Rate/Ratio/Proportion/Shares

Rate →

1. Data → Comparison
2. Data → Different quantities & Different units
3. End Result → unit quantity
4. Purpose → Unit Rate eg per/min
5. eg = Speed = $\frac{\text{Distance}}{\text{Time}}$ ⇒ m/s

Run Rate = $\frac{\text{Score}}{\text{overs}}$

$\Rightarrow$ Team $\rightarrow$ 6 overs, 51 Runs

R.R = $\frac{51}{6}$ = 8.5 Ans:

1. Ayesha collects apples in the basket. She picks about 6 apples each minute. Approximately how many apples she will collect in 10mins.

2. Cost of three dozen eggs is Rs. 720. What is the cost of 5 eggs.

1 min = 6 Apples :

10 x min = 10 x 6

= 60 Apples :

(2) 3 x 12 = 720 Rs

36 Eggs = 720 Rs

36 36

Unit : 1 Egg = 20 Rs

→ 5 x Egg = 5 x 20

= 100 Rs :

2

3. A car takes 3 hours to cover a distance of 360km. What distance will it cover in 40mins?

→ 3 Hours = 360Km

3 × 60mins = 360Km

180mins = 360Km

Unit Rate: 1min = $\frac{360}{180}$ Km = 2Km

→ 40 × min = 40 × 2 = 80Km

Ans: 2

eg ⇒ 8500 : 2500

17x : 5x

Ratio/Proportion

Ratio → Data Comparison

→ Data → Same quantity & Same Unit

→ Unit less

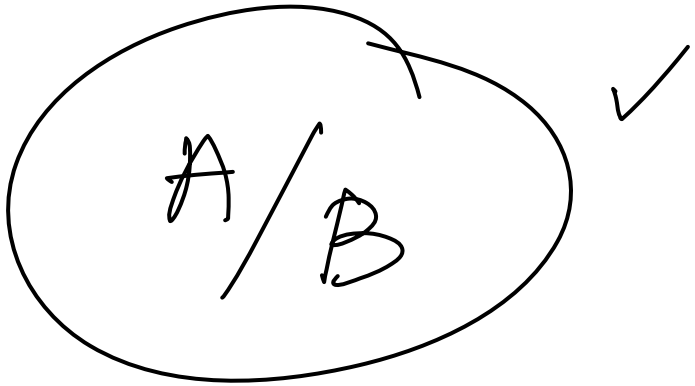
→ purpose ⇒ To simplify the Data :

Represent:

