

Foundation Batch



MATHS

Surds and Indices

(घातांक एवं करणी)

Part -2

LIVE

21-11-2024 07:00PM





If $\frac{4^n \times 4^8 - 4^{(n+1)}}{4 \times 4^{n+7}} = x$, then find $x \times 4^7$

~~(a) $(4^7 - 1)$~~

~~(b) $(4^6 - 1)$~~

~~(c) $(4^5 - 1)$~~

~~(d) $4^{10} - 1$~~

$$\frac{4^n \times 4^8 - 4^1 \times 4^n}{4 \times 4^7 \times 4^n} = x$$

$$\frac{4^{\cancel{n}} (4^8 - 4^1)}{4 \times 4^{\cancel{n}}} = \underline{x \times 4^7}$$

$$\frac{4^{\cancel{n}} (4^7 - 1)}{4} = x \times 4^7$$



11. Given $\sqrt{2} = 1.414$. The value of $\sqrt{8} + 2\sqrt{32} - 3\sqrt{128} + 4\sqrt{50}$ is

(a) 8.484

(b) 8.526

(c) 8.426

(d) 8.876

$$\sqrt{8} + 2\sqrt{32} - 3\sqrt{128} + 4\sqrt{50}$$

$4 \times 2 \quad 16 \times 2 \quad 64 \times 2 \quad 25 \times 2$

$$2\sqrt{2} + 8\sqrt{2} - 24\sqrt{2} + 20\sqrt{2}$$

$$\sqrt{2} (2 + 8 - 24 + 20)$$

$$= 6\sqrt{2}$$

$$6 \times 1.414 = \underline{\underline{8.484}}$$

13. If a, b are rational number and $a\sqrt{2} + b\sqrt{3} = \sqrt{98} + \sqrt{108} - \sqrt{48} - \sqrt{72}$ then the values of a, b are respectively

यदि a, b परिमेय संख्याएँ हैं और $a\sqrt{2} + b\sqrt{3} = \sqrt{98} + \sqrt{108} - \sqrt{48} - \sqrt{72}$ है तो a, b के मान क्रमशः हैं

(a) 1, 2

(b) 1, 3

(c) 2, 1

(d) 2, 3

$$\sqrt{98} + \sqrt{108} - \sqrt{48} - \sqrt{72}$$

$49 \times 2 \quad 36 \times 3 \quad 16 \times 3 \quad 36 \times 2$

$$7\sqrt{2} + 6\sqrt{3} - 4\sqrt{3} - 6\sqrt{2}$$

$$1\sqrt{2} + 2\sqrt{3} = a\sqrt{2} + b\sqrt{3}$$

On comparing $a=1$ $b=2$

$$\# \left(\left(\left(a^m \right)^n \right)^o \right)^p$$

$$= a^{m \times n \times o \times p}$$



14. $\left[\left\{ \left(-\frac{1}{2} \right)^2 \right\}^{-2} \right]^{-1}$ is equal to /के बराबर है

~~(a) $\frac{1}{16}$~~

(b) 16

(c) $-\frac{1}{16}$

(d) -16

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

$= \left(-\frac{1}{2} \right)^4 = \left(+\frac{1}{16} \right)$

$(-a)^{\text{odd}} = -(a)^{\text{odd}}$

$(-a)^{\text{even}} = +(a)^{\text{even}}$



15. The value of $\sqrt[3]{0.000125}$ is

$\sqrt[3]{0.000125}$ का मान है

(a) 0.005

(b) 0.05

(c) 0.5

(d) 0.0005

$$\underline{\underline{(a^m)^n = a^{m \times n}}}$$

$$\underline{\underline{\frac{a^n}{b^n} = \left(\frac{a}{b}\right)^n}}$$

$$\left(\frac{125}{1000000}\right)^{1/3}$$

$$\left[\frac{5^3}{100^3}\right]^{1/3}$$

$$\left[\left(\frac{5}{100}\right)^3\right]^{1/3} = \left(\frac{5}{100}\right)^{3 \times \frac{1}{3}} = \frac{5}{100} = \underline{\underline{0.05}}$$



