Rate/Ratio/Proportion/Shares

Rate

① Data Comparison:

② Data → Different quantities.

③ eg: Speed = $\frac{\text{Distance}}{\text{Time}}$ ⇒ m/s

eg ② Run Rate = score/overs. R/o

④ End Result → Unit

⑤ Purpose → Unit Rate:

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 mins = 10 x 6 Apple

= 60 Apples

(2) 3 Dozen eggs = 720 Rs

3 X 12 Eggs = 720 Rs

36 Eggs = 720 Rs

Unit

1 Egg = 720/36 = 20 Rs

5 Eggs = 5 x 20 = 100 Rs

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

Ans: 80Km

Ratio/Proportion

Ratio:- Data comparison

Data → Same quantity & Same Unit.

End Result → Unitless.

Purpose = To simplify the Data.

Represent :-

$$A : B = \frac{A}{B}$$

Antecedent — Consequent

Note :-

$$A : B \neq B : A$$

Mean proportion $= \sqrt{A \times B}$

eg $A : B = 4 : 121 \Rightarrow \sqrt{4 \times 121} = \sqrt{4} \times \sqrt{121}$

$= 2 \times 11$

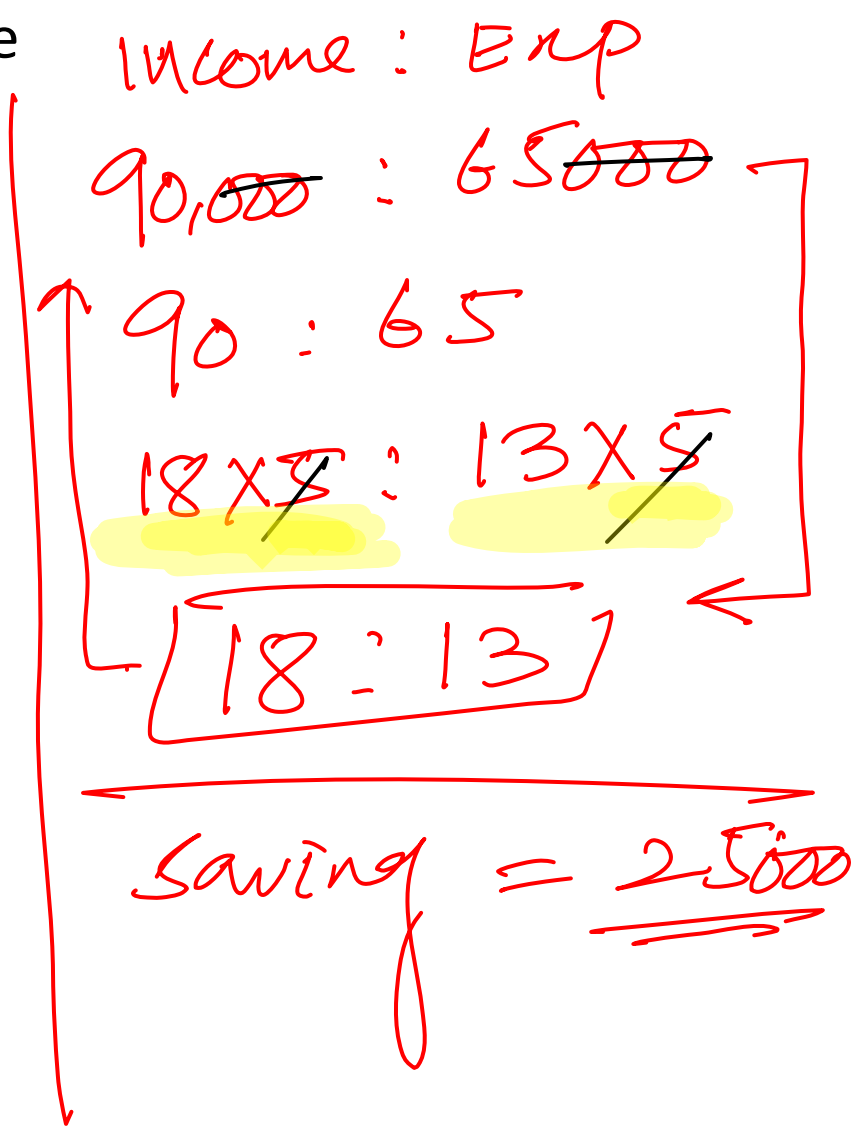
$= 22$

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



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

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

4. Find the mean proportion between 4 and 25?

B = 8 feet = 8 X 12 inches

A : B

4 inches : 8 X 12 inches

1 : 24

Ans:

③ A = 250ml, B = 8L

B = 8 X 1000 ml

A : B

250ml : 8 X 1000ml

1 : 32

④ Mean pro = $\sqrt{4 \times 25}$

$= \sqrt{100}$

$= 10$

Ans:

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, yellow = 22

$(G+x) : \text{Yellow} = 3:2$

$(18+x) : 22 = 3:2$

$\frac{18+x}{22} = \frac{3}{2}$ ∴ Cross X'ing

$2(18+x) = 3 \times 22$

$36 + 2x = 66$

$2x = 66 - 36$

$2x = 30$

$x = 30/2 = 15$

Or

$G : Y = 3:2$

$3 \times 11 : 2 \times 11$

$33 : 22$

-18

15

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

Direct and Inverse Proportion

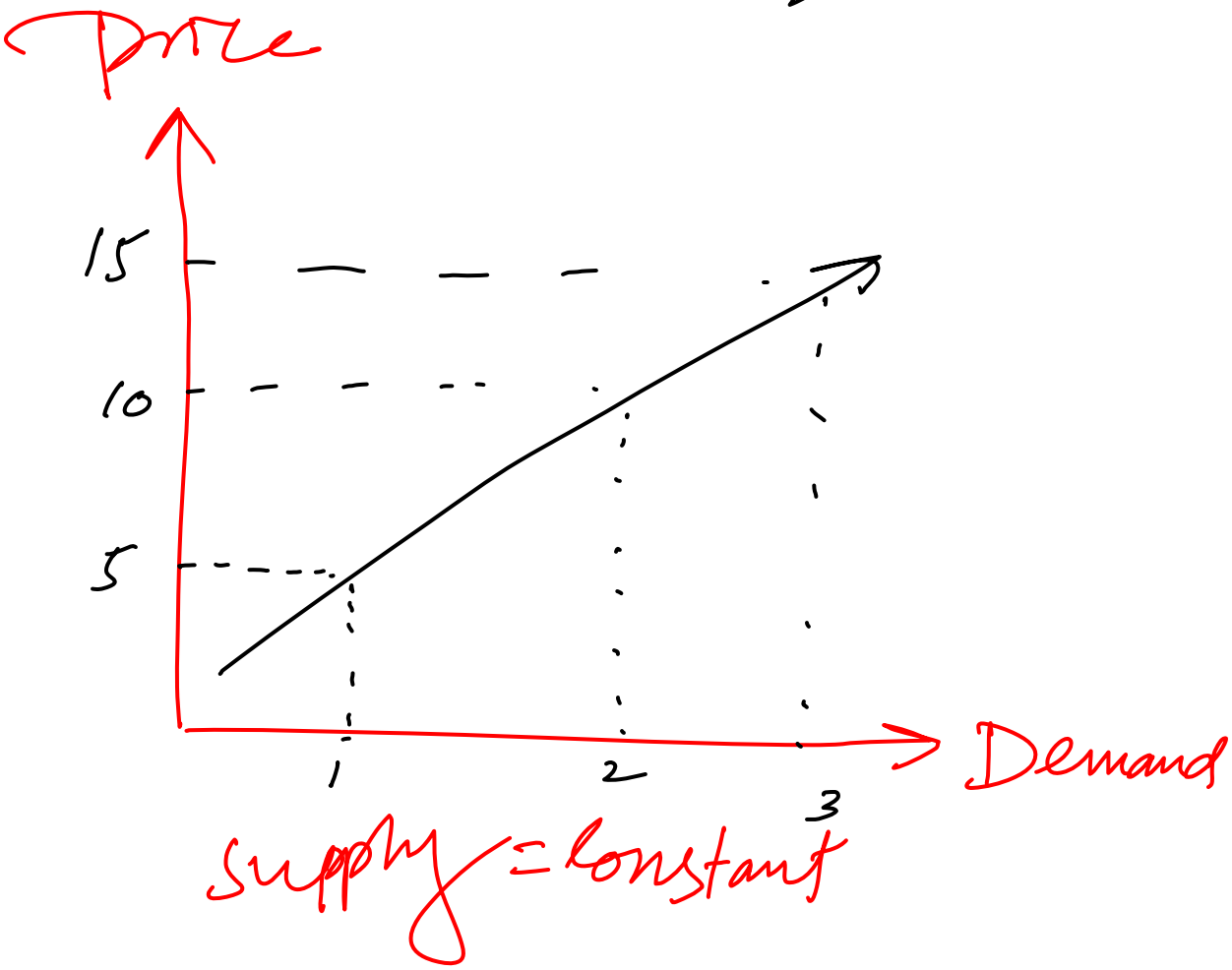
Direct proportion: A (↑), B (↑)