$A : B$

↑ Antecedent

↳ consequent

$A : B \rightarrow$ 

1. Ahmad's monthly income is 90000/- while his expenditure is 65000/-

a. Find ratio b/w income expenditure

b. Ratio b/w expenditure and saving

c. Ratio b/w saving and income

$A : B = A/B$

2 → Saving = 90 − 65

= 25,000

① Income : Exp :-

90,000 : 65000 → 90,000 / 65,000

$5X18 : 5X13$

18 : 13

2. What is the ratio of 4 inches to 8 feet?

3. The ratio of 250ml and 8L is?

$A = 4$ inches

$B = 8$ feet

$\therefore 1F = 12$ inches

$B = 8 \times 12$ inches

$1L = 1000ml$

A : B

$250ml : 8 \times 1000ml$

$1 : 32$

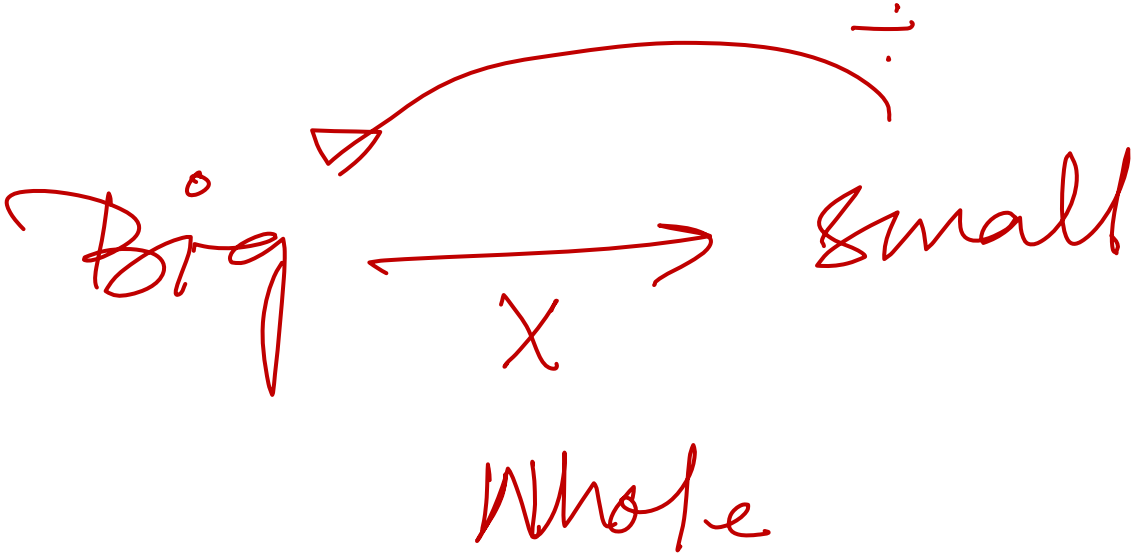
A : B

$4 \text{ inches} : 8 \times 12 \text{ inches}$

$1 : 24$

Ans:

→ Unit Conversion :



In a cage containing 50 parrots, 10 are blue, 18 are green, and 22 are yellow. How many green parrots should be added to make the ratio between green and yellow parrots as 3:2?

Green = 18 + x ⇒ G(N) = 18 + x

Yellow = 22

G(N) : Yellow = 3 : 2

18 + x : 22 = 3 : 2

$\frac{18+x}{22} = \frac{3}{2}$ → Cross Mul

(18 + x)2 = 3(22) ⇒ x = 15

short cut:

G(N) : Y

3 : 2 = 3x : 2x

11 × 3 : 2 × 11

33 : 22

−18

15 Ans: 2

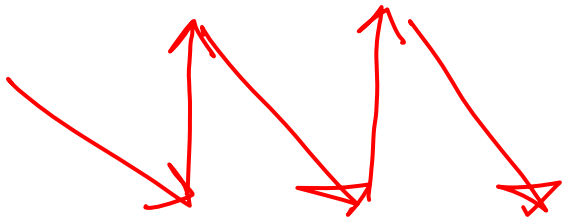
Two numbers are respectively 20% and 50% more than a 3rd number. Find the ratio of the 1st and 2nd number.

→ Percentage ✓

H.W

$\Rightarrow A : B = 2 : 3 \rightarrow$

$\rightarrow B : C = 4 : 5$



$A : B : C \longrightarrow ?$

$A : B : C$

$2 : 3 : -$

x x x

$4 : 5$

Zig → Zag

Xing

$8 : 12 : 15$ Ans:

if A is $\frac{4}{3}$ of B & B is 75% of C, then find A : B : C ?

Sol: ① $A = \frac{4}{3}B \rightarrow \frac{A}{B} = \frac{4}{3}$

$\Rightarrow A : B = 4 : 3$ ✓

② $B = \frac{75}{100}C \rightarrow \frac{B}{C} = \frac{75}{100} = \frac{3}{4}$ ✓

$B : C = 3 : 4$ ✓

A : B : C

4 : 3

3 : 4

~~12 : 9 : 12~~

4 : 3 : 4 ← Ans : 2

Direct and Inverse Proportion

① Data → constant →

② Data → update ↔

① Direct Proportion

A(↑), B(↑)

A(↓), B(↓)