16. $\sqrt{\sqrt[3]{0.004096}}$ is equal to

$\sqrt{\sqrt[3]{0.004096}}$ का मान है

(a) 4

(b) 0.4

(c) 0.04

(d) 0.004

$$\left[\left(\frac{4096}{1000000} \right)^{1/3} \right]^{1/2}$$

$$\left(\frac{4096}{1000000} \right)^{1/6} = \left(\frac{4^6}{10^6} \right)^{1/6}$$

$$= \left(\frac{4}{10} \right)^{1/6 \times 6} = \frac{4}{10} = 0.4$$

$$\begin{aligned} 4^1 &= 4 \\ 4^2 &= 16 \\ 4^3 &= 64 \\ 4^4 &= 256 \\ 4^5 &= 1024 \\ 4^6 &= 4096 \end{aligned}$$



17. Find the value of $\sqrt{625} + \sqrt{\frac{625}{100}} + \sqrt{\frac{625}{10000}} + \sqrt{\frac{625}{1000000}}$

$\sqrt{625} + \sqrt{\frac{625}{100}} + \sqrt{\frac{625}{10000}} + \sqrt{\frac{625}{1000000}}$ का मान ज्ञात कीजिए।

SSC CHSL Tier II 10/01/2024

(a) 27.075

(b) 27.775

(c) 27.75

(d) 27.025

$$25 + \frac{25}{10} + \frac{25}{100} + \frac{25}{1000}$$

$$25 + 2.5 + 0.25 + 0.025$$

$$= \underline{27.775}$$

$$\begin{array}{r} 25 \\ 2.5 \\ 0.25 \\ 0.025 \\ \hline 27.775 \end{array}$$



18. $6\sqrt{(27)^{\frac{-2}{3}} + (8)^{\frac{-2}{3}}}$ simplify value of/ का सरलीकरण मान है।

(a) $6\sqrt{35}$

(b) $\frac{6}{\sqrt{13}}$

(c) $\sqrt{13}$

(d) $6\sqrt{6}$

$$(3^3)^{\frac{-2}{3}} + (2^3)^{\frac{-2}{3}}$$

$$6\sqrt{3^{-2} + 2^{-2}}$$

$$6\sqrt{\frac{1}{3^2} + \frac{1}{2^2}}$$

$$a^{-m} = \frac{1}{a^m}$$

$$6\sqrt{\frac{1}{9} + \frac{1}{4}} = 6\sqrt{\frac{13}{36}} = \cancel{6} \times \frac{\sqrt{13}}{\cancel{6}} = \sqrt{13}$$

19. Which of the following statement(s) is/are true
निम्नलिखित में से कौन-सा कथन सत्य है?

I. $\sqrt{(64)} + \sqrt{(0.0064)} + \sqrt{(0.81)} + \sqrt{(0.0081)} = 9.07$

II. $\sqrt{(0.0010201)} + \sqrt{(98.01)} + \sqrt{(0.25)} = 11.51$

(a) Only I/केवल I

① $8 + 0.08 + 0.9 + 0.09$

(b) Only II/केवल II

(c) Both I and II/I और II दोनों

(d) Neither I nor II/न तो I न ही II

$$\begin{array}{r} 0.08 \\ 0.9 \\ 0.09 \\ 8 + \hline 1.07 \\ \hline = 9.07 \end{array}$$

(SSC CHSL 2021)

