सरलीकरण | Simplification

Type-9 (Surds & Indices)

1. If $\sqrt[3]{0.014\times0.14x} = 0.014\times0.14\sqrt[3]{y}$ then $\frac{x}{y}$ is equal to

यदि $\sqrt[3]{0.014\times0.14x} = 0.014\times0.14\sqrt[3]{y}$ तो $\frac{x}{y}$ का मान ज्ञात कीजिए ?

(A) 0.000196 (B) 0.00196
(C) 0.0196 (D) 0.196

2. $\sqrt{x^{-1}y}.\sqrt{y^{-1}z}.\sqrt{z^{-1}x} = ?$

(A) xyz (B) $\sqrt{xyz}$

(C) $\frac{1}{xyz}$ (D) 1

3. $\left(\frac{x^a}{x^b}\right)^{1/ab}\times\left(\frac{x^b}{x^c}\right)^{1/bc}\times\left(\frac{x^c}{x^a}\right)^{1/ca} = ?$

(A) 1
(B) $x^{1/abc}$
(C) $x^{1/(ab+bc+ca)}$
(D) None of these

4. If $5^{\sqrt{x}}+12^{\sqrt{x}} = 13^{\sqrt{x}}$, the value of x is—

यदि $5^{\sqrt{x}}+12^{\sqrt{x}} = 13^{\sqrt{x}}$ हो, तो x का मान होगा—

(A) $\frac{25}{4}$ (B) 4
(C) 9 (D) 16

5. $\left[\left(x+\frac{1}{y}\right)^a\left(x-\frac{1}{y}\right)^b\right]\div\left[\left(y+\frac{1}{x}\right)^a\left(y-\frac{1}{x}\right)^b\right]$ is equal to–

$\left[\left(x+\frac{1}{y}\right)^a\left(x-\frac{1}{y}\right)^b\right]\div\left[\left(y+\frac{1}{x}\right)^a\left(y-\frac{1}{x}\right)^b\right]$ के बराबर है —

(A) $\left(\frac{x}{y}\right)^{a-b}$ (B) $\left(\frac{x}{y}\right)^{a+b}$

(C) $\left(\frac{y}{x}\right)^{a+b}$ (D) $\left(\frac{y}{x}\right)^{a-b}$

6. The value of $\frac{1}{1+x^{b-a}+x^{c-a}}+\frac{1}{1+x^{c-b}+x^{a-b}}+\frac{1}{1+x^{a-c}+x^{b-c}}$ is –

$\frac{1}{1+x^{b-a}+x^{c-a}}+\frac{1}{1+x^{c-b}+x^{a-b}}+\frac{1}{1+x^{a-c}+x^{b-c}}$ का मान है —

(A) 1 (B) 2
(C) 3 (D) 4

7. The value of $\frac{4^n\times20^{m-1}\times12^{m-n}\times15^{m-n-2}}{16^m\times5^{2m-n}\times9^{m-1}}$ is –

व्यंजक $\frac{4^n\times20^{m-1}\times12^{m-n}\times15^{m-n-2}}{16^m\times5^{2m-n}\times9^{m-1}}$ का मान है —

(A) $\frac{1}{50}$ (B) $\frac{1}{500}$ (C) $\frac{1}{100}$ (D) $\frac{1}{5}$

8. The value of

$\frac{(0.3)^{1/3}.\left(\frac{1}{27}\right)^{1/4}.(9)^{1/6}.(0.81)^{2/3}}{(0.9)^{2/3}.(3)^{-1/2}.\left(\frac{1}{3}\right)^2.(243)^{-1/4}}$ is /का मान है —

(A) 3 (B) 0.03
(C) 0.3 (D) 30

9. If the value of

$\frac{52.5\times52.5-2493.75+47.5\times47.5}{525^3+475^3} = 10^{-k}$ Then find the value of k = ?

यदि $\frac{52.5\times52.5-2493.75+47.5\times47.5}{525^3+475^3} = 10^{-k}$ फिर k का मान ज्ञात कीजिए ?

(A) 3 (B) 4
(C) 5 (D) 6

10. If $2^x = 4^y = 8^z$ and xyz = 288, then the value of $\frac{1}{2x} + \frac{1}{4y} + \frac{1}{6z}$ is –

$2^x = 4^y = 8^z$ और xyz = 288, तब $\frac{1}{2x} + \frac{1}{4y} + \frac{1}{6z}$ का मान ज्ञात करें ?

