + \cos 24° + \cos 175° + \cos 204° + \cos 300°$

$= \cos 5° + \cos 24° + \cos(180° - 5°) + \cos(180° + 24°) + \cos(270° - 30°)$

$= \cos 5° + \cos 24° - \cos 5° - \cos 24° + \sin 30°$

$= \sin 30° = \frac{1}{2}$

Mother's

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

Trigonometry

Part-V

Part-V
Exercise / अभ्यास प्रश्न

1. What is the value of sin20°sin45°sin50° + cos45°cos20°cos50° is:
sin20°sin45°sin50° + cos45°cos20°cos50° का मान ज्ञात कीजिए:

(A) $\frac{\sqrt{6}}{4}$ (B) $\frac{\sqrt{3}}{4}$ (C) $\frac{1}{2}$ (D) $\frac{\sqrt{3}}{5}$

2. If $\sin A = \frac{2}{\sqrt{5}}$ and $\cos B = \frac{1}{\sqrt{10}}$, where A and B are acute angels what is A + B equal to?

यदि $\sin A = \frac{2}{\sqrt{5}}$ और $\cos B = \frac{1}{\sqrt{10}}$, जहाँ A और B न्यून कोण हैं तो A + B का मान किसके बराबर है ?

(A) 135° (B) 90°
(C) 75° (D) 60°

3. What is the value of $\frac{4+\sec 20^\circ}{\text{cosec}20^\circ}$

$\frac{4+\sec 20^\circ}{\text{cosec}20^\circ}$ का मान ज्ञात कीजिए:

(A) tan30° (B) tan60°
(C) 1 (D) sin60°

4. If $\tan^2 B = \frac{1-\sin A}{1+\sin A}$ then what is the value of A + 2B = ?

यदि $\tan^2 B = \frac{1-\sin A}{1+\sin A}$ है तो A + 2B का मान ज्ञात कीजिए।

(A) $\pi/6$ (B) $\pi/2$ (C) $\pi/3$ (D) $\pi/6$

5. What is the value of cos55°sin80° + cos35°sin10°:
cos55°sin80° + cos35°sin10° का मान ज्ञात कीजिए–

(A) $\sqrt{3}$ (B) $\frac{\sqrt{3}}{2}$ (C) $\frac{1}{4}\sin 35^\circ$ (D) None

6. (sinx.cosy + cosx.siny)(sinx.cosy – cosx.siny) =?
(sinx.cosy + cosx.siny)(sinx.cosy – cosx.siny) का मान ज्ञात कीजिए–

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

7. 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) $\sqrt{2}$

8. If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$, then what is $\frac{\tan x}{\tan y}$ equal to.

यदि $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$ है, तो $\frac{\tan x}{\tan y}$ का मान किसके बराबर है ?

(A) a/b (B) b/a (C) $\frac{a+b}{a-b}$ (D) $\frac{a-b}{a+b}$

9. 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

10. tan70° is equal to:
tan70° का मान ज्ञात कीजिए–

(A) 2tan20° + tan50° (B) 2tan50° + tan20°
(C) 2tan50° + tan20° (D) None

11. $\tan\frac{2\pi}{5} - \tan\frac{\pi}{15} - \sqrt{3}\tan\frac{2\pi}{5}.\tan\frac{\pi}{15}$ equal to:

$\tan\frac{2\pi}{5} - \tan\frac{\pi}{15} - \sqrt{3}\tan\frac{2\pi}{5}.\tan\frac{\pi}{15}$ का मान ज्ञात कीजिए–

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

Mother's

12. $\frac{\cot 68^\circ \cot 67^\circ - 1}{\tan 22^\circ + \tan 23^\circ}$ is equal to:

$\frac{\cot 68^\circ \cot 67^\circ - 1}{\tan 22^\circ + \tan 23^\circ}$ का मान ज्ञात कीजिए-

(A) 1 (B) –1

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

13. What is $\frac{1 - \tan 2^\circ \cot 62^\circ}{\tan 152^\circ - \cot 88^\circ}$ is equal to.

$\frac{1 - \tan 2^\circ \cot 62^\circ}{\tan 152^\circ - \cot 88^\circ}$ का मान किसके बराबर है ?

(A) $\sqrt{3}$ (B) $-\sqrt{3}$

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

14. What is the value of $6\sin 30^\circ \cos 75^\circ - 2\sqrt{3}\sec 30^\circ \sin^2 15^\circ$:

$6\sin 30^\circ \cos 75^\circ - 2\sqrt{3}\sec 30^\circ \sin^2 15^\circ$ का मान ज्ञात कीजिए-

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

15. What is the value of $\frac{2(1 - \sin^2\theta)\operatorname{cosec}^2\theta}{\cot^2\theta(1 + \tan^2\theta)} - 1$?

$\frac{2(1 - \sin^2\theta)\operatorname{cosec}^2\theta}{\cot^2\theta(1 + \tan^2\theta)} - 1$ का मान क्या है ?

(A) $\sin 2\theta$ (B) $\sin^2\theta$

(C) $\cos^2\theta$ (D) $\cos 2\theta$

16. If $\cos(x + y) = \frac{3}{5}$ and $\sin(x - y) = \frac{12}{13}$ $0^\circ \le x, y \le 45^\circ$ then the value of tan2x is:

यदि $\cos(x + y) = \frac{3}{5}$ और $\sin(x - y) = \frac{12}{13}$ $0^\circ \le x, y \le 45^\circ$ है, तो tan2x का मान ज्ञात कीजिए-

(A) $\frac{56}{33}$ (B) $-\frac{56}{33}$ (C) $-\frac{19}{12}$ (D) $\frac{20}{7}$

17. Solve this expression

$\sin^2\left(\frac{\pi}{6} + \frac{x}{2}\right) - \sin^2\left(\frac{\pi}{6} - \frac{x}{2}\right)$ को हल करिए:

(A) $\sin\frac{\pi}{6}\sin x$ (B) $\frac{1}{3}\sin x$

(C) $\cos\frac{\pi}{6}\sin x$ (D) $\frac{1}{\sqrt{2}}\sin x$

18. In a ΔPQR, if $\sin(90 + P)\cos Q\sin(90 - R) = \frac{\sqrt{2} - 1}{3}$ and $\sin P\sin Q\sin R = \frac{\sqrt{2} + 1}{3}$ then value of tanP + tanQ + tanR is:

यदि ΔPQR में $\sin(90 + P)\cos Q\sin(90 - R) = \frac{\sqrt{2} - 1}{3}$ और $\sin P\sin Q\sin R = \frac{\sqrt{2} + 1}{3}$ है, तो tanP + tanQ + tanR का मान है-

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

19. What is the value of $\operatorname{cosec}10^\circ + \operatorname{cosec}50^\circ - \operatorname{cosec}70^\circ$ is:

$\operatorname{cosec}10^\circ + \operatorname{cosec}50^\circ - \operatorname{cosec}70^\circ$ का मान ज्ञात कीजिए:

(A) 9 (B) 7

(C) 6 (D) 4

20. The value of $\sqrt{3}\operatorname{cosec}20^\circ - \sec 20^\circ$ is equal to :

$\sqrt{3}\operatorname{cosec}20^\circ - \sec 20^\circ$ का मान किसके बराबर है ?

(A) 4 (B) 2

(C) 1 (D) –4

21. What is the value of $\cos 15^\circ - \cos 165^\circ$?

$\cos 15^\circ - \cos 165^\circ$ का मान क्या है ?

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

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

22. What is the value of

$\frac{[1 + 2\cot^2(90 - x) - 2\operatorname{cosec}(90 - x)\cot(90 - x)]}{[\operatorname{cosec}(90 - x) - \cot(90 - x)]}$?

$\frac{[1 + 2\cot^2(90 - x) - 2\operatorname{cosec}(90 - x)\cot(90 - x)]}{[\operatorname{cosec}(90 - x) - \cot(90 - x)]}$

का मान क्या है ? **[CGL Mains 2017]**

(A) cosx + sinx (B) sinx – cosx

(C) secx + tanx (D) sec x – tan x

23. If A + B = 90°, then what is $\sqrt{\sin A.\sec B - \sin A\cos B}$ equal to :

यदि A + B = 90° है तो $\sqrt{\sin A.\sec B - \sin A\cos B}$ का मान किसके बराबर है ?

(A) sinA (B) cosA

(C) tanA (D) 0

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

24. 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) $\frac{\cot\theta}{(1+\cot^2\theta)^2}$

(C) $\frac{\tan\theta}{(1+\tan^2\theta)^2}$ (D) 0

25. What is the value of / का मान क्या है ?

$$\frac{[(\sin x+\sin y)(\sin x-\sin y)]}{[(\cos x+\cos y)(\cos y-\cos x)]}$$

(A) 0 (B) 1
(C) – 1 (D) 2

26. 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) $\cot 2\theta$

27. $\frac{\tan A}{\cos A-\operatorname{cosec} A}\left(\frac{1-\sin A}{1-\sec A}-\frac{1+\sin A}{1+\sec A}\right)$ is equal to :

$\frac{\tan A}{\cos A-\operatorname{cosec} A}\left(\frac{1-\sin A}{1-\sec A}-\frac{1+\sin A}{1+\sec A}\right)$ का मान किसके बराबर है ?

(A) 1 (B) 2
(C) 3 (D) 4

28. 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

29. 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

30. What is the value of / का मान क्या है ?

$$\cos\left[\frac{(180-0)}{2}\right]\cos\left[\frac{(180-90)}{2}\right]+\sin\left[\frac{(180-30)}{2}\right]\sin\left[\frac{(180-150)}{2}\right]$$

(A) $\sin 2\theta \sin 4\theta$ (B) $\cos 2\theta \cos 6\theta$
(C) $\sin 2\theta \sin 6\theta$ (D) $\cos 2\theta \cos 4\theta$

31. What is the value of / का मान क्या है ?

$$\frac{\sin A+\sin 3A+\sin 5A+\sin 7A}{\cos A+\cos 3A+\cos 5A+\cos 7A}$$

(A) tan2A (B) tan8A
(C) cot4A (D) tan4A

32. What is the value of / का मान क्या है ?

$$\frac{\sin(x+y)-2\sin x+\sin(x-y)}{\cos(x-y)+\cos(x+y)-2\cos x}$$

$\frac{\sin 10x-\sin 8x}{\cos 10x+\cos 8x}$ = ?

(A) 0 (B) $\tan^2 x$
(C) 1 (D) 2tanx

33. What is the value of $[\tan^2(90-\theta)-\sin^2(90-\theta)]\operatorname{cosec}^2(90-\theta)\cot^2(90-\theta)$?
$[\tan^2(90-\theta)-\sin^2(90-\theta)]\operatorname{cosec}^2(90-\theta)\cot^2(90-\theta)$ का मान क्या है ?

(A) 0 (B) 1
(C) – 1 (D) 2

34. 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) $\tan\left(\frac{3x}{2}\right)$

35. What is the simplified value of $\frac{\sin 2A}{1+\cos 2A}$?

$\frac{\sin 2A}{1+\cos 2A}$ का सरलीकृत मान क्या है?

(A) tan A (B) cot A
(C) sin A (D) cos A

36. If $\tan(\alpha+\beta)=2$, and $\tan(\alpha-\beta)=1$; $\tan 2\alpha$ = ?
यदि $\tan(\alpha+\beta)=2$ और $\tan(\alpha-\beta)=1$ है तो $\tan 2\alpha$ का मान किसके बराबर है ?

(A) –3 (B) –2
(C) $-1/3$ (D) 1

37. What is the simplified value of 1+ tan A tan (A/2)?
1+ tan A tan (A/2) का सरलीकृत मान क्या है?
(A) sin A/2 (B) cos A
(C) sec A (D) sin A

38. If A + B = 90° then $\frac{\tan A - \tan B}{2\tan(A-B)}$ is equal to :
यदि A + B = 90° है तो $\frac{\tan A - \tan B}{2\tan(A-B)}$ का मान किसके बराबर है ?
(A) 0 (B) 1 (C) 2 (D) $\frac{1}{2}$

39. If $\sin\theta + \sin 5\theta = \sin 3\theta$ and $0<\theta<(\pi/2)$, then what is the value of θ (in degrees)?
यदि $\sin\theta + \sin 5\theta = \sin 3\theta$ and $0<\theta<(\pi/2)$, तो θ का मान (डिग्री में) क्या होगा?
(A) 30 (B) 45
(C) 60 (D) 75

40. What is the simplified value of cosec 2A + cot 2A?
cosec2A + cot 2A का सरलीकृत मान क्या है ?
(A) sec A (B) sec (A/2)
(C) cot A (D) cot2 A

41. If $\tan\theta = \frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}$ then x^2 is equal to:
यदि $\tan\theta = \frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}$ है, तो x^2 का मान ज्ञात कीजिए–
(A) sin2θ (B) cos2θ
(C) tan2θ (D) cot2θ

42. Given that $\tan\alpha = \frac{M}{(M+1)}$, $\tan\beta = \frac{1}{(2M+1)}$, then what is the value of α + β.
दिया गया है कि $\tan\alpha = \frac{M}{(M+1)}$, $\tan\beta = \frac{1}{(2M+1)}$, तो α + β का मान ज्ञात करें ?
(A) 0 (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{3}$

43. $\frac{\sin x - 2\sin 3x + \sin 5x}{\cos 5x - \cos x}$ is equal to:
$\frac{\sin x - 2\sin 3x + \sin 5x}{\cos 5x - \cos x}$ का मान किसके बराबर है ?
(A) sin2x (B) cos2x
(C) tanx (D) secx

44. $\frac{\cos 4\theta + \cos 3\theta + \cos 2\theta}{\sin 2\theta + \sin 3\theta + \sin 4\theta}$ is equal to:
$\frac{\cos 4\theta + \cos 3\theta + \cos 2\theta}{\sin 2\theta + \sin 3\theta + \sin 4\theta}$ का मान किसके बराबर है ?
(A) cotθ (B) cot3θ
(C) tanθ (D) sinθcosθ

45. $\frac{1+\sin 2\theta - \cos 2\theta}{1+\sin 2\theta + \cos 2\theta}$ is equal to:
$\frac{1+\sin 2\theta - \cos 2\theta}{1+\sin 2\theta + \cos 2\theta}$ का मान किसके बराबर है ?
(A) sinθ (B) cosθ
(C) secθ (D) tanθ

46. What is the simplified value of $\frac{\cos\frac{3\pi}{4} - \cos\frac{5\pi}{12}}{\sin\frac{17\pi}{12} - \sin\frac{\pi}{4}}$
$\frac{\cos\frac{3\pi}{4} - \cos\frac{5\pi}{12}}{\sin\frac{17\pi}{12} - \sin\frac{\pi}{4}}$ का सरलीकृत मान क्या है?
(A) 0 (B) 1 (C) $\sqrt{3}$ (D) $\frac{1}{\sqrt{3}}$

47. $\frac{(\sin x - \sin 3x)\sec^2 x}{1-\tan^2 x}$ is equal to:
$\frac{(\sin x - \sin 3x)\sec^2 x}{1-\tan^2 x}$ का मान किसके बराबर है ?
(A) sinx (B) cos2x
(C) 2sinx (D) $\sqrt{3}$ cosecx

48. If cos2θ = 1.18, [0 < θ < 90] then the value of $\frac{\sin\theta + \tan\theta}{\sin\theta - \tan\theta}$?
यदि cos2θ = 1.18, [0 < θ < 90] है, तो $\frac{\sin\theta + \tan\theta}{\sin\theta - \tan\theta}$ का मान किसके बराबर है ?
(A) $-\frac{10}{13}$ (B) $-\frac{13}{7}$ (C) $\frac{13}{7}$ (D) $\frac{9}{4}$

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

49. If θ is an acute angle and $\sin\theta\cos\theta = 2\cos^3\theta - 1.5\cos\theta$, then what is sinθ equal to?
यदि θ एक न्यून कोण है और $\sin\theta\cos\theta = 2\cos^3\theta - 1.5\cos\theta$, तो sinθ किसके बराबर है ?

(A) $\frac{\sqrt{5}-1}{4}$ (B) $\frac{1-\sqrt{5}}{4}$

(C) $\frac{\sqrt{5}+1}{4}$ (D) $-\frac{\sqrt{5}+1}{4}$

50. If $\cos B + \cos^3 B = \sqrt{2}\cos A$ and $\sin B - \sin^3 B = \sqrt{2}\sin A$ then find the value of sin2B is equal to :
यदि $\cos B + \cos^3 B = \sqrt{2}\cos A$ और $\sin B - \sin^3 B = \sqrt{2}\sin A$ है तो sin2B का मान किसके बराबर है ?

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

51. If $x + \frac{1}{x} = 2\cos\theta$, then the value of $x^3 + \frac{1}{x^3} = ?$

यदि $x + \frac{1}{x} = 2\cos\theta$ तो $x^3 + \frac{1}{x^3}$ का मान क्या होगा ?

(A) $\sin3\theta$ (B) $\cos3\theta$
(C) $3\sin^2\theta$ (D) $2\cos3\theta$

52. ABC is a triangle inscribed in a semicircle of diameter AB. What is cos (A + B) + sin (A + B) equal to ?
ABC व्यास AB के अर्धवृत्त में बना एक त्रिभुज हैं cos (A + B) + sin (A + B) के बराबर हैं ? ***(CDS 2020(II))***

(A) 0 (B) $\frac{1}{4}$ (C) $\frac{1}{2}$ (D) 1

53. What is the simplified value of $\frac{\tan A}{1-\cot A} + \frac{\cot A}{1-\tan A} - \frac{2}{\sin 2A}$ का सरलीकृत मान क्या है ?

$\frac{\tan A}{1-\cot A} + \frac{\cot A}{1-\tan A} - \frac{2}{\sin 2A}$ का सरलीकृत मान क्या है ?

(A) –1 (B) 0
(C) 1 (D) 25

54. If $\frac{\tan A}{1-\cot A} + \frac{\cot A}{1-\tan A} = K + \tan A + \cot A$ then K is equal to :

यदि $\frac{\tan A}{1-\cot A} + \frac{\cot A}{1-\tan A} = K + \tan A + \cot A$ है तो K का मान किसके बराबर है ?

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

55. tan13x – tan9x – tan4x का सरलीकृत मान क्या है ?
tan13x – tan9x – tan4x का सरलीकृत मान क्या है ?

(A) cot13x.cot9x.cot4x
(B) tan13x.tan9x.tan4x
(C) 1 + tan4x.tan9x (D) None

56. $\frac{\sin^3 A + \sin 3A}{\sin A} + \frac{\cos^3 A - \cos 3A}{\cos A}$ is equal to:

(A) sin3A (B) cos3A
(C) sinA + cosA (D) 3

57. $\sin^3\theta + \sin^2\theta + \sin\theta = 1$ find $\cos^6\theta - 4\cos^4\theta + 8\cos^2\theta - 4$?
यदि $\sin^3\theta + \sin^2\theta + \sin\theta = 1$ हैं तो $\cos^6\theta - 4\cos^4\theta + 8\cos^2\theta - 4$ ज्ञात करो।

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

58. If $\sec(\theta + \alpha) + \sec(\theta - \alpha) = 2\sec\theta\sec(\alpha \neq 0)$ then $\sin^2\theta$ = ?
यदि $\sec(\theta + \alpha) + \sec(\theta - \alpha) = 2\sec\theta\sec(\alpha \neq 0)$ हैं तो $\sin^2\theta$ का मान ज्ञात करो।

(A) $-\sec\alpha$ (B) $-\sin\alpha$
(C) $-\cos\alpha$ (D) —$\sin\alpha.\cos\alpha$

59. What is $\sin^2 66\frac{1}{2}^\circ - \sin^2 23\frac{1}{2}^\circ$ equal to ?

$\sin^2 66\frac{1}{2}^\circ - \sin^2 23\frac{1}{2}^\circ$ का मान किसके बराबर है ?

(A) $\sin47^\circ$ (B) $\cos47^\circ$
(C) $2\sin47^\circ$ (D) $2\cos47^\circ$

60. What is the simplified value of $\left[\frac{\cos A}{(1-\tan A)} + \frac{\sin A}{(1-\cot A)}\right]^2$

$\left[\frac{\cos A}{(1-\tan A)} + \frac{\sin A}{(1-\cot A)}\right]^2$ का सरलीकृत मान क्या है ?

(A) sin A + cos A (B) 1 + sin 2A
(C) 1 + $\cos^2$A (D) tan A + cot A

61. tanA + 2tan2A + 4tanA + 8cot8A = ?
tanA + 2tan2A + 4tanA + 8cot8A का मान होगा-

(A) cot2A (B) cotA
(C) tan3A (D) tanA

62. What is the simplified value of [2/(cot A-tan A)]?
[2/(cot A-tan A)] का सरलीकृत मान क्या है ?

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

Mother's

63. Let $a=\frac{2\sin x}{1+\sin x+\cos x}$ and $b=\frac{c}{1+\sin x}$ and a= b, Then c = ?

माना $a=\frac{2\sin x}{1+\sin x+\cos x}$ और $b=\frac{c}{1+\sin x}$ और a = b है, तो c = ?

(A) 1 – sinx cosx (B) 1+sinx – cosx
(C) 1+sinx cosx (D) 1 + cosx – sinx

64. $\frac{(2\sin A)(1+\sin A)}{1+\sin A+\cos A}$ 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

65. If $\frac{3-\tan^2 A}{1-3\tan^2 A}$ = k, where k is a real number, then cosecA(3sinA – 4sin³A) is equal to :

यदि $\frac{3-\tan^2 A}{1-3\tan^2 A}$ = k, जहाँ k एक वास्तविक संख्या है, तो cosecA(3sinA – 4sin³A) किसके बराबर है ?

(A) $\frac{2k}{k-1}$, where $k \geq 3, k < \frac{1}{3}$

(B) $\frac{2k}{k-1}$, where $\frac{1}{3} \leq k \leq 3$

(C) $\frac{2k}{k-1}$, where $k < \frac{1}{3}$ or $k > 3$

(D) $\frac{2k}{k+1}$

66. What is (sinxcosy + cosxsiny) (sinxcosy – cosxsiny) equal to?

(sinxcosy + cosxsiny) (sinxcosy – cosxsiny) किसके बराबर है ?