19. Which of the following statement(s) is/are true
निम्नलिखित में से कौन-सा कथन सत्य है?

☒ I. $\sqrt{(64)} + \sqrt{(0.0064)} + \sqrt{(0.81)} + \sqrt{(0.0081)} = 9.07$

☐ II. $\sqrt{(0.0010201)} + \sqrt{(98.01)} + \sqrt{(0.25)} = 11.51$

☒ (a) Only I/केवल I

(b) Only II/केवल II

(c) Both I and II/I और II दोनों

(d) Neither I nor II/न तो I न ही II

$$0.0101 + 9.9 + 0.5$$

$$\begin{array}{r} 9.9 \\ 0.5 \\ 0.0101 \\ \hline 10.4101 \end{array}$$

(SSC CHSL 2021)



20. If $\sqrt{1 + \frac{x}{144}} = \frac{13}{12}$ then x is equal to

यदि $\sqrt{1 + \frac{x}{144}} = \frac{13}{12}$ तो x किसके बराबर होगा।

(a) 1

(b) 13

(c) 27

(d) 25

$$1 + \frac{x}{144} = \frac{169}{144}$$

$$1 + \frac{x}{144} = 1 + \frac{25}{144}$$

$$\underline{x = 25}$$



21. On comparing the following two numeric expressions we find that?

निम्नलिखित दो संख्यात्मक व्यंजक की तुलना करने पर हम पाते हैं कि?

$$\left[\left(2\frac{7}{9} \right)^{2\frac{1}{2}} \right]^{\frac{3}{5}} \text{ and/और } \left[\left(1\frac{2}{3} \right)^5 \right]^{\frac{3}{5}}$$

Handwritten calculation: $\left(\frac{25}{9} \right)^{\frac{5}{2} \times \frac{3}{5}} = \left(\frac{5}{3} \right)^{\frac{3}{2}} = \frac{125}{27}$

(a) Both the expression are equal. दोनों व्यंजक समान है।

(b) The first expression is smaller than the second.

पहला व्यंजक दूसरे से छोटा है।

(c) The first expression is larger than second expression.

पहला व्यंजक दूसरे से बड़ा है।

(d) The given two expressions cannot be compared.

दिए गए व्यंजकों की तुलना नहीं कि जा सकती है।



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TYPE- II



22. Which one of the following is the least?

निम्नलिखित में से कौन सा सबसे छोटा है?

$\sqrt{3}$, $\sqrt[3]{2}$, $\sqrt{2}$ and $\sqrt[3]{4}$

$$\text{LCM}(2, 3)$$

$$= 6$$

(a) $\sqrt{2}$

(b) $\sqrt[3]{2}$

(c) $\sqrt{3}$

(d) $\sqrt[3]{3}$

ascending order
आरोही क्रम

$$\sqrt[3]{2} < \sqrt{2} < \sqrt[3]{4} < \sqrt{3}$$

$$(3)^{\frac{1}{2} \times \frac{6}{3}} = (3)^{\frac{3}{1}}$$

$$3^3$$

$$27$$

$$(2)^{\frac{1}{3} \times \frac{6}{2}} = (2)^{\frac{2}{1}}$$

$$2^2$$

$$4$$

$$(2)^{\frac{1}{2} \times \frac{6}{2}} = (2)^{\frac{3}{1}}$$

$$2^3$$

$$8$$

$$(4)^{\frac{1}{3} \times \frac{6}{2}} = (4)^{\frac{2}{1}}$$

$$4^2$$

$$16$$

Descending
Order
अवरोही क्रम

$$27 > 16 > 8 > 4$$



23. Which one of the following is the biggest
निम्नलिखित में से कौन सा सबसे बड़ा है

$\sqrt[3]{4}$, $\sqrt[4]{6}$, $\sqrt[6]{15}$ and $\sqrt[12]{245}$.

(a) $\sqrt[3]{4}$

(b) $\sqrt[4]{6}$

(c) $\sqrt[6]{15}$

(d) $\sqrt[12]{245}$

Handwritten calculations for comparing the roots:

$(4)^{\frac{1}{3}}$	$(6)^{\frac{1}{4}}$	$(15)^{\frac{1}{6}}$	$(245)^{\frac{1}{12}}$
$4^{\frac{4}{12}}$	$6^{\frac{3}{12}}$	$15^{\frac{2}{12}}$	$245^{\frac{1}{12}}$
256	216	225	245

Arrows indicate that the values are being compared, with 256 being the highest.