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

(C) $\frac{1}{15}$ (D) $\frac{1}{2}$

11. If $x^m = \sqrt[14]{x\sqrt{x\sqrt{x}}}$ then find the value of m.

यदि $x^m = \sqrt[14]{x\sqrt{x\sqrt{x}}}$ है, तो m का मान क्या है ?

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

(C) $\frac{3}{4}$ (D) $\frac{7}{4}$

12. If $2^m + 2^{1+m} = 24$, then what is the value of m?

यदि $2^m + 2^{1+m} = 24$ हो, तो m का मान क्या हैं ?

(A) 0 (B) $\frac{1}{3}$ (C) 3 (D) 6

13. If $16 \times 8^{n+2} = 2^m$ then m is equal to.

यदि $16 \times 8^{n+2} = 2^m$ है तो m किसके तुल्य हैं ?

(A) n + 8
(B) 2n + 10
(C) 3n + 2
(D) 3n + 10

14. The expression $\left[\left(\sqrt{2}\right)^{\sqrt{2}}\right]^{\sqrt{2}}$ gives.

व्यंजक $\left[\left(\sqrt{2}\right)^{\sqrt{2}}\right]^{\sqrt{2}}$ क्या हैं ?

(A) a natural number/ धन पूर्णांक हैं
(B) an integer and not a natural number
पूर्णांक है और धन पूर्णांक नहीं हैं
(C) a rational number but not an integer
परिमेय संख्या हैं, किन्तु पूर्णांक नहीं हैं
(D) a real number but not a rational number
वास्तविक संख्या हैं, किन्तु परिमेय संख्या नहीं हैं

15. If $p^x = r^y = m$ and $r^w = p^z = n$ then which one of the following is correct ?

यदि $p^x = r^y = m$ और $r^w = p^z = n$ हैं, तो निम्नलिखित में से कौन-सा एक सही हैं ?

(A) xw = yz (B) xz = yw
(C) x + y = w + z (D) x – y = w – z

16. Find the value of $\left[7\left(64^{\frac{1}{3}} + 27^{\frac{1}{3}}\right)^3\right]^{\frac{1}{4}}$

$\left[7\left(64^{\frac{1}{3}} + 27^{\frac{1}{3}}\right)^3\right]^{\frac{1}{4}}$ का मान ज्ञात करें।

(A) 7 (B) 6
(C) 49 (D) 343

17. If $9^x = \sqrt[11]{243}$, then what is the value of x?

यदि $9^x = \sqrt[11]{243}$ है, तो x का मान क्या है ?

(A) 5/11
(B) 5/22
(C) 5/7
(D) 5/33

18. What value of 'p' will satisfy the equation $\frac{p}{\sqrt{540}} = \frac{\sqrt{240}}{p}$?

p का कौनसा मान $\frac{p}{\sqrt{540}} = \frac{\sqrt{240}}{p}$ समीकरण को संतुष्ट करेगा ?

(A) 6 (B) 10
(C) $6\sqrt{10}$ (D) $\sqrt{10}$

19. What is the simplified value of $\sqrt[3]{3125} + 4\sqrt[3]{25} + 3\sqrt[3]{675}$?

$\sqrt[3]{3125} + 4\sqrt[3]{25} + 3\sqrt[3]{675}$ का सरलीकृत मान क्या है ?

(A) $18\sqrt[3]{25}$
(B) $5\sqrt[3]{25}$
(C) $9\sqrt{125}$
(D) $\sqrt[3]{125}$

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20. If /यदि $\frac{(17)^3+(7)^3}{\left(17^2+7^2-k\right)}=24$,

then what is the value of k?
है, तो k का मान क्या है ?

(A) 119 (B) 128
(C) 24 (D) 109

21. If $\frac{4\left[(17)^3-(7)^3\right]}{\left(17^2+7^2+p\right)}=40$, then what is the value of p?

यदि $\frac{4\left[(17)^3-(7)^3\right]}{\left(17^2+7^2+p\right)}=40$ है, तो p का मान क्या है ?

(A) – 119 (B) – 129
(C) 119 (D) 129

22. The value of

$$\frac{428\times428\times428+348\times348\times348}{428\times428-428\times348+348\times348}$$ is :

$$\frac{428\times428\times428+348\times348\times348}{428\times428-428\times348+348\times348}$$

का मान क्या होगा ?