Arrow Direction = Same

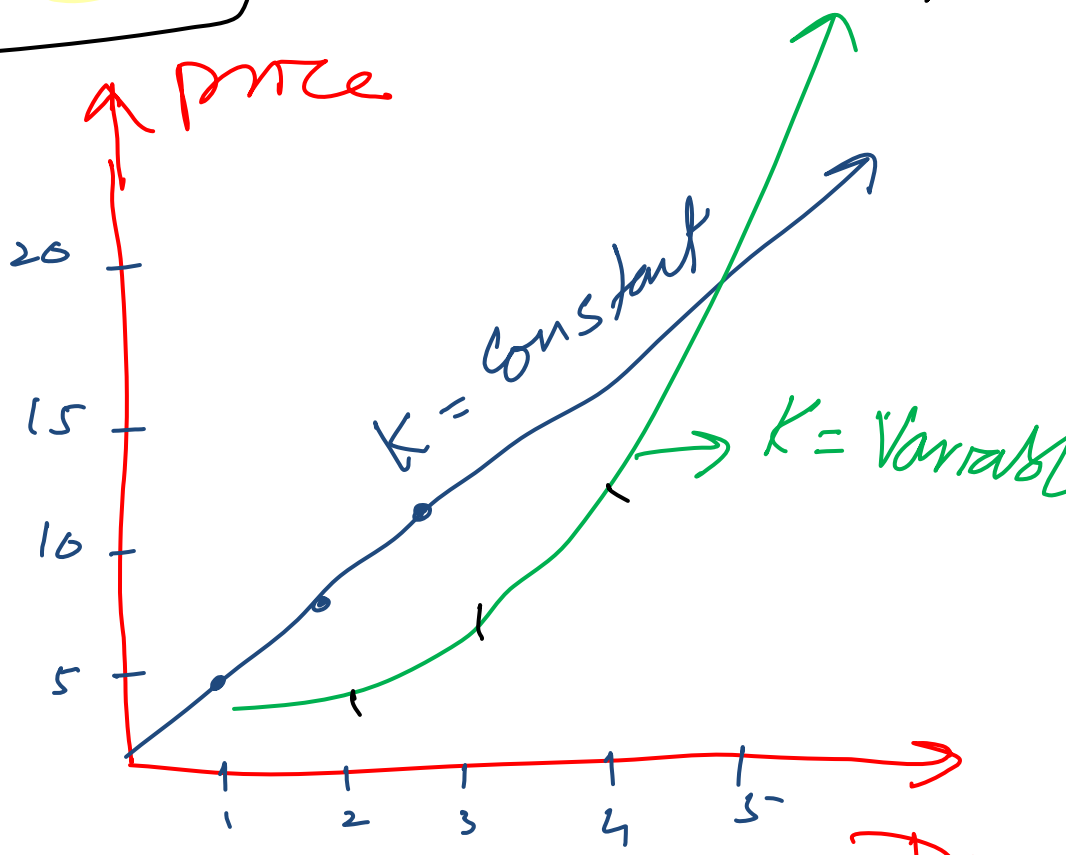
$y \propto x$

$\Rightarrow \boxed{y = Kx}$

K = constant or variable

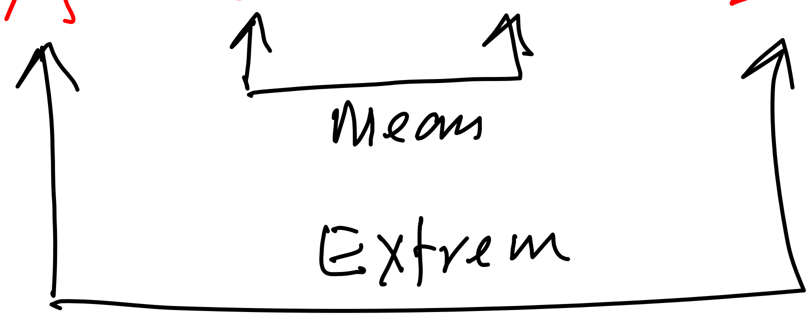
$\text{Slope} = \frac{\Delta y}{\Delta x}$

CSS - 2023



Four quantities :