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

67. If cosec θ – sinθ = m and secθ – cosθ = n, then what is $m^{\frac{4}{3}}n^{\frac{2}{3}} + m^{\frac{2}{3}}n^{\frac{4}{3}}$ equal to ?

यदि cosec θ – sinθ = m और secθ – cosθ = n है तो $m^{\frac{1}{3}}n^{\frac{2}{3}} + m^{\frac{2}{3}}n^{\frac{1}{3}}$ किसके बराबर हैं ?

(A) 0 (B) 1
(C) mn (D) m^4n^4

68. If secθ = m and tanθ = n, then $\frac{1}{m}\left(m+n+\frac{1}{m+n}\right)$ is equal to :

यदि secθ = m और tanθ = n है तो $\frac{1}{m}\left(m+n+\frac{1}{m+n}\right)$ का मान किसके बराबर है ?

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

69. If sinA + cosA = p and $\sin^3 A + \cos^3 A$ = q, then which one of the following is correct?

यदि sinA + cosA = p और $\sin^3 A + \cos^3 A$ = q है, तो निम्नलिखित में से कौन-सा सही है ? **[CDS 2018 I]**

(A) $p^3 - 3p + q = 0$ (B) $q^3 - 3q + 2p = 0$
(C) $p^3 - 3p + 2q = 0$ (D) $p^3 + 3p + 2q = 0$

70. If $\cos\theta_1 + \cos\theta_2 + \cos\theta_3 = 3$, then what is equal to $\sin\theta_1 + \sin\theta_2 + \sin\theta_3$ equal to ?

यदि $\cos\theta_1 + \cos\theta_2 + \cos\theta_3 = 3$ है, तो $\sin\theta_1 + \sin\theta_2 + \sin\theta_3$ किसके बराबर है ?

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

71. If $\frac{p}{q} - \frac{a}{b}\tan\theta = 1$ and $\frac{p}{q}\tan\theta + \frac{a}{b} = 1$, then the value of $\frac{p^2b^2 + a^2q^2}{b^2q^2}$ = ?

यदि $\frac{p}{q} - \frac{a}{b}\tan\theta = 1$ है, और $\frac{p}{q}\tan\theta + \frac{a}{b} = 1$ है, तो $\frac{p^2b^2 + a^2q^2}{b^2q^2}$ का मान ज्ञात करो ?

(A) $2\text{Cos}^2\theta$ (B) $2\text{Sec}^2\theta$
(C) $2\text{Cot}^2\theta$ (D) $2\text{Sin}^2\theta$

72. If cotθ(1 + sinθ) = 4m and cotθ(1 – sinθ) = 4n, then which one of the following is correct?

यदि cotθ(1 + sinθ) = 4m और cotθ(1 – sinθ) = 4n है, तो निम्नलिखित में से कौन-सा एक सही है ?

(A) $(m^2 + n^2)^2 = mn$ (B) $(m^2 - n^2)^2 = mn$
(C) $(m^2 - n^2)^2 = m^2n^2$ (D) $(m^2 + n^2)^2 = m^2n^2$

73. If sin(A + B) = 1, where 0° < B < 45°, then what is cos(A – B) equal to?

यदि sin(A + B) = 1, जहाँ 0° < B < 45° है, तो cos(A – B) किसके तुल्य है ?

(A) sin2B (B) sinB
(C) cos2B (D) cosB

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

74. The value of $\frac{\sin A+\cos A}{\sin A-\cos A}+\frac{\sin A-\cos A}{\sin A+\cos A}$ is :

$\frac{\sin A+\cos A}{\sin A-\cos A}+\frac{\sin A-\cos A}{\sin A+\cos A}$ का मान है—

(A) $\frac{2}{2\sin^2 A-1}$ (B) $\frac{2}{2\cot^2 A-1}$

(C) $\frac{1}{2\sin^2 A-1}$ (D) $\frac{2}{2\cos^2 A-1}$

75. If $\tan\frac{\theta}{2}=\left(\frac{1+e}{1-e}\right)^{\frac{1}{2}}\tan\frac{\phi}{2}$ then $\frac{\cos\phi-e}{1-e\cos\phi}$ is equal to :

यदि $\tan\frac{\theta}{2}=\left(\frac{1+e}{1-e}\right)^{\frac{1}{2}}\tan\frac{\phi}{2}$ है तो $\frac{\cos\phi-e}{1-e\cos\phi}$ का मान किसके बराबर है ?

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

76. $\cos^2\beta+\cos^2(\alpha+\beta)-2\cos\alpha\cos\beta\cos(\alpha+\beta)$ is equal to :

$\cos^2\beta+\cos^2(\alpha+\beta)-2\cos\alpha\cos\beta\cos(\alpha+\beta)$ का मान किसके बराबर है ?

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

77. $\sec 2\alpha\left(\frac{\sin 3\alpha}{\sin\alpha}+\frac{\cos 3\alpha}{\cos\alpha}\right)$ is equal to.

$\sec 2\alpha\left(\frac{\sin 3\alpha}{\sin\alpha}+\frac{\cos 3\alpha}{\cos\alpha}\right)$ का मान किसके बराबर है ?

(A) 1 (B) 2
(C) 3 (D) 4

78. If $\tan(P+Q)=4\tan P$ then value of $\frac{\sin(2P+Q)}{\sin Q}$.

यदि $\tan(P+Q)=4\tan P$ है, तो $\frac{\sin(2P+Q)}{\sin Q}$ का मान है-

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

79. Find the value of $\frac{\sin 3\theta}{\sin\theta}-\frac{\cos 3\theta}{\cos\theta}=?$

$\frac{\sin 3\theta}{\sin\theta}-\frac{\cos 3\theta}{\cos\theta}$ का मान ज्ञात कीजिए-

(A) 0 (B) –2
(C) 2 (D) 1

80. Find the value of $\frac{\text{Cos}3\theta+2\text{Cos}5\theta+\text{Cos}7\theta}{\text{Cos}\theta+2\text{Cos}3\theta+\text{Cos}5\theta}+\text{Sin}2\theta\tan 3\theta=?$

$\frac{\text{Cos}3\theta+2\text{Cos}5\theta+\text{Cos}7\theta}{\text{Cos}\theta+2\text{Cos}3\theta+\text{Cos}5\theta}+\text{Sin}2\theta\tan 3\theta$ का मान होगा-

(A) Cos3θ (B) Cos2θ
(C) Sin2θ (D) Sin3θ

ANSWER

1.	(A)	**2.**	(A)	**3.**	(B)	**4.**	(B)	**5.**	(D)	**41.**	(A)	**42.**	(B)	**43.**	(C)	**44.**	(C)	**45.**	(D)
6.	(A)	**7.**	(D)	**8.**	(A)	**9.**	(D)	**10.**	(B)	**46.**	(D)	**47.**	(C)	**48.**	(B)	**49.**	(A)	**50.**	(C)
11.	(D)	**12.**	(B)	**13.**	(B)	**14.**	(D)	**15.**	(D)	**51.**	(D)	**52.**	(D)	**53.**	(C)	**54.**	(A)	**55.**	(B)
16.	(B)	**17.**	(C)	**18.**	(C)	**19.**	(C)	**20.**	(A)	**56.**	(D)	**57.**	(C)	**58.**	(C)	**59.**	(B)	**60.**	(B)
21.	(D)	**22.**	(D)	**23.**	(D)	**24.**	(B)	**25.**	(B)	**61.**	(B)	**62.**	(B)	**63.**	(B)	**64.**	(A)	**65.**	(A)
26.	(B)	**27.**	(B)	**28.**	(D)	**29.**	(B)	**30.**	(B)	**66.**	(D)	**67.**	(B)	**68.**	(A)	**69.**	(C)	**70.**	(A)
31.	(D)	**32.**	(B)	**33.**	(B)	**34.**	(B)	**35.**	(A)	**71.**	(A)	**72.**	(B)	**73.**	(A)	**74.**	(A)	**75.**	(A)
36.	(A)	**37.**	(C)	**38.**	(B)	**39.**	(A)	**40.**	(C)	**76.**	(A)	**77.**	(D)	**78.**	(D)	**79.**	(C)	**80.**	(B)

Mother's

Solution

1. (A) $\because$ sin(A + B) = sinAcosB + cosAsinB
$\Rightarrow$ sin45(sin20cos40) + cos45(cos20sin40)

$= \frac{1}{\sqrt{2}}[\sin(20+40)]$

$= \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2} = \frac{\sqrt{6}}{4}$

2. (A)

3. (B) We have, $\frac{4+\sec 20^\circ}{\operatorname{cosec} 20^\circ}$

$= \frac{\sin 20^\circ}{\cos 20^\circ}(4\cos 20^\circ + 1)$

$= \frac{2\sin 40^\circ + \sin 20^\circ}{\cos 20^\circ}$

$= \frac{\sin 40^\circ + (\sin 40^\circ + \sin 20^\circ)}{\cos 20^\circ}$

$= \frac{\sin 40^\circ + 2\sin 30^\circ \cos 10^\circ}{\cos 20^\circ}$

$= \frac{\sin 40^\circ + \sin 80^\circ}{\cos 20^\circ}$

$= \frac{2\sin 60^\circ \cos 20^\circ}{\cos 20^\circ} = 2 \times \frac{\sqrt{3}}{2} = \sqrt{3}$
$= \tan 60^\circ$

4. (B)

5. (D) $\because$ cos(A – B) = cosAcosB + sinAsinB
$\Rightarrow$ cos55°cos10° + sin55°sin10°

= cos(55° – 10°) = cos45° = $\frac{1}{\sqrt{2}}$

6. (A) sin(x + y).sin(x – y) = sin²x – sin²y
$\Rightarrow$ 1 – cos²x – 1 + cos²y
$\Rightarrow$ cos²y – cos²x

7. (D) (sin59 cos31 + cos59 sin31) ÷ (cos20 cos25 – sin20 sin25)

$\frac{\sin(59+31)}{\cos(20+25)} = \frac{\sin 90}{\cos 45} = \frac{1}{\frac{1}{\sqrt{2}}} = \sqrt{2}$

8. (A)

9. (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

10.(B) tan70° = tan(50° + 20°)

$\tan 70^\circ = \frac{\tan 50^\circ + \tan 20^\circ}{1 - \tan 50^\circ . \tan 20^\circ}$

$\Rightarrow$ tan70° – tan50°.tan20°.tan70° = tan50° + tan20°
$\Rightarrow$ tan70° = tan50° + tan50° + tan20°
= 2tan50° + tan20°

11.(D) $\tan\frac{\pi}{3} = \tan\left(\frac{2\pi}{5} - \frac{\pi}{15}\right)$

$\sqrt{3} = \frac{\tan\frac{2\pi}{5} - \tan\frac{\pi}{15}}{1 + \tan\frac{2\pi}{5}.\tan\frac{\pi}{15}}$

$\Rightarrow \sqrt{3} + \sqrt{3}\tan\frac{2\pi}{5}.\tan\frac{\pi}{15} = \tan\frac{2\pi}{5} - \tan\frac{\pi}{15}$

$\Rightarrow \tan\frac{2\pi}{5} - \tan\frac{\pi}{15} - \sqrt{3}\tan\frac{2\pi}{5}.\tan\frac{\pi}{15} = \sqrt{3}$

12. (B) $\because \cot(A+B) = \frac{\cot A \cot B - 1}{\cot A + \cot B}$

$\Rightarrow \frac{\cot 68^\circ \cot 67^\circ - 1}{\cot 68^\circ + \cot 67^\circ}$
= cot(68° + 67°) = cot(135°) = –1

13. (B)

14. (D) $6 \times \frac{1}{2}\sin 15^\circ - 2\sqrt{3} \times \frac{2}{\sqrt{3}}\sin^3 15^\circ$

$\Rightarrow$ 3sin15° – 4sin³15°

= sin3 × 15° = sin45° = $\frac{1}{\sqrt{2}}$

15.(D) $\frac{2\cos^2\theta}{\sin^2\theta \times \cot^2\theta(1+\tan^2\theta)} - 1$

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

16. (B) $\Rightarrow$ (x + y) in Ist quadrant
$\Rightarrow$ 2x = (x + y) + (x – y)

$\therefore \tan 2x = \frac{\tan(x+y) + \tan(x-y)}{1 - \tan(x+y)\tan(x-y)}$

$\Rightarrow \frac{\frac{4}{3} + \frac{12}{5}}{1 - \frac{4}{3} \times \frac{12}{5}} = \frac{\frac{56}{15}}{\frac{15-48}{15}} = -\frac{56}{33}$

17. (C) $\because$ sin²A – cos²A = sin(A+B)sin(A – B)

$\Rightarrow \sin\left(\frac{\pi}{6} + \frac{\pi}{6}\right) \times \sin\left(\frac{x}{2} + \frac{x}{2}\right)$

$\Rightarrow \sin\frac{\pi}{3} \times \sin x = \frac{\sqrt{3}}{2}\sin x$

Mother's

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

18. (C) $\cos P\cos Q\cos R = \frac{\sqrt{2}-1}{3}$

$\sin P\sin Q\sin R = \frac{\sqrt{2}+1}{3}$

$\therefore \quad \tan P\tan Q\tan R = \frac{\sqrt{2}+1}{\sqrt{2}-1} = 3 + 2\sqrt{2}$

$\because \quad P + Q + R = 180°$

$\tan(P + Q + R) = \tan 180°$

$\Rightarrow \quad \frac{\tan(P+Q)+\tan R}{1-\tan(P+Q)\tan R} = 0$

$\Rightarrow \quad \tan(P + Q) = -\tan R$

$\Rightarrow \quad \frac{\tan P+\tan Q}{1-\tan P\tan Q} = -\tan R$

$\Rightarrow \quad \tan P + \tan Q + \tan R = \tan P\tan Q\tan R$

$= 3 + 2\sqrt{2}$

19. (C) We have $\frac{1}{\sin 10°} + \frac{1}{\sin 50°} - \frac{1}{\sin 70°}$

$= \frac{1}{\cos 80°} + \frac{1}{\cos 40°} - \frac{1}{\cos 20°}$

$= \frac{\cos 40°\cos 20° + \cos 80°\cos 20° - \cos 40°\cos 80°}{\cos 20°.\cos 40°.\cos 80°}$

$= 8[\cos 20°(\cos 40° + \cos 80°)] - \cos 40°\cos 80°]$

$= 8[2\cos 20°\cos 60°\cos 20° - \cos 40°\cos 80°)]$

$= 4[2\cos^2 20° - 2\cos 40°\cos 80°]$

$= 4[1 + \cos 40° - (\cos 120° + \cos 40°)]$

$= 4.\frac{3}{2} = 6$

20. (A)

21.(D) $\cos 15° - \cos 165°$

$\Rightarrow \cos 15° + \cos 15°$

$= 2\cos 15° = 2 \times \frac{\sqrt{3}+1}{2\sqrt{2}} = \frac{\sqrt{3}+1}{\sqrt{2}}$

22.(D) $\frac{1 + 2\tan^2 x - 2\sec x\tan x}{\sec x - \tan x}$

$\Rightarrow \quad \frac{\sec^2 x + \tan^2 x - 2\sec x\tan x}{\sec x - \tan x} = \sec x - \tan x$

23.(D) $\sin(180 - \theta)\sin(90 - \theta) - \left[\frac{\cot(90-\theta)}{1+\tan^2\theta}\right]$

$= \sin\theta\cos\theta - \left[\frac{\tan\theta}{\sec^2\theta}\right] = 0$

24. (B)

25.(B) $\frac{(\sin x + \sin y)(\sin x - \sin y)}{(\cos x + \cos y)(\cos y - \cos x)}$

by putting

$x = 90°; \quad y = 0°$

$\frac{(\sin 90° + \sin 0°)(\sin 90° - \sin 0°)}{(\cos 90° + \cos 0°)(\cos 0° - \cos 90°)} = \frac{1}{1} = 1$

26.(B) $\frac{(\tan 5\theta + \tan 3\theta)}{4 \times \cos 4\theta(\tan 5\theta - \tan 3\theta)}$

$\frac{\frac{\sin 5\theta}{\cos 5\theta} + \frac{\sin 3\theta}{\cos 3\theta}}{4\cos 4\theta\left(\frac{\sin 5\theta}{\cos 5\theta} - \frac{\sin 3\theta}{\cos 3\theta}\right)}$

$= \frac{\sin 5\theta\cos 3\theta + \cos 5\theta\sin 3\theta}{4\cos 4\theta(\sin 5\theta\cos 3\theta - \cos 5\theta\sin 3\theta)}$

$= \frac{\sin 8\theta}{4\cos 4\theta \times \sin 2\theta} = \frac{2\sin 4\theta\cos 4\theta}{4\cos 4\theta\sin 2\theta}$

$= \frac{2 \times 2\sin 2\theta\cos 2\theta}{4\sin 2\theta} = \cos 2\theta$

27. (B)

28.(D) $\sin(B-C)\cos(A-D) + \sin(A-B)\cos(C-D) + \sin(C-A)\cos(B-D)$

Let $A = B = C = D$

$\sin 0°\cos 0° + \sin 0°\cos 0° + \sin 0°\cos 0°$

$0 + 0 + 0 = 0$

29.(B) $\frac{\left[4\cos(90 - A)\sin^3(90 + A)\right] - \left[4\sin(90 + A)\cos^3(90 - A)\right]}{\cos\left(\frac{180 + 8A}{2}\right)}$

$= \frac{4\sin A\cos^3 A - 4\cos A\sin^3 A}{\cos(90 + 4A)}$

$= \frac{4\sin A\cos A(\cos^2 A - \sin^2 A)}{-\sin 4A}$

$= \frac{4\sin A\cos A\cos 2A}{-2\sin 2A\cos 2A}$

$= \frac{4\sin A\cos A}{-4\sin A\cos A} = -1$

30.(B) $\cos\left(\frac{180-\theta}{2}\right)\cos\left(\frac{180-9\theta}{2}\right) + \sin\left(\frac{180-3\theta}{2}\right)\sin\left(\frac{180-13\theta}{2}\right)$

$= \left[\sin\frac{\theta}{2}\sin\frac{9\theta}{2} + \cos\frac{3\theta}{2}\cos\frac{13\theta}{2}\right]$

$= \frac{1}{2}\left[2 \times \sin\frac{\theta}{2}\sin\frac{9\theta}{2} + 2\cos\frac{3\theta}{2}\cos\frac{13\theta}{2}\right]$

$\frac{1}{2}[-\cos 5\theta + \cos 4\theta + \cos 5\theta + \cos 8\theta]$

$\frac{1}{2} \times 2\cos 6\theta\cos 2\theta = \cos 6\theta\cos 2\theta$

Mother's

31.(D) $\dfrac{\sin A+\sin 3A+\sin 5A+\sin 7A}{\cos A+\cos 3A+\cos 5A+\cos 7A}$

$= \dfrac{2\sin 4A.\cos 3A+2\sin 4A.\cos A}{2\cos 4A.\cos 3A+2\cos 4A.\cos A}$

$= \dfrac{2\sin 4A(\cos 3A+\cos A)}{2\cos 4A(\cos 3A+\cos A)} = \tan 4A$

32.(B) $\dfrac{2\sin x.\cos y-2\sin x}{2\cos x.\cos y-2\cos x}\cdot\dfrac{\sin 10x-\sin 8x}{\cos 10x+\cos 8x}$

$\Rightarrow \dfrac{2\sin x.\cos y-2\sin x}{2\cos x.\cos y-2\cos x}\times\dfrac{2\cos 9x.\sin x}{2\cos 9x.\cos x}$

$\Rightarrow \dfrac{2\sin x}{2\cos x}\left(\dfrac{\cos y-1}{\cos y-1}\right)\times \tan x$

$\Rightarrow \tan x.\tan x = \tan^2 x$

33.(B) $[(\tan^2(90-\theta)-\sin^2(90-\theta)]\ \operatorname{cosec}^2(90-\theta)\ \cot^2(90-\theta)$

$= (\cot^2\theta-\cos^2\theta)\ \sec^2\theta\ \tan^2\theta$

$= \cos^2\theta\left(\dfrac{1}{\sin^2\theta}-1\right)\sec^2\theta\ \tan^2\theta$

$= \cos^4\theta\times\dfrac{1}{\sin^2\theta}\times\sec^4\theta\times\sin^2\theta = 1$

34.(B) $\dfrac{(\sin 7x-\sin 5x)}{\cos 7x+\cos 5x}-\dfrac{(\cos 6x-\cos 4x)}{\sin 6x+\sin 4x}$

Try putting $x = 30°$

$\dfrac{\sin 210°-\sin 150°}{\cos 210°-\cos 150°}-\dfrac{\cos 180°-\cos 120°}{\sin 180°-\sin 120°}$

$\dfrac{-\sin 30°-\sin 30°}{-\cos 30°-\cos 30°}-\dfrac{(-1)+\cos 60°}{0+\sin 60°}$

$\dfrac{-\frac{1}{2}-\frac{1}{2}}{-\frac{\sqrt3}{2}-\frac{\sqrt3}{2}}-\dfrac{(-1)+\frac{1}{2}}{\frac{\sqrt3}{2}} \Rightarrow \dfrac{1}{\sqrt3}+\dfrac{1}{\sqrt3}=\dfrac{2}{\sqrt3}$

In option $2\tan x$ at $30° = \dfrac{2}{\sqrt3}$

35.(A) $= \dfrac{\sin 2A}{1+\cos 2A} = \dfrac{2\sin A\cos A}{1+2\cos^2 A-1} = \tan A$

36. (A)

37.(C) $\Rightarrow 1+\tan A\tan\left(\dfrac{A}{2}\right)$

$= 1+\dfrac{2\tan\frac{A}{2}}{1-\tan^2\frac{A}{2}}\times\tan\dfrac{A}{2}$

$= \dfrac{1-\tan^2\frac{A}{2}+2\tan^2\frac{A}{2}}{1-\tan^2\frac{A}{2}}$

$\Rightarrow \dfrac{1+\tan^2\frac{A}{2}}{1-\tan^2\frac{A}{2}} = \sec A$

38. (B)

39.(A) $\sin\theta+\sin 5\theta = \sin 3\theta$

$\sin C+\sin D = 2\sin\left(\dfrac{C+D}{2}\right)\cos\left(\dfrac{C-D}{2}\right)$

