

9. On comparing the following two numeric expressions $[(2\frac{7}{9})^{2\frac{1}{2}}]^{\frac{3}{5}}$ & $[(1\frac{2}{3})^5]^{\frac{3}{5}}$, we find that _____?

निम्नलिखित दो संख्यात्मक व्यंजक $[(2\frac{7}{9})^{2\frac{1}{2}}]^{\frac{3}{5}}$ & $[(1\frac{2}{3})^5]^{\frac{3}{5}}$ की तुलना करने पर हम पाते हैं कि _____?

(MTS 2023)

- [A] Both the expression are equal.
- [B] The first expression is smaller than the second.
- [C] The first expression is larger than second expression.
- [D] The given two expressions cannot be compared.

$(\frac{25}{9})^3$ $(\frac{5}{3})^3$

$[(\frac{25}{9})^3]^3$ $(\frac{5}{3})^3$

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$$\diamond \quad \text{if } x + y = \textcircled{A}$$

$$x - y = \textcircled{B}$$

$$\text{तो } x = \frac{A+B}{2}, \quad y = \frac{A-B}{2}$$



10. if $3^{x+y}=81$ and $81^{x-y}=3$ then $x*y=?$

~~[A]~~ $\frac{255}{64}$

[C] $\frac{240}{64}$

[B] $\frac{125}{32}$

[D] none #

$$3^{x+y} = 3^4$$

$$81^{x-y} = 81^{\frac{1}{4}}$$

$$\begin{aligned} x+y &= 4 \\ x-y &= \frac{1}{4} \end{aligned}$$

$$\begin{aligned} x &= \frac{4 + \frac{1}{4}}{2} = \frac{17}{8} \\ y &= \frac{15}{8} \end{aligned}$$

$$\frac{17}{8} \times \frac{15}{8}$$



11. If $\left(\frac{25}{9}\right)^{x+1} \times \left(\frac{81}{625}\right)^{x-1} = \frac{9}{25}$, then find the value of 'x'.

यदि $\left(\frac{25}{9}\right)^{x+1} \times \left(\frac{81}{625}\right)^{x-1} = \frac{9}{25}$ है, तो x का मान ज्ञात कीजिए।

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[A] 8

[B] 6

[C] 5

[D] 4 ✓ $x=4$

$$\left(\frac{25}{9}\right)^{x+1} \times \left(\frac{9}{25}\right)^{x-1}$$

$$\left(\frac{25}{9}\right)^{x+1} \times \left(\frac{25}{9}\right)^{1-x}$$

$$\Rightarrow \left(\frac{25}{9}\right)^{3-x} = \left(\frac{25}{9}\right)^{-1}$$



$$\left(\frac{1}{a}\right)^{-n} = \frac{1}{a^{-n}} = a^n$$

12. Find the value of $\left(\frac{1}{7}\right)^{-4} + \left(\frac{1}{9}\right)^{-4} + \left(\frac{1}{5}\right)^{-4}$.

$\left(\frac{1}{7}\right)^{-4} + \left(\frac{1}{9}\right)^{-4} + \left(\frac{1}{5}\right)^{-4}$ का मान ज्ञात करें।

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[A] 9584

[B] 9578

[C] 9587

[D] 9596

$$\begin{aligned} (9^2)^2 \\ 81^2 \end{aligned}$$

$$\begin{aligned} & 7^4 + 9^4 + 5^4 \\ & = 2401 + 6561 + 625 \\ & = \end{aligned}$$



13. The value of $\left(\frac{4096}{9}\right)^{-\left(\frac{3}{2}\right)} \times \left(\frac{4}{3}\right)^5 \div \sqrt[4]{(256)^{-3}}$ is:

$\left(\frac{4096}{9}\right)^{-\left(\frac{3}{2}\right)} \times \left(\frac{4}{3}\right)^5 \div \sqrt[4]{(256)^{-3}}$ का मान ज्ञात कीजिए।

$4096 = 16^3 = 64^2$

[A]

$\frac{1}{41}$

[B]

$\frac{1}{43}$

[C]

$\frac{1}{36}$

[D]

$\frac{1}{37}$

$\left(\sqrt[4]{256}\right)^{-3} = 4^{-3} = \frac{1}{4^3}$

$(4^3)^3$

$\left(\frac{3}{64}\right)^3 \times \left(\frac{4}{3}\right)^5 \times 4^3$

$= \frac{3^3}{4^9} \times \frac{4^5}{3^5} \times 4^3 = \frac{1}{4} \times \frac{1}{3^2} = \frac{1}{36}$



14. Find the value/मान ज्ञात करें।

$$\left[\left\{ (\underline{9261})^{1/3} \div \underline{81}^{1/4} \right\}^2 \times \sqrt[4]{\underline{1296}} \right]$$

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[A] 249

[C] 147

$1296 = 36^2 = 6^4$ [B] 174

~~[D] 294~~

$9261 = 21^3$

$= 7^2 \times 6$

$= 294$



15.

