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Maths 3rd April

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Ratio, Proportion & Percentage

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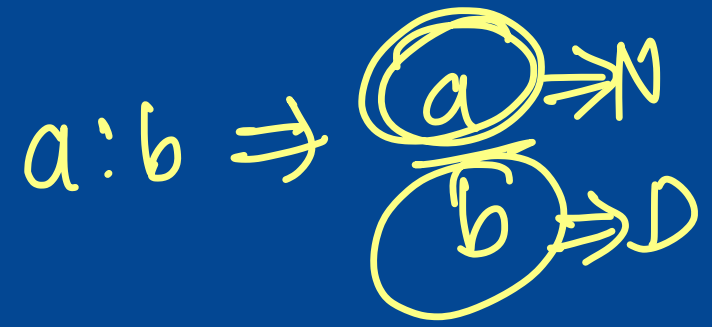
Ratio



Any two quantities expressed as a:b or $\frac{a}{b}$ is called as Ratio

a is called as NUMERATOR or Antecedent

b is called as DENOMINATOR or Consequent

Proportion

A proportion is a mathematical statement expressing equality of two ratios.

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

The two terms ‘b’ and ‘c’ are called ‘means or mean term,’ whereas the terms ‘a’ and ‘d’ are known as ‘extremes or extreme terms.’

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TIP 1 ✓

a:b `x`

If two numbers are in a ratio of a:b and the sum of these numbers is 'x', then these numbers are $\frac{ax}{a+b}$ and $\frac{bx}{a+b}$

Example:

a:b `x`

Ratio of two numbers is 4:5 and addition is 810. Find numbers.

$$\frac{ax}{a+b} = \frac{4 \times 810^{90}}{9} = 360$$

$$\frac{bx}{a+b} = \frac{5 \times 810^{90}}{9} = 450$$

TIP 2

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✓ a:b = 3:4

✓ b:c = 2:5

Find a:b:c ? ✓

(2)

Equal the value of 'b'

a:b:c = 3 x 2 : 4 x 2 : 5 x 4

= 6 : 8 : 20

= 3 : 4 : 10

a:b = 3:4]

⇒ b:c = 2:5

a:b:c = 3x2 : 4x2 : 5x4

= 6 : 8 : 20

= 3 : 4 : 10

formula

a:b = p:q

b:c = x:y

a:b:c = px : qx : qy

TIP 3 3 Ratios.

a:b = 1:2

b:c = 3:2

c:d = 1:3

Find a:b:c:d ?

TRICK

a	b	c	d
1	2→	2 →2	
3 ←3		2→2	
1←1←1		3	

a : b : c : d ⇒ 3 : 6 : 4 : 12

Percentage

$100\% = 1$

$50\% = 0.5$ $\quad 1\% = 0.01$

$25\% = 0.25$ $\quad 10\% = 0.10$

Percentage is a way of expressing a number as a fraction of 100.

Marks $\quad 12/20$

$\rightarrow \frac{\cancel{12}^{6}}{\cancel{20}} \times 10\cancel{0} = 60\%$ $\quad \frac{1}{100}$

10% of $30 \Rightarrow \frac{10}{100} \times 30 = \boxed{3}$

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1. A man spends 75% of his income. His income is increased by 20% and he increased his expenditure by 10%. His saving are increased by

A. 10%
B. 25%
C. 37.5%
D. 50%

$20 = 0.20$

0.2

Rs. 100 ⇒ 1

Expense = 75

Saving = 25

$\frac{75}{100} \times 100 = 75$

$100 \times 0.2 = 20$

New Income = 100 + 20 = 120

$\frac{10}{100} \times 75 = \frac{75}{10} = 7.5$

Expense = 75 + 7.5 = 82.5

120 − 82.5 = 37.5 ✓

$\frac{12.5}{25} \times 100 = 50\%$

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2. The ratio of the number of boys and girls in a school is 3: 2. If 20% of the boys and 30% of the girls are scholarship holders, the percentage of the students who are not scholarship holder is

A. 50 %
B. 72 %
C. 75 %
D. 76 %

D

$\frac{B}{G} = \frac{3}{2}$

Let students = 100

$3x + 2x = 100$

$5x = 100$

$x = \frac{100}{5} = 20$

$B = 3x = 3 \times 20 = 60$

$G = 2x = 2 \times 20 = 40$

$\Rightarrow B = 60\%$

$G = 40\%$

$100 - 24\% = 76\%$

$B = 12$

$G = 12$

Total = 24 = 24%

10 = 3

40 = 3 × 4 = 12

10 ⇒ 10% ⇒ 1

⇒ 20% = 2

60 ⇒ 2 × 6 = 12 (×6)

