

## Chapter 1

# RATIO AND PROPORTION , INDICES , LOGARITHMS

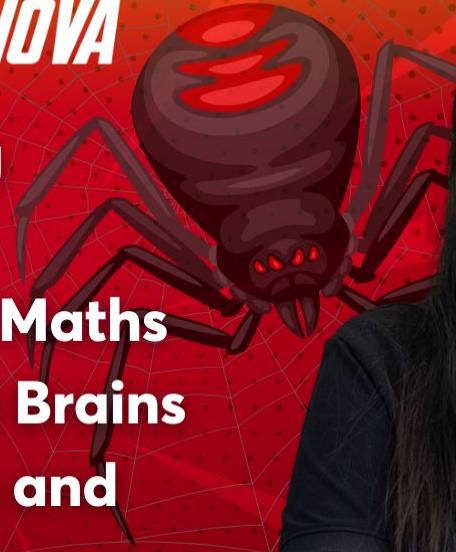
TOPIC : RATIO

BY : SHIVANI SHARMA

# **SHIVANI SHARMA**

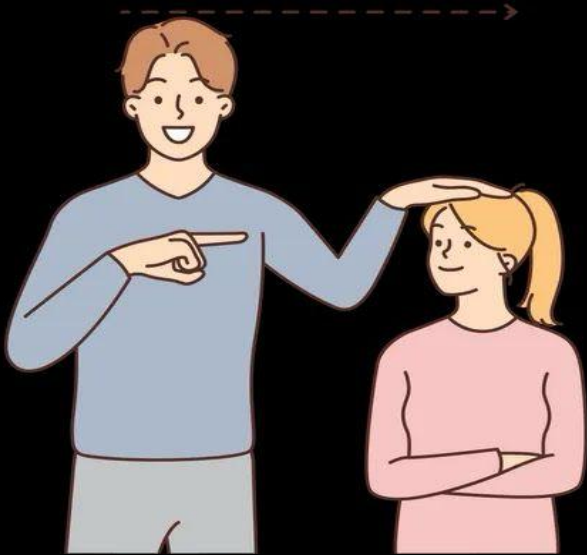
## **QUANTITATIVE APTITUDE ROMANOVA**

- **7 years** of experience in teaching **Mathematics**
- **Gold Medalist** in M.Sc. and B.Sc. Maths
- Was **#1 Maths Faculty** in Magnet Brains
- Teaches Maths in **CA foundation** and **K-12**
- Taught **30000+ students** with highest score as 100



# RATIO

- A ratio is a **comparison** of two quantities of the **same kind** and of **same units** by division .





# **RATIO**

- **Ratio exists only between quantities of the same kind.**

## ***Illustration***

- **There is no ratio between the weight of one child and the age of another child.**



# RATIO

- Quantities to be compared (by division) must be in the same units.

## ***Illustration***

Ratio between 3 kg & 5 kg =  $\frac{3}{5}$



# **RATIO**

## ***Illustration***

**(i) Ratio between 150 gm and 2 kg**



## **RATIO**

**(ii) Ratio between 25 minutes and 45 seconds**

# RATIO

- If  $a$  and  $b$  are two quantities of the same kind (in same units), then the fraction  $a/b$  is called the ratio of  $a$  to  $b$ . It is written as  $a : b$ .
- The quantities  $a$  and  $b$  are called the terms of the ratio .
- $a$  is called the **first term or antecedent** and  $b$  is called the **second term or consequent**.

$$a : b = \frac{a}{b}$$

—antecedent  
—consequent



## Exercise 1(A)

**Que 2** The ratio of two quantities is 3 : 4. If the antecedent is 15, the consequent is

- (a) 16
- (b) 60
- (c) 22
- (d) 20

## FEATURES OF RATIO

- ❖ Both terms of a ratio can be multiplied or divided by the same (non-zero) number.
- ❖ Usually a ratio is expressed in lowest terms (or simplest form)

### ***Illustration***

- ❖  $12 : 16 = 12/16 = 3/4 = 3 : 4$

## FEATURES OF RATIO

- ❖ The order of the terms in a ratio is important.

### ***Illustration***

**3 : 4 is not same as 4 : 3.**

## FEATURES OF RATIO

- *To compare two ratios ,convert them into equivalent like fractions*

- **Illustration** To find which ratio is greater \_\_\_\_\_.

$$2\frac{1}{3} : 3\frac{1}{3} ; 3.6 : 4.8$$



## FEATURES OF RATIO

- If a quantity increases or decreases in the ratio  $a : b$  then  
new quantity =  $b/a$  of the original quantity.

**Illustration VII** Rounaq weighs 56.7 kg. If he reduces his weight in the ratio 7 : 6, find his new weight.

**Example 1** Simplify the ratio  $\frac{1}{3} : \frac{1}{8} : \frac{1}{6}$



## **INVERSE RATIO**

- One ratio is the inverse of another if their product is 1.
- Thus  $a : b$  is the inverse of  $b : a$  and vice-versa.



## Exercise 1(A)

**Que1** The inverse ratio of 11 : 15 is

- (a) 15 : 11
- (b)  $\sqrt{11} : \sqrt{15}$
- (c) 121 : 225
- (d) None of these

## Exercise 1(A)

**Que 3** The ratio of the quantities is 5 : 7. If the consequent of its inverse ratio is 5, the antecedent is

- (a) 5
- (b)  $\sqrt{5}$
- (c) 7
- (d) none of these

## PROPERTIES OF RATIO

- The **ratio compounded** of the two ratios  $a : b$  and  $c : d$  is  $ac : bd$ .

**For example**

compound ratio of  $3 : 4$  and  $5 : 7$  is  $15 : 28$ .

Compound ratio of  $2 : 3$ ,  $5 : 7$  and  $4 : 9$  is  $40 : 189$ .

## Exercise 1(A)

**Que 4** The ratio compounded of  $2 : 3$ ,  $9 : 4$ ,  $5 : 6$  and  $8 : 10$  is

(a)  $1:1$

(b)  $1:5$

(c)  $3:8$

(d) none of these

## PROPERTIES OF RATIO

- A ratio compounded of itself is called its duplicate ratio.

$a^2 : b^2$  is the **duplicate ratio** of  $a : b$ .

$a^3 : b^3$  is the **triplicate ratio** of  $a : b$

**For example** duplicate ratio of  $2 : 3$  is  $4 : 9$ .

TriPLICATE ratio of  $2 : 3$  is  $8 : 27$ .

## PROPERTIES OF RATIO

$\sqrt{a} : \sqrt{b}$  is the **Sub - duplicate ratio** of  $a : b$ .

