

DAY 13

MCA CET 2025

MATHS

INDICES



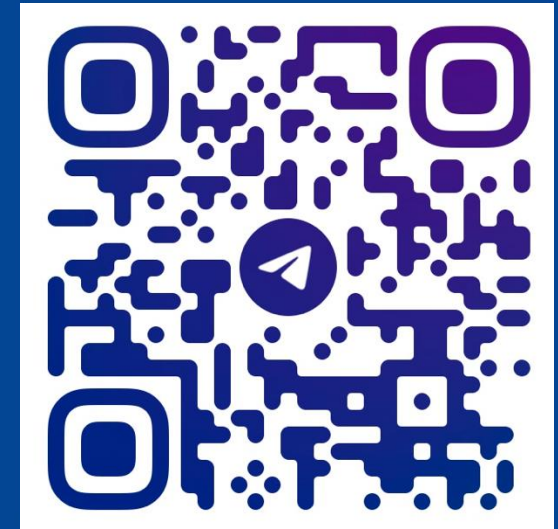
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Indices

$$a^n \begin{array}{l} \xrightarrow{\text{power}} \\ \downarrow \\ \text{base} \end{array} = \underbrace{a \times a \times a \dots}_{\text{n times}}$$

$$a^{\frac{2}{3}} \begin{array}{l} \xrightarrow{\text{power}} \\ \xrightarrow{\text{root}} \end{array} = \left(\sqrt[3]{a} \right)^2 = \sqrt[3]{a^2}$$



Laws of indices

$$1. a^m \times a^n = a^{m+n}$$

$$2. \frac{a^m}{a^n} = a^{m-n}$$

$$3. (a^m)^n = a^{m \times n}$$

$$4. a^m \times b^m = (ab)^m$$

$$5. \frac{a^m}{b^m} = \left(\frac{a}{b}\right)^m$$



Laws of indices

$$6. a^{-n} = \frac{1}{a^n} \Rightarrow \frac{a^0}{a^n} = a^{0-n} = a^{-n}$$

$$7. a^0 = 1$$



Laws of indices

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

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

$$\begin{aligned} \frac{D}{N} &\Rightarrow P \\ \frac{D}{R} &\Rightarrow R \end{aligned}$$

$$(\sqrt[n]{a})^n = a$$

e.g. $(\sqrt{2})^2 = 2$

$$(\sqrt[3]{4})^3 = 4$$



$\frac{[(12)^{-2}]^2}{[(12)^2]^{-2}} = ? \Rightarrow \frac{(12)^{-4}}{(12)^{-4}} = 1$

(a) 12 (b) 4.8
(c) $\frac{12}{144}$ ~~(d) 1~~

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



Find the value of $(10)^{200} \div (10)^{196}$.

~~(a) 10000~~

(b) 1000

(c) 100

(d) 100000

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

$$\frac{10^{200}}{10^{196}} = 10^4 = \underline{10000}$$



If $0 < x < 1$, then it is true that

~~(a) $x^{100} > x^{101}$~~

(b) ~~$x^{100} > 1$~~

(c) ~~$x^{100} < x^{101}$~~

(d) ~~$x^{101} > 1$~~

$$0 < x < 1$$

$$\underline{0.1}$$

$$0.1^2 = \underline{0.01}$$

$$0.1 > 0.01$$

$$(0.1)^1 > (0.1)^3$$

$$0.001$$



If $5^a = 3125$, then the value of 5^{a-3} is

(a) 625

~~(b) 25~~

(c) 5

(d) 225

$$5^a = 5^5 = 3125$$

$$a = 5$$

$$5^{a-3} = 5^2 = 25$$

5	3125
5	625
5	125
5	25
5	5
	1



What is the value of x in the following equation?

$$x^{0.4} + 16 = 32 \div x^{2.6}$$

(a) 8

(b) 9

(c) 6

(d) 7

$$0.4 = \frac{4}{10}$$

$$2.6 = \frac{26}{10}$$

$$\frac{x^{0.4}}{16} = \frac{32}{x^{2.6}}$$

$$x^{0.4} \times x^{2.6} = 16 \times 32$$

$$x^{\frac{4}{10}} \times x^{\frac{26}{10}} = x^{\frac{4+26}{10}} = x^{\frac{30}{10}} = x^3 = \underline{\underline{16 \times 32}}$$

$$x^3 = \boxed{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2}$$

x



If $2^x + 2^{x+1} = 48$, then the value of x^x is

- (a) 4
- (c) 256

- (b) 64
- (d) 16

$$2^x + 2^{x+1} = 48$$

↓

$$2^x + 2^x \cdot 2^1 = 48$$

$$2^x (1 + 2) = 48$$

3 ↗

$$a^m \times a^n = a^{m+n}$$

$$2^x = \frac{48}{3} = 16$$

$$2^x = 2 \times 2 \times 2 \times 2$$

$$2^x = 2^4$$

$$x = 4$$

$$x^x = 4^4 =$$



$[p^{(b-c)}]^{b+c} \cdot [p^{(c-a)}]^{c+a} \cdot [p^{(a-b)}]^{(a+b)} = ?$
(a) 0 (b) p^{abc}
(c) 1 (d) p^{a+b+c}

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

$$a^m \times a^n = a^{m+n}$$

$$= p^{b^2 - c^2} \times p^{c^2 - a^2} \times p^{a^2 - b^2} \\ = p^{\cancel{b^2} - \cancel{c^2} + \cancel{c^2} - \cancel{a^2} + \cancel{a^2} - \cancel{b^2}} = p^0 = \underline{\underline{1}}$$



Simplify $\frac{6a^{-2}bc^{-3}}{4ab^{-3}c^2} \div \frac{5a^{-3}b^2c^{-1}}{3ab^{-2}c^3}$

(a) $\frac{9}{10}ac$ (b) $\frac{9}{10}ac^{-1}$

(c) $\frac{9}{10}ac^2$ (d) $\frac{9}{10}ac^{-3}$

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

$$\frac{3 \cancel{a}^{-2} \cancel{b} c^{-3}}{2 \cancel{4} \cancel{a} \cancel{b}^{-3} \cancel{c}^2} \times \frac{3 \cancel{d} \cancel{b}^{-2} \cancel{c}^3}{5 a^{-3} \cancel{b}^2 \cancel{c}^{-1}} = \frac{9ac^{-1}}{10}$$

$\frac{c^{-3+1}}{c^{-1}} = c^{-2+1} = c^{-1}$



The greatest number among 3^{50} , 4^{40} , 5^{30} and 6^{20} is

(a) 6^{20}
(c) 3^{50}

(b) 5^{30}
(d) 4^{40}



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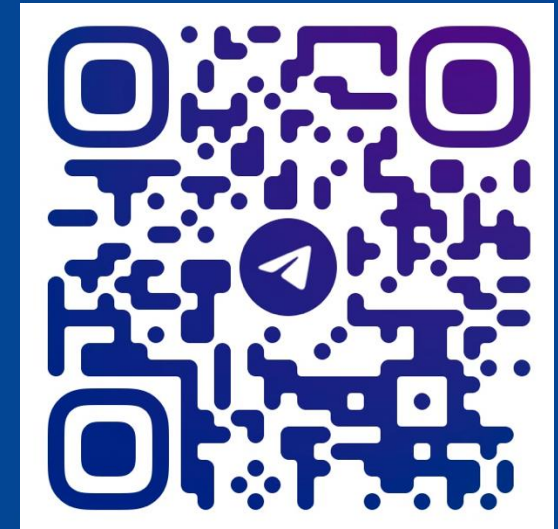
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