(A) 776 (B) 62080
(C) 80 (D) 40

23. Which of the following statement is correct?
निम्नलिखित में से कौन सा कथन सही है ?

I. The value of $100^2-99^2+98^2-97^2+96^2-95^2+94^2-93^2+\ldots\ldots+22^2-21^2$ is 4840.
$100^2-99^2+98^2-97^2+96^2-95^2+94^2-93^2+\ldots\ldots+22^2-21^2$ का मान 4840 है।

II. The value of $\left(k^2+\frac{1}{k^2}\right)\left(k-\frac{1}{k}\right)\left(k^4+\frac{1}{k^4}\right)$ is $k^{16}-\frac{1}{k^{16}}$

II. $\left(k^2+\frac{1}{k^2}\right)\left(k-\frac{1}{k}\right)\left(k^4+\frac{1}{k^4}\right)$ का मान $k^{16}-\frac{1}{k^{16}}$ है।

(A) Neither I nor II/ ना ही ना ही
(B) Only II/ केवल II
(C) Only I/ केवल I
(D) Both I and II/ I तथा II दोनों

24. Simplify the following.
निम्नलिखित को सरल करें।

$25^3-75^3+50^3$

(A) – 281250 (B) 281350
(C) 271250 (D) – 281450

25. What is the value of

$$\left(k-\frac{1}{k}\right)\left(k^2+\frac{1}{k^2}\right)\left(k^4+\frac{1}{k^4}\right)\left(k^8+\frac{1}{k^8}\right)\left(k^{16}+\frac{1}{k^{16}}\right)\left(k^{32}+\frac{1}{k^{32}}\right)$$?

$$\left(k-\frac{1}{k}\right)\left(k^2+\frac{1}{k^2}\right)\left(k^4+\frac{1}{k^4}\right)\left(k^8+\frac{1}{k^8}\right)\left(k^{16}+\frac{1}{k^{16}}\right)\left(k^{32}+\frac{1}{k^{32}}\right)$$ का मान क्या है ?

(A) $\frac{k^{64}-\frac{1}{k^{64}}}{k+\frac{1}{k}}$ (B) $\frac{k^{32}-\frac{1}{k^{32}}}{k-\frac{1}{k}}$

(C) $\frac{k^{32}-\frac{1}{k^{32}}}{k+\frac{1}{k}}$ (D) $\frac{k^{32}+\frac{1}{k^{32}}}{k+\frac{1}{k}}$

SOLUTIONS

1. (B) $\sqrt{0.014\times0.14x}=0.014\times0.14\sqrt{y}$

Doing square of both sides

$0.014 \times 0.14x = (0.014)^2 \times (0.14)^2\, y$

$\Rightarrow \dfrac{x}{y}=0.014\times0.14=0.00196$

2. (D) $\sqrt{x^{-1}y}\times\sqrt{y^{-1}z}\times\sqrt{z^{-1}x} = \sqrt{\dfrac{y}{x}}\times\sqrt{\dfrac{z}{y}}\times\sqrt{\dfrac{x}{z}}=1$

3. (A) $\left(\dfrac{x^a}{x^b}\right)^{\frac{1}{ab}}\times\left(\dfrac{x^b}{x^c}\right)^{\frac{1}{bc}}\times\left(\dfrac{x^c}{x^a}\right)^{\frac{1}{ca}} = x^{\frac{1}{a}-\frac{1}{b}+\frac{1}{c}+\frac{1}{a}} = x^0 = 1$

4. (B) ATQ, $5^{\sqrt{x}}+12^{\sqrt{x}}=13^{\sqrt{x}}$

As we know, $5^2 + 12^2 = 13^2$

By comparison,

$\sqrt{x} = 2$

$\Rightarrow x = 4$

5. (A) $\left[\left(x+\dfrac{1}{y}\right)^a\left(x-\dfrac{1}{y}\right)^b\right]\div\left[\left(y+\dfrac{1}{x}\right)^a\left(y-\dfrac{1}{x}\right)^b\right]$

$=\dfrac{(xy+1)^a}{y^a}\times\dfrac{(xy-1)^b}{y^b}\times\dfrac{x^a}{(xy+1)^a}\times\dfrac{x^b}{(xy-1)^b}$