$2\sin 3\theta\cos 2\theta = \sin 3\theta$

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

$2\theta = 60°$

$\theta = 30°$

40.(C) $\operatorname{cosec}2A+\cot 2A$

$= \dfrac{1}{\sin 2A}+\dfrac{\cos 2A}{\sin 2A} = \dfrac{1+2\cos^2 A-1}{2\sin A\cos A}$

$= \dfrac{1+2\cos^2 A-1}{2\sin A\cos A} = \dfrac{2\cos^2 A}{2\sin A.\cos A} = \cot A$

41.(A) $\dfrac{1}{\tan\theta} = \dfrac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}$

By C&D $\dfrac{1+\tan\theta}{1-\tan\theta} = \dfrac{\sqrt{1+x^2}}{\sqrt{1-x^2}}$

$\Rightarrow \dfrac{\tan^2\left(\frac{\pi}{4}+\theta\right)}{1} = \dfrac{1+x^2}{1-x^2}$

Again C&D

$\Rightarrow \dfrac{1+\tan^2\left(\frac{\pi}{4}+\theta\right)}{-1+\tan^2\left(\frac{\pi}{4}+\theta\right)} = \dfrac{1}{x^2}$

$\Rightarrow -\cos\left(\dfrac{\pi}{2}+2\theta\right) = x^2$

$\Rightarrow \sin 2\theta = x^2$

42. (B)

43. (C) $\dfrac{\sin 5x+\sin x-2\sin 3x}{\cos 5x-\cos x}$

$= \dfrac{2\sin 3x\cos 2x-2\sin 3x}{-2\sin 3x\sin 2x}$

$= \dfrac{2\sin 3x(\cos 2x-1)}{-2\sin 3x\sin 2x}$

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

$$\Rightarrow \quad \frac{1-2\sin^2 x-1}{-\sin 2x} = \frac{2\sin^2 x}{2\sin x\cos x} = \tan x$$

44. (C) $\dfrac{\cos 4\theta+\cos 2\theta+\cos 3\theta}{\sin 4\theta+\sin 2\theta+\sin 3\theta}$

$$\Rightarrow \quad \frac{2\cos 3\theta\cos\theta+\cos 3\theta}{2\sin 3\theta\cos\theta+\sin 3\theta}$$

$$\Rightarrow \quad \frac{\cos 3\theta(2\cos\theta+1)}{\sin 3\theta(2\cos\theta+1)} = \cot 3\theta$$

45. (D)

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

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

$$= \frac{2\sin\theta(\sin\theta+\cos\theta)}{2\cos\theta(\sin\theta+\cos\theta)} = \tan\theta$$

46. (D) $\dfrac{\cos\frac{3\pi}{4}-\cos\frac{5\pi}{12}}{\sin\frac{17\pi}{12}-\sin\frac{\pi}{4}}$

$$= \frac{-2\sin\frac{7\pi}{12}.\sin\frac{\pi}{6}}{2\cos\frac{5\pi}{12}.\sin\frac{7\pi}{12}} = \frac{-\sin\frac{\pi}{6}}{\cos\frac{5\pi}{12}} = \frac{-\sin 30^\circ}{\cos 150^\circ}$$

$$= \frac{-\frac{1}{2}}{\cos(90^\circ+60^\circ)} = \frac{-\frac{1}{2}}{-\sin 60^\circ} \Rightarrow \frac{-\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}}$$

47. (C) $\because \quad \sin C-\sin D = 2\cos\left(\dfrac{C+D}{2}\right)\sin\left(\dfrac{C-D}{2}\right)$

and $\cos\theta = \dfrac{1-\tan^2\theta}{1+\tan^2\theta}$

$$\frac{\sin x-\sin 3x}{1-\tan^2 x} = \frac{2\cos 2x\sin x}{\cos 2x}$$

$$1+\tan^2 x$$

$$=2\sin x$$

48. (B) $\because \quad \cos 2\theta = \cos^2\theta-1 \quad \text{or} \quad 1-2\sin^2\theta$

$$\Rightarrow \quad 2\cos^2\theta-1 = 1.18$$

$$\Rightarrow \quad \cos^2\theta = \frac{1.18}{2} = 0.09$$

$$\Rightarrow \quad \cos\theta = \sqrt{\frac{9}{100}} = \frac{3}{10}$$

$$\therefore \quad \frac{\sin\theta\left(1+\frac{1}{\cos\theta}\right)}{\sin\theta\left(1-\frac{1}{\cos\theta}\right)}$$

$$\Rightarrow \quad \frac{1+\frac{10}{3}}{1-\frac{10}{3}} = -\frac{13}{7}$$

49. (A) We have, $\sin\theta\cos\theta = 2\cos^3\theta-\dfrac{3}{2}\cos\theta$

$= 2\sin\theta\cos\theta = 4\cos^2\theta-3\cos\theta$

$= \cos\theta \neq 0; \ = 2\sin\theta = 4\cos^2\theta-3$

$\Rightarrow \quad 2\sin\theta = 4-4\sin^2\theta-3$

$\Rightarrow \quad 4\sin^2\theta+2\sin\theta-1 = 0$

$$\therefore \quad \sin\theta = \frac{-2\pm\sqrt{4+16}}{8} = \frac{-2\pm 2\sqrt{5}}{8}$$

$$\Rightarrow \quad \sin\theta = \frac{-1\pm\sqrt{5}}{4}$$

Since, θ is an acute angle,

$\sin\theta > 0$

$$\sin\theta = \frac{\sqrt{5}-1}{4}$$

50. (C)

51. (D) $\Rightarrow x^3+\dfrac{1}{x^3} = (2\cos\theta)^3-3\times 2\cos\theta$

$= 8\cos^3\theta-6\cos\theta$

$= 2(4\cos^3\theta-3\cos\theta)$

$= 2\cos 3\theta$

52.(D)

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

$\cos 90^\circ+\sin 90^\circ$

$= 1$

53. (C) $\dfrac{\tan A}{1-\cot A}+\dfrac{\cot A}{1-\tan A}-\dfrac{2}{\sin 2A}$

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

$$= \frac{\sin^2 A}{\cos A(\sin A-\cos A)}+\frac{\cos^2 A}{\sin A(\cos A-\sin A)}-\frac{2}{\sin 2A}$$

$$= \frac{\sin^2 A}{\cos A(\sin A-\cos A)}-\frac{\cos^2 A}{\sin A(\sin A-\cos A)}-\frac{2}{\sin 2A}$$

$$= \frac{\sin^3 A-\cos^3 A}{\sin A\cos A(\sin A-\cos A)}-\frac{2}{\sin 2A}$$

Mother's

$$= \frac{(\sin A-\cos A)(\sin^2 A+\cos^2 A+\sin A\cos A)}{(\sin A-\cos A)\sin A\cos A} - \frac{2}{2\sin A\cos A}$$

$$= \frac{1+\sin A\cos A}{\sin A\cos A} - \frac{1}{\sin A\cos A}$$

$$= \frac{\sin A\cos A}{\sin A\cos A} = 1$$

54. (A)

55. (B) $\tan 13x = \tan(9x + 4x)$

$$\tan 13x = \frac{\tan 9x+\tan 4x}{1-\tan 9x.\tan 4x}$$

$\Rightarrow$ $\tan 13x - \tan 13x.\tan 9x.\tan 4x = \tan 13x + \tan 4x$

$\Rightarrow$ $\tan 13x - \tan 13x - \tan 4x = \tan 13x.\tan 9x.\tan 4x$

56. (D)

57. (C) $\sin^3\theta + \sin^2\theta + \sin\theta = 1$

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

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

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

$\sin^2\theta(2 - \cos^2\theta)^2 = \cos^4\theta$

$(1 - \cos^4\theta - 4\cos^2\theta - 4\cos^2\theta - \cos^6\theta + 4\cos^6\theta = \cos^4\theta$

$4 - 8\cos^2\theta - \cos^6\theta - 4\cos^4\theta = 0$

$\cos^6\theta - 4\cos^4\theta + 8\cos^2\theta - 4 = 0$

58. (C) $\frac{1}{\cos(\theta+\alpha)} + \frac{1}{\cos(\theta-\alpha)} = \frac{2}{\cos\theta}$

$$\Rightarrow \frac{\cos(\theta-\alpha)+\cos(\theta+\alpha)}{\cos(\theta+\alpha).\cos(\theta-\alpha)} = \frac{2}{\cos\theta}$$

$$\Rightarrow \frac{2\cos\theta.\cos\alpha}{\cos^2\theta - \sin^2\alpha} = \frac{2}{\cos\theta}$$

$\Rightarrow \cos^2\theta.\cos\alpha = \cos^2\theta - \sin^2\alpha$

$\Rightarrow \sin^2\alpha = \cos^2\theta(1 - \cos\alpha)$

$\Rightarrow (1 - \cos\alpha)(1 + \cos\alpha) = \cos^2\theta(1 - \cos\alpha)$

$\Rightarrow \cos^2\theta = (1 + \cos\alpha)$

$\Rightarrow 1 - \sin^2\theta = 1 + \cos\alpha$

$\Rightarrow \sin^2\theta = -\cos\alpha$

59. (B)

60. (B) $\left[\frac{\cos A}{(1-\tan A)} + \frac{\sin A}{(1-\cot A)}\right]^2$

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

$$= \left[\left(\frac{\cos^2 A}{\cos A-\sin A}\right) - \left(\frac{\sin^2 A}{\cos A-\sin A}\right)\right]^2$$

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

$$= \left(\frac{(\cos A-\sin A)(\cos A+\sin A)}{\cos A-\sin A}\right)^2$$

$(\cos A+\sin A)^2$

$= \cos^2 A + \sin^2 A + 2\sin A\cos A$

$= 1 + \sin 2A$

61. (B) $\tan A + 2\tan 2A + 4\tan 4A + \frac{8}{\tan 8A}$

$\Rightarrow \tan A + 2\tan 2a + 4\tan 4a + \frac{8(1-\tan^2 4A)}{2\tan 4A}$

$\Rightarrow \tan A + 2\tan 2A + 4\tan 4A + \frac{4}{\tan 4A} - 4\tan 4A$

$\Rightarrow \tan A + 2\tan 2A + \frac{4(1-\tan^2 2A)}{2\tan 2A}$

$\Rightarrow \tan A + 2\tan 2A + \frac{2}{\tan 2A} - 2\tan 2A$

$\Rightarrow \tan A + \frac{2}{\tan 2A} \Rightarrow \tan A + \frac{2(1-\tan^2 A)}{2\tan A}$

$\Rightarrow \tan A + \frac{1}{\tan A} - \tan A$

$\Rightarrow \frac{1}{\tan A} = \cot A$

62. (B) $\frac{2}{\cot A - \tan A} = \frac{2}{\frac{\cos A}{\sin A} - \frac{\sin A}{\cos A}}$

$$= \frac{2\sin A\cos A}{\cos^2 A - \sin^2 A} = \frac{\sin 2A}{\cos 2A} = \tan 2A$$

63. (B) Put $x = 45°$

$a = \frac{\sqrt{2}}{1+\sqrt{2}} = \frac{c\sqrt{2}}{1+\sqrt{2}} \Rightarrow c = 1$

By this option B and D satisfies

If $x = 0°$

$a = 0$

$o = \frac{c}{1+\sin x}$

Here option B satisfies

64. (A) $\frac{(2\sin A)(1+\sin A)}{(1+\sin A+\cos A)} \times \frac{(1+\sin A-\cos A)}{(1+\text{Sin}A-\cos A)}$

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

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

$= 1 + \sin A - \cos A$

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

65. (A) Given $\frac{3-\tan^2A}{1-3\tan^2A} = k$

$\Rightarrow$ $3 - \tan^2A = k(1 - 3\tan^2A)$

$\Rightarrow$ $3k\tan^2A - \tan^2A = k - 3$

$\Rightarrow$ $\tan^2A(3k - 1) = k - 3$

$\Rightarrow$ $\tan^2A = \frac{k-3}{3k-1}$

$\Rightarrow$ $\tan A = \sqrt{\frac{k-3}{3k-1}} = \frac{\sqrt{k-3}}{\sqrt{3k-1}}$

In right angled ΔABC,

$AC^2 = BC^2 + AB^2$

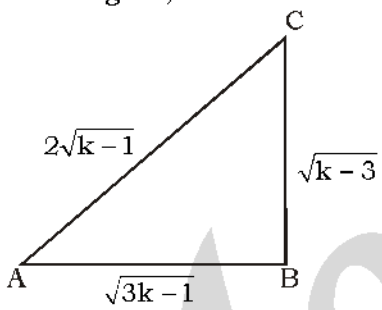
$\Rightarrow$ $AC^2 = \left(\sqrt{k-3}\right)^2 + \left(\sqrt{3k-1}\right)^2$

$\Rightarrow$ $AC^2 = k - 3 + 3k - 1$

$\Rightarrow$ $AC^2 = 4k - 4 \Rightarrow AC^2 = 4(k - 1)$

$\therefore$ $AC = 2\sqrt{k-1}$

From the figure,



$\sin A = \frac{BC}{AC} = \frac{\sqrt{k-3}}{2\sqrt{k-1}}$

Now, $\operatorname{cosec}A(3\sin A - 4\sin^3A)$

$= \operatorname{cosec}A \times \sin A(3 - 4\sin^2A)$

$= \frac{1}{\sin A} \times \sin A(3 - 4\sin^2A)$

$\left[\because \operatorname{cosec}A = \frac{1}{\sin A}\right]$

$= 3 - 4\sin^2A = 3 - 4\left(\frac{\sqrt{k-3}}{2\sqrt{k-1}}\right)^2$

$= 3 - 4\left[\frac{k-3}{4(k-1)}\right] = 3 - \frac{(k-3)}{(k-1)}$

$= \frac{3(k-1)-(k-3)}{k-1} = \frac{3k-3-k+3}{k-1}$

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

66. (D) $(\sin x\cos y + \cos x\sin y)(\sin x\cos y - \cos x\sin y)$

$= \sin(x + y).\sin(x - y)$

$= \sin^2x - \sin^2y$

$[\because \sin^2A - \sin^2B = \sin(A + B)\sin(A - B)]$

67.(B) $\operatorname{cosec}\theta - \sin\theta = m$

$\sec\theta - \cos\theta = n$

$\theta = 45 \quad m = \frac{1}{\sqrt{2}}, n = \frac{1}{\sqrt{2}}$

$m = n$

$m^{2/3} n^{2/3} [m^{2/3} + n^{2/3}]$

$m^{4/3} 2m^{2/3}$

$2m^2$

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

68. (A)

69.(C) Given, $\sin A + \cos A = p$ ..... (i)

$\sin^3A + \cos^3A = q$ ..... (ii)

Squaring eq. (i), we get

$(\sin A + \cos A)^2 = p^2$

$\Rightarrow$ $\sin^2A + \cos^2A + 2\sin A\cos A = p^2$

or $2\sin A\cos A = p^2 - 1$

$[\because \sin^2A + \cos^2A = 1]$

$\Rightarrow$ $\sin A\cos A = \frac{p^2-1}{2}$ ..... (iii)

Now, cubing both sides of Eq. (i), we get

$(\sin A + \cos A)^3 = p^3$

$\sin^3A + \cos^3A + 3\sin A\cos A(\sin A + \cos A) = p^3$

$[\because (a + b)^3 = a^3 + b^3 + 3ab(a + b)]$

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

$\Rightarrow$ $2q + 3p^3 - 3p = 2p^3$

$\Rightarrow$ $p^3 - 3p + 2q = 0$

Hence, option (C) is correct.

70.(A) We have,

$\cos\theta_1 + \cos\theta_2 + \cos\theta_3 = 3$ .....(i)

Since $0 \le \cos\theta \le 1$

$\therefore$ From Eqs. (i) to be true

$\cos\theta_1 = \cos\theta_2 = \cos\theta_3 = 1$

$\therefore$ $\theta_1 = \theta_2 = \theta_3 = 2n\pi$

Now, $\sin\theta_1 + \sin\theta_2 + \sin\theta_3$

$= \sin 2n\pi + \sin 2n\pi + \sin 2n\pi$

$= 0 + 0 + 0$ $[\because \sin 2n\pi = 0]$

$= 0$

71. (A) $\frac{p}{q} = 1 + \frac{a}{b}\tan\theta$ ..... (i)

$\frac{p}{q}\tan\theta = 1 - \frac{a}{b}$ ..... (ii)

From (i) and (ii)

$\Rightarrow$ $\left(1 + \frac{a}{b}\tan\theta\right)\tan\theta = 1 - \frac{a}{b}$

$\Rightarrow$ $\tan\theta + \frac{a}{b}\tan^2\theta = 1 - \frac{a}{b}$

$\Rightarrow \frac{a}{b}(1+\tan^2\theta) = 1-\tan\theta \quad \Rightarrow \frac{a}{b} = \frac{1-\tan\theta}{\sec^2\theta}$

Similarly

$\Rightarrow \frac{p}{q} - \left(1-\frac{p}{q}\tan\theta\right)\tan\theta = 1$

$\Rightarrow \frac{p}{q} - \tan\theta + \frac{p}{q}\tan^2\theta = 1$

$\Rightarrow \frac{p}{q} = \frac{1+\tan\theta}{\sec^2\theta}$

$\because \frac{p^2}{q^2} + \frac{a^2}{b^2} = \frac{p^2b^2+a^2q^2}{b^2q^2}$

$\therefore \frac{(1-\tan\theta)^2}{\sec^4\theta} + \frac{(1+\tan\theta)^2}{\sec^4\theta}$

$\because (a-b)^2 + (a+b)^2 = 2(a^2+b^2)$

$\therefore \frac{2(1+\tan^2\theta)}{\sec^4\theta} = \frac{2\sec^2\theta}{\sec^4\theta}$

$\therefore \frac{2}{\sec^2\theta} = 2\cos^2\theta$

72.(B) We have $\cot\theta(1+\sin\theta) = 4m$ ..... (i)

$\cot\theta(1-\sin\theta) = 4n$ .....(ii)

$16mn = \cot^2\theta(1-\sin^2\theta)$

$16mn = \cot^2\theta\cos^2\theta$ .....(iii)

Now, add eqs. (i) and (ii), we get

$\cot\theta = 2(m+n)$

Subtracting eqs. (ii) from (i), we get

$\cot\theta\sin\theta = 2(m-n)$

$\Rightarrow \cos\theta = 2(m-n)$

Putting the value of $\cot\theta$ and $\cos\theta$ in eq. (iii), we get

$16mn = (2^2(m-n)^2)(2^2(m+n)^2)$

$= 16(m^2-n^2)^2$

$\Rightarrow mn = (m^2-n^2)^2$

73. (A) $\because \sin(A+B) = 1$

$\Rightarrow (A+B) = 90°$

$\therefore B = 90° - A$

$\Rightarrow A = 90° - B$

Now, $\cos(A-B) = \cos A\cos B + \sin A\sin B$

$= \cos(90°-B)\cos B + \sin(90°-B)\sin B$

$= \sin B\cos B + \cos B\sin B$

$= 2\sin B\cos B = \sin 2B$

74.(A) $\frac{\sin A+\cos A}{\sin A-\cos A} + \frac{\sin A-\cos A}{\sin A+\cos A}$

$\Rightarrow \frac{(\sin A+\cos A)^2 + (\sin A-\cos A)^2}{\sin^2 A - \cos^2 A}$

$\Rightarrow \frac{2(\sin^2 A+\cos^2 A)}{\sin^2 A - (1-\sin^2 A)} = \frac{2}{2\sin^2 A - 1}$

75. (A)

76. (A)

77. (D)

78. (D) $\tan(P+Q) = 4\tan(P)$

$\Rightarrow \frac{\tan(P+Q)}{\tan P} = \frac{4}{1}$

$\Rightarrow \frac{\sin(P+Q).\cos P}{\cos(P+Q).\sin P} = \frac{4}{1}$

C & D

$\Rightarrow \frac{\sin(P+Q).\cos P + \cos(P+Q).\sin P}{\sin(P+Q).\cos P - \cos(P+Q).\sin P} = \frac{4+1}{4-1}$

$\because \sin A.\cos B + \cos A.\sin B = \sin(A+B)$

and $\sin A.\cos B - \cos A.\sin B = \sin(A-B)$

So, $\frac{\sin(P+Q+P)}{\sin(P+Q-P)} = \frac{\sin(2P+Q)}{\sin Q}$

$\Rightarrow \frac{5}{2} = 2\frac{1}{2}$

79. (C) $\frac{\sin 3\theta\cos\theta - \cos 3\theta\sin\theta}{\sin\theta\cos\theta}$

$= [\sin A.\cos B - \cos A\sin B = \sin(A-B)]$

$\Rightarrow \frac{\sin(3\theta-\theta)}{\sin\theta\cos\theta} \quad \Rightarrow \frac{\sin 2\theta}{\sin\theta\cos\theta}$

$\Rightarrow [\sin 2\theta = 2\sin\theta\cos\theta]$

$\Rightarrow \frac{2\sin\theta.\cos\theta}{\sin\theta.\cos\theta} = 2$

80. (B) $\frac{\cos 3\theta + \cos 7\theta + 2\cos 5\theta}{\cos\theta + \cos 5\theta + 2\cos 3\theta} + \sin 2\theta.\tan 3\theta$

$\Rightarrow \frac{2\cos 2\theta.\cos 5\theta + 2\cos 5\theta}{2\cos 2\theta.\cos 3\theta + 2\cos 3\theta} + \sin 2\theta.\tan 3\theta$

$[\because \cos(A+B) + \cos(A-B) = 2.\cos A.\cos B]$

$\Rightarrow \frac{2\cos 5\theta(\cos 2\theta+1)}{2\cos 3\theta(\cos 2\theta+1)} + \frac{\sin 2\theta.\sin 3\theta}{\cos 3\theta}$

$\Rightarrow \frac{\cos 5\theta}{\cos 3\theta} + \frac{\sin 2\theta.\cos 3\theta}{\cos 3\theta}$

$\Rightarrow \frac{\cos(2\theta+3\theta) + \sin 2\theta.\sin 3\theta}{\cos 3\theta}$

$\Rightarrow \frac{\cos 2\theta.\cos 3\theta - \sin 2\theta.\sin 3\theta + \sin 2\theta.\sin 3\theta}{\cos 3\theta}$

$\Rightarrow \frac{\cos 2\theta.\cos 3\theta}{\cos 3\theta} = \cos 2\theta$

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

Trigonometry

Part-VI

Part-VI
Exercise / अभ्यास प्रश्न

1. What is the value of 189° in radian?
189° का मान रेडियन में कितना होगा ?

(A) $\left(\frac{21\pi}{20}\right)^c$ (B) $\left(\frac{7\pi}{9}\right)^c$ (C) $\left(\frac{6\pi}{9}\right)^c$ (D) $\left(\frac{5\pi}{9}\right)^c$

2. Find the degree angle of $\left(\frac{11}{16}\right)^c$ is :

$\left(\frac{11}{16}\right)^c$ का डिग्री माप बताओ $\left(\pi = \frac{22}{7}\right)$

(A) 39°22'30" (B) 39°20'15"
(C) 39°45'47" (D) 39°11'23"

3. If the tip of the pendullum oscillates and makes an are of 50 cm and 60° of angle. Then find the length of the pendulum.
यदि एक पेण्डूलम/लोलक का अग्र भाग दोलन करता है। तथा 50 सेमी. चाप पर 60° का कोण बनाता है। तो पेण्डुलम की लम्बाई है ?