$$A : B :: C : D$$



$$\frac{A}{B} = \frac{C}{D} \Rightarrow \boxed{AD = BC} \checkmark$$

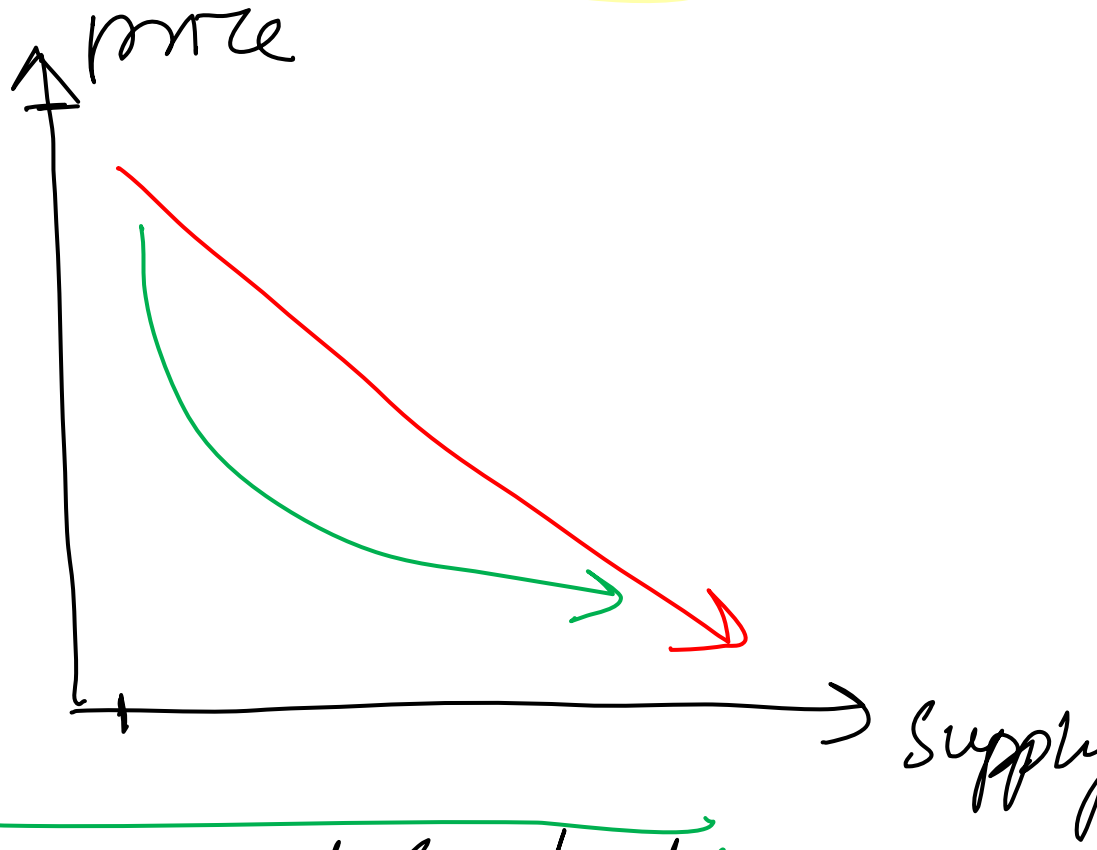
product of extrem = product of mean

(2) Inverse prop :- A(↑), B(↓)

Arrow Direction = opposite (↑↓)

$y \propto \frac{1}{x}$

$y = \frac{K}{x}$



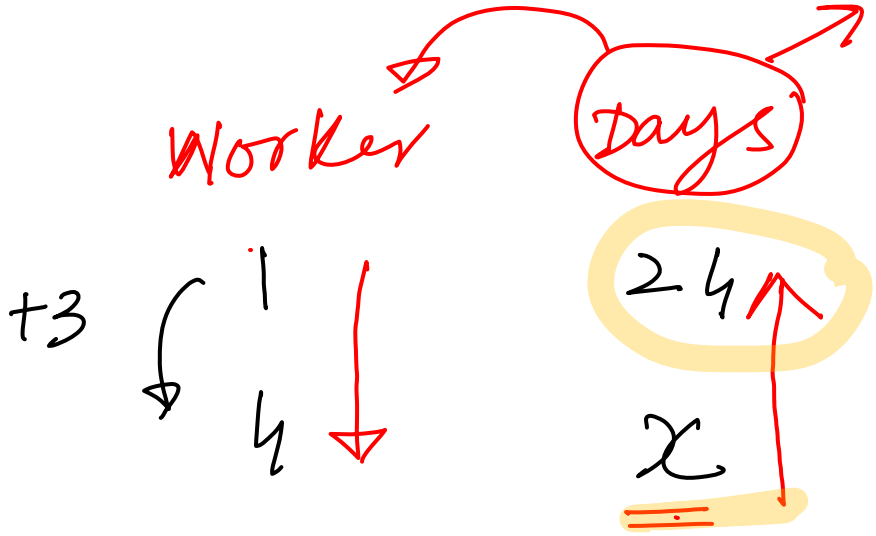
Demand = Constant

Four quantities : inverse

→ $A : \frac{1}{B} :: C : \frac{1}{D}$

$$A \times B = C \times D$$ ✓

1. A worker can complete a task in 24days. If three more workers join him, in how many days the same work will be completed?