$=\left(\dfrac{x}{y}\right)^{a-b}$

6. (A) $\dfrac{1}{1\times x^{b-a}+x^{c-a}}+\dfrac{1}{1\times x^{c-b}+x^{a-b}}+\dfrac{1}{1\times x^{a-c}+x^{b-c}}$

$=\dfrac{x^a}{x^a+x^b+x^c}+\dfrac{x^b}{x^a+x^b+x^c}+\dfrac{x^c}{x^a+x^b+x^c}$

$=\dfrac{x^a+x^b+x^c}{x^a+x^b+x^c}=1$

7. (B) $\dfrac{4^n\times20^{m-1}\times12^{m-n}\times15^{m-n-2}}{16^m\times5^{2m+n}\times9^{m-1}}$

$=\dfrac{2^{2n}\times2^{2m-2}\times5^{m-1}\times2^{2m-2n}\times3^{m-n}\times3^{m-n-2}\times5^{m+n-2}}{2^{4m}\times5^{2m+n}\times3^{2m-2}}$

$=2^{-2}\times3^{0}\times5^{-3}=\dfrac{1}{500}$

8. (C) $\dfrac{(0.3)^{\frac{1}{3}}\left(\frac{1}{27}\right)^{\frac{1}{4}}(9)^{\frac{1}{6}}(0.81)^{\frac{2}{3}}}{(0.9)^{\frac{2}{3}}(3)^{\frac{1}{2}}\left(\frac{1}{3}\right)^{2}(243)^{\frac{1}{4}}}$

$=\dfrac{3^{-1}\times3^{-1}\times3^{-8}\times10^{-2}\times3^{-1}\times3^{-5}}{10^{-1}\times3^{-3}\times10^{-4}\times3^{-4}\times3^{-2}}$

$=\dfrac{3^{-10-7}\times10^{-2}}{3^{-49}\times10^{-5}}=\dfrac{3}{10}=0.3$

9. (C) $\Rightarrow \dfrac{10^{-2}}{(525+475)}=\dfrac{10^{-2}}{1000}=\dfrac{10^{-2}}{10^3}=10^{-5}$

$= k = 5$

10. (A) $2^x = 4^y = 8^z$

$\Rightarrow 2^x = 2^{2y} = 2^{3z}$

$\Rightarrow x = 2y = 3z$

Given, $xyz = 288$

$\Rightarrow x\times\dfrac{x}{2}\times\dfrac{x}{3}=288$

$\Rightarrow x = \sqrt[3]{6\times6\times6\times2\times2\times2} = 12$

So, $y = 6$, $z = 4$

$\Rightarrow \dfrac{1}{2x}+\dfrac{1}{4y}+\dfrac{1}{6z}=\dfrac{1}{24}+\dfrac{1}{24}+\dfrac{1}{24}=\dfrac{1}{8}$

11. (A) $x^m = \sqrt[14]{x\times\sqrt{x^{3/2}}}$

$x^m = \sqrt[14]{x\times x^{3/4}}$

$x^m = \sqrt[14]{x^{7/4}}$

$x^m = x^{\frac{7}{4}\times\frac{1}{14}} =$

$\Rightarrow x^m = x^{\frac{1}{8}}$

$\therefore m = \dfrac{1}{8}$

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12. (C) दिया हैं, $2^m + 2^{1+m} = 24$

$\Rightarrow 2^m + 2^1 . 2^m = 24 \Rightarrow 2^m (1 + 2^1) = 24$

$\Rightarrow 2^m.3 = 24 \Rightarrow 2^m = 8 = 2^3$

$\therefore m = 3 \quad [\because a^m = a^n \Rightarrow m = n]$

13. (D) दिया हैं $16 \times 8^{n+2} = 2^m \Rightarrow (2)^4 \times 2^{3(n+2)} = 3n + 10$

$\Rightarrow 2^{(4 + 3n + 6)} = 2^m \Rightarrow 2^{(3n+10)} = 2^m$

$\Rightarrow 3n + 10 = m \quad [\because a^n = a^m \Rightarrow n = m]$

$\therefore m = 3n + 10$

14. (D) दिया गया व्यंजक = $\left[\left(\sqrt{2}\right)^{\sqrt{2}}\right]^{\sqrt{2}} \left(\sqrt{2}\right)^2 = (2)^{2/2} = 2$