24. The greatest of the numbers

$$(2.89)^{0.5}, 2 - (0.5)^2, 1 + \frac{0.5}{1 - \frac{1}{2}}, \sqrt{3}$$

सबसे बड़ी संख्या $(2.89)^{0.5}, 2 - (0.5)^2, 1 + \frac{0.5}{1 - \frac{1}{2}}, \sqrt{3}$ है।

(a) $(2.89)^{0.5}$

$[(1.7)^2]^{\frac{1}{2}}$

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

$1 + \frac{0.5}{\frac{1}{2}}$

1.73

(b) $2 - (0.5)^2$

1.7

$\frac{7}{4}$

1+1

1.73

(c) $1 + \frac{0.5}{1 - \frac{1}{2}}$

(d) $\sqrt{3}$

1.7

1.75

2

1.73



26. The smallest among the numbers is/ संख्याओं में सबसे छोटी है।

2^{250} , 3^{150} , 5^{100} and 4^{200}

(a) 4^{200}

(b) 5^{100}

(c) 3^{150}

(d) 2^{250}

HCF (250, 150, 100, 200)

(50) (5, 3, 2, 4)

$$\begin{array}{l} \overset{5}{\cancel{250}} \\ \hline 25 \\ \times 2 \\ \hline 50 \end{array}, \quad \begin{array}{l} \overset{3}{\cancel{150}} \\ \hline 50 \\ \times 3 \\ \hline 150 \end{array}, \quad \begin{array}{l} \overset{2}{\cancel{100}} \\ \hline 50 \\ \times 2 \\ \hline 100 \end{array}, \quad \begin{array}{l} \overset{4}{\cancel{200}} \\ \hline 50 \\ \times 4 \\ \hline 200 \end{array}$$

$$25^1, \quad 3^3, \quad 5^2, \quad 4^4$$

$$32, \quad 27, \quad \textcircled{25}, \quad 256$$



27. The greatest number among 2^{60} , 3^{48} , 4^{36} and 5^{24}
 2^{60} , 3^{48} , 4^{36} और 5^{24} और में से सबसे बड़ी संख्या है।

(a) 2^{60}

~~(b) 3^{48}~~

~~(c) 4^{36}~~

(d) 5^{24}

HCF (60, 48, 36, 24)

(12) (5, 4, 3, 2)

~~$\frac{5 \times 60}{12}$~~ , ~~$\frac{4 \times 48}{12}$~~ , ~~$\frac{3 \times 36}{12}$~~ , ~~$\frac{2 \times 24}{12}$~~

2^5 3^4 4^3 5^2
 32 **(81)** 64 25



28. $2^{60}, 3^{70}, 4^{50}, 5^{20}$ find the value of smallest and largest number.

$2^{60}, 3^{70}, 4^{50}, 5^{20}$ सबसे छोटी और सबसे बड़ी संख्या का मान ज्ञात करें।

(a) $4^{50}, 5^{20}$

(b) $2^{60}, 3^{10}$

(c) $3^{70}, 5^{20}$

(d) $5^{20}, 3^{70}$

$$\text{HCF}(60, 70, 50, 20) = 10$$

$$2^6, 3^7, 4^5, 5^2$$

$$64, 2187, 1024, 25$$

Smallest 5^{20}
largest = 3^{70}

$$\begin{aligned} &3^3 \times 3^3 \times 3^1 \\ &27 \times 27 \times 3 \\ &729 \times 3 = 2187 \end{aligned}$$

29. Which is the greatest among/ इनमें से सबसे ~~बड़ा~~ ^{बड़ा} कौन है?

$(\sqrt{19} - \sqrt{17})$, $(\sqrt{13} - \sqrt{11})$, $(\sqrt{7} - \sqrt{5})$ and $(\sqrt{5} - \sqrt{3})$?