$\sqrt[3]{a} : \sqrt[3]{b}$  is the **Sub - triplicate ratio** of  $a : b$

**For example**

Sub - duplicate ratio of  $4 : 9$  is  $2 : 3$

Sub - triplicate ratio of  $8 : 27$  is  $2 : 3$

## Exercise 1(A)

**Que 5** The duplicate ratio of 3 : 4 is

- (a)  $\sqrt{3} : 2$
- (b) 4 : 3
- (c) 9 : 16
- (d) none of these

## Exercise 1(A)

**Que 6** The sub-duplicate ratio of 25 : 36 is

- (a) 6:5
- (b) 36:25
- (c) 50:72
- (d) 5:6



## Exercise 1(A)

**Que 7** The triplicate ratio of 2 : 3 is

(a) 8:27

(b) 6:9

(c) 3:2

(d) none of these

## Exercise 1(A)

**Que 8** The sub-triplicate ratio of 8 : 27 is

(a) 27:8

(b) 24:81

(c) 2:3

(d) none of these

## Exercise 1(A)

**Que9** The ratio compounded of 4:9 and the duplicate ratio of 3: 4 is

(a) 1:4

(b) 1:3

(c) 3:1

(d) none of these

## Exercise 1(A)

**Que10** The ratio compounded of 4 : 9, the duplicate ratio of 3 : 4, the triplicate ratio of 2 : 3 and 9 : 7 is

- (a) 2 : 7
- (b) 7 : 2
- (c) 2 : 21
- (d) none of these

## Exercise 1(A)

**Que11** The ratio compounded of 4:5, 9:7, the triplicate ratio of 3:4, and the triplicate ratio of 2:3 is

- (a) 4:512
- (b) 3:32
- (c) 1:12
- (d) none of these

## Exercise 1(A)

**Que 12** If  $a : b = 3 : 4$ , the value of  $(2a+3b) : (3a+4b)$  is

(a) 54:25

(b) 8:25

(c) 17:24

(d) 18:25

## Exercise 1(A)

**Que 13** Two numbers are in the ratio  $2 : 3$ . If 4 be subtracted from each, they are in the ratio  $3 : 5$ . The numbers are

- (a) (16, 24)
- (b) (4, 6)
- (c) (2, 3)
- (d) none of these

## Exercise 1(A)

**Que 14** The angles of a triangle are in ratio 2 : 7 : 11. The angles are

(a)  $(20^\circ, 70^\circ, 90^\circ)$

(b)  $(30^\circ, 70^\circ, 80^\circ)$

(c)  $(18^\circ, 63^\circ, 99^\circ)$

(d) none of these



## Exercise 1(A)

**Que 15** Division of ₹ 324 between X and Y is in the ratio 11 : 7. X & Y would get Rupees

(a) (204, 120)

(b) (200, 124)

(c) (180, 144)

(d) none of these

## Exercise 1(A)

**Que 16** Anand earns ₹ 80 in 7 hours and Promode ₹ 90 in 12 hours. The ratio of their earnings is

(a) 32 : 21

(b) 23 : 12

(c) 8 : 9

(d) none of these

## Exercise 1(A)

**Que 17** The ratio of two numbers is 7 : 10 and their difference is 105.

The numbers are

(a) (200, 305)

(b) (185, 290)

(c) (245, 350)

(d) none of these

## Exercise 1(A)

**Que 19** If  $x : y = 3 : 4$ , the value of  $x^2y + xy^2 : x^3 + y^3$  is

(a) 13:12

(b) 12:13

(c) 21:31

(d) none of these

## Exercise 1(A)

**Que 20** If  $p : q$  is the sub-duplicate ratio of  $p - x^2 : q - x^2$  then  $x^2$  is

(a)  $\frac{p}{p+q}$

(b)  $\frac{q}{p+q}$

(c)  $\frac{pq}{p+q}$

(d) none of these

## Exercise 1(A)

**Que 21** If  $2s : 3t$  is the duplicate ratio of  $2s-p : 3t-p$  then

(a)  $p^2 = 6st$

(b)  $p = 6st$

(c)  $2p = 3st$

(d) none of these

## Exercise 1(A)

**Que 22** If  $p : q = 2 : 3$  and  $x : y = 4 : 5$ , then the value of  $5px + 3qy : 10px + 4qy$  is

(a) 71:82

(b) 27:28

(c) 17:28

(d) none of these

## Exercise 1(A)

**Que 23** The number which when subtracted from each of the terms of the ratio 19:31 reducing it to 1:4 is

- (a) 15
- (b) 5
- (c) 1
- (d) none of these



## PROPERTIES OF RATIO

- If the ratio of two similar quantities can be expressed as a ratio of two integers , the quantities are said to be **commensurable** .
- otherwise, they are said to be **incommensurable**.

### EXAMPLE

- $\sqrt{3} : \sqrt{2}$  cannot be expressed as the ratio of two integers and therefore,  $\sqrt{3}$  and  $\sqrt{2}$  are **incommensurable quantities**.

## PROPERTIES OF RATIO

- **Continued Ratio** is the relation (or comparison) between the magnitudes of three or more quantities of the same kind.
- The continued ratio of three similar quantities  $a, b, c$  is written as  $a : b : c$ .

**Illustration** The continued ratio of ₹ 200, ₹ 400 and ₹ 600 is

$$₹ 200 : ₹ 400 : ₹ 600 = 1 : 2 : 3.$$

## Exercise 1(A)

**Que 18** P, Q and R are three cities. The ratio of average temperature between P and Q is 11 : 12 and that between P and R is 9 : 8. The ratio between the average temperature of Q and R is

- (a) 22:27
- (b) 27:22
- (c) 32:33
- (d) none of these

**Example 2** The ratio of the number of boys to the number of girls in a school of 720 students is 3 : 5. If 18 new girls are admitted in the school, find how many new boys may be admitted so that the ratio of the number of boys to the number of girls may change to 2 : 3.

**Example 1** The monthly incomes of two persons are in the ratio 4 : 5 and their monthly expenditures are in the ratio 7 : 9. If each saves ₹ 50 per month, find their monthly incomes.

- (a) ₹ 400 , ₹ 500
- (b) ₹ 800 , ₹ 1000
- (c) ₹ 40 , ₹ 50
- (d) none of these

**Example 2** The ratio of the prices of two houses was 16 : 23. Two years later when the price of the first has increased by 10% and that of the second by ₹ 477, the ratio of the prices becomes 11 : 20. Find the original prices of the two houses.