जो कि एक वास्तविक संख्या हैं किन्तु परिमेय संख्या नहीं हैं।

15. (A) दिया हैं $p^x = r^y \Rightarrow r = p^{x/y}$

तथा $p^z = r^w \Rightarrow r = p^{z/y}$

सभी (i) व (ii) से

$$p^{x/y} = p^{z/w} \Rightarrow \frac{x}{y} = \frac{z}{w}$$

$\Rightarrow xw = yz$

16.(A) $7\left[\left(64^{1/3} + 27^{1/3}\right)^3\right]^{1/4} = 7\left[(4+3)^3\right]^{1/4} = 7$

17.(B) $9^x = \sqrt[11]{243}$

$\Rightarrow 9^{11x} = \sqrt{243}$

$\Rightarrow 9^{11x} = \sqrt[9]{3}$

$\Rightarrow x = \frac{5}{22}$

18.(C) $\frac{P}{\sqrt{540}} = \frac{\sqrt{240}}{P}$

$\Rightarrow P = \sqrt[6]{10}$

19.(A) $\sqrt[3]{3125} + 4\sqrt[3]{25} + 3\sqrt[3]{675}$

$= 5\sqrt[3]{25} + 4\sqrt[3]{25} + 3 \times 3\sqrt[3]{25}$

$= 18\sqrt[3]{25}$

20. **(A)** $\frac{(17)^3 + (7)^3}{(17^2 + 7^2 - k)} = 24$

$a + b = 17 + 7 = 24$

$\therefore \frac{a^3 + b^3}{a^2 + b^2 - ab} = (a + b)$

$k = ab = 17 \times 7 = 119.$

21. **(C)** $\frac{4\left[(17)^3 - (7)^3\right]}{(17^2 + 7^2 + P)} = 40$

$\frac{\left[(17)^3 - (7)^3\right]}{17^2 + 7^2 + P} = 10$

$\therefore a^3 - b^3 = (a - b)(a^2 + b^2 + ab)$ {identity}

$\frac{[17 - 7][17^2 + 7^2 + 7 \times 17]}{17^2 + 7^2 + P} = 10$

$17^2 + 7^2 + P = 17^2 + 7^2 + 7 \times 17$

$P = 17 \times 7 = 119.$

22. **(A)** $\frac{428 \times 428 \times 428 + 348 \times 348 \times 348}{428 \times 428 - 428 \times 348 + 348 \times 348}$

Identity, $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

$\frac{(428 + 348)(428 \times 428 - 428 \times 348 + 348 \times 348)}{428 \times 428 - 428 \times 348 + 348 \times 348}$

$= 428 + 348 = 776.$

23. **(C)** Statement - 1

1. $199 + 195 + 191 + \ldots\ldots\ldots\ldots + 43.$

$\ell = a + (n - 1)d$

$199 = 43 + (h - 1) \times 4$

$\boxed{h = 40}$

$S_n = \frac{n}{2}(a + \ell)$

$= \frac{40}{2}[43 + 199]$

$= 20 \times 242 = 4840$

Statement -1 is carrect

Statement - 2 is wrong.

Only statement - 1 is carrect.

24. (B) 97×103

$(100 - 3) \times (100 + 3)$

$\Rightarrow$ $(a - b)(a + b) = a^2 - b^2$

$= (100)^2 - (3)^2$

$= 9991.$

25. (A) $\left(k - \frac{1}{k}\right)\left(k^2 + \frac{1}{k^2}\right)\left(k^4 + \frac{1}{k^4}\right)\left(k^8 + \frac{1}{k^8}\right)\left(k^{16} + \frac{1}{k^{16}}\right)\left(k^{32} + \frac{1}{k^{32}}\right) \times \frac{\left(k + \frac{1}{k}\right)}{\left(k + \frac{1}{k}\right)}$

$$\frac{\left(k^2 - \frac{1}{k^2}\right)\left(k^2 + \frac{1}{k^2}\right)\left(k^8 + \frac{1}{k^8}\right)\left(k^{16} + \frac{1}{k^{16}}\right)\left(k^{32} + \frac{1}{k^{32}}\right)}{k + \frac{1}{k}}$$

similarly,

$a^2 - b^2 = (a - b)(a + b)$

$$= \frac{k^{64} - \frac{1}{k^{64}}}{k + \frac{1}{k}}.$$

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