If $\left[\left\{ \left(\frac{2}{3} \right)^3 \right\}^{(2x+3)} \right]^{\frac{-3}{4}} = \left[\left\{ \left(\frac{2}{3} \right)^{\frac{2}{3}} \right\}^{(3x+7)} \right]^{\frac{-6}{5}}$, then the value of $\sqrt{2-42x}$ is:

यदि $\left[\left\{ \left(\frac{2}{3} \right)^3 \right\}^{(2x+3)} \right]^{\frac{-3}{4}} = \left[\left\{ \left(\frac{2}{3} \right)^{\frac{2}{3}} \right\}^{(3x+7)} \right]^{\frac{-6}{5}}$ है, तो $\sqrt{2-42x}$ का मान ज्ञात कीजिए।

[A] 5 ✓

[B] 6

[C] 3

[D] 4

$$\sqrt{2-(-23)} = 5$$

$$3 \times (2x+3) \times \frac{-3}{4} = \frac{2}{3} \times (3x+7) \times \frac{-6}{5}$$

$$90x + 135 = 48x + 112$$

$$42x = -23$$



16.

$\frac{(a^7 \times b^8 \times c^7)}{(a^9 \times b^5 \times c^4)}$ in simplified form is:

$\frac{(a^7) \times b^8 \times c^7}{(a^9) \times b^5 \times c^4}$ का सरलीकृत रूप ज्ञात कीजिए।

(SSC CGL MAINS 2024)

~~[A] $(a^0) \times (b^2) \times (c^1)$~~

~~[B] $(a^{-7}) \times (b^2) \times (c^{-4})$~~

~~[C] $(a^{-2}) \times (b^3) \times (c^3)$~~

~~[D] $(a^{-5}) \times (b^{-8}) \times (c^0)$~~



17. If $\frac{3^{a+3} \times 4^{a+6} \times 25^{a+1}}{27^{a-1} \times 8^{a-2} \times 125^{a+4}} = \frac{4}{15^{26}}$, then the value of $\sqrt{a+9}$ is:

यदि $\frac{3^{a+3} \times 4^{a+6} \times 25^{a+1}}{27^{a-1} \times 8^{a-2} \times 125^{a+4}} = \frac{4}{15^{26}}$ है, तो $\sqrt{a+9}$ का मान ज्ञात कीजिए।

[A] 4

[B] 6

[C] 5 ✓

[D] 8

$$\frac{2^{2a+12}}{2^{3a-6}} = 2^{2a}$$

$$\frac{2^{-a+18}}{2^0} = 2^{2a}$$

$$-a+18 = 2a$$

$$a = 16$$

20/12/✓



18.

If $\frac{9^n \times 3^2 \times \left(3^{-\frac{n}{2}}\right)^{-2} - (27)^n}{3^{3m} \times 2^3} = \frac{1}{729}$, then $m-n = ?$

[A] 3

[B] 1

[C] 2 ✓

[D] -2

$$\frac{3^{3n} \times 9 - 3^{3n}}{3^{3m} \times 8}$$

$$\frac{3^{3n} \times 8}{3^{3m} \times 8}$$

$$\frac{3^{3n}}{3^{3m}}$$

$$\frac{3^{3n-3m}}{3} = \frac{1}{3^6}$$

$$\begin{aligned} 3n-3m &= -6 \\ n-m &= -2 \end{aligned}$$



19. If $2^{x+y-2z} = 8^{8z-5-y}$, $5^{4y-6z} = 25^{y+z}$, $3^{4x-3z} = 9^{x+z}$ then the value of $2x + 3y + 5z$ is:

यदि $2^{x+y-2z} = 8^{8z-5-y}$, $5^{4y-6z} = 25^{y+z}$, $3^{4x-3z} = 9^{x+z}$ है तो $2x + 3y + 5z$ का मान बताइए।

$= 10 + 24 + 10$

- [A] 56
- [B] 44
- [C] 32
- [D] 28

$x+y-2z = 24z-15-3y$

$4y-6z = 2y+2z$

$4x-3z = 2x+2z$

$x+4y-2z = -15$

$2y = 8z$

$2x = 5z$

$\frac{5z}{2} - 10z = -15$

$y = 4z$
 $y = 8$

$x = \frac{5z}{2}$

$\frac{15z}{2} = 15 \Rightarrow z = 2$

$x = 5$

2017



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

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$$(3+\sqrt{5})^2 = \underbrace{3^2 + \sqrt{5}^2}_{\text{integers}} + 2 \times 3 \times \sqrt{5} = 14 + 6\sqrt{5} \checkmark$$

$$\sqrt{14 + 6\sqrt{5}} =$$

integer irrational

~~$$\sqrt{14 + 2 \times 3 \times \sqrt{5}}$$~~

~~$$= \sqrt{3^2 + \sqrt{5}^2 + 2 \times 3 \times \sqrt{5}}$$~~

~~$$= \sqrt{(3+\sqrt{5})^2} = 3+\sqrt{5} \checkmark$$~~

$$\diamond (a \pm b)^2 = a^2 + b^2 \pm 2ab$$

$$\blacksquare (3 + \sqrt{5})^2$$

$$\# \sqrt{14 + 6\sqrt{5}} = \sqrt{14 + 2 \times 3 \times \sqrt{5}} = 3 + \sqrt{5} \checkmark$$

$$\blacksquare \sqrt{9 + 4\sqrt{5}} = \sqrt{9 + 2 \times 2 \times \sqrt{5}} = 2 + \sqrt{5}$$

$$\blacksquare \sqrt{55 + 14\sqrt{6}} = \sqrt{55 + 2 \times 7 \times \sqrt{6}} = 7 + \sqrt{6}$$

$$\blacksquare \sqrt{91 + 6\sqrt{10}} = \sqrt{91 + 2 \times 3\sqrt{10} \times 1} = 3\sqrt{10} + 1$$