3. If 3A=5B and 4B = 6C, then A:C is equal to

A. 5:2
B. 3:5
C. 2:5
D. 4:5

(A)

$3A = 5B$

$\left[\frac{A}{B} = \frac{5}{3}\right]$

$4B = 6C$

$\frac{B}{C} = \frac{6}{4} = \frac{3}{2}\Big]^3$

$A:B:C = 5:3:2$

$A:C = 5:2$

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4. A sum of Rs 53 is divided among A, B, C in such a way that A gets Rs 7 more than what B gets and B gets Rs 8 more than what C gets. The ratio of their shares is

A. 16:9:18
B. 25:18:10
C. 18:25:10
D. 15:8:30

(B)

$C = 'x' = 10$

$B = x + 8 = 10 + 8 = 18$

$A = x + 8 + 7 = 10 + 8 + 7 = 25$

$x + x + 8 + x + 8 + 7 = 53$

$3x + 23 = 53$

$3x = 53 - 23 \Rightarrow 30$

$3x = 30 \Rightarrow x = \frac{30}{3} = 10$

$A : B : C = 25 : 18 : 10$

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5. Half percent, written as a decimal is,

A. 0.2
B. 0.02
C. 0.005
D. 0.05

C

100% ⇒ 1
10% ⇒ 0.1
1% = 0.01
0.5% = 0.005
0.1% = 0.001

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6. The percentage increase in the area of a rectangle, if each of its sides is increased by 20% is

A. 40%
B. 42%
C. 44% ✓
D. 46%

(C)

100% = 1
+ 20% = 0.2
120% = 1.2

Area (Rectangle) = l × b
= 1lb

Increase =
length = 1.2l
breadth = 1.2b

Area = 1.2l × 1.2b
= 1.44 lb

0.44
⇒ 44% ✓

7. Find the percentage gain or loss when the pens bought for Rs. 96 per dozen were sold at the rate of 10 pens for Rs. 90?

A. 13%
B. 20%
C. 4%
D. 12.5%

D

96 ⇒ 12 ⇒ $\frac{96}{12}$ = Rs. 8 = Buy.

90 ⇒ 10 ⇒ $\frac{90}{10}$ = Rs. 9 = Sell

Profit % = $\frac{\text{Profit}}{\text{Buying}} \times 100$

= $\frac{1}{8} \times 100$ = 12.5

Profit = Sell − Buy.
= 9 − 8
= Rs. 1

= 12.5 %

1km = 1000 m

8. Ratio of 2 km to 600 m should be,

A. 2:7
B. 2:8
C. ~~2:3~~
D. 10:3

D

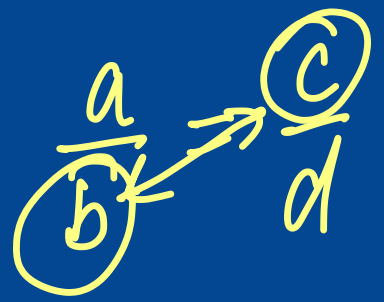
$\frac{2}{600}$

2km = 2 × 1000
= 2000 m

$\frac{2000}{600} = \frac{10}{3}$

9. In a:b = c:d, then b and c are called,

A. Antecedent
B. Extreme
C. Consequent
D. Mean



10. $10\%\ of\ x = 25\%\ of\ y$. Then the ratio of $x : y$ is

A. 2:5
B. 5:2
C. 3:4
D. 4:3

B

$\frac{10}{100} \times x = \frac{25}{100} \times y$

$\frac{x}{y} = 5\frac{25}{100} \times \frac{100}{10}2$

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

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11. $\frac{48}{7}$ is approximately how much percentage of $\frac{7}{48}$

A. 6000%
B. 4700%
C. 1000%
D. None

(B)

$$\frac{\left(\frac{a}{b}\right)}{\left(\frac{c}{d}\right)} = \frac{a}{b} \times \frac{d}{c}$$

$$\frac{\frac{48}{7}}{\frac{7}{48}} \times 100 = \frac{48}{7} \times \frac{48}{7} \times 100$$

$$\approx 7 \quad \approx 7$$

$$= \frac{48}{7} \times \frac{48}{7} \times 100$$

$$7\frac{49}{7} = 7$$

$$49 \times 100$$

$$\approx 4900$$

Ticket = 100 Total = 100

12. A reduction of 25% in the ticket rates resulted in increase of 30% in the daily attendance in a theater. The daily collection will be?

A. 2.5% more
B. Same
C. 5% less
D. 2.5% less

Collection = 100 X 100
= 10,000

Ticket = 100 - 25 = 75
Sale = 100 + 30 = X 1.30

975 0

D

2.5%
25
100 00

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