(1) Days & worker inverse → ↑↓

↑ It (Denominator)

↓ T (Numerator)

→ Unknown = $Q_1 \times Q_2 \times \cdots$

(A/B) = (A/B)

$$\frac{x}{24} = \frac{1}{4} \Rightarrow x = \frac{1}{4} \times 24 = 6$$

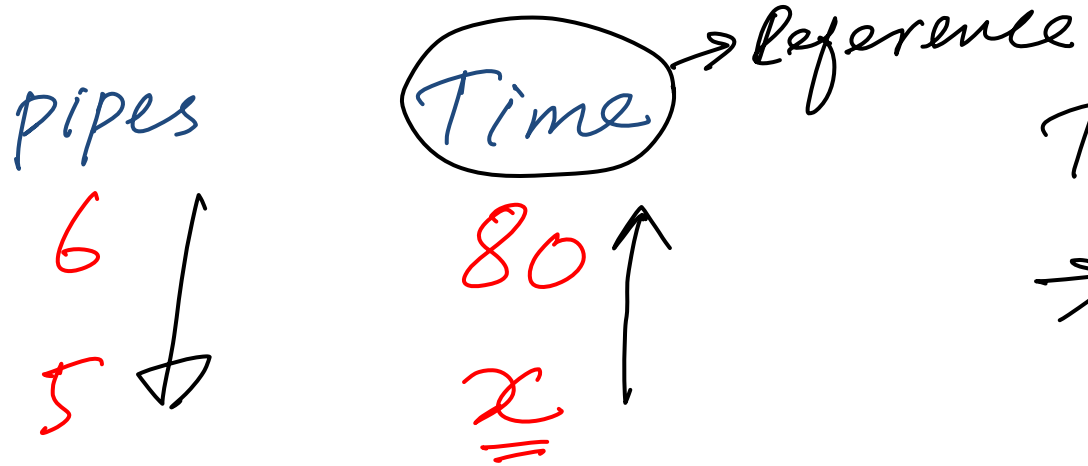
$x = 6$ days

Ans:

2. Aslam types 200 words in 30mins. How many words he will type in 12mins?

80 mins

6 pipes are required to fill a tank in 1hr,20mins. If we use 5 such types of pipes, how much time it will take to fill the tank?



Time & pipes

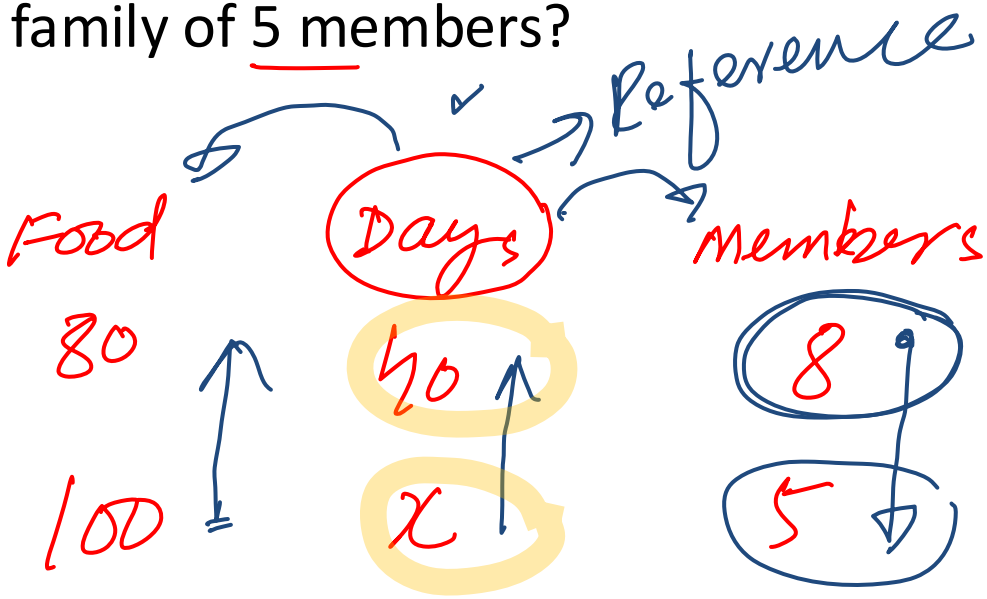
→ Inverse (↑↓)

$$\frac{x}{80} = \frac{6}{5} \Rightarrow x = \frac{6}{5} \times 80 \Rightarrow 96 \text{ mins}$$

$= 1\text{hr}, 36 \text{ mins}$ Ans

3. In a factory 5 men work for 8hrs to produce 200 products. If 8 men work for 6hrs then how many commodities will be manufactured?

4. If 80kg of ration is sufficient for a family of 8 members for 40 days. Then for how many days, 100kg food will be sufficient for a family of 5 members?