(A) $47\frac{9}{11}$ (B) $47\frac{8}{11}$ (C) $45\frac{8}{11}$ (D) $46\frac{8}{11}$

4. Earth takes 24 hours to rotate on its axis. Find out the angle at which it rotates after 4 hours and 12 minutes.
स्वयं अपने अक्ष के चारों ओर घूमने में पृथ्वी को 24 घंटे लगते हैं। 4 घंटे 12 मिनट में यह किस कोण से घूमेगी।

(A) 63° (B) 64°
(C) 65° (D) 70°

5. An arc AB of a circle Subtands an angle x^c at the centre O of the circle. Given that the area of the sector AOB is equal to the square of the length of the arc AB. find the value of x.
एक वृत्त का चाप AB वृत्त के केन्द्र O पर x^c का कोण बनाता हैं, त्रिज्याखण्ड AOB का क्षेत्रफल चाप AB के लम्बाई के वर्ग के बराबर है तो x का मान ज्ञात करें।

(A) $\left(\frac{1}{2}\right)^c$ (B) $\left(\frac{3}{2}\right)^c$ (C) $\left(\frac{4}{3}\right)^c$ (D) None

6. Two arcs of two different circles are the equal length. If these arcs subtend angle 45° and 60° at the centre of the circle find the ratio of the radii of the two cricles.
दो भिन्न वृत्तों के चाप समान हैं। अगर चाप वृत्त के केन्द्र पर क्रमशः 45° तथा 60° के कोण बनाते हैं तो दो दोनों वृत्तों की त्रिज्याओं का मान ज्ञात करो।

(A) 4 : 3 (B) 5 : 4
(C) 6 : 7 (D) None

7. Find the angle in degree throught which a pendulam swings if its length is 105 cm and the tip describes arc of length 66 cm.
105 cm लम्बाई वाले एक दोलायमान दोलक का एक सिरे से दूसरे सिरे तक दोलन करने में जो कोण बनता है उसका माप डिग्री में ज्ञात कीजिए, जबकि उसके नोक द्वारा बनाए गए चाप की लम्बाई 66 cm है।

(A) 30° (B) 60°
(C) 72° (D) 36°

8. The perimeter of a cirtain sector of a circle is equal to the length of the arc of the semicircle having the same radius. The angle of the sector is ?
एक त्रिज्या खण्ड की परिधि समान त्रिज्या वाले अर्द्धवृत्त की चाप की लम्बाई के बराबर हैं तो त्रिज्याखण्ड द्वारा बनाये गये कोण का मान ज्ञात करो।

(A) $\left(\frac{700}{11}\right)^\circ$ (B) $\left(\frac{720}{11}\right)^\circ$ (C) $\left(\frac{6}{7}\right)^\circ$ (D) None

9. The diameter of moon makes an angle of $\left(\frac{1}{2}\right)^\circ$ on the eye of the observer. At what distance from the eye of observer a coin of 1 cm. diameter should be placed, that the coin should cover the moon completely. $\left(\pi = \frac{22}{7}\right)$

Mother's

माना कि चाँद का व्यास एक प्रेक्षक के आँख पर $\left(\frac{1}{2}\right)^{\circ}$ का कोण बनाता है। प्रेक्षक की आँख से कितनी दूरी पर 1 सेमी. व्यास वाला एक सिक्का रखा जाये ताकि सिक्का चाँद को पूरी तरह ढँक लें। मान लीजिए -

(A) $112\frac{5}{11}$ सेमी. (B) $110\frac{6}{11}$ सेमी.

(C) $116\frac{5}{11}$ सेमी. (D) $114\frac{6}{11}$ सेमी.

10. If the sum difference of two angles are $\left(\frac{22}{9}\right)^{C}$ and 36° and If we take π as $\frac{22}{7}$, then from two angles find out the smaller angle ?

यदि दो कोणों का योग और अंतर क्रमशः $\left(\frac{22}{9}\right)^{C}$ और 36° है। और यदि π का मान $\frac{22}{7}$ लें तो अपेक्षाकृत लघु कोण का माप डिग्री में है ?

(A) 88° (B) 52°

(C) 44° (D) कोई नहीं

11. A circle is drawn on AB as diameter. The centre of the circle is O and the length AB = 10 cm. P is a point on the circumference of the circle such that the chord AP = 5 cm. calculate the value of the angle PBA in radians.

एक AB व्यास का वृत्त बनाया गया हैं। O वृत्त का केन्द्र हैं। AB = 10 सेमी हैं। P वृत्त की परिधि पर एक ऐसा बिन्दु हैं कि AP = 5 सेमी तो कोण PBA का मान रेडियन में ज्ञात करें।

(A) $\left(\frac{\pi}{6}\right)^{C}$ (B) $\left(\frac{\pi}{2}\right)^{C}$ (C) $\left(\frac{\pi}{4}\right)^{C}$ (D) None

12. The value of two angles of triangle are 1/2 radian and 1/3 radian. then the value of third angle degree is—

एक त्रिभुज के दो कोण 1/2 रेडियन तथा 1/3 रेडियन हैं। तदनुसार तीसरे कोण का मान कितने अंश होगा ($\pi = 22/7$ लेने पर)

(A) $132\frac{1}{11}^{o}$ (B) $132\frac{2}{11}^{o}$

(C) $132\frac{3}{11}^{o}$ (D) 132°

13. In ΔABC, ∠ABC = 75° and ∠ACB = $\frac{5\cancel{5}}{7\cancel{2}}$, then ∠BAC is (in radian) —

त्रिभुज ABC में, ∠ABC = 75° तथा ∠ACB = $\frac{\pi^{c}}{4}$, ∠BAC का वृत्तीय माप होगा :

(A) $\frac{5\pi}{12}$ रेडियन (B) $\frac{\pi}{3}$ रेडियन

(C) $\frac{\pi}{24}$ रेडियन (D) $\frac{5\pi}{24}$ रेडियन

14. If angular measurement of moon is 30' then how far the coin of 4.4 cm. diameter be kept. from the eye so that it will cover the whole moon—

यदि चंद्रमा का कोणीय व्यास 30' हो, तो आँख से कितनी दूरी पर 4.4 cm व्यास का एक सिक्का रखा जाए तो चंद्रा को पूरा ढक लें :

(A) 252 cm (B) 504 cm

(C) 300 cm (D) 500 cm

15. 1 radian is equal to —

1 रेडियन बराबर होता है :

(A) 100 (B) $\left(\frac{\pi}{180}\right)^{0}$ (C) $\left(\frac{180}{\pi}\right)^{0}$ (D) 90

16. The wheel takes how many second to rotate in 55 radians?

एक पहिया 1 सेकण्ड में 3.5 बार घूर्णन करता है। पहिया कोण के 55 रेडियन घूर्णन करने में कितना समय लेता है।

(A) 1.5 सेकण्ड (B) 2.5 सेकण्ड

(C) 3.5 सेकण्ड (D) 4.5 सेकण्ड

17. If two angle of triangle are 40°40'40" and 15° 10' 15" then its third angle is—

यदि किसी त्रिभुज के दो कोण 40° 40' 40" और 15° 10' 15" है तो तीसरा कोण होगा ?

(A) 124° 9' 5" (B) 124° 8' 55"

(C) 57° 16' 22" (D) 125° 18' 5"

18. The curve of a railway track is alike a circle. If after moving 40 m, the chage in angle is 25° then find the radius of circle?

एक रेलमार्ग का वक्र, एक वृत्त के अनुसार बनाना है। तदनुसार, यदि उस,मार्ग की ओर 40 मीटर दूरी में मार्ग की दिशा में 25° का परिवर्तन करना हो, तो उस वृत्त की त्रिज्या कितनी रखनी होगी ?

(A) 91.64 मीटर (B) 90.46 मीटर

(C) 89.64 मीटर (D) 93.64 मीटर

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

19. When each angle of a triangle was reduced by 15° then their ratio become 2 : 3 : 5 then find the biggest angle in radian :
एक त्रिभुज के प्रत्येक कोण को 15° कम करने से, उसके कोणों का अनुपात 2 : 3 : 5 हो जाता है तो सबसे बड़े कोण का रेडियन में मान ज्ञात कीजिये :

(A) $\frac{11\pi}{24}$ (B) $\frac{\pi}{12}$ (C) $\frac{\pi}{24}$ (D) $\frac{5\pi}{24}$

20. The length of minute hand is 35 cm. then length of arc made by it in 18 seconds—
(take $\pi = 22/7$)
एक दीवार घड़ी की मिनट की सुई 35 cm लम्बी है इसके सिरे द्वारा 18 सेकेण्ड में चले गए चाप की लंबाई ज्ञात कीजिये ? ($\pi = 22/7$ लेने पर)

(A) 11 cm (B) 1.1 cm
(C) 6.6 cm (D) 6 cm

21. A circular wire of radius 7.5 cm is cut in such a way that it get adjusted on circumference of keyring of radius 120 cm. What is the value of angle (in degree) made by wire at the centre of keyring?
7.5 cm त्रिज्या वाले वृत्ताकार तार को काट कर इस प्रकार मोड़ा जाता है कि यह 120 cm त्रिज्या वाले छल्ले के परिधि के साथ ठीक-ठीक बैठ जाता है। तार द्वारा छल्ले के केन्द्र पर अंतरित कोण का अंश मान होगा।

(A) 22° (B) 22°30'
(C) 32° (D) 32° 30'

22. If in two circles, arcs of the same length subtend angles 16° and 72° at the centre. Find the ratio of their biggest chords.
यदि दो वृत्तों में समान लम्बाई की चाप केंद्र पर 16° और 72° के कोण अंतरित करती है तो उनकी सबसे बड़ी जीवाओं का अनुपात ज्ञात कीजिए-

(A) 5 : 4 (B) 7 : 2
(C) 9 : 2 (D) 11 : 4

23. If an angle measures p degrees and q radians, then which one of the following is correct ?
यदि कोण का मान p डिग्री और q रेडियन है निम्न में से कौन-सा सम्बन्ध सही हैं।

(A) $\pi p = 90q$ (B) $\pi p = 360q$
(C) $\pi p = 180q$ (D) $\pi q = 180p$

24. If angular measurement of moon is 30' then how far the coin of 4.4 cm. diameter be kept. from the eye so that it will cover the whole moon—
यदि चंद्रमा का कोणीय व्यास 30' हो, तो आँख से कितनी दूरी पर 4.4 cm व्यास का एक सिक्का रखा जाए तो चंद्रा को पूरा ढक लें:

(A) 252 cm (B) 504 cm
(C) 300 cm (D) 500 cm

25. Assume the Earth to be a sphere of radius R. What is the radius of the circle of latitude 40°South ?
माना पृथ्वी R त्रिज्या का एक गोला हैं 40 डिग्री दक्षिणी अक्षांश पर वृत्त की त्रिज्या क्या होगी ?

(A) R cos 40° (B) R sin 80°
(C) R sin 40° (D) R tan 40°

26. The minute hand of a clock is 15 cm long. The distance moved by the tip of the hand in 35 minute is.
एक घड़ी में मिनट की सुई की लम्बाई 15 सेमी हैं उस सुई के किनारे द्वारा 35 मिनट में तय की गई दूरी ज्ञात करो।

(A) 35π (B) $\frac{35\pi}{2}$ (C) $\frac{5\pi}{4}$ (D) $\frac{5\pi}{2}$

27. The angles of a triangle are is A.P., and the number of degrees in the least angle is to the number of degrees in the mean angle as 1 : 120. Find the angle is radians.
एक त्रिभुज के कोण समान्तर श्रेणी में है और न्यूनतम कोण में डिग्री की संख्या मध्य कोण में डिग्री संख्या का अनुपात 1:120 हो तो सबसे बड़े कोण का रेडियन मान ज्ञात करो ।

(A) $\frac{239\pi}{360}$ (B) $\frac{260\pi}{270}$ (C) $\frac{265\pi}{270}$ (D) $\frac{265\pi}{360}$

28. The arc of a 22 cm length of a circle, whose radius is 100 cm, will make an angle of how many degree of measurement at the centre of circle. use $\left(\pi = \frac{22}{7}\right)$
एक वृत्त जिसकी त्रिज्या 100 सेमी. है, 22 सेमी. लम्बाई की चाप बनाता है, तो बताइए केंद्र पर कितने डिग्री माप का कोण बनाएगा ?

(A) 12°24' (B) 10°45'
(C) 12°36' (D) 12°39'

29. In a circle of diameter 22 cm., the length of a semichord is 5.5 cm. Find the length of minor arc of the chord.
22 सेमी. व्यास वाले एक वृत्त में एक अर्द्धजीवा की लम्बाई 5.5 सेमी. है। जीवा के द्वारा अंतरित लघु चाप की लम्बाई ज्ञात कीजिए-

(A) $\frac{20\pi}{3}$ (B) $\frac{22\pi}{3}$ (C) $\frac{11\pi}{3}$ (D) None

30. If $\tan\frac{19\pi}{3} = A$ and $\sin\left(-\frac{11\pi}{3}\right) = B$ then the value of $B^2 - A$ is :
यदि $\tan\frac{19\pi}{3} = A$ और $\sin\left(-\frac{11\pi}{3}\right) = B$ है, तो $B^2 - A$ का मान ज्ञात करें-

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

Solution

1. (A) $189^\circ \times \frac{\pi}{180^\circ} = \left(\frac{21\pi}{20}\right)^c$

2. (A) $\left(\frac{11}{16} \times \frac{180}{22} \times 7\right)^\circ = \left(\frac{45 \times 7}{8}\right)^\circ$

$= 39^\circ + \left(\frac{3}{8} \times 60\right)^\circ$

$= 39^\circ + 22' + \left(\frac{1}{2} \times 60\right)''$

$= 39^\circ 22' 30''$

3. (B) $r = \frac{l}{\theta}$

$r = \frac{50}{60} \times \frac{180}{22} \times 7$

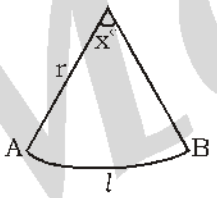
$r = 47\frac{8}{11}$

4. (A) $24h = 360$

$1h = 15^\circ$

$4h \cdot 12m = 60 + 3 = 63$

5. (A) Area of sector = $\frac{\pi r^2 x^c}{360^\circ} = l^2$



$\frac{\pi r^2 x^c}{360} = (x^c)^2 \times r^2 \Rightarrow (x^c) = \left(\frac{1}{2}\right)^c$

6. (A) Given

$l_1 = \theta_1 r_1$

$l_2 = \theta_2 r_2$

$l_1 = l_2$

$\theta_1 l_1 = \theta_2 r_2$

$45^\circ r_1 = 60^\circ r_2$

$\frac{r_1}{r_2} = \frac{4}{3}$

$= 4 : 3$

7. (D) $\because \theta = \frac{l}{r}$ radian

$\theta = \frac{66\,cm}{105\,cm} = \frac{22}{35}$ radian

$= \frac{22}{35} \times \frac{180}{22} \times 7 = \frac{180}{5} = 36^\circ$

8. (B) Perimeter of circle is = $2r + \theta r$

lenth of the semicircle = πr

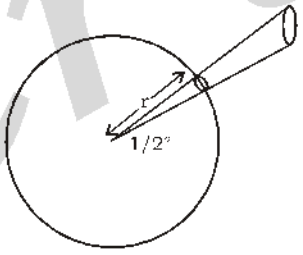
$2r + \theta r = \pi r$

$\theta + 2 = \pi$

$\theta^\circ = \frac{22}{7} - 2 = \left(\frac{8}{7}\right)^\circ$

$\theta^\circ = \frac{8}{7} \times \frac{180}{22} \times 7 = \left(\frac{720}{11}\right)^\circ$

9. (D) $\frac{1}{2} \times \frac{\pi}{180^\circ} = \frac{l}{r}$



$r = \frac{360}{\pi} \times 7$

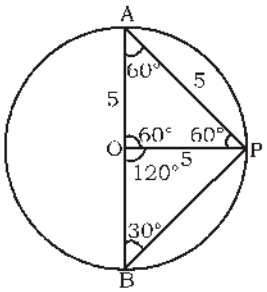
$r = 114\frac{6}{11}$ cm

10.(B) $x + y = \frac{22}{9} \times \frac{180}{22} \times 7 = 140^\circ$

$x - y = 36^\circ$

$y = 36^\circ$

11.(A)



$PBA = 30^\circ = \left(\frac{\pi}{6}\right)^c$

12.(C) $\frac{22}{7} - \frac{1}{2} - \frac{1}{3} = \frac{97}{42}$

Now

Mother's

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

$$\frac{97\times7\times180^\circ}{42\times22}=\left(132\frac{3}{11}\right)^\circ$$

13.(B) $\angle ABC = 75^\circ$

$$\angle ABC = \frac{\pi}{4}^c = 45^\circ$$

$$\angle BAC = 180 - 75 - 45 = 60^\circ = \left(\frac{\pi}{3}\right)^c \text{ रेडियन}$$

14. (B) $30' = \frac{30}{60}^\circ = \left(\frac{1}{2}\right)^\circ$

$$= \frac{4.4\times2\times7\times180}{1\times22}$$

$= 504$ cm

15. (C)

16. (B) 1 sec. = 3.5

3.5 round = $2\pi\times3.5$

$$= 7\pi = 7\times\frac{22}{7}$$

$$\text{total angle} = \frac{55}{7\times22}\times7 = 2.5 \text{ sec.}$$

17.(C) I $\Rightarrow 40^\circ\ 40'\ 40''$

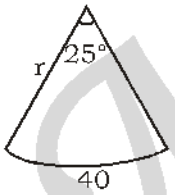
II $\Rightarrow \underline{15^\circ\ 10'\ 15''}$

$55^\circ\ 50'\ 55''$

$180^\circ = 179^\circ\ 59'\ 60'' - 55^\circ\ 50'\ 55''$

$= 124^\circ\ 9'\ 5''$

18.(A)



$$\theta = \frac{l}{r}$$

$$r = \frac{l}{\theta} = \frac{40\times180\times7}{25\times22} = 91.64\text{m}$$

19.(A) $15^\circ\times3 = 45^\circ$

$= 180^\circ - 45 = 135^\circ$

$x = 13.5^\circ$

$5x = 13.5\times5 = 67.5^\circ + 15^\circ = 82.5^\circ = \frac{\pi}{180} = \frac{11\pi}{24}$

20.(B) 1 sec = 6°

$$\text{then 18 sec} = \frac{108^\circ}{60^\circ}$$

$l = r\theta$

$$l = \frac{35\times108\times22}{7\times180\times60} = \frac{66}{60} = 1.1 \text{ m}$$

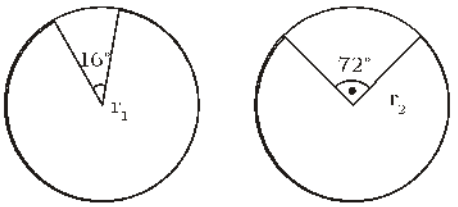
21.(B) $l = 2\pi\times7.5$

$l = 15\pi$

$r = 120$

$$\theta = \frac{l}{r} = \frac{15\pi}{120}\times\frac{180}{\pi} = \frac{45}{2} = 22^\circ30'$$

22. (C)



First circle $\Rightarrow \theta = \frac{l}{r}$ radian

$$\Rightarrow 16^\circ = \frac{l}{r_1} \quad \text{..... (i)}$$

Second circle $\Rightarrow 72^\circ = \frac{l}{r_2}$ ..... (ii)

$\because$ arc length is same

$\therefore 16^\circ\times r_1 = 72^\circ\times r_2$

$$\Rightarrow \frac{r_1}{r_2} = \frac{72^\circ}{16^\circ} = \frac{9}{2}$$

$\because$ Biggest chord as known, diameter of circle.

$$\therefore \frac{2r_1}{2r_2} = \frac{D_1}{D_2} = \frac{9}{2}$$

23.(C) Given that, $p^\circ = q^c$

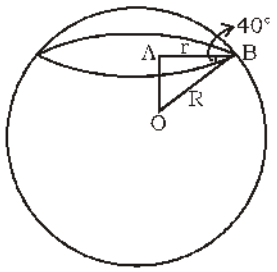
$$\Rightarrow \left(p\cdot\frac{\pi}{180}\right)^\circ = q^\circ \quad [\because 180^\circ = \pi^c]$$

$\Rightarrow (p\pi)^\circ = (q180)^\circ$

$\therefore \pi p = 180q$

24.(*)

25.(A) In ΔOAB



$$\cos 40^\circ = \frac{AB}{OB} \Rightarrow \cos40^\circ = \frac{r}{R}$$

$\Rightarrow r = R\cos40^\circ$

So, the radius of the circle of latitude 40°S is $R\cos40^\circ$.