A (↓), B (↓)

Arrow Direction = Same (↑↑, ↓↓)

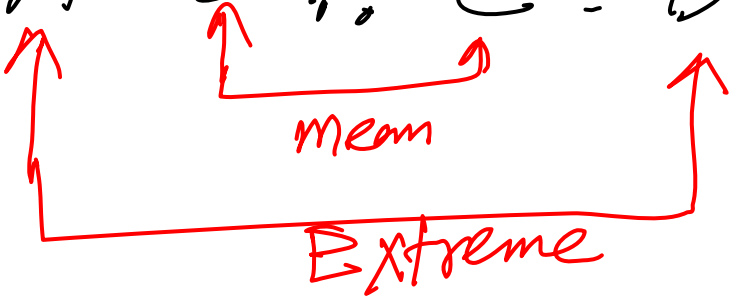
$y \propto x$

$y = kx$



Four quantities:

Rep ⇒ $A : B :: C : D$



$$\frac{A}{B} = \frac{C}{D} \rightarrow \text{cross Xmg}$$

$$\boxed{AD = BC}$$

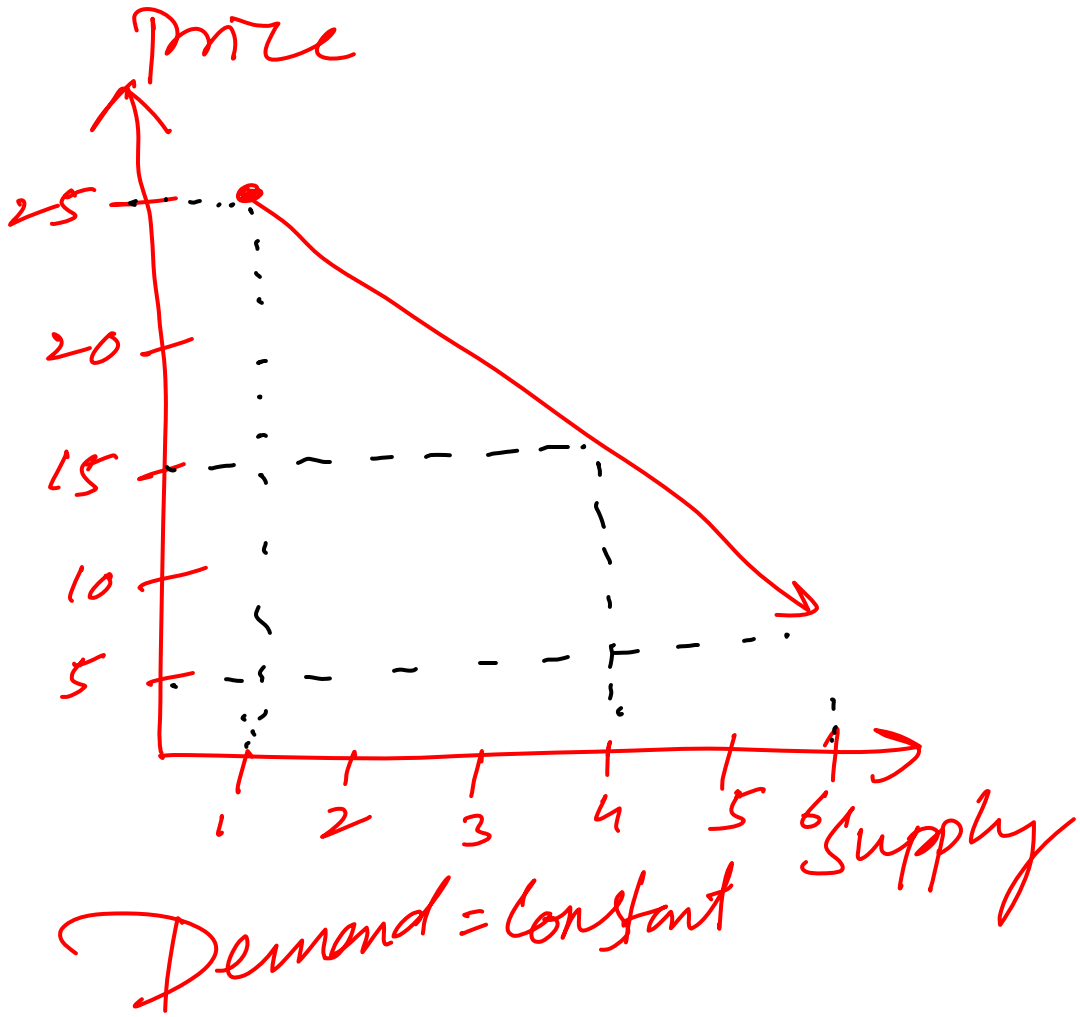
Note = product of extremes = product of means.

Inverse prop: A (↓), B (↑)

Arrow Direction = opposite

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

$$\boxed{y = K/x}$$



Four quantities :-

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

$$\boxed{A \times B = C \times D}$$

Note :- Product of 1st two = Product of last two :

1 3

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?

Reference

Worker Days

+3 1 24

4 x

Days & Worker Inverse Relation (↑↓)

Unknow (Fraction) = Known (Fraction)

Head (Deno)

Tail (Num)

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

$x = 6$ days

Ans:-

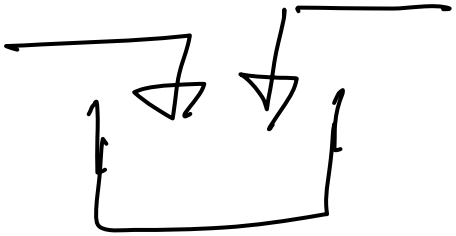
80words

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

80mins

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?