(a) ₹ 848 , ₹ 1219

(b) ₹828 , ₹ 1000

(c) ₹848 , ₹ 1229

(d) none of these

**Example 3** Find in what ratio will the total wages of the workers of a factory be increased or decreased if there be a reduction in the number of workers in the ratio  $15 : 11$  and increment in their wages in the ratio  $22 : 25$

## Exercise 1(A)

**Que 24** Daily earnings of two persons are in the ratio 4:5 and their daily expenses are in the ratio 7:9. If each saves ₹ 50 per day, their daily earnings in ₹ are

- (a) (40, 50)
- (b) (50, 40)
- (c) (400, 500)
- (d) none of these



## Exercise 1(A)

**Que 25** The ratio between the speeds of two trains is 7 : 8. If the second train runs 400 kms in 5 hours, the speed of the first train is

- (a) 10 Km/hr
- (b) 50 Km/hr
- (c) 70 Km/hr
- (d) none of these

## PYQs

**Que 1.** If  $p/q = -2/3$ , then the value of  $(2p + q) / (2p - q)$  is:

- (a) 1
- (b)  $-1/7$
- (c)  $1/7$
- (d) 7

**Ans: c**

## PYQs

**Que 2.** What must be added to each term of the ratio  $49 : 68$ , so that it becomes  $3 : 4$  ?

- (a) 3
- (b) 5
- (c) 8
- (d) 9

**Ans : c**

## PYQs

**Que 3.** The students of two classes are in the ratio 5 : 7, if 10 students left from each class, the remaining students are in the ratio of 4 : 6 then the number of students in each class is:

- (a) 30, 40
- (b) 25, 24
- (c) 40, 60
- (d) 50, 70

**Ans : d**

## PYQs

**Que 4.** If  $A : B = 2 : 5$ , then  $(10A + 3B) : (5A + 2B)$  is equal to:

(a)  $7 : 4$

(b)  $7 : 3$

(c)  $6 : 5$

(d)  $7 : 9$

**Ans : a**

## PYQs

**Que 5.** The ratio Compounded of  $4 : 5$  and sub-duplicate of " $a$ ":  $9$  is  $8 : 15$ .

Then Value of " $a$ " is:

(a)  $2$

(b)  $3$

(c)  $4$

(d)  $5$

**Ans : c**

## PYQs

**Que 6.** The triplicate ratio of 4 : 5 is:

(a) 125 : 64

(b) 16 : 25

(c) 64 : 125

(d) 120 : 46

**Ans : c**

## PYQs

**Que 7.** Find three numbers in the ratio  $1 : 2 : 3$ , so that the sum of their squares is equal to 504

(a) 6, 12, 18

(b) 3, 6, 9

(c) 4, 8, 12

(d) 5, 10, 15

**Ans : a**



## PYQs

**Que 8.** If the salary of P is 25% lower than that of Q and the salary of R is 20% higher than that of Q, the ratio of the salary of R and P will be:

(a) 5 : 8

(b) 8 : 5

(c) 5 : 3

(d) 3 : 5

**Ans : b**

## PYQs

**Que 9.** A person has assets worth ₹1,48,200. He wish to divide it amongst his wife, son and daughter in the ratio 3 : 2 : 1 respectively. From this assets, the share of his son will be:

- (a) ₹24,700
- (b) ₹49,400
- (c) ₹74,100
- (d) ₹ 37,050

**Ans : b**

## PYQs

**Que 10.** X, Y, Z together starts a business. If X invests 3 times as much as Y invests and Y invests two third of what Z invests, then the ratio of capitals of X, Y, Z is:

- (a) 3 : 9 : 2
- (b) 6 : 3 : 2
- (c) 3 : 6 : 2
- (d) 6 : 2 : 3

**Ans : d**

## PYQs

**Que 11.** There are total 23 coins of ₹ 1 , ₹ 2 and ₹ 5 in a bag. If their value is ₹43 and the ratio of coins of ₹ 1 and ₹ 2 is 3 : 2. Then the number of coins of ₹ 1 is:

(a) 12

(b) 5

(c) 10

(d) 14

**Ans : a**

## PYQs

**Que 12.** If  $a : b = 2 : 3$ ,  $b : c = 4 : 5$  and  $c : d = 6 : 7$ , then  $a : d$  is:

(a)  $24 : 35$

(b)  $8 : 15$

(c)  $16 : 35$

(d)  $7 : 15$

**Ans : c**

## PYQs

**Que 13.** The ratio of the number of ₹ 5 coins and ₹ 10 coins is 8 : 15. If the value of ₹ 5 coins is ₹ 360, then the number of ₹ 10 coins will be:

- (a) 72
- (b) 120
- (c) 135
- (d) 185

**Ans : c**

## PYQs

**Que 14.**  $\frac{3x-2}{5x+6}$  is the duplicate ratio of  $2/3$  then find the value of  $x$  :

(a) 2

(b) 6

(c) 5

(d) 9

**Ans : b**

## PYQs

**Que 15.** If  $x : y : z = 7 : 4 : 11$  then  $(x + y + z)/z$  is:

(a) 2

(b) 3

(c) 4

(d) 5

**Ans : a**



## PYQs

**Que 16.** The price of scooter and moped are in the ratio 7 : 9. The price of moped is ₹ 1,600 more than that of scooter. Then the price of moped is:

- (a) ₹ 7,200
- (b) ₹ 5,600
- (c) ₹ 800
- (d) ₹ 700

**Ans : a**

## PYQs

**Que 17.** The ratio of number of boys and the number of girls in a school is found to be 15 : 32. How many boys and equal number of girls should be added to bring the ratio to  $\frac{2}{3}$  ?

- (a) 19
- (b) 20
- (c) 23
- (d) 27

**Ans : a**

## PYQs

**Que 18.** In a certain business A and B received profit in a certain ratio B and C received profits in the same ratio. If A gets ₹ 1600 and C gets ₹ 2500 then how much does B get?

- (a) ₹ 2,000
- (b) ₹ 2,500
- (c) ₹ 1,000
- (d) ₹ 1,500

**Ans : a**

## PYQs

**Que 19.** The salaries of A, B and C are in the ratio 2 : 3 : 5. If increments of 15%, 10% and 20% are allowed respectively to their salary, then what will be the new ratio of their salaries?

- (a) 3 : 3 : 10
- (b) 10 : 11 : 20
- (c) 23 : 33 : 60
- (d) Cannot be determined

**Ans : c**

## PYQs

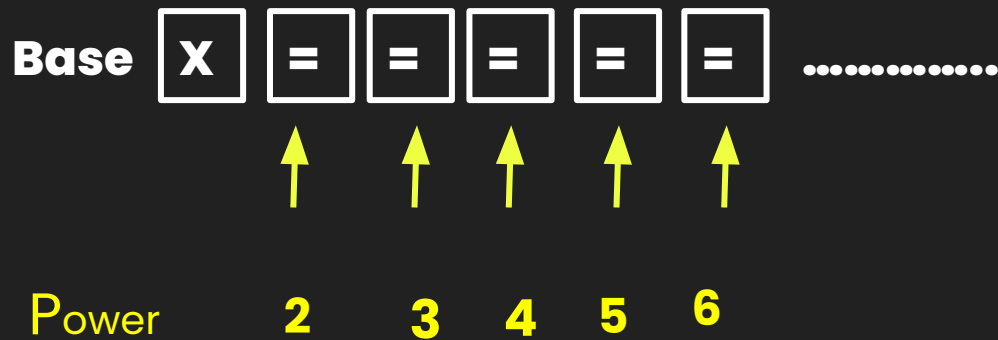
**Que 20.** A bag contains 105 coins containing some 50 paise, and 25 paise coins. The ratio of the number of these coins is 4 : 3. The total value (in ₹) in the bag is

- (a) 43.25
- (b) 41.25
- (c) 39.25
- (d) 35.25

**Ans : b**

# SIMPLE POWER

## CALCULATOR TRICKS



# **SIMPLE POWER**

**CALCULATOR TRICKS**

$$3^4$$

$$4^5$$

$$2^4$$

$$6^4$$



## PROPORTION

- An equality of two ratios is called a proportion.
- Four quantities  $a, b, c, d$  are said to be in proportion

if ,  $a : b = c : d$  ( also written as  $a : b :: c : d$  ) i.e.

if  $a/b = c/d$

If  $ad = bc$ . ( **CROSS PRODUCT RULE** )





## **PROPORTION**

- The quantities  $a, b, c, d$  are called terms of the proportion;
  - $a, b, c$  and  $d$  are called its first, second, third and fourth terms respectively.
  - They are also called " first proportional ", " second proportional ", " third proportional " , and " fourth proportional " respectively .
  - First and fourth terms are called extremes (or extreme terms).
  - Second and third terms are called means (or middle terms).

# PROPORTION

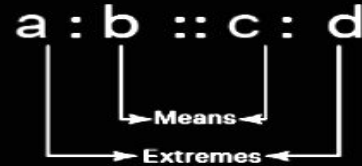
## CROSS PRODUCT RULE

- If  $a : b = c : d$  are in proportion then

$$a/b = c/d$$

$$ad = bc$$

- i.e. product of extremes = product of means.



$$\text{Product of extremes} = \text{Product of means}$$
$$a \times d = b \times c$$



## PROPORTION

### Note:

- In a ratio  $a : b$ , both quantities must be of the same kind while in a proportion  $a : b = c : d$ , all the four quantities need not be of the same type.
- The first two quantities should be of the same kind and last two quantities should be of the same kind.

**Illustration** ₹ 6 : ₹ 8 = 12 toffees : 16 toffees are in a proportion.

Here 1st two quantities are of same kind and last two are of same kind



## PROPORTION

**Example 2** Find the value of  $x$  if  $10/3 : x :: 5/2 : 5/4$ .



## PROPORTION

**Example 3** Find the fourth proportional to  $\frac{2}{3}$ ,  $\frac{3}{7}$ , 4.

## EXERCISE 1(B)

**Que. 1** The fourth proportional to 4, 6, 8 is

(a) 12

(b) 32

(c) 48

(d) None of these

## EXERCISE 1(B)

**Que. 4** The number which has the same ratio to 26 that 6 has to 13 is

- (a) 11
- (b) 10
- (c) 21
- (d) None of these

## EXERCISE 1(B)

**Que. 5** The fourth proportional to  $2a$ ,  $a^2$ ,  $c$  is

- (a)  $ac/2$
- (b)  $ac$
- (c)  $2/ac$
- (d) None of these



## EXERCISE 1(B)

**Que. 6** If four numbers  $\frac{1}{2}$ ,  $\frac{1}{3}$ ,  $\frac{1}{5}$ ,  $\frac{1}{x}$  are proportional then x is

(a)  $\frac{6}{5}$

(b)  $\frac{5}{6}$

(c)  $\frac{15}{2}$

(d) None of these

## CONTINUOUS PROPORTION

- Three quantities  $a$ ,  $b$ ,  $c$  of the same kind (in same units) are said to be in continuous proportion if

$$a : b = b : c$$

$$\text{i.e. } a/b = b/c$$

$$b^2 = ac$$

$$b = \sqrt{ac}$$

here ,

$a$  = first proportional

$c$  = third proportional

$b$  = mean proportional



## CONTINUOUS PROPORTION

**Example 4** Find the third proportion to 2.4 kg, 9.6 kg.



## CONTINUOUS PROPORTION

**Example 5** Find the mean proportion between 1.25 and 1.8



## **CONTINUED PROPORTION**

**When three or more numbers are related such that  $a/b = b/c = c/d = d/e$  .....the numbers a, b,c,d,and e are said to be in continued proportion .**

## EXERCISE 1(B)

**Que. 2** The third proportional to 12, 18 is

- (a) 24
- (b) 27
- (c) 36
- (d) None of these

## EXERCISE 1(B)

**Que. 3** The mean proportional between 25, 81 is

- (a) 40
- (b) 50
- (c) 45
- (d) None of these

## EXERCISE 1(B)

**Que. 7** The mean proportional between  $12x^2$  and  $27y^2$  is

(a)  $18xy$

(b)  $81xy$

(c)  $8xy$

(d) None of these



## EXERCISE 1(B)

**Que. 23** 12, 16, \*, 20 are in proportion. Then \* is

(a) 25

(b) 14

(c) 15

(d) None of these

## EXERCISE 1(B)

**Que. 24** 4, \*, 9,  $13\frac{1}{2}$  are in proportion. Then \* is

(a) 6

(b) 8

(c) 9

(d) None of these

## EXERCISE 1(B)

**Que. 10** If  $p/q = r/s = 2.5/1.5$ , the value of  $ps : qr$  is

(a)  $3/5$

(b)  $1:1$

(c)  $5/3$

(d) None of these

## EXERCISE 1(B)

**Que. 8** If  $A = B/2 = C/5$ , then  $A : B : C$  is

(a)  $3 : 5 : 2$

(b)  $2 : 5 : 3$

(c)  $1 : 2 : 5$

(d) None of these

## EXERCISE 1(B)

**Que. 9** If  $a/3 = b/4 = c/7$ , then  $a + b + c/c$  is

(a) 1

(b) 3

(c) 2

(d) None of these

## EXERCISE 1(B)

**Que. 11** If  $x : y = z : w = 2.5 : 1.5$ , the value of  $(x + z)/(y + w)$  is

(a) 1

(b)  $3/5$

(c)  $5/3$

(d) None of these

## EXERCISE 1(B)

**Que. 13** If  $A : B = 3 : 2$  and  $B : C = 3 : 5$ , then  $A : B : C$  is

(a)  $9 : 6 : 10$

(b)  $6 : 9 : 10$

(c)  $10 : 9 : 6$

(d) None of these

## EXERCISE 1(B)

**Que. 14** If  $x/2 = y/3 = z/7$ , then the value of  $(2x - 5y + 4z)/2y$  is

(a)  $6/23$

(b)  $23/6$

(c)  $3/2$

(d)  $17/6$



## EXERCISE 1(B)

**Que. 15** If  $x : y = 2 : 3$ ,  $y : z = 4 : 3$  then  $x : y : z$  is

(a)  $2 : 3 : 4$

(b)  $4 : 3 : 2$

(c)  $3 : 2 : 4$

(d)  $8 : 12 : 9$

## EXERCISE 1(B)

**Que. 16** Division of ₹ 750 into 3 parts in the ratio 4 : 5 : 6 is

(a) (200, 250, 300)

(b) (250, 250, 250)

(c) (350, 250, 150)