26.(B) In hand $\Rightarrow 6^\circ$ min

$35\times6 = 210^\circ \quad \pi = 180^\circ$

$l = r\theta \qquad \frac{\pi}{180} = 1^\circ$

Mother's

$$l = r \times \frac{\pi}{180} \times 210$$

$$l = 15 \times \frac{\pi}{180} \times 210$$

$$l = \frac{35\pi}{2}$$

27.(A) Let the angles of the triangle be $(a - d)°$, $a°$ and $(a + d)°$.

We know that the sum of the angles of a triangles of a triangle is 180°.

$a - d + a + a + d = 180°$

$3a = 180°$

$a = 60°$

Given

$$\frac{\text{Number of degrees in the least angle}}{\text{Number of degrees in the mean angle}} = \frac{1}{120}$$

$$\frac{(a-d)}{a} = \frac{1}{120}$$

$$\frac{(60-d)}{60} = \frac{1}{120}$$

$120 - 2d = 1$

$2d = 119$

$d = 59.5$

∴ The angle are :

$(a + d)° = 60° + 59.5° = 119.5°$

Angles of triangle in radians

$$\left(\frac{0.5 \times x}{180}\right)\text{rad} = \frac{\pi}{360}$$

$$\left(\frac{60 \times x}{180}\right)\text{rad} = \frac{\pi}{3}$$

$$\left(\frac{119.5 \times \pi}{180}\right)\text{rad} = \frac{239\pi}{360}$$

28. (C) $\because \theta = \frac{l}{r}$ radian

$l = 22$ cm, $r = 100$ cm

$$\therefore \theta = \frac{22}{100} = \left(\frac{11}{50}\right)^c$$

$$= \left(\frac{11}{50} \times \frac{180}{22} \times 7\right)^\circ$$

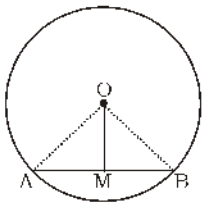
$$= \left(\frac{11 \times 18 \times 7}{5 \times 22}\right)^\circ$$

$$= 12 + \frac{3}{5} \times 60'$$

$$= 12°36'$$

29. (C) $\because$ r = 11 cm,

and semichord AM = MB = 5.5 cm



$\Rightarrow$ AB = 11

$\therefore$ ΔAOB is equiliteral triangle.

$$\Rightarrow \theta = \frac{l}{r}\text{radian}$$

$$\Rightarrow 60° \times \frac{\pi}{180°} = \frac{l}{11}$$

$$\Rightarrow l = \frac{11\pi}{3}\text{ cm}$$

30. (A) $\tan\frac{19\pi}{3} = \tan\left(6\pi + \frac{\pi}{3}\right) = \tan\left(2\pi \times 3 + \frac{\pi}{3}\right)$

$$= \tan\frac{\pi}{3} = \sqrt{3}$$

$$\therefore A = \sqrt{3}$$

$$\Rightarrow \sin\left(-\frac{11\pi}{3}\right) = B$$

$$\Rightarrow -\sin\left(\frac{11\pi}{3}\right) = -\sin\left(4\pi - \frac{\pi}{3}\right)$$

$$\Rightarrow -\sin\left(-\sin\frac{\pi}{3}\right) \qquad \therefore B = \frac{\sqrt{3}}{2}$$

$$\Rightarrow B^2 - A = \left(\frac{\sqrt{3}}{2}\right)^2 - (\sqrt{3})$$

$$\Rightarrow = \frac{3}{4} - (\sqrt{3}) \qquad \Rightarrow \frac{3 - 4\sqrt{3}}{4}$$

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

Trigonometry
Height and Distance

Part-VII

Part-VII
Exercise / अभ्यास प्रश्न

1. 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 mm) between the two points (correct to one decimal place)?

$25\sqrt{3}$ मी. ऊँचे एक टॉवर का शीर्ष का, इसके दोनों ओर समतल मैदान पर स्थित दो बिन्दुओं से उन्नयन कोण 45° एवं 60° है। दोनों बिन्दुओं के बीच की दूरी कितनी है ?

(A) 45.3 m (B) 58.4 m
(C) 68.3 m (D) 50.6 m

2. 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?

दो समान ऊँचाई के खंभे A व B एक 40 मी. चौड़ी सड़क के दोनों ओर खड़े हैं। सड़क के किसी बिन्दु से उसके शीर्ष के उन्नयन कोण क्रमशः 30° और 45° हैं। A खंभे से उस बिन्दु की दूरी क्या होगी ?

(A) $40\left(\sqrt{3}-1\right)$ m (B) $20\left(2-\sqrt{3}\right)$ m

(C) $20\left(3-\sqrt{3}\right)$ m (D) $39\sqrt{3}$ m

3. 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।

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

4. Asha and Suman'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।

(A) 16 (B) 7
(C) 25 (D) 24

5. 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 क्रमशः 30° और 45° हैं। A और B की ऊँचाई का अनुपात ज्ञात करें।

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

6. The angles of elevation of the top of a tower from two points on the ground at distance 52 m and 13 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 52 मी. और 13 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) 26 (B) 20
(C) 28 (D) 16

7. 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 क्रमशः 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) $600\sqrt{3}$

Mothers

8. A pole on the ground leans at 60° with the vertical. At a point x metre away from the base of the pole on the ground, two halves of the pole subtend the same angle. If the pole and the point are in the same vertical plane, then what is the length of the pole ?
जमीन पर एक खंभा ऊर्ध्वाधर रेखा के साथ 60° के कोण पर झुका हुआ है। जमीन पर खंभे के आधार से x मीटर की दूरी पर स्थित एक बिन्दु पर खंभे के दो हिस्से आधे समान कोण अंतरित (सबटेंड) करते हैं। यदि खंभा और बिन्दु दोनों एक ही ऊर्ध्वाधर समतल में हैं, तो खंभे की लम्बाई क्या है ? **(CDS-2021)**

(A) $\sqrt{2}$ x metre/ मीटर (B) $\sqrt{3}$ x metre/ मीटर
(C) 2x metre/ मीटर (D) $2\sqrt{2}$ x metre/ मीटर

9. A vertical tower standing at the corner of a rectangular field subtends angles of 60° and 45° at the two nearer corners. If θ is the angle that the tower subtends at the farthest corver, then what is cotθ equal to ?
एक आयताकार खेत के कोने पर एक ऊर्ध्वाधर टॉवर इसके निकटतम दो कोनों पर 60° और 45° के कोण अंतरित (सबटेंड) करता है। यदि टॉवर सबसे दूर वाले कोने पर θ का कोण अंतरित करता है, तो cotθ किसके बराबर होगा ?

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

10. A Pole standing in the middle of a circular field that makes an angle of elvation of 30° from the eye of a person standing on the circumference of the circle. Find the height of the pole if the circumference is 396 m. (The height of person is 3 m)
एक वृत्ताकार मैदान के बीच में खड़ा खम्भा जो कि वृत्त की परिधि पर खड़े व्यक्ति की आंख से 30° का उन्नयन कोण बनाता है, यदि परिधि की माप 396m है तो खंभे की ऊंचाई बताएं (यदि व्यक्ति की लम्बाई 3m हो)-

(A) $3 + 7\sqrt{3}$ (B) $3(1 + 7\sqrt{3})$
(C) $4 + 3\sqrt{2}$ (D) None of these

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

12. 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 taht 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) $\frac{b\tan a}{\tan\beta}$

13. The angls of elevation of the top of a building and the top of the chimney on the roof of the building from a point on the ground are x and 45 respectively. The height of building is h metre. Then the height of the chimeny in metre is.
जमीन के किसी बिन्दु से एक इमारत के शीर्ष और इमारत की छत पर स्थित चिमनी के शिर्ष के कोण क्रमशः x और 45° हैं यदि इमारत की ऊँचाई h मीटर है तों चिमनी की ऊँचाई ज्ञात करें।

(A) h cotx +h (B) h cotx – h
(C) h tanx – h (D) h tan x + h

14. A balloon of radius r makes an angle α at the eye of an observer and the angle of elevation of its centre is β. The height of its centre from the ground level is given by:-
एक r त्रिज्या का गुब्बारा पर्यवेक्षक α कोण बनाता हैं तथा गुब्बारा के केन्द्र से पर्यवेक्षक पर अवनमन कोण β हैं तो इसके केन्द्र की जमीन से ऊँचाई ज्ञात करो।

(A) r sin β cosec $\frac{\alpha}{2}$ (B) r cosec $\frac{\alpha}{2}$ sin α
(C) r cosec α sin β (D) None of these

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

15. A spherical balloon of radius r subtends angle 60° at the eye of an observer. If the angle of elevation of its centre is 60° and h is the height of the centre of the balloon, then which one of the following is correct ?
एक r त्रिज्या का गोलाकार गुब्बारा कोण 60° को एक पर्यवेक्षक की आँख पर दिखाता हैं। यदि इसके केंद्र की ऊँचाई का कोण 60° है और h गुब्बारा के केन्द्र की ऊँचाई हैं, तो निम्न में से कौन-सा सही हैं ?

(A) $h = r$ (B) $h = \sqrt{2}r$

(C) $h = \sqrt{3}r$ (D) $h = 2r$

16. An aeroplane flying at a height of 300 m above the ground passes vertically above another plane at an instant when the angles of elevation of the two planes from the same point on the ground are 60° and 45° respectively. What is the height of the lower plane from the ground ?
एक हवाई जहाज, जो धरती से 300 मी की ऊँचाई पर उड़ रहा हैं, किसी क्षण पर एक दूसरे हवाई जहाज के उर्ध्वाधर ऊपर से गुजरता हैं। उस क्षण पर धरती के एक ही बिन्दु से दोनों हवाई जहाजों के उन्नयन कोण: 60° व 45° थे। नीचे वाले हवाई जहाज की धरती से ऊँचाई क्या हैं ?

(A) $100\sqrt{3}$ m/मी (B) $\frac{100}{\sqrt{3}}$ m/मी

(C) $50\sqrt{3}$ m/मी (D) $50\left(\sqrt{3}+1\right)$ m/मी

17. ABCDEF is a regular polygon. Two poles at C and D are standing vertically and subtend angles of elevation 30° and 60° at A respectively. What is the ratio of the height of the pole at C to that of the pole at D ?
ABCDEF एक सम बहुभुज हैं। C और D पर दों खम्भे ऊर्ध्वाधर खड़े हैं, जो A पर क्रमश: 30° और 60° के उन्नयन कोण अंतरित करते हैं। C पर खड़े खंभे की ऊँचाई और D पर खड़े खंभे की ऊँचाई का अनुपात क्या हैं ?

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

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

18. From a height of h units, a man observes the angle of elevation as α and β angle of depression as p of the top and the bottom respectively of a tower of height H (> 4h). To what further height should he climb so that the values of angle of elevation and angle of depression get inter changed for the top and bottom of the tower?
h इकाई की ऊँचाई से एक व्यक्ति देखता हैं कि H (> 4h) ऊँचाई वाले एक टॉवर के शीर्ष और तल का क्रमश: उन्नयन कोण α और अवनमन कोण β हैं। उसे आगे और कितना ऊँचा चढ़ना चाहिए, ताकि टॉवर के शीर्ष और तल के उन्नयन कोण और अवनमन के मान अंतर्बदल हो जाएँ ?

(A) H – h units/इकाई (B) H – 2h units/इकाई

(C) H – 3h units/इकाई (D) H – 4 units/इकाइ

19. The angles of elevation of the tops of two pillars of heights h and 2h from a point P on the line joining the feet of the two pillars are complementary. If the distances of the foot of the pillars from the point P are x and y respectively, then which one of the following is correct ?
h और 2h ऊँचाई वाले दो खंभों के आधारों (अधोभाग) को मिलाने वाली रेखा पर स्थित किसी बिन्दु P से दोनों खंभों के शीर्षों के उन्नयन कोण एक दूसरे के पूरक हैं। यदि बिन्दु P से खंभों के आधार की दूरियाँ क्रमश: x और y हैं, तो निम्नलिखित में से कौन सा एक सही हैं?

(A) $2h^2 = x^2y$ (B) $2h^2 = xy^2$

(C) $2h^2 = xy$ (D) $2h^2 = x^2y^2$

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. 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

22. 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.

23. 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 अवनमन 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.

24. 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.

25. 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°. Point P 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) $20\left(\sqrt{3}-1\right)$

26. 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 ? **(Mains 2017)**
(A) $5\sqrt{6}-5\sqrt{3}$ (B) $5\sqrt{6}-5\sqrt{2}$
(C) $5\sqrt{2}-1$ (D) $5\sqrt{3}-5\sqrt{2}$

27. 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) $305\sqrt{3}$

28. 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

29. A man standing on the line joining the two poles finds that the top of the polest make an angle of elevation of 60° and 45° respectively. After walking some distance towards other pole, the angles becomes 30°and 60° respectively. The ratio of the height of the poles is :
दो ध्रुवों को मिलाने वाली रेखा पर खड़ा एक व्यक्ति पाता हैं कि ध्रुवों के शीर्ष क्रमशः 60° और 45° की ऊँचाई का कोण बनाते हैं। दूसरे ध्रुव की ओर कुछ दूर चलने के बाद कोण क्रमशः 30° और 60° बदल जाते हैं। ध्रुवों की ऊँचाई का अनुपात हैं-
(A) $\frac{\sqrt{3}-1}{2}$ (B) $\frac{\sqrt{3}+1}{2}$ (C) $\frac{\sqrt{3}-1}{4}$ (D) $\frac{\sqrt{3}+1}{4}$

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

30. 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

31. 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 हवाई 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) $300\sqrt{3}$

32. 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

33. On the top of a hemispherical dome of radius r, there stands a flag of height h. From a point on the ground, the elevation of the top flag is 30°. After moving a distance d towards the dome, when the flag is just visible the elevation is 45°. The ratio of h to r is equal to.
r त्रिज्या वाले एक अर्ध गोलाकार गुम्बद के शीर्ष पर h ऊँचाई वाला एक झंडा लगा हैं। तल के एक बिन्दु से झंडे के शीर्ष का उन्नयन कोण 30° हैं। गुम्बद की ओर d दूरी चलने के बाद जहाँ तक झंडा मात्र दिखाई देता रहे। उन्नयन कोण 45° हैं। यहाँ h से r का अनुपात किसके बराबर हैं ?
(A) $\sqrt{2}-1$ (B) $\frac{\sqrt{3}+1}{2\sqrt{2}}$
(C) $\frac{\sqrt{3}+1}{2\sqrt{2}}d$ (D) $\frac{(\sqrt{3}+1)(\sqrt{2}-1)}{2\sqrt{2}}d$

34. The angle of elevation from three point A, B, C on ground at the top of pole are α, 2α, 3α respectively. If bottom of pole is P, then $3AB^2 = 4PB^2$, then what is PC ? If AB = 100 cm.
एक स्तम्भ के शिखर से क्षैतिज पर स्थित A, B, C तीन बिन्दुओं का उन्नयन कोण क्रमशः α, 2α, 3α है यदि स्तम्भ का पाद P है तथा $3AB^2 = 4PB^2$ तो PC ज्ञात करों ? यदि AB = 100 सेमी.।
(A) 50 सेमी. (B) $\frac{200}{\sqrt{3}}$ सेमी.
(C) $100\sqrt{3}$ सेमी. (D) 100 सेमी.

35. There are two parallel streets each directed north to south. A person in the first street travelling from south to north wishes to take the second street which is on his right side. At some place, he makes a 150° turn to the right and he travels for 15 minutes at the speed of 20 km/hr. After that he takes a left turn of 60° and travels for 20 minutes at the speed of 30 km/hr in order to meet the second street. What is the distance between the two streets?
दो समांतर गलियाँ है, प्रत्येक गली उत्तर से दक्षिण की ओर दिष्ट हैं। पहली गली में दक्षिण से उत्तर की ओर जाता हुआ एक व्यक्ति दुसरी गली में जाना चाहता हैं जो उसके दायी ओर हैं। किसी जगह पर वह दाईं ओर 150° मुड़ता हैं और 15 मिनट तक 20 किमी/घण्टा की गति से चलता हैं। उसके बाद वह 60° बायी ओर मुड़ता हैं और 20 मिनट तक 30 किमी/घण्टा की गति से चलकर दूसरी गली में पहुँच जाता हैं। दोनों गलियों के बीच की दूरी कितनी हैं ?
(A) 7.5 km/किमी
(B) 10.5 km/किमी
(C) 12.5 km/किमी
(D) 15 km/किमी

36. A plane is going in circles around an airport. The plane takes 3 minutes to complete one round The angle of elevation of the plane from a point P on the ground at time t seconds is equal to that at time (t + 30) seconds. At time (t + x) seconds, the plane flies vertically above the point P. What is x equal to ?
एक विमान एक हवाई पत्तन के चारों और वृत्ताकार चक्कर लगा रहा हैं। एक चक्कर पूरा करने में विमान 3 मिनट लेता हैं। भूमि पर बिन्दु P से समय t सेकण्ड पर और समय (t + 30) सेकण्ड पर विमान के उन्नयन कोण बराबर हैं। समय (t + x) सेकण्ड पर, विमान बिन्दु P के उर्ध्वाधर उड़ता हैं तो x किसके बराबर हैं।
(A) 75 seconds/सेकण्ड (B) 90 seconds/सेकण्ड
(C) 105 seconds/सेकण्ड (D) 135 seconds/सेकण्ड

37. A ladder is resting against a vertical wall and its bottom is 2.5 m away from the wall. If it slips 0.8 m down the wall, then its bottom will move away from the wall by 1.4 m. What is the length of the ladder?
एक सीढ़ी एक ऊर्ध्वाधर दीवार के सहारे खड़ी हुई हैं और इसका तला दीवार से 2.5 मी दूरी हैं। यदि यह दीवार पर 0.8 मी नीचे की ओर सरक जाती हैं तो इसका तला दीवार से 1.4 मी और अधिक दूरी हो जाता हैं। सीढ़ी की लम्बाई कितनी हैं ?
(A) 6.2 m/मी (B) 6.5 m/मी
(C) 6.8 m/मी (D) 7.5 m/मी

38. On a plane area there are two vertical towers separated by 100 feet apart. The shorter tower is 40 feet tall. A pole of length 6 feet stands on the line joining the base of two towers so that the tip of the towers and tip of the of the pole are also on the same line. If the distance of the pole from the shorter tower is 75 feet, then what is the height of the taller tower (approximately) ?
एक समतल क्षेत्र में दो ऊर्ध्वाधर मीनारें एक दूसरे से 100 फीट की दूरी पर हैं। छोटी मीनार की ऊँचाई 40 फीट हैं। 6 फीट लंबा (ऊँचा) एक खंभा इन दो मीनारों के तल को जोड़ने वाली रेखा पर इस प्रकार खड़ा है कि दोनों मीनारों के शीर्ष और खंभे का शीर्ष एक ही रेखा पर हैं। यदि छोटी मीनार से मीनार से खंभे की दूरी 75 फीट हैं, तो बड़ी मीनार की ऊँचाई (लगभग) कितनी हैं ?
(A) 85 feet/फिट (B) 110 feet/फिट
(C) 125 feet/फिट (D) 140 feet/फिट

39. The angles of elevation of a cloud from a point 200 m above a lake is 30° and the angle of depression of its reflection in the lake is 60°. The height of the cloud is.
एक झील के 200 मी ऊपर स्थित एक बिन्दु से किसी बादल का उन्नयन कोण 30° है और उसके झील में प्रतिबिम्ब का अवनमन कोण 60° हैं। बादल की ऊँचाई क्या हैं ?
(A) 200 m (B) 300 m
(C) 400 m (D) 600 m

40. The angles of elvation of the top of a tower from two points situated at distance 36m and 64m from its base and in the same straight line with are complementary. What is the height of the tower ?
अगर आधार से 36 मीटर और 64 मीटर की दूरी पर स्थित दो बिन्दुओं से एक टॉवर के सिरे की ऊँचाई के कोण और उसी के साथ सीधी रेखा में पूरक हैं। टॉवर की ऊँचाई कितनी हैं ?
(A) 50 m (B) 48 m
(C) 25 m (D) 24 m

41. The angle of elevation of the top of an incomplete vertical piller at a horizontal distance of 100 m from its base is 45°. If the angle of elevation of the top of complete pillar at the same point is to be 60°, then the height of the incomplete pillar is to be increased by.
आधार से 100 मीटर की क्षैतिज दूरी पर एक अपूर्ण ऊर्ध्वाधर स्तम्भ के शीर्ष की ऊँचाई का कोण 45° है। अगर एक ही समय में पूर्ण स्तंभ के शीर्ष की ऊँचाई का कोण बिन्दु पर 60° होना हैं, फिर अपूर्ण स्तम्भ की ऊँचाई कितनी बढ़ाना होगा।
(A) $50\sqrt{2}$ m (B) 100 m
(C) $100\left(\sqrt{3}-1\right)$ m (D) $100\left(\sqrt{3}+1\right)$ m

42. A man is watching from the top of a tower a boat speeding away from the tower. The boat makes an angle of depression of 45° with the man's eye when at a distance of 60m from the bottom of tower. After 5s, the angle of depression becomes 30°. What is the approximate speed of the boat assuming that it is running in still water ?
एक आदमी टॉवर के ऊपर से एक नाव को देख रहा है जो टॉवर से दूर जा रही हैं। टॉवर से 60 मीटर की दूरी पर नाव आदमी की आंख के साथ 45° के अवसाद का कोण बनाती हैं। 5 सेकण्ड के बाद अवसाद का कोण 30° हो जाता हैं। नाव की अनुमानित गति क्या हैं कि यह स्थिर पानी में चल रही हैं।
(A) 31.5 km/h (B) 36.5 km/h
(C) 38.5 km/h (D) 40.5 km/h

43. A flag pole on the top of a mall building is 75m high. To an observer at a height of 400 m, the mall building and the pole subtend equal angle θ. If the height of the mall building is 325m. Then find the horizontal distance (in m) of the observer from the pole.
एक माल भवन के ऊपर एक ध्वज-दंड स्थित है जिसकी ऊँचाई 75 मी हैं, 400 मीटर ऊँचाई पर स्थित एक व्यक्ति पर माल भवन और ध्वज दंड बराबर कोण θ अंतरित करते हैं, यदि माल भवन की ऊँचाई 325 मी हैं, तब ध्वज दंड और व्यक्ति के बीच क्षैतिज दुरी ज्ञात करें ?
(A) $20\sqrt{10}$ (B) 30
(C) $25\sqrt{10}$ (D) $30\sqrt{10}$

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

44. At the foot of a mountain the elveation of its summit is 45° after ascending 1000m towards the mountain up a slope of 30° inclination the elevation is found to be 60°. Find the height of the mountain.
एक पर्वत के तल से शिखर का अवनमन कोण 45° है। 1000 मीटर पर्वत की तरफ 30° कोण के साथ चलने पर वहा से पर्वत के शिखर का अवनमन कोण 60° हो जाता है तो पर्वत की ऊँचाई ज्ञात करो।

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

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

45. 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

46. Two men on either side of a tower 75 m high observe the angle of elevation of the top of the tower to be 30° and 60° What is the distance between the two men ?
75 मी ऊँचे एक टॉवर के दोनों तरफ खड़े दो आदमी टॉवर के शीर्ष के उन्नयन कोण 30° और 60° का पाते हैं। दोनों आदमियों के बीच की दूरी कितनी हैं ?

