

# Ratio and proportion.

$$P = 5ar.$$

$$50 \text{ km/hr} = 10 \text{ km/hr}.$$

$$R:S = 2:3$$

$$4000:6000.$$

$$\text{ratio of } Pov/Sov = 50:10$$

$$= 5:1$$

$$a:b = c:d$$

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

$$a:b = a/b$$

$$b:a = b/a$$

Tips.

$$1) \frac{a}{b} = \frac{c}{d}$$

$$ad = cb.$$

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

$$\frac{a-b}{b} \neq \frac{c-d}{d}$$

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

componendo and  
dividendo.

$$2) \frac{a}{b} = \frac{c}{d}$$

$$ad > bc \rightarrow \frac{a}{b} > \frac{c}{d}$$

$$ad < bc \rightarrow \frac{a}{b} < \frac{c}{d}$$

$$ad = bc \rightarrow \frac{a}{b} = \frac{c}{d}$$

$$3) \frac{a}{b} = \frac{c}{d}$$

$$\boxed{\frac{a+b}{b} = \frac{c+d}{d} \rightarrow \text{componendo.}}$$

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

inverse  $a:b::b:c$

$$b) \frac{a}{b} : \frac{c}{d} \rightarrow \begin{cases} \text{extremes} \\ \downarrow \\ \text{mean} \end{cases}$$

$$a:b:c:d$$

$$\boxed{\begin{array}{c} \uparrow \\ \text{mean} \end{array}} \rightarrow \text{extremes} \quad a:b::c:d$$

$$4) \frac{a}{b} = \frac{c}{d}$$

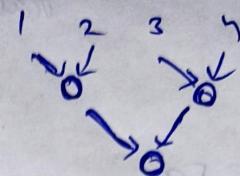
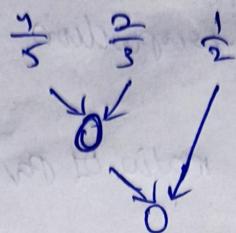
$$\boxed{\frac{a-b}{b} = \frac{c-d}{d} \downarrow \text{dividendo}}$$

$$\frac{17}{18} \quad \frac{10}{11}$$

$$17 \times 11 = 18 \times 10$$

$$187 > 180$$

(greater)



2) 3rd proportion to 18 and 54?

$$a:b:c$$

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

$$18: 54 : ?$$

$$\begin{array}{r} 18 \\ \hline 54 \\ \hline b=3 \\ \hline d=18 \end{array}$$

$$ac = b^2$$

$$18 \times c = 54 \times 54$$

$$c = 54 \times 3$$

$$c = 162.$$

3)  $a:b:c:d$

$$a:b::c:d$$

$$9:13:153:?$$

$$\begin{aligned} &= \frac{13 \times 153}{9} \\ &= 221 \text{ (why)} \end{aligned}$$

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

$$ad = bc$$

$$d = \frac{bc}{a}$$

4)  $\frac{7}{5}$  and  $63$  what is mean?

$$a:b:c$$

$$7: ?: ? : 63$$

~~7x63~~

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

$$7 \times 63 = b^2$$

$$7 \times 7 \times 9 = b^2$$

$$7 \times 7 \times 3 \times 3 = b^2$$

$$b = 21$$

$$7 \times 13 = \frac{11}{28} = \frac{21}{n} = \frac{12}{n} = k (?)$$

$$\frac{10+11+21+12}{13+28+11+11} = \frac{54}{63} = \frac{6}{7}$$

6) Ramesh and swresh 5:6. Their spending ratio is 7:9  
Ramesh saves 4000 and swresh saves 3000. Income of  
Ramesh and swresh?

$$\text{Income} = \text{Spend} + \text{Saving}$$

$$\text{Spend} = \text{Inc} - \text{Saving}$$

$$\text{Ratio} = 5:6$$

$$\frac{\text{Ramesh}}{\text{Swresh}} = \frac{5}{6} \quad \frac{7}{9} = \frac{\text{Spend R}}{\text{Spend S}} = \frac{5k - 4000}{6k - 3000}$$