(d) None of these

## EXERCISE 1(B)

**Que. 18** The numbers 14, 16, 35, 42 are not in proportion. The fourth term for which they will be in proportion is

- (a) 45
- (b) 40
- (c) 32
- (d) None of these

## EXERCISE 1(B)

**Que. 25** The mean proportional between 1.4 gms and 5.6 gms is

- (a) 28 gms
- (b) 2.8 gms
- (c) 3.2 gms
- (d) None of these

## EXERCISE 1(B)

**Que. 26** If  $\frac{a}{4} = \frac{b}{5} = \frac{c}{9}$  then  $\frac{a+b+c}{c}$  is

(a) 4

(b) 2

(c) 7

(d) None of these

## EXERCISE 1(B)

**Que. 27** Two numbers are in the ratio 3 : 4; if 6 be added to each number of the ratio, then the new ratio will be 4 : 5, then the numbers are

- (a) 14, 20
- (b) 17, 19
- (c) 18 and 24
- (d) None of these

## EXERCISE 1(B)

**Que. 29** If  $a : b = 4 : 1$  then  $\sqrt{\frac{a}{b}} + \sqrt{\frac{b}{a}}$  is

- (a)  $5/2$
- (b) 4
- (c) 5
- (d) None of these

## PROPERTIES OF PROPORTION

1. If  $a : b = c : d$ , then  $b : a = d : c$

$$\text{If } \frac{a}{b} = \frac{c}{d} \Rightarrow \frac{b}{a} = \frac{d}{c}.$$

**INVERTENDO**



## PROPERTIES OF PROPORTION

2. If  $a : b = c : d$ , then  $a : c = b : d$  OR  $d : b = c : a$

**ALTERNENDO**

$$\text{If } \frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a}{c} = \frac{b}{d}, \text{ Or } \frac{d}{b} = \frac{c}{a}.$$

## PROPERTIES OF PROPORTION

3. If  $a : b = c : d$ , then  $a + b : b = c + d : d$

**COMPONENDO**

$$\text{If } \frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a+b}{b} = \frac{c+d}{d}$$

## PROPERTIES OF PROPORTION

4. If  $a : b = c : d$ , then  $a - b : b = c - d : d$

**DIVIDENDO**

$$\frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a-b}{b} = \frac{c-d}{d}$$

## PROPERTIES OF PROPORTION

## COMPONENDO AND DIVIDENDO

5. If  $a : b = c : d$ , then  $a + b : a - b = c + d : c - d$

$$\text{If } \frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a+b}{a-b} = \frac{c+d}{c-d}.$$

## PROPERTIES OF PROPORTION

### ADDENDO

6. If  $a : b = c : d = e : f = \dots\dots\dots$ , then each of these ratios is equal

$$(a + c + e + \dots\dots) : (b + d + f + \dots\dots)$$

If  $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \dots\dots\dots$  then each of these ratios is equal to

$$\frac{a + c + e + \dots\dots}{b + d + f + \dots\dots}$$

i.e ,

$$\frac{a}{b} =$$

$$\frac{a + c + e + \dots\dots}{b + d + f + \dots\dots}$$

,

$$\frac{c}{d} =$$

$$\frac{a + c + e + \dots\dots}{b + d + f + \dots\dots}$$

,

$$\frac{e}{f} =$$

$$\frac{a + c + e + \dots\dots}{b + d + f + \dots\dots}$$

## PROPERTIES OF PROPORTION

### SUBTRAHENDO

7. If  $a : b = c : d = e : f = \dots\dots\dots$ , then each of these ratios is equal

$$(a - c - e + \dots\dots) : (b - d - f - \dots\dots)$$

If  $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \dots\dots\dots$  then each of these ratios is equal to  $\frac{a - c - e \dots\dots}{b - d - f \dots\dots}$

i.e ,

$$\frac{a}{b} = \frac{a - c - e \dots\dots}{b - d - f \dots\dots}, \quad \frac{c}{d} = \frac{a - c - e \dots\dots}{b - d - f \dots\dots}, \quad \frac{e}{f} = \frac{a - c - e \dots\dots}{b - d - f \dots\dots}$$

**Example 1** If  $a : b = c : d = 2.5 : 1.5$ , what are the values of  $ad : bc$  and

$a + c : b + d$ ?

**Example 2**

If  $\frac{a}{3} = \frac{b}{4} = \frac{c}{7}$ , then prove that  $\frac{a+b+c}{c}$



## EXERCISE 1(B)

**Que. 19** If  $x/y = z/w$ , implies  $y/x = w/z$ , then the process is called

- (a) Dividendo
- (b) Componendo
- (c) Alternendo
- (d) None of these

## EXERCISE 1(B)

**Que. 20** If  $p/q = r/s = p - r/q - s$ , the process is called

- (a) Subtrahendo
- (b) Addendo
- (c) Invertendo
- (d) None of these

## EXERCISE 1(B)

**Que. 21** If  $a/b = c/d$ , implies  $(a + b)/(a - b) = (c + d)/(c - d)$ , the process is called

- (a) Componendo
- (b) Dividendo
- (c) Componendo and Dividendo
- (d) None of these

## EXERCISE 1(B)

**Que. 22** If  $u/v = w/p$ , then  $(u - v)/(u + v) = (w - p)/(w + p)$ . The process is called

- (a) Invertendo
- (b) Alternendo
- (c) Addendo
- (d) None of these

## EXERCISE 1(B)

**Que. 28** If  $\frac{a}{4} = \frac{b}{5}$  then

(a)  $\frac{a+4}{a-4} = \frac{b-5}{b+5}$

(b)  $\frac{a+4}{a-4} = \frac{b+5}{b-5}$

(c)  $\frac{a-4}{a+4} = \frac{b+5}{b-5}$

(d) None of these

## EXERCISE 1(B)

**Que. 17** The sum of the ages of 3 persons is 150 years. 10 years ago their ages were in the ratio 7 : 8 : 9. Their present ages are

(a) (45, 50, 55)

(b) (40, 60, 50)

(c) (35, 45, 70)

(d) None of these

## EXERCISE 1(B)

**Que. 12** If  $(5x - 3y)/(5y - 3x) = 3/4$ , the value of  $x : y$  is

(a) 2 : 9

(b) 7 : 2

(c) 7 : 9

(d) None of these

## EXERCISE 1(B)

**Que. 30** If  $\frac{x}{b+c-a} = \frac{y}{c+a-b} = \frac{z}{a+b-c}$  then  $(b-c)x + (c-a)y + (a-b)z$  is

(a) 1

(b) 0

(c) 5

(d) None of these



**Example3** A dealer mixes tea costing ₹ 6.92 per kg. with tea costing ₹ 7.77 per kg and sells the mixture at ₹ 8.80 per kg and earns a profit of  $17\frac{1}{2}\%$  on his sale price. In what proportion does he 2 mix them?