(A) $100\sqrt{3}$ m/मी (B) $\frac{100\sqrt{3}}{3}$ m/मी

(C) $75\sqrt{3}$ m/मी (D) $60\sqrt{3}$ m/मी

47. Consider a regular hexagon ABCDEF. Two towers are situated at B and C. The angle of elevation from A to the top of the tower at B is 30° , and the angle of elevation to the top of the tower at C is 45°.What is the ratio of the height of towers at B and C?
एक समषटभुज ABCDEF पर विचार कीजिए। B और C पर दो टॉवर स्थित हैं। A से B पर स्थित टॉवर के शीर्ष का उन्नयन कोण 30° हैं, और C पर स्थित टॉवर के शीर्ष का उन्नयन कोण 45° है। B और C पर स्थित टॉवरों की ऊँचाईयों के अनुपात क्या हैं ?

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

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

48. A pole stands vertically inside a triangular park ABC. If the angle of elevation of the top of the pole from each corner of the park is same, then in the triangle ABC, the foot of the pole is at the.
एक त्रिकोणीय पार्क (उद्यान) ABC के अन्दर एक स्तम्भ उर्ध्वाधर खड़ा हैं। यदि पार्क के प्रत्येक कौने से स्तम्भ के शीर्ष की उच्चता का कोण एकसमान हैं, तो त्रिकोण ABC में स्तम्भ का पाद कहा पर हैं ?

(A) Centroid/केन्द्रक
(B) Circumcentre/परिकेन्द्र
(C) Incentre/अंत:केन्द्र
(D) Orthocentre / लम्ब केन्द्र

Direction (49-50) : As seen from the top and bottom of a building of height h m, the angles of elevation of the top of a tower of height $\frac{(3+\sqrt{3})h}{2}$ m, are α and β respectively.
किसी इमारत के शीर्ष और निचले बिन्दु से किसी टॉवर जिसकी ऊँचाई $\frac{(3+\sqrt{3})h}{2}$ मीटर है अवनमन कोण क्रमश: α और β हैं

49. If $\alpha = 30°$ then what is the value of $\tan\beta$?
अगर $\alpha = 30°$ है तो $\tan\beta$ का मान ज्ञात करो ?

(A) 1 (B) $\frac{1}{2}$ (C) $\frac{1}{3}$ (D) None

50. If $\beta = 30°$ and θ is the angle of depression of the foot of the tower as seen from the top of the building, then what is the value of $\tan\theta$?
यदि $\beta = 30°$ और θ टॉवर के तल अवसाद का कोण हैं जैसा कि इमारत के ऊपर से देखा जाता हैं तो $\tan\theta$ का मान क्या हैं ?

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

(C) $\left(\frac{2-\sqrt{3}}{3\sqrt{3}}\right)$ (D) None of these

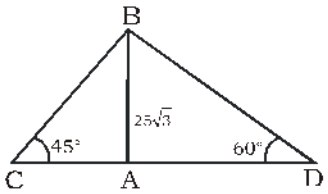
51. A Navy captain going away from a lighthouse at the speed of $4\left[\left(\sqrt{3}\right)-1\right]$ m/s. He observes that it takes him 1 minute to change the angle of elevation of the top of the lighthouse from 60° to 45°. What is the height (in metres) of the lighthouse?
एक नौसेना कप्तान $4\left[\left(\sqrt{3}\right)-1\right]$ 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) $280\sqrt{2}$

Solution

1.(C)



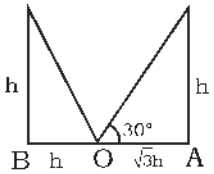
$AC = AB = 25\sqrt{3}$

$AD = \frac{AB}{\sqrt{3}} = 25$

$CD = 25\sqrt{3} + 25$

$CD = 25 \times 2.73 = 68.25\ m$

2.(C)



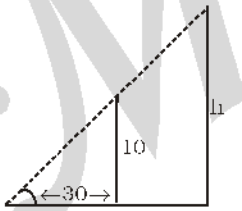
$h + \sqrt{3}h = 40$

$h = \frac{40(\sqrt{3}-1)}{2}$

$h = 20(\sqrt{3}-1)$

$AO = \sqrt{3}h = 20(3-\sqrt{3})$

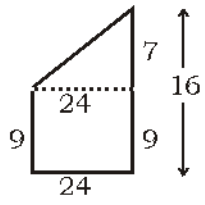
3.(A)



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

$\frac{1}{3} = \frac{h}{1425} \Rightarrow h = 475m$

4. (C)

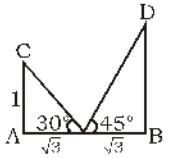


distance fart tops from each other

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

$= \sqrt{625} = 25$

5. (B)



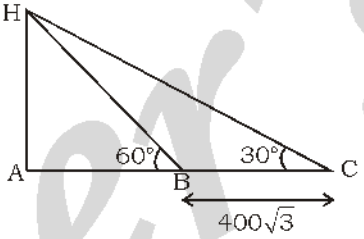
$OB = BD$

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

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

$= \sqrt{52 \times 13} = 26m$

7. (C)

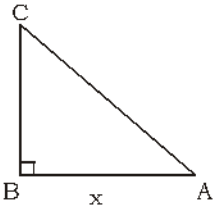


$BC = 400\sqrt{3}$

So, $AB = 200\sqrt{3}$

then $H = 200\sqrt{3} \times \sqrt{3} = 600\ m$

8. (B)

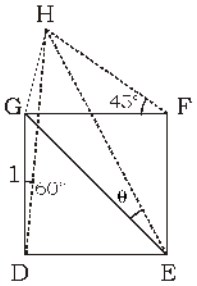


$\angle A = 60°, \quad AB = x$

$\Rightarrow \quad \tan A = \tan 60° = \frac{\sqrt{3}x}{x}$

$\therefore$ length of pole $BC = \sqrt{3}\,x$

9. (C)



$\tan 60° = \frac{\sqrt{3}}{1} = \frac{GH}{GD}$

$\tan 45° = \frac{\sqrt{3}}{\sqrt{3}} = \frac{GH}{GF}$

Mother's

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

DG = 1, GH = $\sqrt{3}$ and GF = $\sqrt{3}$

$\therefore \quad \cot\theta = \frac{GE}{GH} = \frac{\sqrt{1^2+\left(\sqrt{3}\right)^2}}{\sqrt{3}}$

$\therefore \quad \cot\theta = \frac{2}{\sqrt{3}}$

10.(B) $2\pi r = 396$

$r = \frac{396\times 7}{2\times 22} = 63$ m

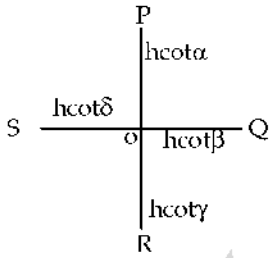
$\because \tan 30° = \frac{1}{\sqrt{3}} \quad \Rightarrow \quad \sqrt{3} \to 63$

$1 \to 21\sqrt{3}$

$\therefore$ length of pole = $3 + 21\sqrt{3}$

$= 3(1 + 7\sqrt{3})$

11.(C) ATQ,



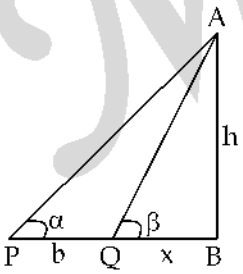
From the figure

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

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

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

12.(B)



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

$x = h\cot\alpha - b$

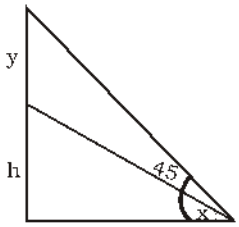
$h = x\tan\beta$

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

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

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

13.(B) h cot x – h



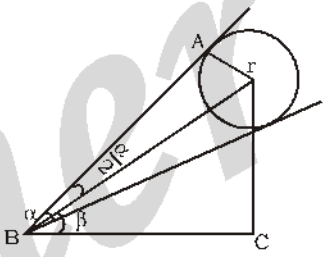
$\frac{y+h}{b} = 1 \;\Big|\; \frac{h}{b} = \tan x$

$h + y = b \;\Big|\; b = \frac{h}{\tan x} = h\cot x$

$y + h = h\cot x$

$y = h\cot x - h$

14.(A) $r\,\text{cosec}\frac{\alpha}{2}\sin\beta$



$\frac{OA}{OB} = \sin\frac{\alpha}{2}$

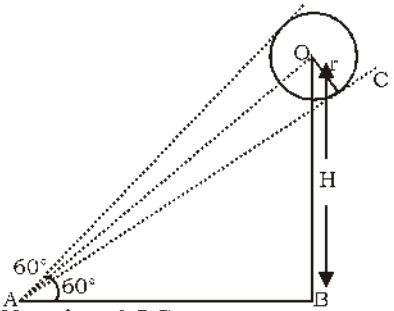
$OB = \frac{r}{\sin\frac{\alpha}{2}} = r\,\text{cosec}\frac{\alpha}{2}$

$\frac{OC}{OB} = \sin\beta \Rightarrow OC = r\,\text{cosec}\frac{\alpha}{2}\sin\beta$

15.(C) $h = \sqrt{3}r$

In ΔABO

$\sin 60° = \frac{OB}{AO} \Rightarrow AO = \frac{OB}{\sin 60°}$



Now in ΔAOC

$\sin = \frac{60°}{2} = \frac{OC}{AO}$

Mother's

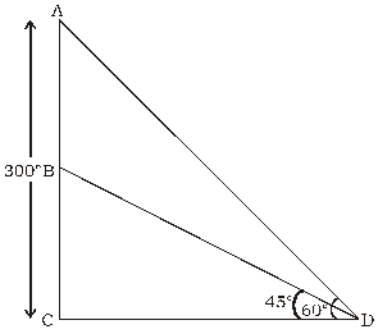
$\Rightarrow AO = \dfrac{OC}{\sin 30°}$

From Eqs. (i) and (ii), $\dfrac{OB}{\sin 60°}$

$= \dfrac{OC}{\sin 30°} \Rightarrow \dfrac{h}{\frac{\sqrt{3}}{2}} = \dfrac{r}{\frac{1}{2}}$

$\therefore h = \sqrt{3}r$

16.(A) $100\sqrt{3}$ m/मी



In ΔBCD:

$$\tan 45° = \frac{BC}{CD}$$

$\Rightarrow 1 \times CD = BC$

$\Rightarrow CD = BC$ ..... (i)

In ΔACD

$\tan 60° = \dfrac{AC}{CD} \Rightarrow \sqrt{3} = \dfrac{300}{CD}$

$\Rightarrow CD = \dfrac{3 \times 100}{\sqrt{3}} \Rightarrow CD = 100\sqrt{3}$

So, BC = CD = $100\sqrt{3}$

17.(B) $1 : 2\sqrt{3}$

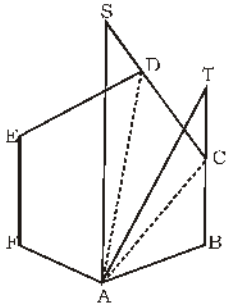
$\angle ABC = 120°$ [Angle of regular hexagon]

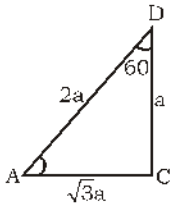
$\angle BAC = \angle BCA = \dfrac{180° - 120°}{2} = 30°$

$\angle DCA = 120° - 30° = 90°$

Thus, ΔDCA, C is a right triangle.

Let side DC = a





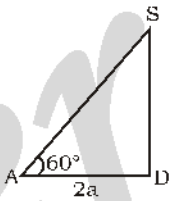
In ΔACD:

$\dfrac{AC}{a} = \cot 30° \Rightarrow AC = \sqrt{3}a$

$\dfrac{AD}{a} = \operatorname{cosec} 30° \Rightarrow AD = 2a$

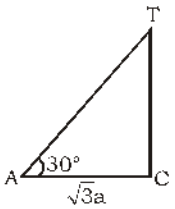
Now taking triangle ADS:

Let S is the vertex of pole



$\dfrac{DS}{AD} = \tan 60° \Rightarrow DS = 2\sqrt{3}a$

In triangle TCA :



$\dfrac{TC}{AC} = \tan 30° \Rightarrow TC = \dfrac{\sqrt{3}a}{\sqrt{3}} = a$

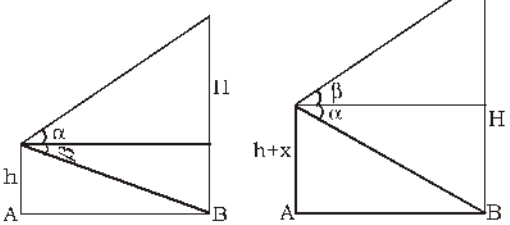
Thus, ratio is

$\dfrac{CT}{DS} = \dfrac{a}{2\sqrt{3}a} = \dfrac{1}{2\sqrt{3}}$

Hence CT : DS = $1 : 2\sqrt{3}$

Hence option = (b)

18.(B) H – 2h units/इकाई



In the initial figure, $\tan \alpha = \dfrac{(H - h)}{AB}$,

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

$$\tan\beta = \frac{h}{AB}$$

From 2nd figure

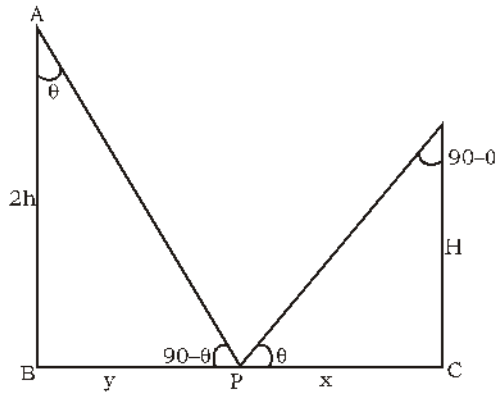
$$\tan\alpha = \frac{(h+x)}{AB}$$

Equating both the values of $\tan\alpha$

$$\frac{(H-h)}{AB} = \frac{(h+x)}{AB}$$

$x = H - 2h$

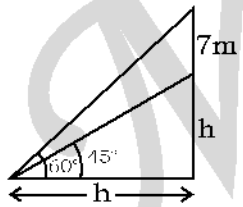
19.(C) $2h^2 = xy$



$$\frac{DC}{CP} = \frac{BP}{AB}$$

$$\frac{h}{x} = \frac{y}{2h} = \boxed{2h^2 = xy}$$

20.(D)



$$\tan 60° = \frac{h+7}{h}$$

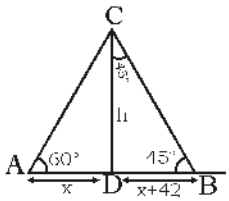
$$h\sqrt{3} = h + 7$$

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

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

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

21.(D)



By triangle BCD $h = x + 42$

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

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

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

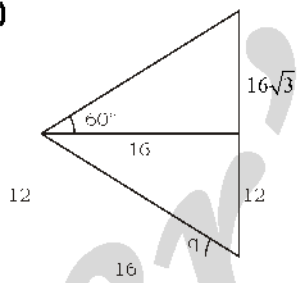
$$x\left(\sqrt{3}-1\right) = 42 \Rightarrow x = \frac{42\left(\sqrt{3}+1\right)}{2}$$

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

So, length of tower = 57.372 + 42 = 99.37

= 99.37 ~ 99.40

22.(D)



$$\tan 60° = \frac{x}{16}$$

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

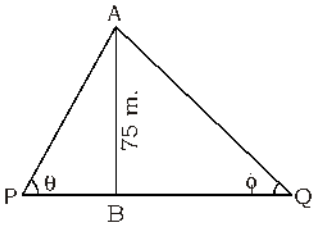
From the figure

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

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

$$= 39.68 \text{ m}$$

23.(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,

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

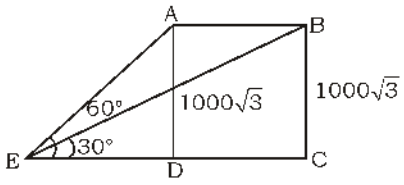
Mother's

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

$\Rightarrow BQ = 15 \times 8 = 120m$

$\Rightarrow PQ = 100 + 120 = 220m$

24.(A)



$DE = 1000\sqrt{3}\ \cot 60$

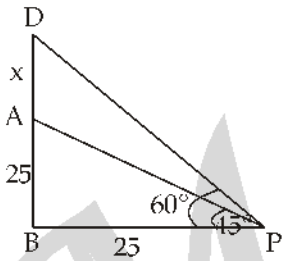
$EC = 1000\sqrt{3}\ \cot 30$

Distance travelled by drone
= CE – DE = DC

$\Rightarrow 1000\sqrt{3}\ \left|\cot 30 - \cot 60\right|$

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

25.(C)



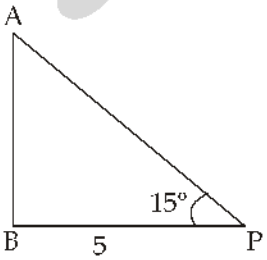
Here x = height of pole

$AB = BP = 25 \rightarrow$ in ΔABP

$25\sqrt{3} = 25 + x \rightarrow$ in ΔDBP

$x = 25\left(\sqrt{3} - 1\right)$

26.(B)

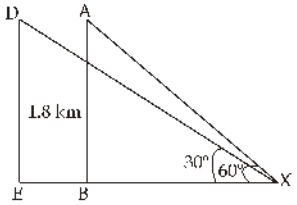


$AP = \text{length of ladder} \quad \left|\cos 15° = \frac{BP}{AP} = \frac{5}{AP}\right.$

$$AP = \frac{5}{\cos 15°} = \frac{5}{\left(\sqrt{3}+1\right)} \times 2\sqrt{2} \times \frac{\sqrt{3}-1}{\left(\sqrt{3}-1\right)}$$

$AP = 5\sqrt{2}\left(\sqrt{3}-1\right) \Rightarrow 5\sqrt{6} - 5\sqrt{2}$

27.(A)



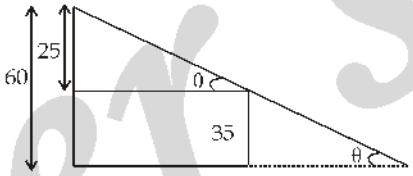
$$BX = \frac{1.8}{\sqrt{3}} = 0.6\sqrt{3}$$

$ED = 1.8\sqrt{3}$

$EB = AD = 1.2\sqrt{3}$

$$S = \frac{1.2\sqrt{3}}{20} \times 60 \times 60 = 216\sqrt{3}\ \text{km/hr}$$

28.(D)

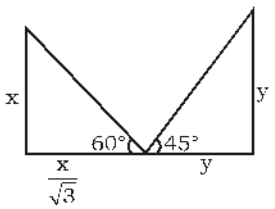


$$\tan\theta = \frac{5}{9} \Rightarrow \tan\theta = \frac{5}{9}$$

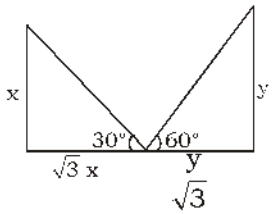
$$\frac{25}{b} = \frac{5}{9} \Rightarrow b = 45$$

29.(A) $\frac{\sqrt{3}-1}{2}$

I.