$$\blacksquare \sqrt{143 + 42\sqrt{10}} =$$



$$\sqrt{143 + 42\sqrt{10}} = 7\sqrt{2} + 3\sqrt{5}$$

$$2 \times 7 \times 3 \times 5 \times 2$$

$$\diamond \sqrt{a^2 + b^2 - 2ab}$$

$$a - b \quad (a > b)$$

$$b - a \quad (b > a)$$

$$\blacksquare (a - b)^2 = (b - a)^2 = a^2 + b^2 - 2ab$$

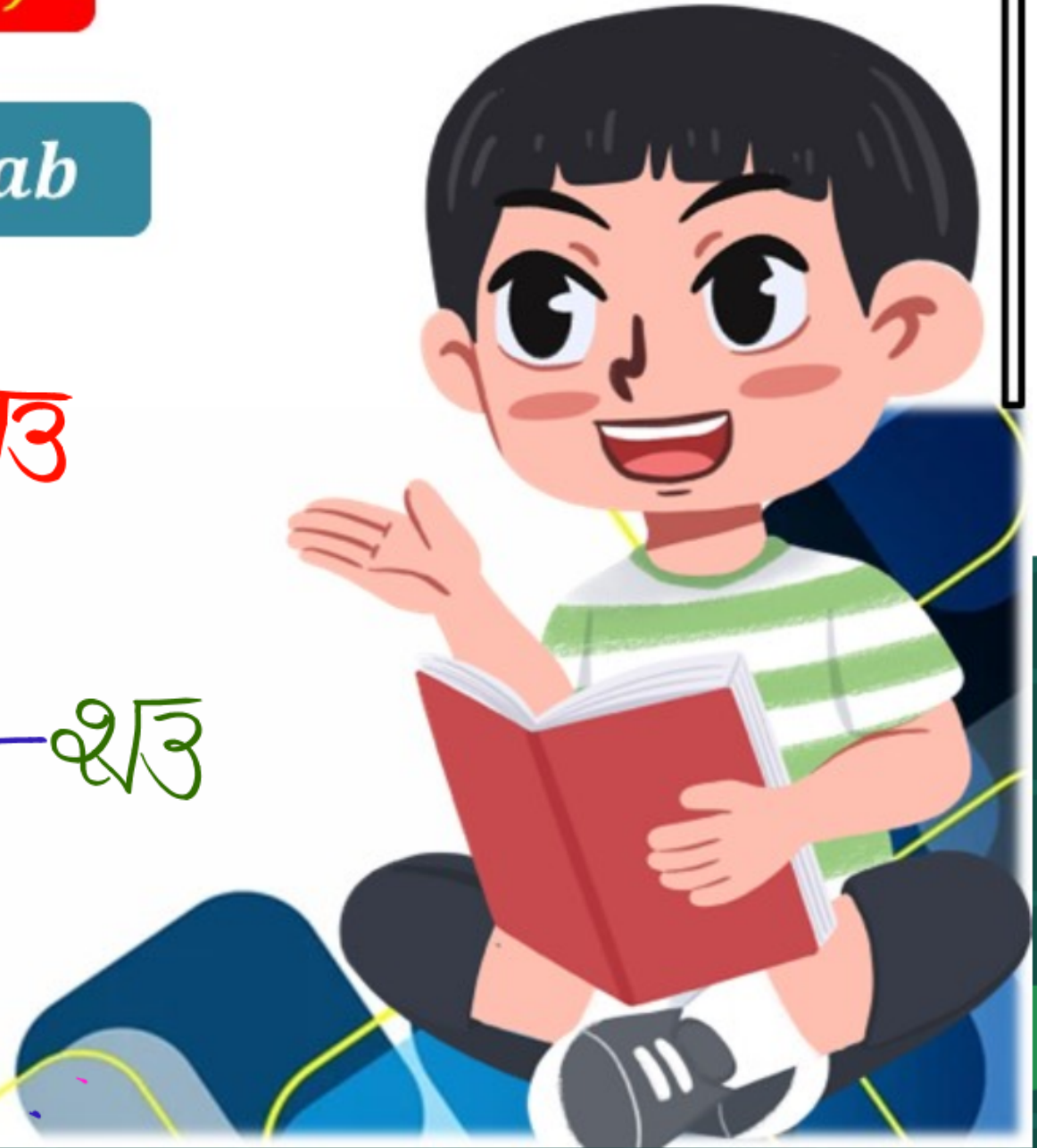
$$\blacksquare \sqrt{7 - 4\sqrt{3}} = \sqrt{7 - 2 \times 2 \times \sqrt{3}} = 2 - \sqrt{3}$$

49 < 50

$$\blacksquare \sqrt{37 - 20\sqrt{3}} = \sqrt{37 - 2 \times 5 \times 2\sqrt{3}} = 5 - 2\sqrt{3}$$

$$\blacksquare \sqrt{99 - 70\sqrt{2}} = 5\sqrt{2} - 7$$

$2 \times 7 \times 5\sqrt{2}$



20. find the square root of
निम्न का वर्गमूल ज्ञात कीजिए

[A] $\sqrt{7 + 4\sqrt{3}}$

[B] $4 + \sqrt{15}$

[C] $\sqrt{61 + 28\sqrt{3}} = 7 + 2\sqrt{3}$

[D] $139 - 80\sqrt{3}$

[E] $\sqrt{74 - 12\sqrt{30}} = 2\sqrt{6} - 2\sqrt{5}$

$2 \times 6 \times \sqrt{30}$

$2 \times 3 \times \sqrt{6} \times \sqrt{5}$



$$\sqrt{4 + \sqrt{15}} = \sqrt{\frac{8 + 2\sqrt{15}}{2}} = \frac{\sqrt{5 + \sqrt{3}}}{\sqrt{2}}$$

21. Evaluate $\sqrt{220 - 30\sqrt{35}}$?

$\sqrt{220 - 30\sqrt{35}}$ मूल्यांकन करें

~~[A]~~ $(5\sqrt{7} - 3\sqrt{5})$

~~[B]~~ $7\sqrt{5} - 3\sqrt{7}$

[C] $5\sqrt{5} - 3\sqrt{7}$

~~[D]~~ $3\sqrt{7} - 5\sqrt{5}$

$175 + 45 = 220$
 $\sqrt{16} = 4 \Rightarrow 4^2 = 16$



22. $\sqrt{6 - \sqrt{35}} = ?$

[A] $\frac{1}{\sqrt{2}}(\sqrt{7} - \sqrt{5})$

[C] $\frac{1}{4}(\sqrt{7} - \sqrt{5})$

[B] $\frac{1}{\sqrt{2}}(\sqrt{5} - \sqrt{7})$

[D] $\frac{1}{4}(\sqrt{7} + \sqrt{3})$

$$= \sqrt{\frac{12 - 2\sqrt{35}}{2}} = \frac{\sqrt{7} - \sqrt{5}}{\sqrt{2}}$$