### PYQS

A dealer mixes rice costing ₹ 13.84 per . with rice costing ₹ 15.54 and sells the mixture at ₹ 17.60 per kg . So, he earns a profit of 14.6 % on his sale price. The proportion in which he mixes the two qualities of rice is:

(a) 3 : 7

(b) 5 : 7

(c) 7 : 9

(d) 9 : 11

**Ans : a**

**PYQS**

**Fourth proportional to  $x$  ,  $2x$  ,  $(x + 1)$  is:**

**(a)  $(x + 2)$**

**(b)  $(x - 2)$**

**(c)  $(2x + 2)$**

**(d)  $(2x - 2)$**

**Ans : c**

**PYQS**

**Which of the numbers are not in proportion?**

- (a) 6, 8, 5, 7**
- (b) 7, 3, 14, 6**
- (c) 18, 27, 12, 18**
- (d) 8, 6, 12, 9**

**Ans : a**

**PYQS**

**The ratio of third proportion of 12 ,30 to the mean proportion of 9 , 25 is:**

- (a) 2 : 1**
- (b) 5 : 1**
- (c) 7 : 15**
- (d) 3 : 5**

**Ans : b**

**PYQS**

**What number must be added to each of the numbers 10 , 18 , 22 , 38 to make the numbers in proportion?**

**(a) 2**

**(b) 4**

**(c) 8**

**(d) None of these.**

**Ans : a**

## PYQS

A vessel contained a solution of acid and water in which water was 64 % . Four litres of the solution were taken out of the vessel and the same quantity of water was added. If the resulting solution contains 30 % acid, the quantity (in litres) of the solution, in the beginning in the vessel, was

(a) 12

(b) 36

(c) 24

(d) 2

**Ans : c**

## PYQS

A sum of money is to be distributed among A, B, C, D in the proportion of 5 : 2 : 4 : 3. If C gets ₹ 1,000 more than D, what is B 's share?

(a) ₹ 2,000

(b) ₹1,500

(c) ₹2,500

(d) ₹ 1,000

**Ans : a**



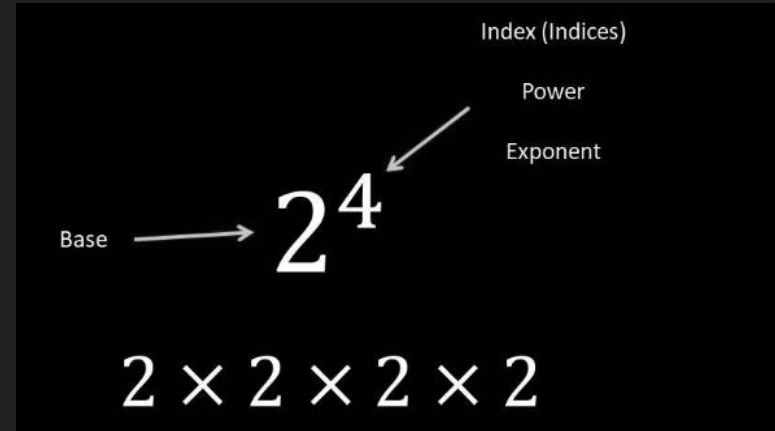
# INDICES

- The word “Indices” is the plural of “ index .

- When a number is expressed in the form of  $a^n$

$a$  is called the **base** ,

and  $n$  is called the **index / exponent / power**



## For any real number a

- $a^n = a \times a \times a \dots \dots \dots$  to n factors.

- **Example:**  $3^4 = 3 \times 3 \times 3 \times 3$

- $a^0 = 1$

- **Example:**  $3^0 = 1$

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

- **Example:**  $2^{-5} = 1/2^5$

- **Example:**  $1/2^{-5} = 2^5$

## LAW OF INDICES

### LAW 1

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

For example :

$$3^4 \times 3^5 = 3^9$$

## LAW OF INDICES

### LAW 2

$$a^m / a^n = a^{m-n}$$

For example

$$2^7 / 2^4 = 2^3$$

## LAW OF INDICES

LAW 3

$$(a^m)^n = a^{mn},$$

For example

$$(2^4)^3 = 2^{12}$$

## LAW OF INDICES

LAW 4

$$(ab)^n = a^n b^n$$

For Example

$$(2 \times 3)^3 = 2^3 \times 3^3$$

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

For Example

$$(5/3)^4 = 5^4/3^4$$

## LAW OF INDICES

### LAW 5

$$a^{m/n} = (a^m)^{1/n}, a^{m/n} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$$

For Example

$$\sqrt{9} = 9^{1/2}$$

$$\sqrt[5]{9^2} = 9^{2/5}$$



## REMARK

- If  $a^x = a^y$ , then  $x = y$
- If  $x^a = y^a$ , then  $x = y$
- If  $a^m = k$ , then  $a = k^{1/m}$

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



**Example 1** Simplify  $2x^{1/2} 3x^{-1}$  if  $x = 4$

**Example 2** Simplify  $6ab^2c^3 \times 4b^{-2}c^{-3}d$

**Example 3**

Find the value of

$$\frac{4x^{-1}}{x^{-1/3}}$$

**Example 4**

**Simplify**

$$\frac{2a^{\frac{1}{2}} \times a^{\frac{2}{3}} \times 6a^{\frac{7}{3}}}{9a^{\frac{-5}{3}} \times a^{\frac{3}{2}}} \text{ if } a=4$$

**Example 5** Simplify  $(x^a \cdot y^{-b})^3 \cdot (x^3 y^2)^{-a}$

**Example 6**

$$\sqrt[6]{a^{4b} x^6} \cdot (a^{2/3} x^{-1})^{-b}$$

**Example 7** Find  $x$  ,  $x\sqrt{x} = (x\sqrt{x})^x$

**Example 8** Find the value of  $k$  from  $(\sqrt{9})^{-7} \times (\sqrt{3})^{-5} = 3^k$



## Exercise 1(C)

**Que.1**  $4x^{-1/4}$  is expressed as

(a)  $-4x^{1/4}$

(b)  $x^{-1}$

(c)  $4/x^{1/4}$

(d) None of these

## Exercise 1(C)

**Que. 2** The value of  $8^{1/3}$  is

(a) 32

(b) 4

(c) 2

(d) None of these

## Exercise 1(C)

**Que. 3** The value of  $2 \times (32)^{1/5}$  is

- (a) 2
- (b) 10
- (c) 4
- (d) None of these

## Exercise 1(C)

**Que. 4** The value of  $4/(32)^{1/5}$  is

- (a) 8
- (b) 2
- (c) 4
- (d) None of these

## Exercise 1(C)

**Que. 5** The value of  $(8/27)^{1/3}$  is

(a)  $2/3$

(b)  $3/2$

(c)  $2/9$

(d) None of these

## Exercise 1(C)

**Que. 6** The value of  $2(256)^{-1/8}$  is

- (a) 1
- (b) 2
- (c)  $1/2$
- (d) None of these

## Exercise 1(C)

**Que. 7**  $2^{1/2} \cdot 4^{3/4}$  is equal to

- (a) a fraction
- (b) a positive integer
- (c) a negative integer
- (d) None of these