II.



$$\frac{y}{\sqrt{3}} + y = \sqrt{3}x + \frac{y}{\sqrt{3}}$$

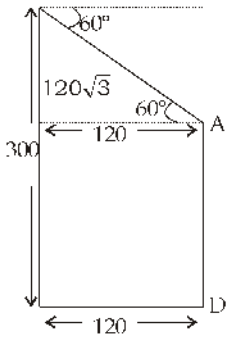
$$x\left(\frac{1}{\sqrt{3}} - \sqrt{3}\right) = y\left(\frac{1}{\sqrt{3}} - 1\right)$$

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

Mother's

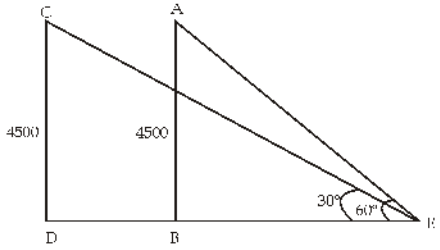
HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

30.(C)



AD = 300 – $120\sqrt{3}$ = 92.15 meter

31.(B)



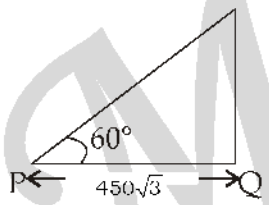
In ΔABE BE = $1500\sqrt{3}$

In ΔCDE DE = $4500\sqrt{3}$

BD = DE – BE = $3000\sqrt{3}$

So, Speed = $\frac{3000\sqrt{3}}{30} = 100\sqrt{3}$ (m/sec)

32.(B)

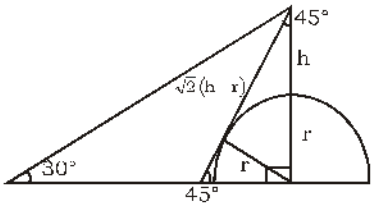


$1 \rightarrow 450\sqrt{3}$

$\sqrt{3} \longrightarrow 450 \times 3 = 1350$

Speed = $\frac{1350}{60 \times 6}$ = 3.75/sec

33.(A)

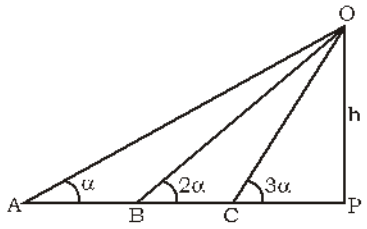


$$\frac{(h+r)}{\sqrt{2}(h+r)} = \frac{r}{(h+r)}$$

$h + r = \sqrt{2}\, r$

$h + r = \left(\sqrt{2} - 1\right) \Rightarrow \frac{h}{r} = \boxed{\sqrt{2} - 1}$

34.(A)



If ∠AOB + ∠OAB = 2α

∠AOB + α = 2α

∠AOB = α

∴ Δ ABO Isosceles triangle then AB = OB

∵ $3AB^2 = 4PB^2$

$$\Rightarrow \quad PB^2 = \frac{3}{4}AB^2$$

$$PB = \frac{\sqrt{3}}{2}AB \ldots\ldots\ldots\ldots (i)$$

ΔOBP is,

$$\cos 2\alpha = \frac{PB}{OB}$$

PB = OB cos2α = ABcos2α ..... (ii)

Equation (i) and (ii)

$$\frac{\sqrt{3}}{2}AB = \cos\alpha 2AB$$

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

$\Rightarrow \alpha = 15°$

$\Rightarrow 3\alpha = 45°$

ΔOCP is

$$\tan 45° = \frac{OP}{PC}$$

$\Rightarrow$ OP = PC

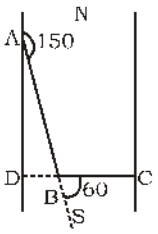
$\Rightarrow$ OBP is

$$\sin 30° = \frac{OP}{OB} = \frac{1}{2}$$

$$\Rightarrow \frac{PC}{AB} = \frac{1}{2}$$

$$\Rightarrow PC = \frac{AB}{2} = \frac{100}{2} = 50 \text{ meter}$$

35.(C) 12.5 km



Initially the person is travelling from south to north i.e. D to A

Mother's

He takes 150° right turn and moves AB distance and then he takes 60° left turn travels BC

$$AB = 20\text{km/hr} \times \frac{15}{60}\ \text{hr} = 5\text{km}$$

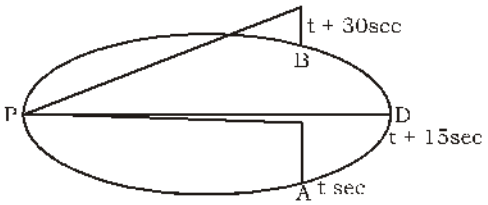
$$BC = 30 \times \frac{20}{60} = 10\ \text{km}$$

We know that distance between both the streets is DC = DB + BC

$$DB = AB\cos 60° = 5 \times \frac{1}{2} = 2.5\ \text{km}$$

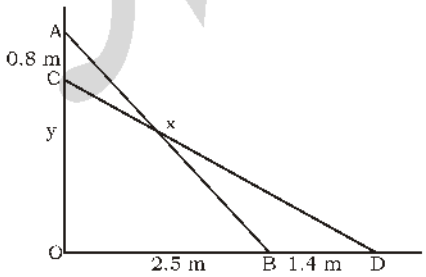
So the distance between streets = 12.5 km

36. (C)



Let the plane be at point A at t seconds and at point B after t + 30 seconds
Since the motion is uniform, we can say that at time t + 15 seconds, the plane is above the point is diametrically opposite to the point P from where the angle is same.
Now since the time taken to cover the full circle is 3 minutes (180 seconds), the time taken by the plane to reach the diametrically opposite point will be 90 seconds.
So the time after which the plane reaches the point P will be = t + 15 + 90 seconds = (t + 105)seconds.

37.(B) 6.5 m/मी

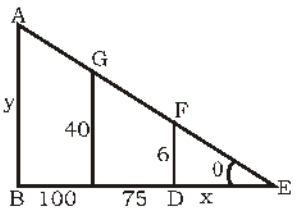


AB = CD = x = Length of ladder
Let OC = y m
$y^2 + 3.9^2 = x^2$
$(y+0.8)^2 + 2.52 = x^2$
So $y^2 + 3.9^2 = (y + 0.8)^2 + 2.5^2$
y = 5.2m

$$x = \sqrt{(5.2^2 + 3.9^2)}$$

x = 6.5m

38.(A) 85



$$\frac{DE}{DF} = \frac{CE}{CG} \Rightarrow \frac{x}{6} = \frac{75+x}{40}$$

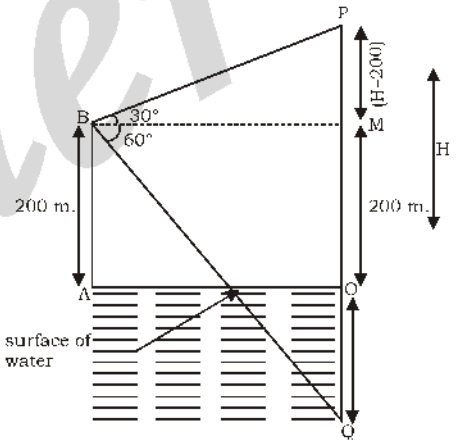
Now

$$\frac{CE}{CG} = \frac{BE}{AB} \Rightarrow \frac{75+x}{40} = \frac{175+x}{y}$$

$$\frac{88.23}{40} = \frac{188.23}{y}$$

y = $\boxed{85}$ (approximately)

39.(C) 400 m



$\therefore OQ = OP = H$
Given $\angle PBM = 30°$ and $\angle MBQ = 60°$
In right angled ΔPBM

$$\tan 30° = \frac{PM}{BM} = \frac{H-200}{BM}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{H-200}{BM}$$

$\Rightarrow BM = \sqrt{3}(H–200)$ ..... (i)
In right angle ΔQBM

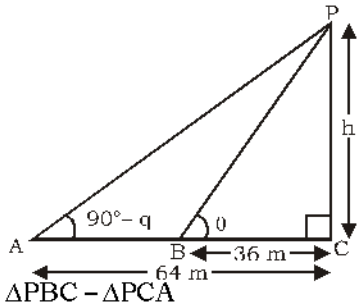
$$\tan 60° = \frac{MQ}{BM} = \frac{H+200}{BM}$$

$$\Rightarrow \sqrt{3} = \frac{H+200}{\sqrt{3}(H-200)}\ [\text{from Eq (i)}]$$

$\Rightarrow H + 200 = 3(H - 200)$
$\Rightarrow H + 200 = 3H - 600 \Rightarrow 2H = 800$
$\therefore H = 400$ m
Hence the height of the cloud is 400m.

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

40.(B) 48 m



$\Delta PBC - \Delta PCA$

$\frac{PC}{AC} = \frac{BC}{PC} \Rightarrow PC^2 = AC \times BC$

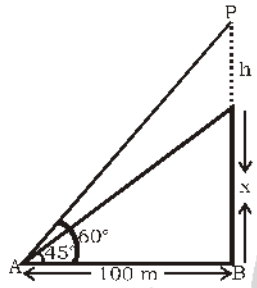
$\Rightarrow h^2 = 64 \times 36$

$\Rightarrow h = 8 \times 6 = 48m$

So, the height of the tower is 48 m.

41.(C) $100\left(\sqrt{3}-1\right)$ m

Let the height of the incomplete pillar be m and the increase height be PC = h



In ΔABC, $\tan 45° = \frac{x}{100} \Rightarrow x = 100m$

and in ΔAPB, $\tan 60° = \frac{x+h}{100}$

$\Rightarrow x + h = 100\sqrt{3}$

$\Rightarrow h = 100\sqrt{3} - x = 100\sqrt{3} - 100$

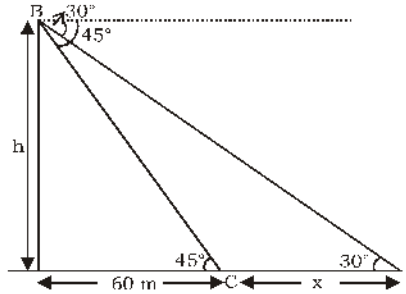
$\therefore h = 100\left(\sqrt{3}-1\right)m$

42.(A) 31.5 km/h

Let AB = h height of towar in ΔABC

in ΔABC

$\tan 45° = \frac{AB}{AC} \Rightarrow 1 = \frac{AB}{AC} \Rightarrow h = 60$ m



Now, In ΔADB

$\tan 30° = \frac{AB}{AC} = \frac{60}{60+x} = \frac{1}{\sqrt{3}} = \frac{60}{60+x}$

$\Rightarrow x = 60\left(\sqrt{3}-1\right) = 60(1.73-1)$

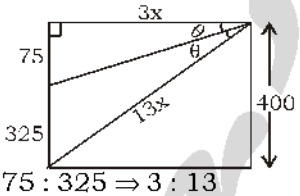
$= 60 \times 0.73 = 43.8$ m

$\text{speed} = \frac{\text{Distance}}{\text{time}}$

$\therefore$ speed of boat

$= \frac{43.8}{5} \times \frac{18}{5}$ km / h = 31.5 km/h

43.(B)



75 : 325 ⇒ 3 : 13

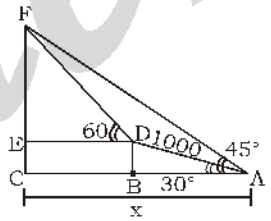
$(3x)^2 + (400)^2 = (13x)^2$

$9x^2 + 160000 = 169\,x^2$

$160x^2 = 16000$

$3x = 30$

44.(A)



$\frac{BD}{1000} = \frac{1}{2} \Rightarrow BD = 500$

$\frac{AB}{1000} = \frac{\sqrt{3}}{2} \Rightarrow AB = 500\sqrt{3}$

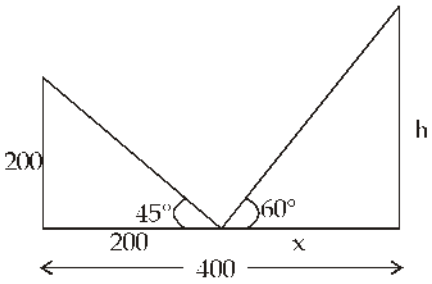
$ED = x - 500\sqrt{3}$

$FE = x - 500$

$\frac{x-500}{x-500\sqrt{3}} = \sqrt{3} \Rightarrow x\left(\sqrt{3}-1\right) = 100$

$x = \frac{1000}{\sqrt{3}-1} = \frac{1}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1} = \boxed{\frac{\sqrt{3}+1}{2}}$

45.(B)

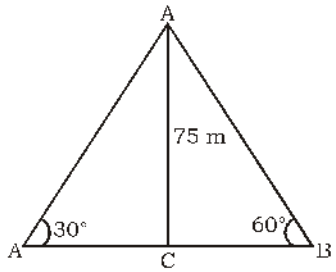


$x = 400 - 200 = 200$

$h = x \tan 60 = 200\sqrt{3}$

Mother's

46.(A) $100\sqrt{3}$ m/मी



In Triangle ACD:

$$\tan 30° = \frac{CD}{AC}$$

$$\Rightarrow AC = \frac{CD}{\tan 30°} = \frac{75}{\left(\frac{1}{\sqrt{3}}\right)}$$

$$\Rightarrow AC = 75\sqrt{3}$$

In Triangle BCD :

$$\tan 60° = \frac{CD}{BC}$$

$$\Rightarrow BC = \frac{CD}{\tan 60°} \qquad \Rightarrow BC = \frac{75}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$\Rightarrow BC = \frac{75\sqrt{3}}{3} \qquad \Rightarrow BC = 25\sqrt{3}$$

Then

AB = AC + BC

$$\Rightarrow AB = 75\sqrt{3} + 25\sqrt{3}$$

$$\Rightarrow AB = 100\sqrt{3}$$

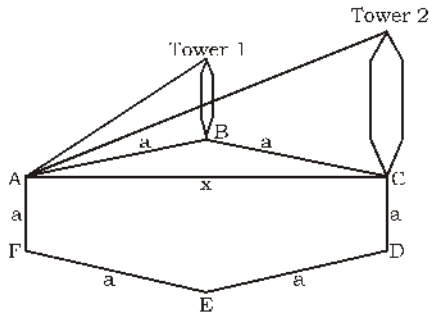
Hence required distance be $100\sqrt{3}$ m

Hence option (A)

47.(B) 1 : 3

Let the side of regular hexagon be 'a'

Let height of the tower1 be h_1 and tower 2 be h_2



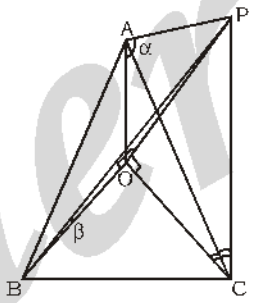
Height of tower 1 = h_1 = (distance between A and B) × (tan 30°) = $a \cdot \frac{1}{\sqrt{3}}$

Distance between A and C = $2 \times \sqrt{3} \cdot \frac{a}{2} = \sqrt{3}a$

Height of tower 2 = h_2 = (distance between A and C) × (tan 45°) = $\sqrt{3}a \cdot 1 = \sqrt{3}a$

Ratio of height of towers at B and C respectively = $\frac{a}{\sqrt{3}a} = \frac{1}{3}$

48.(B) Circumcentre



Since, angle of the elevation of the top of he pole are same form each corner of ΔABC

$\therefore$ In ΔAOP, $\tan\alpha = \frac{OP}{OA}$ ..... (i)

$\therefore$ In ΔBOP, $\tan\beta = \frac{OP}{OB}$ ..... (ii)

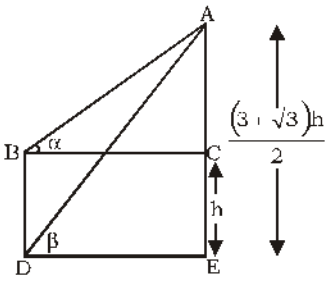
$\therefore$ In ΔCOP, $\tan\gamma = \frac{OP}{OC}$ ..... (iii)

$\because \alpha = \beta = \gamma$

$\therefore$ OA = OB = OC

Hence O is the circumecntre of Δ ABC.

49.(A)



Given then $\alpha = 30°$

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

In ΔABC, $\tan\alpha = \tan 30°$

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

$\Rightarrow BC = \sqrt{3}\,AC = \sqrt{3}\,(AE - CE)$

$= \sqrt{3}\,(AE - BD)$ $[\because BD = CE]$

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

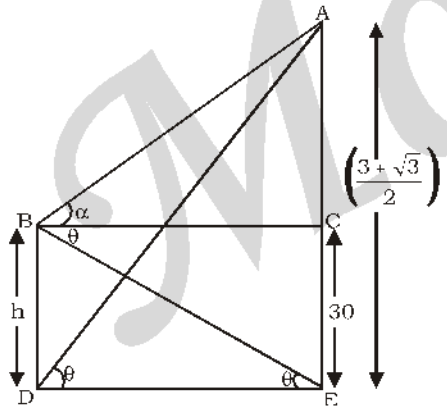
Now, In ΔADE

$\tan\beta = \frac{AE}{DE} \Rightarrow \tan\beta = \frac{AE}{BC}$ $[\because DE = BC]$

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

$\therefore \tan\beta = 1$

50.(A) $\left(\frac{3-\sqrt{3}}{3\sqrt{3}}\right)$



Given that = $\beta = 30°$

In Δ =ADE, $\tan\beta = \frac{AE}{DE}$

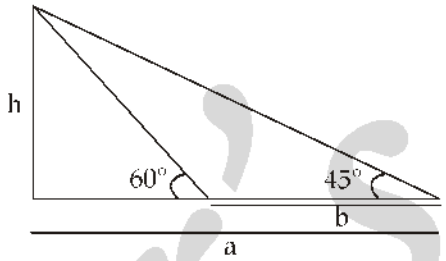
$\Rightarrow DE = \frac{3}{2}\left(1+\sqrt{3}\right)h$.....(i)

$\Rightarrow \tan\theta = \frac{h}{\frac{3}{2}\left(1+\sqrt{3}\right)h}$

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

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

51.(A)



Total distance = $4\left(\sqrt{3}-1\right)\times 60$

$b = 240\left(\sqrt{3}-1\right)$

(i) $\tan 45° = \frac{h}{a}$, $1 \quad \frac{h}{a}$, $h = a$

(ii) $\tan 60° = \frac{h}{a-b}$, $\sqrt{3} = \frac{h}{a-240\left(\sqrt{3}-1\right)}$

$h = \sqrt{3}a - 240\left(3-\sqrt{3}\right)$ $a = \sqrt{3}a - 240\left(3-\sqrt{3}\right)$

$240\left(3-\sqrt{3}\right) = \sqrt{3}a - a$

$240\sqrt{3}\left(\sqrt{3}-1\right) = a\left(\sqrt{3}-1\right)$

$a = 240\sqrt{3}$ $\quad h = 240\sqrt{3}$

Mother's

Trigonometry
Maximum & Minimum

Part-VIII

Part-VIII
Exercise/ अभ्यास प्रश्न

1. Find maximum and minimum value of $10 - \sin^2\theta$.
$10 - \sin^2\theta$ का अधिकतम और न्यूनतम मान ज्ञात करें।
(A) 10,9 (B) 10,7
(C) 9, 8 (D) 8,7

2. Find maximum and minimum value of $20 - \tan^2\theta$.
$20 - \tan^2\theta$ का अधिकतम और न्यूनतम मान ज्ञात करें।
(A) 20,8 (B) 21,4
(C) 22,5 (D) 20, Not Defined

3. Find maximum and minimum value of $12 - \sec^2\theta$.
$12 - \sec^2\theta$ का अधिकतम और न्यूनतम मान ज्ञात करें।
(A) 11,12 (B) 13, 14
(C) 11, Not Defined (D) 15, 16

4. Find maximum and minimum value of $17 + \text{cosec}^2\theta$.
$17 + \text{cosec}^2\theta$ का अधिकतम और न्यूनतम मान ज्ञात करें।
(A) 14,15 (B) 18,20
(C) Not Defined, 18 (D) 19, 22

5. Find maximum value of $16 - 17\cot^2\theta$.
$16 - 17\cot^2\theta$ का महत्तम मान क्या होगा?
(A) 15 (B) 16
(C) 12 (D) None of these

6. Find maximum and minimum value of $10 + 2\sec^2\theta$.
$10 + 2\sec^2\theta$ का अधिकतम और न्यूनतम मान ज्ञात करें।
(A) 15, 18 (B) Not Defined, 12
(C) 16, 18 (D) 17, 20

7. Find the respectively ratio of maximum and minimum value of $9\sin^2\theta + 21\cos^2\theta$.
$9\sin^2\theta + 21\cos^2\theta$ के अधिकतम और न्यूनतम मान का क्रमशः अनुपात ज्ञात करें।
(A) 1 : 2 (B) 3 : 7
(C) 9 : 7 (D) 7 : 3

8. Find maximum and minimum value of $-(9\sin^2\theta + 8\cos^2\theta)$.
$-(9\sin^2\theta + 8\cos^2\theta)$ का अधिकतम और न्यूनतम मान ज्ञात करें।
(A) 9, 8 (B) –9, 8
(C) 9, –8 (D) –8, –9

9. Find minimum value of $11\sec^2\theta + 17\tan^2\theta$.
$11\sec^2\theta + 17\tan^2\theta$ का न्यूनतम मान ज्ञात करें।
(A) 10 (B) 11
(C) 15 (D) 20

10. Find maximum and minimum value of $6\sin\theta + 8\cos\theta$.
$6\sin\theta + 8\cos\theta$ का अधिकतम और न्यूनतम मान ज्ञात करें।
(A) ± 10 (B) ± 7
(C) ± 14 (D) ± 2

11. Find maximum and minimum value of $11\cos^2 x + 6\sin x\cos x + 3\sin^2 x$.
$11\cos^2 x + 6\sin x\cos x + 3\sin^2 x$ का अधिकतम और न्यूनतम मान ज्ञात करें।
(A) 12,3 (B) 12, 4
(C) 12, 2 (D) 12, 5

12. Find maximum and minimum value of $3\sin\alpha + 4\cos\beta$.
$3\sin\alpha + 4\cos\beta$ का अधिकतम और न्यूनतम मान ज्ञात करें।
(A) 5, –5 (B) 7, –7
(C) 4, –4 (D) 3, –3

13. Find maximum and minimum value of $\sin^5\theta \times \cos^5\theta$.
$\sin^5\theta \times \cos^5\theta$ का अधिकतम और न्यूनतम मान ज्ञात करें।
(A) $\frac{1}{30}, -\frac{1}{31}$ (B) $\frac{1}{32}, -\frac{1}{32}$
(C) $\frac{1}{34}, -\frac{1}{35}$ (D) $\frac{1}{30}, -\frac{1}{30}$

Mother's

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

14. Find maximum and minimum value of $\sin^6\theta \times \cos^6\theta$.
$\sin^6\theta \times \cos^6\theta$ का अधिकतम और न्यूनतम मान ज्ञात करें।

(A) $\frac{1}{64}, 0$ (B) $\frac{1}{62}, 2$

(C) $\frac{1}{64}, 2$ (D) $\frac{1}{68}, 2$

15. Find maximum and minimum value of $\cos^4\theta + \sin^4\theta$.
$\cos^4\theta + \sin^4\theta$ का अधिकतम और न्यूनतम मान ज्ञात करें।

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

(C) $1, \frac{1}{4}$ (D) $1, \frac{1}{5}$

16. Find maximum and minimum value of $\sin^6\theta + \cos^6\theta$.
$\sin^6\theta + \cos^6\theta$ का अधिकतम और न्यूनतम मान ज्ञात करें।

(A) $1, \frac{1}{5}$ (B) $1, \frac{1}{4}$

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

17. Find maximum and minimum value of $\sin^2\theta + \cos^4\theta$.
$\sin^2\theta + \cos^4\theta$ का अधिकतम और न्यूनतम मान ज्ञात करें।

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

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

18. Find maximum and minimum value of $\sin^2\theta + \sin\theta$.
$\sin^2\theta + \sin\theta$ का अधिकतम और न्यूनतम मान ज्ञात करें।