$$\frac{7}{9} = \frac{5k - 4000}{6k - 3000} \quad 42k - 21000 = 45k - 36000$$

$$15000 = 3k$$

$$1k = 5000$$

$$\text{Ramesh: } 25000$$

$$\text{Swresh: } 30000$$

$$7) a:b=3:7 \text{ and } b:c=9:5 \quad a:b:c = ?$$

$$a:b:c$$

$$a:b:c$$

$$3:7:2$$

$$3:7$$

$$9:9:5$$

$$\underline{27:63:35}$$

$$3:8:5 \text{ A brief } (1)$$

$$8) \text{ how to divide } 3395 \text{ in ratio } 42:32:23?$$

$$42k + 32k + 23k = 3395$$

$$97k = 3395$$

$$k = 35.$$

$$42k = 1470.$$

$$32k = 1120$$

$$23k = 805.$$

9) 285 is sum of 3 numbers. Ratio between 2nd and 3rd number is 6:5. Ratio between 1st and 2nd number is 3:7  
The 3rd number is?

1st : 2nd

and : 2nd

3 : 7

6 : 5

3 : 7 : 7

6 : 6 : 5

18 : 42 : 35

$$3rd = \frac{35}{95} \times 185$$

$$(18+42+35)$$

3

- 10) ratio of two numbers is 3:8. On adding 5 to both the numbers, the ratio become 2:5. Which is smaller?

ratio = 3 : 8

3k : 8k

45

$$\frac{3k+5}{8k+5} = \frac{3}{5}$$

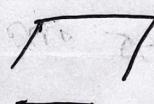
$$15k+25 = 16k+15$$

$$\boxed{k=15}$$

- 11) Find A:B:C:D When A:B = 2:3 B:C = 7:9

C:D = 5:7 ?

$$\frac{2}{3} = \frac{7}{9} = \frac{5}{7}$$



A : B : C : D

70 : 105 : 135 : 189

12) Price of each article of type P, Q, and R is Rs. 300,  
 Rs. 180 and Rs. 120 respectively. Suresh buys  
 articles of each type in the ratio 3:2:3 in Rs. 6480.  
 How many articles of type Q did he purchase?

$$P:Q:R$$

$$300:180:120:$$

$$3:2:3$$

$$3k:2k:3k$$

$$900k + 360k + 360k = 6480.$$

$$1620 = 6480$$

$$k = 4$$

13) Ajai and Raj together have Rs. 1050. On  
 taking Rs. 150 from Ajai, Ajai will have same  
 amount as what Raj had earlier. Find the  
 ratio of amounts with Ajay and Raj initially.

$$A+R = 1050 \quad \text{--- } ①$$

$$A:R = 600:700$$

$$A - 150 = R$$

$$4:5$$

$$A - R = 150 \quad \text{--- } ②$$

$$A+R+A-R = 1050+150.$$

$$2A = 1200$$

$$A = 600.$$

(14) If  $x:y = 3:4$ , then  $(x+3y):(7x-3y)$   
is equal to  $\rightarrow$  2 ways

I short cut

$$x:y = 3:4 \quad (m+3y):(7m-3y)$$

$$\frac{n}{y} = \frac{3}{4} \Rightarrow \frac{7m}{3y} = \frac{21}{12}$$

$$\frac{x+y}{n-y} = \frac{21+12}{21-12}$$

$$= \frac{33}{9} \Rightarrow 11:3$$

(15) If  $a:b = 5:7$  and  $c:d = 2a:3b$ , then

$ac:bd$  is ~~such a~~ such a ratio

$$\text{eff. } \frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$$

$$= \frac{5}{7} \times \frac{2a}{3b}$$

$$= \frac{10a}{21b}$$

$$= \frac{10(5)}{21(7)}$$

$$= \frac{50}{147}$$

16) The three numbers are in the ratio  $\frac{1}{2} : \frac{3}{4}$ .  
 $\frac{3}{4}$  The difference between greatest & smallest numbers is 36. Find the numbers.

$$\frac{k}{2} : \frac{2k}{3} : \frac{3k}{4} \quad \frac{10}{2} = 0.5(k)$$

$$\frac{3k}{4} - \frac{k}{2} = 36 \quad \frac{2}{3} = 0.666(k)$$

$$k = 36 \times 4.$$

$$= \frac{36 \times 4}{2} \Rightarrow 72$$

$$= \frac{36 \times 4 \times 2}{3} \Rightarrow 96$$

$$= \frac{36 \times 4 \times 3}{4} \Rightarrow 108$$

17) The ratio of Market prices of wheat & paddy is 2:3 and the ratio of consumption in a family is 5:4. Find the ratio of expenditure of wheat & paddy.