① Days & food
Direct (↑↑)

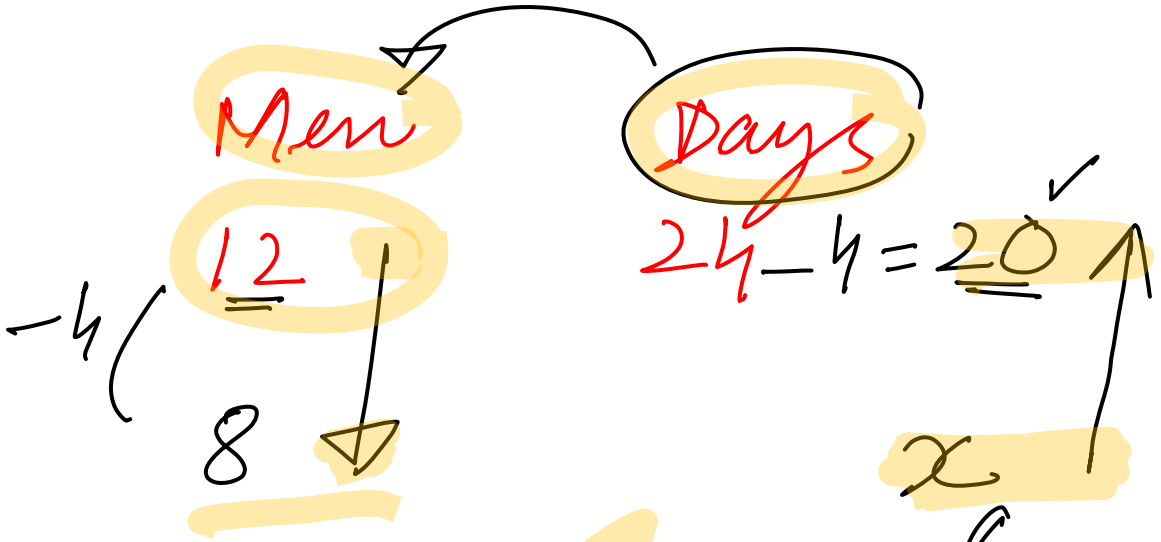
② Days & members
Inverse (↑↓)

$$\text{Days} = \frac{\text{food} \times \text{members}}{2}$$

$$\frac{x}{40} = \frac{100}{80} \times \frac{8}{5} \Rightarrow x = 2 \times 40 = 80 \text{ days}$$

update → use → updated

12 men can complete a job in 24 days, after 4 days four men left the job/ the remaining job will be done in how many days by the remaining men? CSS-2024



Days & men
inverse
(↑↓)

$$\Rightarrow \frac{x}{20} = \frac{12}{8} \Rightarrow x = \frac{12}{8} \times 20 = 30 \text{ days}$$

A fort had enough provision of food for 300 soldiers for 90days. After 20 days, 50 men left the fort. How long would the food last now at the same rate?

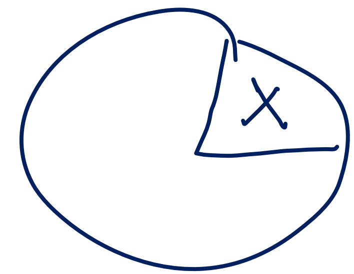
Soldiers $\propto$ Days

300 → 250 (−50)

$90-20=70$

x

Food



$300, 90$

$90-20=70$

$$\frac{x}{70}=\frac{300}{250} \Rightarrow x=\frac{70\times 6}{5}$$

$x = 84$ days.

Compound Proportion

1. 20 pens const 200rs, what will be the cost of 35pens?

2. The value of x in the given proportion 1.6:1.2::2.4:x is?

Shares → Next class

1. Share an amount of 840 between A and B in the ratio of 4:3

2. Share 150kg into 9:4:2.

3. Moiz and Mair share a lottery win of Rs. 2000 in the ratio of 1:4, Moiz then share his part between himself, his wife and his son in the ratio of 4:5:1, how much more his wife gets over his son?

4. Three persons start a business and spend 25,000, 15,000 and 40,000 respectively. Find the share of each out of a profit of 14,400 in a year.

5. A and B started a business in partnership investing Rs. 20000 and Rs. 15000 respectively. After six months, C joined them with Rs. 20000. What will be B's share in the total profit of Rs. 25000 earned at the end of 2 years from the starting of the business?