(A) $1, -\frac{1}{2}$ (B) $2, -\frac{1}{4}$

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

19. Find maximum and minimum value of $10\sin\theta\cos\theta + 1 - 2\sin^2\theta$.
$10\sin\theta\cos\theta + 1 - 2\sin^2\theta$ का अधिकतम और न्यूनतम मान ज्ञात करें।

(A) $\sqrt{21}, -\sqrt{21}$ (B) $\sqrt{24}, -\sqrt{24}$

(C) $\sqrt{25}, -\sqrt{25}$ (D) $\sqrt{26}, -\sqrt{26}$

20. Find minimum value of $4\tan^2\theta + 9\cot^2\theta$
$4\tan^2\theta + 9\cot^2\theta$ का न्यूनतम मान ज्ञात करें।

(A) 10 (B) 11

(C) 12 (D) 13

21. Find minimum value of $13\sin^2\theta + 15\operatorname{cosec}^2\theta$.
$13\sin^2\theta + 15\operatorname{cosec}^2\theta$ का न्यूनतम मान ज्ञात करें।

(A) 28 (B) 24

(C) 27 (D) 32

22. Find minimum value of $32\sin^2\theta + 2\cot^2\theta$.
$32\sin^2\theta + 2\cot^2\theta$ का न्यूनतम मान ज्ञात करें।

(A) 12 (B) 14

(C) 13 (D) 10

23. Find minimum value of $16\cos^2\theta + 25(\sec^2\theta - 1)$.
$16\cos^2\theta + 25(\sec^2\theta - 1)$ का न्यूनतम मान ज्ञात करें।

(A) 13 (B) 15

(C) 16 (D) 10

24. Find minimum value of $49\sec^2\theta + 25\operatorname{cosec}^2\theta$.
$49\sec^2\theta + 25\operatorname{cosec}^2\theta$ का न्यूनतम मान ज्ञात करें।

(A) 144 (B) 150

(C) 155 (D) 170

25. Find minimum value of $2^{\sin^2\theta} + 2^{\cos^2\theta}$
$2^{\sin^2\theta} + 2^{\cos^2\theta}$ का न्यूनतम मान ज्ञात करें।

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

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

26. Find minimum value of $a^2\sec^2 x + b^2\operatorname{cosec}^2 x$.
$a^2\sec^2 x + b^2\operatorname{cosec}^2 x$ का न्यूनतम मान ज्ञात करें।

(A) $(a + b^2)$ (B) $(a + b)^2$

(C) $(a - b)$ (D) $(a - b)^2$

27. Find minimum value of $\sin^2\alpha + \operatorname{cosec}^2\alpha + \cos^2\beta + \sec^2\beta + \tan^2\gamma + \cot^2\gamma$.
$\sin^2\alpha + \operatorname{cosec}^2\alpha + \cos^2\beta + \sec^2\beta + \tan^2\gamma + \cot^2\gamma$ का न्यूनतम मान ज्ञात करें।

(A) 1 (B) 4

(C) 6 (D) 8

28. Find minimum value of $\sin^2\theta + \operatorname{cosec}^2\theta + \cos^2\theta + \sec^2\theta + \tan^2\theta + \cot^2\theta$.
$\sin^2\theta + \operatorname{cosec}^2\theta + \cos^2\theta + \sec^2\theta + \tan^2\theta + \cot^2\theta$ का न्यूनतम मान ज्ञात करें।

(A) 5 (B) 7

(C) 10 (D) 14

29. Find maximum and minimum value of $A = \cos^2\theta + \sin^4\theta$.
$A = \cos^2\theta + \sin^4\theta$ का अधिकतम और न्यूनतम मान ज्ञात करें।

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

(C) $1, \frac{3}{4}$ (D) $1, \frac{3}{5}$

30. What is the least value of $3\sin^2\theta + 4\cos^2\theta$?
$3\sin^2\theta + 4\cos^2\theta$ का न्यूनतम मान क्या है ?
(A) 5 (B) 4
(C) 3 (D) 2

31. If $p = \sin^2\theta + \cos^4\theta$ for $0 \le \theta \le \frac{\pi}{2}$, then consider the following statements :

यदि $0 \le \theta \le \frac{\pi}{2}$ के लिए $p = \sin^2\theta + \cos^4\theta$ है, तो निम्नलिखित कथनों पर विचार कीजिए :

i. p can be less than $\frac{3}{4}$./ p, $\frac{3}{4}$ से कम हो सकता है।

ii. p can be more than 1./ p, 1 से अधिक हो सकता है।

Which of the above statements is/are correct ?
उपर्युक्त कथनों में से कौन-सा/से सही है/हैं ?
(A) i Only (B) ii Only
(C) Both i and ii (D) Neither i nor ii

32. $\cos3\theta + \sin3\theta$ is maximum when θ is :
θ के किस मान के लिए $\cos3\theta + \sin3\theta$ का मान अधिकतम होगा-
(A) 15° (B) 30°
(C) 45° (D) 60°

33. The maximum value of $\sin x \cdot \cos x$ is:
$\sin x \cdot \cos x$ का मान अधिकतम होगा-
(A) 2 (B) $\sqrt{2}$
(C) $\frac{1}{2}$ (D) 2

34. The maximum and minimum value of $(1 + \cos2x)$ are.
$(1 + \cos2x)$ का अधिकतम और न्यूनतम मान है-
(A) –1 and 1 (B) 1 and 2
(C) $-\frac{1}{2}$ and $\frac{1}{2}$ (D) 0 and 2

35. If $0 \le \theta \le \frac{\pi}{2}$, then which of the following is true ?

यदि $0 \le \theta \le \frac{\pi}{2}$, तो निम्न में से कौन-सा सत्य है ?
(A) $(\tan^2\theta + \cot^2\theta) \ge 2$ (B) $(\tan^2\theta + \cot^2\theta) \le 2$
(C) $(\tan^2\theta + \cot^2) \le 1$ (D) None of these

36. $\sin x + \sqrt{3}\cos x$ is maximum when x is

x के किस मान के लिए, $\sin x + \sqrt{3}\cos x$ का मान अधिकतम होगा-
(A) $x = 30°$ (B) $x = 0°$
(C) $x = 45°$ (D) $x = 60°$

37. What is the minimum value of $\sin^6\theta + \cos^6\theta$?
$\sin^6\theta + \cos^6\theta$ का न्यूनतम मान है-
(A) $\frac{1}{2}$ (B) $\frac{1}{4}$
(C) 1 (D) None of these

38. The greatest value of is $81^{\sin x} \cdot 27^{\cos x}$ is:
$81^{\sin x} \cdot 27^{\cos x}$ का अधिकतम मान है-
(A) 3^5 (B) 3^4
(C) 3 (D) 3^3

39. The ratio of the greatest value of $2 - \cos x + \sin^2 x$ its least value is :
$2 - \cos x + \sin^2 x$के अधिकतम और न्यूनतम मान का अनुपात ज्ञात करें।
(A) $\frac{1}{4}$ (B) $\frac{9}{4}$ (C) $\frac{13}{4}$ (D) $\frac{7}{4}$

40. $3\sin x + 4\cos x + r$ is always greater than or equal to 0. What is the smallest value 'r' can to take ?
$3\sin x + 4\cos x + r$ हमेशा 0 से बड़ा या उसके बराबर है, तो 'r' का न्यूनतम मान क्या हो सकता है ?
(A) 5 (B) –5
(C) 4 (D) 3

41. Consider the following statement:
निम्नलिखित कथन पर विचार करें:

i. $\sin\theta = x + \frac{1}{x}$ is possible for some real value of x.

$\sin\theta = x + \frac{1}{x}$, x के कुछ वास्तविक मूल्य के लिए संभव हैं।

ii. $\cos\theta = x + \frac{1}{x}$ is possible for some real value of x.

$\cos\theta = x + \frac{1}{x}$, x के कुछ वास्तविक मूल्य के लिए संभव हैं।

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

42. Cosider the following statements :
निम्नलिखित कथनों पर विचार करें।

i. The value of cos 61° + sin 29° cannot exceed 1.
cos 61° + sin 29° का मान 1 से अधिक नहीं हो सकता।

ii. The value of tan 23° – cot 67° is less than 0.
tan23° – cot 67° का मान 0 से कम हैं।

Which of the above statements is/are correct?
उपरोक्त कथनों में से कौन-सा सही है।

(A) i Only
(B) ii Only
(C) Both i and ii
(D) Neither i nor ii

43. If $\sin\theta\cos\theta = k$, where $0 \le \theta \le \frac{\pi}{2}$, then which one of the following is correct ?

यदि $\sin\theta\cos\theta = k$ है, जहाँ $0 \le \theta \le \frac{\pi}{2}$ हो, तो निम्नलिखित में से कौनसा सही है ?

(A) $0 \le k \le 1$ (B) $0 \le k \le 0.5$ only
(C) $0.5 \le k \le 1$ only (D) $0 < k < 1$

44. What is the ratio of the greatest to the smallest value of $2 - 2\sin x - \sin^2 x$, $0 \le x \le \frac{\pi}{2}$?

$2 - 2\sin x - \sin^2 x$, $0 \le x \le \frac{\pi}{2}$ के महत्तम मान का इसके लघुत्तम मान से अनुपात क्या है ?

(A) –3 (B) –2
(C) 2 (D) 3

Solution

1.(A) $10 - \sin^2\theta$
Max = 10 – 0 = 10
Min = 10 – 1 = 9

2.(D) $20 - \tan^2\theta$
Max = 20 – 0 = 20
Min = Not Defined

3.(C) $12 - \sec^2\theta$
Max = 12 – 1 = 11
Min = Not Defined

4.(C) $17 + \text{cosec}^2\theta$
Max = Not Defined
Min = 17 + 1 = 18

5.(D) $16 - 17\cot^2\theta$
Max = Not defined

6.(B) $10 + 2\sec^2\theta$
Max = Not Defined
Min = 12

7.(D) $9\sin^2\theta + 21\cos^4\theta$
Max = 21
Min = 9
then the ratio is 7 : 3

8.(B) $-(9\sin^2\theta + 8\cos^2\theta)$
Max = –8
Min = –9

9.(A) $11\sec^2\theta + 17\tan^2\theta$
$11 + 11\tan^2\theta + 17\tan^2\theta$
$11 + 28\tan^2\theta$
Min
11 + 0 = 11

10.(C) $6\sin\theta + 8\cos^2\theta$

$\text{Max} = \sqrt{a^2 + b^2} = 10$

$\text{Min} = -\sqrt{a^2 + b^2} = -10$

11.(C) $11\cos^2 x + 6\sin x\cos x + 3\sin^2 x$
$9\cos^2 x + 6\sin\theta\cos\theta + \sin^2\theta + 2$
$(3\cos\theta + \sin\theta)^2 + 2$

$\text{Max} = \left(\sqrt{10}\right)^2 + 2 = 12$

Min = 0 + 2 = 2

12.(B) $3\sin\alpha + 4\cos\beta$
Max = 3 + 4 = 7
Min = –3 –4 = –7

13.(B) $\sin^5\theta \times \cos^5\theta$

$\text{Max} = \left(\frac{1}{2}\right)^5 = \frac{1}{32}$

$\text{Min} = -\left(\frac{1}{2}\right)^5 = -\frac{1}{32}$

14.(A) $\sin^6\theta \times \cos^6\theta$

$\text{Max} = \left(\frac{1}{2}\right)^6 = \frac{1}{64}$

Min = 0

15.(A) $\sin^4\theta + \cos^4\theta$
$1 - 2\sin^2\theta \cdot \cos^2\theta$
Max = 1 – 0 = 1

$\text{Min} = 1 - 2 \times \left(\frac{1}{2}\right)^2 = \frac{1}{2}$

16.(B) $\sin^6\theta + \cos^6\theta$
$1 - 3\sin^2\theta \cdot \cos^2\theta$
Max = 1 – 0 = 1

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

Mother's

17.(A) $\sin^2\theta + \cos^4\theta$

$1 - \cos^2\theta + \cos^4\theta$

$\cos^4\theta - \cos^2\theta + \frac{1}{4} - \frac{1}{4} + 1$

$\left(\cos^2\theta - \frac{1}{2}\right)^2 + \frac{3}{4}$

Max = $\frac{1}{4} + \frac{3}{4} = 1$; Min = $\frac{3}{4}$

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

$= \sin^2\theta + 2 \times \frac{1}{2}\sin\theta + \frac{1}{4} - \frac{1}{4}$

$= \left(\sin\theta + \frac{1}{2}\right)^2 - \frac{1}{4}$

Max = $\left(1 + \frac{1}{2}\right)^2 - \frac{1}{4} = \frac{9}{4} - \frac{1}{4} = 2$

Min = $0 - \frac{1}{4} = -\frac{1}{4}$

19.(D) $10\sin\theta\cos\theta + 1 - 2\sin^2\theta$

$= 5 \times 2\sin\theta\cos\theta + \cos 2\theta$

$= 5\sin 2\theta + \cos 2\theta$

Max = $\sqrt{25+1} = \sqrt{26}$

Min = $\sqrt{25+1} = -\sqrt{26}$

20.(C) $4\tan^2\theta + 9\cot^2\theta$

Min = $2\sqrt{ab} = 2\sqrt{4 \times 9} = 12$

21.(C) $13\sin^2\theta + 14\operatorname{cosec}^2\theta$

Min = a + b = 13 + 14 = 27

22.(B) $32\sin^2\theta + 2\cot^2\theta$

Min $\Rightarrow 32\sin^2\theta + 2(\operatorname{cosec}^2\theta - 1)$

$32\sin^2\theta + 2\operatorname{cosec}^2\theta - 2$

Min $\Rightarrow 2\sqrt{ab} - 2$

$= 2 \times \sqrt{32 \times 2} - 2$

$= 16 - 2 = 14$

23.(C) $16\cos^2\theta + 25(\sec^2\theta - 1)$

$16\cos^2\theta + 25\sec^2\theta - 25$

Min $\Rightarrow 16 + 25 - 25 = 16$

24.(A) $49\sec^2\theta + 25\operatorname{cosec}^2\theta$

Min $\Rightarrow \left(\sqrt{a} + \sqrt{b}\right)^2$

$= \left(\sqrt{49} + \sqrt{25}\right)^2$

$= (7 + 5)^2 = 144$

25.(A) AM > GM

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

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

26.(B) $A = a^2\sec^4x + b^2\operatorname{cosec}^4x$

Min = $\left[\sqrt{a^2} + \sqrt{b^2}\right]^2$

$= (a + b)^2$

27.(C) $\sin^2\alpha + \operatorname{cosec}^2\alpha + \cos^2\beta + \sec^2\beta + \tan^2\gamma + \cot^2\gamma$

For Min Value

$\sin\theta + \operatorname{cosec}\theta = 2$

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

So,

$2 + 2 + 2 = 6$

28.(B) $\sin^4\theta + \cos^4\theta + \sec^4\theta + \operatorname{cosec}^4\theta + \tan^2\theta + \cot^2\theta$

$= 1 + 1 + \tan^2\theta + 1 + \cot^2\theta + \tan^2\theta + \cot^2\theta$

$= 3 + 2(\tan^2\theta + \cot^2\theta)$

$= 3 + 2 \times 2$

$\therefore$ Min $2\sqrt{ab} = 2\sqrt{1 \times 1} = 2$

$= 7$

29.(C) $A = \cos^2\theta + \sin^4\theta$

Max = 1

Min = 45°

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

30.(C) minimum value of $3\sin^2\theta + 4\cos^2\theta$

$\Rightarrow$ Put $\theta = 90°$

$\Rightarrow$ $3(1) + 4(0) = 3$

31.(D) $p = \sin^2\theta + \cos^4\theta$

$= 1 - \cos^2\theta + \cos^4\theta$

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

$= 1 - \cos^4\theta\sin^2\theta$

$= 1 - \frac{\sin^2 2\theta}{4}$

$= 1$, if $\theta \leq 0°$

$= \frac{3}{4}$, if $\theta \leq 45°$

32.(A) $\cos 3\theta + \sin 3\theta$

$= \sqrt{2}\left(\frac{1}{\sqrt{2}}\cos 3\theta + \frac{1}{\sqrt{2}}\sin 3\theta\right)$

$= \sqrt{2}(\sin 45° \cdot \cos 3\theta + \cos 45° \cdot \sin 3\theta)$

$= \sqrt{2}\sin(45° + 3\theta)$

The maximum value occurs when

$\sin(45° + 3\theta) = 1$

i.e. $3\theta = 45° \Rightarrow \theta = 15°$

33.(C) $\sin x \cdot \cos x = \frac{1}{2}(2\sin x \cdot \cos x)$

$= \frac{1}{2}\sin 2x \leq \frac{1}{2}$

$[\because -1 \leq \sin 2x \leq 1]$

Hence max value of $\sin x \cdot \cos x$ is $\frac{1}{2}$.

34.(D) We know that

$= -1 \leq \cos\theta \leq 1$

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org

$\therefore -1 \le \cos 2x \le 1$ Or
$-1 + 1 \le 1 + \cos 2x \le 1 + 1$
$\Rightarrow 0 \le 1 + \cos 2x \le 2$

35.(A) $\tan^2\theta + \cot^2\theta = \tan^2\theta + \cot^2\theta - 2\tan\theta \cdot \cot\theta + 2\tan\theta \cdot \cot\theta$
$= (\tan\theta - \cot\theta)^2 + 2 \ge 2$

36.(A) Let $y = \sin x + \sqrt{3}\cos x$

$$= 2\left(\frac{1}{2}\sin x + \frac{\sqrt{3}}{2}\cos x\right)$$

$= 2\sin(x + 60°)$
y will be maximum, when $\sin(x + 60°)$ maximum
i.e. $\sin(x + 60°) = 1 = \sin 90°$
$\Rightarrow x + 60° = 90°$
$\Rightarrow x = 30°$

37.(B) $x = \sin^6\theta + \cos^6\theta$
$\Rightarrow x = (\sin^2\theta)^3 + (\cos^2\theta)^3$
$\Rightarrow x = (\sin^2\theta + \cos^2\theta)$
$\sin^4\theta + \cos^4\theta - \sin^2\theta \cdot \cos^2\theta$
$(\sin^4\theta + \cos^4\theta - \sin^2\theta \cdot \cos^2\theta)$
$x = 1 \times [(\sin^2\theta + \cos^2\theta)^2 - 3\sin^2\theta \cdot \cos^2\theta]$
$x = 1 - 3\sin^2\theta \cdot \cos^2\theta$

$$x = 1 - \frac{3}{4}(2\sin\theta \cdot \cos\theta)^2$$

$$x = 1 - \frac{3}{4}\sin^2 2\theta$$

$\because 0 \le \sin^2 2\theta \le 1$
$\therefore$ at $\sin^2 2\theta = 0$

$$x = 1 - \frac{3}{4}(0) = 1$$

and at $\sin^2 2\theta = 1$

$$x = 1 - \frac{3}{4}(1) = \frac{1}{4}$$

i.e. $\frac{1}{4} \le x \le 1$
i.e. least value of

$$\sin^6\theta + \cos^6\theta = \frac{1}{4}$$

38.(A) $81^{\sin x} \cdot 27^{\cos x} = 3^{4\sin x} \cdot 3^{3\cos x}$
$= 3^{4\sin x + 3\cos x}$
For maximum value,
$4\sin x + 3\cos x$ must be maximum and maximum value of :
$4\sin x + 3\cos x$
$= \sqrt{4^2 + 3^2} = 5$
$\therefore$ Greatest value of
$81^{\sin x} \cdot 27^{\cos x} = 3^5$

39.(C) $2 - \cos x + \sin^2 x$
$= 2 - \cos x + 1 - \cos^2 x$
$= -(\cos^2 x + \cos x) + 3$

$$= -\left[\left(\cos x + \frac{1}{2}\right)^2 - \frac{1}{4}\right] + 3$$

$$= \frac{13}{4} - \left(\cos x + \frac{1}{2}\right)^2$$

$\therefore$ Max, value occurs at

$$\cos x = -\frac{1}{2} \quad \text{and it is } \frac{13}{4}$$

and Min. value occurs at $\cos x = 1$ and it is 1

$\therefore$ The required ratio is $\frac{13}{4}$.

40.(A) $3\sin x + 4\cos \ge -r$

$$5\left(\frac{3}{5}\sin x + \frac{4}{5}\cos x\right) \ge -r$$

$\frac{3}{5} = \cos A \Rightarrow \sin A = \frac{4}{5}$
$5(\sin x \cos A + \sin A \cos x) \ge -r$
$5(\sin(x + A)) \ge -r$
$5\sin(x + A) \ge -r$
$5\sin(x + A) \le -5$
$r_{min} = 5$

41. (D) $\sin\theta = x + \frac{1}{x}$
$-1 \le \sin\theta \le 1$
$\cos\theta$
$\theta \le \cos\theta \le 1$
for any value of x both statement is not satisfied
(D) Neither i or nor ii.

42.(A) Statement – (i)
$\cos 61° + \sin 29°$
$= 2\sin 29°$
$\sin 29°$ Is less 0.5
Statement (i) is correct
Statement – (ii)
$\tan 23° - \cot 67°$
$\tan 23° - \tan 23° = 0$
Statement (ii) is wrong.

43.(B) $\sin\theta\cos\theta = k$
$2\sin\theta\cos\theta = 2k$

$$\Rightarrow \quad \frac{\sin 2\theta}{2} = k$$

$$\Rightarrow \quad 0 \le \theta \le 45°$$

$$\Rightarrow \quad 0 \le k \le \frac{1}{2}$$

$\Rightarrow \quad 0 \le k \le 0.5$ only

44.(B) $2 - 2\sin x - \sin^2 x$
$\max \rightarrow x = 0°$
$\Rightarrow \quad 2 - 0 - 0 = 2$
$\min = x = 90°$
$= 2 - 2 - 1 = -1$

$$\text{ratio} = \frac{2}{-1} = -2$$

Notes

Mother's

HEAD OFFICE : 201, Himmat Nagar, Gopalpura Mode, Tonk Road, Jaipur-302018
0141-2711689, +91-7073909991 | www.motherseducationhub.org