(a) $\sqrt{5} - \sqrt{3}$

(b) $\sqrt{13} - \sqrt{11}$

(c) $\sqrt{7} - \sqrt{5}$

(d) $\sqrt{19} - \sqrt{17}$

सबसे बड़ा

सबसे छोटी

$\frac{2}{\sqrt{19} + \sqrt{17}}$
36

$\frac{2}{\sqrt{13} + \sqrt{11}}$
24

$\frac{2}{\sqrt{7} + \sqrt{5}}$
12

$\frac{2}{\sqrt{5} + \sqrt{3}}$
8

29. Which is the greatest among/ इनमें से सबसे ~~बड़ा~~ कौन है?

$(\sqrt{19} - \sqrt{17})$, $(\sqrt{13} - \sqrt{11})$, $(\sqrt{7} - \sqrt{5})$ and $(\sqrt{5} - \sqrt{3})$?

(a) $\sqrt{5} - \sqrt{3}$

(b) $\sqrt{13} - \sqrt{11}$

(c) $\sqrt{7} - \sqrt{5}$

(d) $\sqrt{19} - \sqrt{17}$

1

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

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

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

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$$\frac{1}{\sqrt{6}+\sqrt{5}}$$

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$$\begin{array}{r} 0.5 \\ 1 \\ \hline 2 \\ \hline \hline \end{array}$$

ઘટી

$$\begin{array}{r} 0.33 \\ 1 \\ \hline 3 \\ \hline \hline \end{array}$$

ઘટી



Q.30

30. $(\sqrt{5} + \sqrt{4})$, $(\sqrt{7} + \sqrt{2})$, $(\sqrt{6} + \sqrt{3})$ find the value of largest and smallest number.

$(\sqrt{5} + \sqrt{4})$, $(\sqrt{7} + \sqrt{2})$, $(\sqrt{6} + \sqrt{3})$ सबसे बड़ी और सबसे छोटी संख्या का मान ज्ञात करें।

(a) $\sqrt{5} + \sqrt{4}$, $\sqrt{7} + \sqrt{2}$

(b) $\sqrt{5} + \sqrt{4}$, $\sqrt{6} + \sqrt{3}$

(c) $\sqrt{7} + \sqrt{2}$, $\sqrt{5} + \sqrt{4}$

(d) $\sqrt{6} + \sqrt{3}$, $\sqrt{7} + \sqrt{2}$

32. Arrange the following in ascending order

$\sqrt[3]{9}, \sqrt[4]{20}, \sqrt[6]{25}$

निम्नलिखित को आरोही क्रम में व्यवस्थित करें

$\sqrt[3]{9}, \sqrt[4]{20}, \sqrt[6]{25}$

(a) $\sqrt[6]{25} < \sqrt[4]{20} < \sqrt[3]{9}$

(b) $\sqrt[3]{9} < \sqrt[4]{20} < \sqrt[6]{25}$

(c) $\sqrt[4]{20} < \sqrt[6]{25} < \sqrt[3]{9}$

(d) $\sqrt[6]{25} < \sqrt[3]{9} < \sqrt[4]{20}$

$6\sqrt[6]{25} < 3\sqrt[3]{9} < 4\sqrt[4]{20}$ $\text{LCM}(3, 4, 6) = 12$

$9^{\frac{1}{3} \times \frac{4}{4}} = 9^{\frac{4}{12}}$
 $9^4 = 81 \times 81$
 $80 \times 80 = 6400$

$20^{\frac{1}{4} \times \frac{3}{3}} = 20^{\frac{3}{12}}$
 $20^3 = 8000$

$25^{\frac{1}{6} \times \frac{2}{2}} = 25^{\frac{2}{12}}$
 $25^2 = 625$



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