## Exercise 1(C)

**Que. 8**  $\left(\frac{81x^4}{y^{-8}}\right)^{\frac{1}{4}}$  has simplified value equal to

- (a)  $xy^2$
- (b)  $x^2y$
- (c)  $9xy^2$
- (d) None of these



## Exercise 1(C)

**Que. 9**  $x^{a-b} \times x^{b-c} \times x^{c-a}$  is equal to

(a)  $x$

(b) 1

(c) 0

(d) None of these

## Exercise 1(C)

**Que. 10** The value of  $\left(\frac{2p^2q^3}{3xy}\right)^0$  where  $p, q, x, y \neq 0$  is equal to

(a)  $x$

(b)  $1$

(c)  $0$

(d) None of these

## Exercise 1(C)

**Que. 11**  $\{(3^3)^2 \times (4^2)^3 \times (5^3)^2\} / \{(3^2)^3 \times (4^3)^2 \times (5^2)^3\}$  is

(a)  $3/4$

(b)  $4/5$

(c)  $4/7$

(d) 1

## Exercise 1(C)

**Que. 12** Which is True ?

(a)  $2^0 > (1/2)^0$

(b)  $2^0 < (1/2)^0$

(c)  $2^0 = (1/2)^0$

(d) None of these

## Exercise 1(C)

**Que. 13** If  $x^{1/p} = y^{1/q} = z^{1/r}$  and  $xyz = 1$ , then the value of  $p + q + r$  is

(a) 1

(b) 0

(c)  $1/2$

(d) None of these

## Exercise 1(C)

**Que. 14** The value of  $y^{a-b} \times y^{b-c} \times y^{c-a} \times y^{-a-b}$  is

(a)  $y^{a+b}$

(b)  $y$

(c) 1

(d)  $1/y^{a+b}$

## Exercise 1(C)

**Que. 15** The True option is

(a)  $x^{2/3} = \sqrt[3]{x^2}$

(b)  $x^{2/3} = \sqrt{x^3}$

(c)  $x^{2/3} > \sqrt[3]{x^2}$

(d)  $x^{2/3} < \sqrt[3]{x^2}$

## Exercise 1(C)

**Que. 16** The simplified value of  $16x^{-3}y^2 \times 8^{-1}x^3y^{-2}$  is

(a)  $2xy$

(b)  $xy/2$

(c)  $2$

(d) none of these



## Exercise 1(C)

**Que. 17** The value of  $(8/27)^{-1/3} \times (32/243)^{-1/5}$  is

(a)  $9/4$

(b)  $4/9$

(c)  $2/3$

(d) none of these

## Exercise 1(C)

**Que. 18** The value of  $\left\{ \frac{(x+y)^{2/3} \times (x-y)^{2/3}}{\sqrt{x+y} \times \sqrt{(x-y)^3}} \right\}^6$  is

(a)  $(x+y)^2$

(b)  $(x-y)$

(c)  $x+y$

(d) None of these

## Exercise 1(C)

**Que. 19** Simplified value of  $(125)^{2/3} \times \sqrt{25} \times \sqrt[3]{5^3} \times 5^{1/2}$  is

(a) 5

(b)  $1/5$

(c) 1

(d) None of these

## Exercise 1(C)

**Que. 20**  $[\{(2)^{1/2} \cdot (4)^{3/4} \cdot (8)^{5/6} \cdot (16)^{7/8} \cdot (32)^{9/10}\}^4]^{3/25}$  is

- (a) A fraction
- (b) an integer
- (c) 1
- (d) None of these

## Exercise 1(C)

**Que. 21**  $[1 - \{1 - (1 - x^2)^{-1}\}^{-1}]^{-1/2}$  is equal to

(a)  $x$

(b)  $1/x$

(c)  $1$

(d) None of these

## Exercise 1(C)

**Que. 22**  $\left[ \left( x^n \right)^{n \cdot \frac{1}{n}} \right]^{\frac{1}{n+1}}$  is equal to

(a)  $x^n$

(b)  $x^{n+1}$

(c)  $x^{n-1}$

(d) None of these

## Exercise 1(C)

**Que. 23** If  $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$ , then the simplified form of

$$\left[ \frac{x^l}{x^m} \right]^{l^2+lm+m^2} \times \left[ \frac{x^m}{x^n} \right]^{m^2+mn+n^2} \times \left[ \frac{x^n}{x^l} \right]^{l^2+ln+n^2}$$

- (a) 0
- (b) 1
- (c) x
- (d) None of these

## Exercise 1(C)

**Que. 24** Using  $(a-b)^3 = a^3 - b^3 - 3ab(a-b)$  tick the correct of these when  $x = p^{1/3} - p^{-1/3}$

(a)  $x^3 + 3x = p + 1/p$

(b)  $x^3 + 3x = p - 1/p$

(c)  $x^3 + 3x = p + 1$

(d) None of these



## Exercise 1(C)

**Que. 25** On simplification,  $1/(1 + a^{m-n} + a^{m-p}) + 1/(1 + a^{n-m} + a^{n-p}) + 1/(1 + a^{p-m} + a^{p-n})$  is equal to

- (a) 0
- (b)  $a$
- (c) 1
- (d)  $1/a$

## Exercise 1(C)

**Que. 26** The value of

$$\left(\frac{x^a}{x^b}\right)^{a+b} \times \left(\frac{x^b}{x^c}\right)^{b+c} \times \left(\frac{x^c}{x^a}\right)^{c+a}$$

- (a) 1
- (b) 0
- (c) 2
- (d) None of these

## Exercise 1(C)

**Que. 27** If  $x = 3^{1/3} + 3^{-1/3}$ , then  $3x^3 - 9x$  is

(a) 15

(b) 10

(c) 12

(d) None of these

## Exercise 1(C)

**Que. 28** If  $a^x = b$ ,  $b^y = c$ ,  $c^z = a$ , then  $xyz$  is

(a) 1

(b) 2

(c) 3

(d) None of these

## Exercise 1(C)

**Que. 29** The value of

$$\left(\frac{x^a}{x^b}\right)^{(a^2+ab+b^2)} \times \left(\frac{x^b}{x^c}\right)^{(b^2+bc+c^2)} \times \left(\frac{x^c}{x^a}\right)^{(c^2+ca+a^2)}$$

- (a) 1
- (b) 0
- (c) -1
- (d) None of these

## Exercise 1(C)

**Que. 30** If  $2^x = 3^y = 6^{-z}$ ,  $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$  is

(a) 1

(b) 0

(c) 2

(d) None of these

## PYQs

**Que.** Find the value of a from the following:

$$(\sqrt{9})^{-5} \times (\sqrt{3})^{-7} = (\sqrt{3})^{-a}$$

(a) 11

(b) 13

(c) 15

(d) 17

**Ans: d**

## PYQs

If,  $\left(\frac{3a}{2b}\right)^{2x-4} = \left(\frac{2b}{3a}\right)^{2x-4}$ , for some a and b, then the value

of x is

(a) 8

(b) 6

(c) 4

(d) 2

**Ans : d**



## PYQs

The value of  $\left(1 - \sqrt[3]{0.027} \left(\frac{5}{6}\right) \left(\frac{1}{2}\right)^2\right)$  is:

(a) 11/16

(b) 13/16

(c) 15/16

(d) 1

**Ans: c**

## PYQs

By simplifying  $(2a^3b^4)^6 / (4a^3b)^2 \times (a^2b^2)$ , the answer will be:

- (a)  $4a^2b^3$
- (b)  $4a^6b^4$
- (c)  $4a^{10}b^{10}$
- (d)  $4a^{10}b^{20}$

**Ans : d**

## PYQs

If  $\sqrt[3]{a} + \sqrt[3]{b} + \sqrt[3]{c} = 0$  then the value of  $\left(\frac{a+b+c}{3}\right)^3$  is equal to:

- (a)  $abc$
- (b)  $9abc$
- (c)  $1/abc$
- (d)  $1/9abc$

**Ans: a**

## PYQs

Value of  $\left[ 9^{n+\frac{1}{4}} \cdot \frac{\sqrt{3 \cdot 3^n}}{3 \cdot \sqrt{3^{-n}}} \right]^{\frac{1}{n}}$

(a) 9

(b) 27

(c) 81

(d) 3

**Ans : b**

## PYQs

If  $2^{x^2} = 3^{y^2} = 12^{z^2}$  then

(a)  $\frac{1}{x^2} + \frac{1}{y^2} = \frac{1}{z^2}$

(b)  $\frac{1}{x^2} + \frac{2}{y^2} = \frac{1}{z^2}$

(c)  $\frac{2}{x^2} + \frac{1}{y^2} = \frac{1}{z^2}$

(d) None of the above

**Ans: c**

## PYQs

If  $x = 3^{1/3} + 3^{-1/3}$  then find the value of  $3x^3 - 9x$

(a) 3

(b) 9

(c) 12

(d) 10

**Ans : d**

# LOGARITHM

If  $a^x = n$

then

$$x = \log_a n$$

logarithm of  $n$  to the base  $a$  is  $x$

## CONDITIONS

- $n > 0$
- $a > 0$
- $a \neq 1$



## LOGARITHM

$$2^4 = 16$$

$$4 = \log_2 16$$

$$10^3 = 1000$$

$$3 = \log_{10} 1000$$

$$5^{-3} = 1/125$$

$$-3 = \log_5 (1/125)$$

$$2^3 = 8$$

$$3 = \log_2 8$$



## EXERCISE 1 (D)

**Que. 2**  $\log_2 8$  is equal to

(a) 2

(b) 8

(c) 3

(d) None of these

## EXERCISE 1 (D)

**Que. 5** The value of  $\log 0.0001$  to the base 0.1 is

(a)  $-4$

(b)  $4$

(c)  $1/4$

(d) None of these

## EXERCISE 1 (D)

**Que. 7**  $\log_{\sqrt{2}} 64$  is equal to

(a) 12

(b) 6

(c) 1

(d) None of these

## EXERCISE 1 (D)

**Que. 8**  $\log_{2\sqrt{3}} 1728$  is equal to

(a)  $2\sqrt{3}$

(b) 2

(c) 6

(d) None of these

## EXERCISE 1 (D)

**Que. 9**  $\log (1/81)$  to the base 9 is equal to

(a) 2

(b)  $1/2$

(c) -2

(d) None of these

## EXERCISE 1 (D)

**Que. 10**  $\log_2 0.0625$  to the base 2 is equal to

(a) 4

(b) 5

(c) 1

(d) None of these

## EXERCISE 1 (D)

**Que. 13** The value of  $\log \frac{1}{3}$  to the base 9 is

(a)  $-1/2$

(b)  $1/2$

(c) 1

(d) None of these

## PROPERTIES OF LOGARITHM

- $\log_a 1 = 0$

- $\log_a a = 1$



## PROPERTIES OF LOGARITHM

$$\log_a m + \log_a n = \log_a (mn)$$

## EXERCISE 1 (D)

**Que. 1**  $\log 6 + \log 5$  is expressed as

(a)  $\log 11$

(b)  $\log 30$

(c)  $\log 5/6$

(d) None of these

## EXERCISE 1 (D)

**Que. 4**  $\log (1 \times 2 \times 3)$  is equal to

(a)  $\log 1 + \log 2 + \log 3$

(b)  $\log 3$

(c)  $\log 2$

(d) None of these

## EXERCISE 1 (D)

**Que. 11** Given  $\log 2 = 0.3010$  and  $\log 3 = 0.4771$  the value of  $\log 6$  is

(a) 0.9030

(b) 0.9542

(c) 0.7781

(d) None of these

## EXERCISE 1 (D)

**Que. 14** If  $\log x + \log y = \log (x+y)$ ,  $y$  can be expressed as

(a)  $x-1$

(b)  $x$

(c)  $x/(x-1)$

(d) None of these

## EXERCISE 1 (D)

**Que. 17** Given that  $\log_{10} 2 = x$  and  $\log_{10} 3 = y$ , the value of  $\log_{10} 60$

is expressed as

(a)  $x - y + 1$

(b)  $x + y + 1$

(c)  $x - y - 1$

(d) None of these

## PROPERTIES OF LOGARITHM

$$\log_a m - \log_a n = \log_a \frac{m}{n}$$

## EXERCISE 1 (D)

**Que. 3**  $\log (32/4)$  is equal to

(a)  $\log 32 / \log 4$

(b)  $\log 32 - \log 4$

(c)  $2^3$

(d) None of these



## EXERCISE 1 (D)

**Que. 18** Given that  $\log_{10} 2 = x$ ,  $\log_{10} 3 = y$ , then  $\log_{10} 1.2$  is expressed in terms of  $x$  and  $y$  as

(a)  $x + 2y - 1$

(b)  $x + y - 1$

(c)  $2x + y - 1$

(d) None of these

## PROPERTIES OF LOGARITHM

$$\log_a m^n = n \log_a m$$

**Example :**  $\log_{10} 100^5$

## EXERCISE 1 (D)

**Que.6** If  $2 \log x = 4 \log 3$ , the  $x$  is equal to

(a) 3

(b) 9

(c) 2

(d) None of these

## EXERCISE 1 (D)

**Que. 12** The value of  $\log_2 \log_2 \log_2 16$

(a) 0

(b) 2

(c) 1

(d) None of these

## EXERCISE 1 (D)

**Que. 15** The value of  $\log_2 [\log_2 \{\log_3 (\log_3 27^3)\}]$  is equal to

(a) 1

(b) 2

(c) 0

(d) None of these

## EXERCISE 1 (D)

**Que. 19** Given that  $\log x = m + n$  and  $\log y = m - n$ , the value of

$\log (10x/y^2)$  is expressed in terms of  $m$  and  $n$  as

(a)  $1 - m + 3n$

(b)  $m - 1 + 3n$

(c)  $m + 3n + 1$

(d) None of these

## EXERCISE 1 (D)

**Que. 20** The simplified value of  $2 \log_{10} 5 + \log_{10} 8 - 1/2 \log_{10} 4$  is

(a)  $1/2$

(b) 4

(c) 2

(d) None of these