x



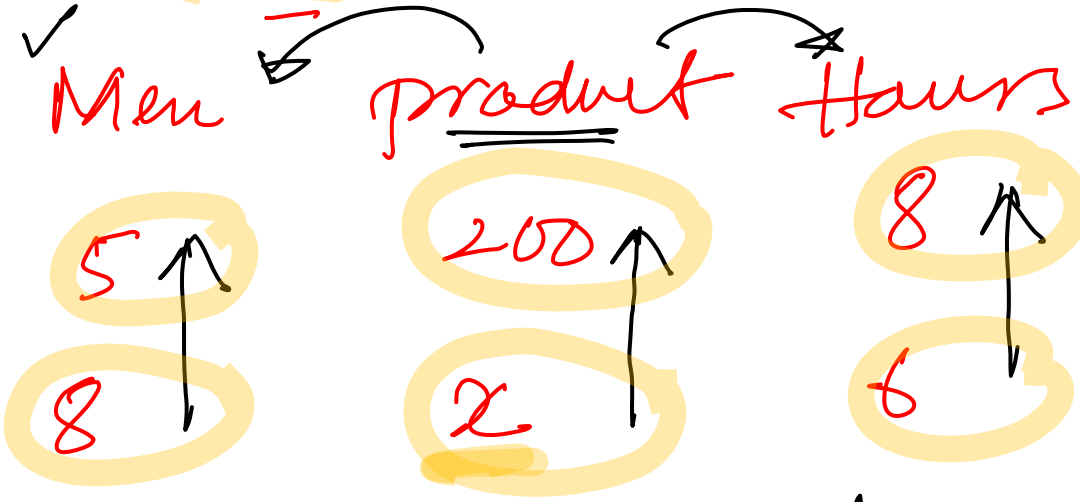
Pipes	Time
6 ↓	80 ↑
5	x

Pipes & time inverse

$$\frac{x}{80} = \frac{6}{5} \Rightarrow x = \frac{6}{5} \times 80^{16}$$

$x = 96$ mins, 1hr, 36mins

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?



(i) Product & Men Direction Rel (↑↑)

(ii) Product & Hour Direct Rel (↑↑)

Unknow (—) = Known (— x —)

Product = Men x Hour

$$\frac{x}{200} = \frac{8}{5} \times \frac{6}{8} \Rightarrow x = \frac{6}{5} \times 200^{40}$$

$x = 240$ products

Ans:

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?

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

Men — Days

$12 - 4 = 8$ ↓ — $24 - 4 = 20$ ↑

8 — x

Men & Days inverse (↑↓)

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

Less —

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?

Inverse

Soldier: 300 ↓ 250

Days: 90 − 20 = 70 ↑ x

$$\frac{x}{70} = \frac{300}{250} \Rightarrow x = \frac{\overset{6}{\cancel{30}}}{\underset{5}{\cancel{25}}} \times \overset{14}{\cancel{70}}$$

$$x = 6 \times 14 = 84 \text{ days}$$

Compound Proportion

1. 20 pens const 200rs, what will be the cost of 35pens? 350

2. The value of x in the given proportion 1.6:1.2::2.4:x is? 1.8

SR → Sum of Ratio

Shares

⇒ A : B : C : D ---- , Total/profit = ○

1 : 2 : 3 : 2

① Time ⇒ Constant

② Time → Variable : → DF = Distribution Factor

⇒ A's share = $\left(\frac{\text{Total}}{SR}\right)$ × Ratio of A

B's share = $\left(\frac{\text{Total}}{SR}\right)$ × Ratio of B

⋮

C's share = $\left(\frac{\text{Total}}{SR}\right)$ × Ratio of C

D's share = DF x Ratio of D:

A B C

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

Total = 150

SR = 9+4+2 = 15

$DF = \frac{Total}{SR}$

$DF = \frac{150}{15} = 10$

A's share = DF x Ratio of A

= 10 x 9 = 90kg.

B's share = DF x Ratio of B

= 10 x 4 = 40kg

C's share = 10 x 2 = 20kg

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

$\Rightarrow$ Sum $= 4+3 \Rightarrow (7)$, Total $= 840$

A's share $= \left(\frac{\text{Total}}{\text{Sum}}\right) \times$ Ratio of A

$= \left(\frac{840}{7}\right) \times 4 = 120 \times 4$

$= 480$ Ans.

B's $= 120 \times 3 = 360$ Ans

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?

Moiz's share $= \left(\frac{2000}{1+4}\right) \times 1 = \frac{2000}{5} = 400$

$\Rightarrow$ SR $= 4+5+1 = 10$, $DF_2 = \frac{400}{10} = 40$

Wife's share $= 40 \times 5 = 200$ Rs.

Son's share $= 40 \times 1 = 40$ Rs.

wife − son $= 200 - 40 = 160$ Rs, more is getting

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?

$A \times T_A : B \times T_A : C \times T_C$

$20K \times 2 : 15K \times 2 : 20K \times 1.5$

$4\phi : 3\phi : 3\phi$

$4 : 3 : 3$

$SR = 4 + 3 + 3 = 10$

$B's = \frac{25000}{10} \times 3$

$= 7500$

Ans: