

 TARGET CAT 2025 



# MBA FASTRACK

QUANT : Arithmetic

## Ratio & Its Application

Lecture No.- 01

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**Quants  
Expert**

## **VINIT KAKRIYA**

- 14+ years of teaching experience
- BE - Mechanical & MBA - Operations
- 5 lakh aspirants trained for CAT, IPMAT, GRE, GMAT & OMETs
- Nurtured many 99+ %ile achievers

# TOPICS *to be covered*



- 1) ~~Concept & Numerical based on 'Ratio'~~
- 2) ~~Concept & Numerical based on 'Proportion'~~
- 3) ~~Concept & Numerical based on 'Partnership'~~
- 4) ~~Concept & Numerical based on 'Variation'~~
- 5) Problems for Practice & CAT PYQs

# Arithmetic:

## Arithmetic

✓ Ratio & Its Application

✓ Percentages

✓ Simple & Compound Interest

✓ Mixture & Allegation

✓ Profit & Loss

✓ Time Work & Pipes Cistern

✓ Time Speed Distance

✓ Averages

## Meaning & Concept of Ratio :

$a : b : c$

$$\boxed{a : b} \sim \boxed{\frac{a}{b}}$$

$$\begin{array}{c} \times 3 \\ a : b \\ \hline 3a : 3b \\ \hline \frac{a}{5} : \frac{b}{5} \end{array}$$

$$\left| \begin{array}{l} \div 5 \\ \boxed{\frac{3}{4}} = \boxed{\frac{15}{20}} = \boxed{\frac{45}{60}} \\ 0.75 = 0.75 = 0.75 \end{array} \right.$$

## Meaning & Concept of Ratio:

$$T \cdot Amt = 360$$

$a : b : c$

$(2 : 3 : 7) = 12$

$$c = \frac{7}{12} \times 360 = 210$$

$$a = \frac{2}{12} \times 360 = 60$$

$$b = \frac{3}{12} \times 360 = \underline{\underline{90}}$$

$a : b$        $b : c$

$2 : 5 \times 7$        $7 : 11 \times 5$

$\underline{14} : \underline{35}$        $\underline{35} : 55$

$a : b : c$

$14 : 35 : 55$

OR

$$a : b : c$$

$$\begin{array}{r} a : b : c \\ 2 : 5 \rightarrow 5 \\ 7 : 7 : 11 \\ \hline 14 : 35 : 55 \end{array}$$

**QUESTION- 1**

#Q. The sum of three numbers is 126. If the ratio between 1<sup>st</sup> and 2<sup>nd</sup> be 3 : 4 and that between 2<sup>nd</sup> and 3<sup>rd</sup> be 5 : 7. Find the first number

- A 20
- B 25
- C 30
- D 35

Total = 126

$I : II \quad | \quad II : III$

$3 : 4 \quad | \quad 5 : 7$

$I : II : III$

$3 : 5 : 7$

$\frac{15}{63} : \frac{20}{63} : \frac{28}{63} = 63$

$$I = \frac{15}{63} \times 126 = 30$$

## QUESTION- 2

#Q. Vinay got thrice as many marks in Maths as in English. The proportion of his marks in Maths and History is  $4:3$ . If his total marks in Maths, English and History are 250, what are his marks in English?

A 120

B 90

C 40

D 80

$$M = 3E$$

$$\frac{M}{E} = \frac{3}{1}$$

$$M : E = 3 : 1$$

$$M : H = 4 : 3$$

$$M : E : H$$

$$\begin{matrix} 3 \\ 4 \end{matrix} : 1 : \begin{matrix} 3 \\ 5 \end{matrix}$$

$$\boxed{12 : 5 : 9} = 25$$

$$\boxed{\text{Total} = 250}$$

$$\begin{aligned} E &= \frac{5}{25} \times 250 \\ &= 50 \end{aligned}$$

### QUESTION- 3

#Q. In a box of mangoes, the ratio of rotten mangoes non-rotten mangoes is 2 : 3. There are two qualities of mangoes i.e., A<sub>1</sub> and A<sub>2</sub>. Among non-rotten mangoes, the ratio of A<sub>1</sub> quality mangoes to A<sub>2</sub> quality mangoes is 2 : 3. Find the ratio of rotten mangoes to (A<sub>2</sub> quality non-rotten mangoes).

**A**

$$2:3 \quad \frac{R}{(NR)_{A_2}}$$

**B**

$$3:2 \quad = \frac{2/0}{18} = \frac{10}{9}$$

**C**

$$9:10$$

**D**

$$10:9$$

$$\boxed{\begin{array}{l} R : NR \\ 2 : 3 \end{array}}$$

$$\text{let, } R = 20$$

$$NR = 30$$

$$R = 40$$

$$NR = 60$$

$$\frac{R}{(NR)_{A_2}} = \frac{40}{36} = \frac{10}{9}$$

$$\text{Non-Rotten} = 30$$



$$A_2 = 3$$

$$= \frac{3}{8} \times 30 = 18$$

$$\boxed{NR = 60}$$

$$A_1 : A_2$$

$$\boxed{2 : 3} = 5$$

$$A_2 = \frac{3}{8} \times 60 = 36$$

## Meaning & Concept of Proportion :

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

$a, b, c, d \rightarrow$  Proportion

$$(a \times d) = (b \times c)$$

$$\frac{5}{(7+x)} = \frac{10}{26}$$

$$130 = 10(7+x)$$

$$130 = 70 + 10x$$

$$60 = 10x$$

$$6 = x$$

## QUESTION- 4

#Q. A mixture of 680 ml contains milk and water in the ratio  $10 : 7$ . How much more water is added to get a new mixture containing milk and water in the ratio  $5 : 4$ ?

A 30 ml

B 20 ml

C 80 ml

D 40 ml

$$\begin{array}{c} T. \text{Mix} = 680 \\ M : W \\ \boxed{10} : \boxed{7} = 17 \\ \text{water} (x) \end{array}$$

$$\begin{aligned} M &= \frac{10}{17} \times 680 \\ M &= 400 \end{aligned}$$

$$\begin{aligned} W &= \frac{7}{17} \times 680 \\ W &= 280 \end{aligned}$$

$$\begin{aligned} \frac{400}{(280 + x)} &\times \frac{5}{4} \\ 1400 + 5x &= 1600 \\ 5x &= 200 \\ x &= 40 \end{aligned}$$

## Application of Ratio & Proportion :

### Partnership :

If A, B and C are working as partners in a business, then the profit is distributed among partners, on the basis of,  
 " Product of Investment & Period of Investment"

$$\begin{aligned}A &= 5 \text{ L } @ 2 \text{ yr} \\B &= 6 \text{ L } @ 1.5 \text{ yr}\end{aligned}$$

$$\begin{aligned}A : B \\(5 \times 2) : (6 \times 1.5) \\10 : 9 = 19\end{aligned}$$

Note: If Period of Investment is same for all Partners, then we can ignore it while finding Profit Ratio

$$\text{Profit} = 380000$$

$$B = \frac{9}{19} \times \frac{200000}{380000} = \underline{\underline{180000}}$$

## Application of Ratio & Proportion :

Partnership :

$$\text{Period} = 1 \text{ year} = 12 \text{ months}$$

$$\frac{1}{12} \cdot \text{Profit} = 2100$$

Example: A starts a business with a capital of Rs. 10000 and ~~four~~ months later, B joins him with his capital of Rs. 6000. What is the share of B in the profit of Rs. 2100 at the end of the year?

$$A : B = (10000 \times 12) : (6000 \times 8)$$

$$120 : 48$$

$$5 : 2 = 7$$

$$B = \frac{2}{7} \times 2100 = \underline{\underline{600}}$$

## QUESTION- 5

#Q. In a partnership business, A invests Rs. 20000 for two years, B invests Rs. 40000 for  $1\frac{1}{2}$  years, C invests Rs. 30000 for one year and D invests Rs. 35000 for two years. Out of the total profit made, C gets a share of 20% as a 'working partner' before the profit is further distributed amongst all of them. What would be the share of C in the total profit of Rs. 25000?

A 9000

$$A = 20000 \text{ @ } 2 \text{ yrs}$$

$$B = 40000 \text{ @ } 1.5 \text{ yrs}$$

$$C = 30000 \text{ @ } 1 \text{ yr}$$

$$D = 35000 \text{ @ } 2 \text{ yrs}$$

B 7800

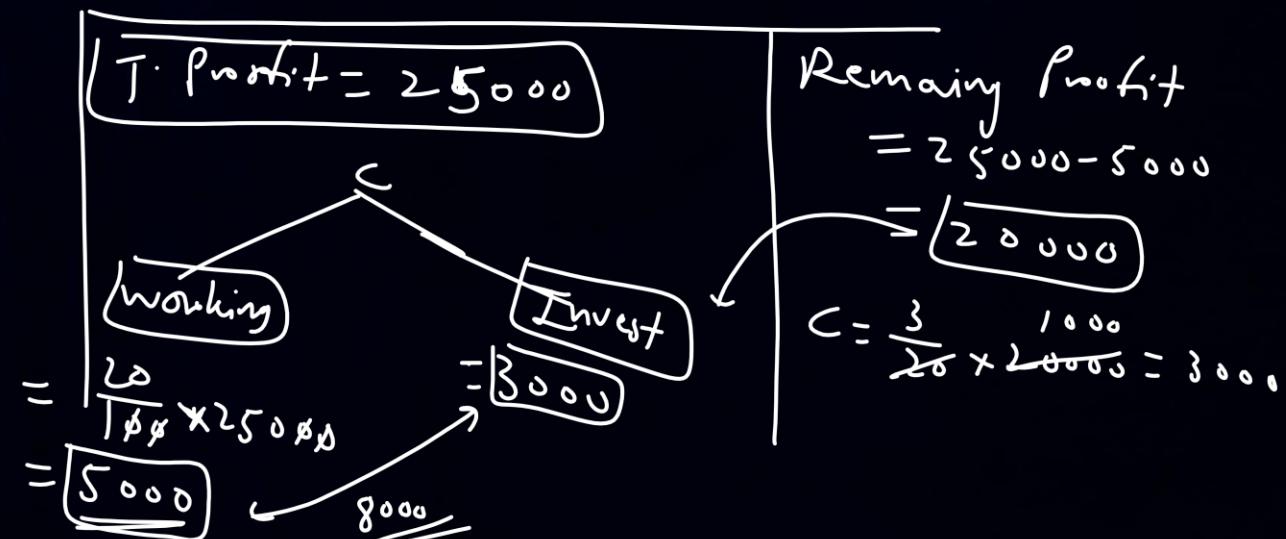
C 11000

D 8000

$$A : B : C : D$$

$$(40000) : (60000) : (30000) : (70000)$$

$$\boxed{4 : 6 : 3 : 7} = 20$$



## Application of Ratio & Proportion :

Variation :



a) If A & B are directly proportional to each other, then we can say that

$$\begin{aligned}
 & A \propto B \\
 & A = kB \quad \Rightarrow \quad g = k(3) \\
 & \boxed{A_1 = g} \quad \boxed{A_2 = 2g} \quad \boxed{B_1 = 3} \quad \boxed{B_2 = ?} \\
 & \boxed{\frac{A_1}{A_2} = \frac{B_1}{B_2}} \Rightarrow \frac{g}{2g} = \frac{3}{B_2} \quad \left| \begin{array}{l} P \propto Q \\ \frac{P_1}{P_2} = \frac{Q_1}{Q_2} \end{array} \right. \\
 & \quad B_2 = \frac{3 \times 2g}{g} = 6 \\
 & \quad B_2 = 8
 \end{aligned}$$

b) If A & B are inversely proportional to each other, then we can say that

$$\begin{aligned}
 & A \propto \frac{1}{B} \\
 & A = \frac{k}{B} \\
 & \boxed{A_1 = 5} \quad \boxed{B_1 = 2} \\
 & \quad \boxed{5 = \frac{k}{2}} \\
 & \quad \boxed{8 = k} \\
 & \boxed{\frac{A_1}{A_2} = \frac{B_2}{B_1}} \Rightarrow \frac{5}{A_2} = \frac{8}{2} \\
 & \quad \frac{5}{A_2} = 4 \\
 & \quad A_2 = \frac{5}{4} = 1.25
 \end{aligned}$$

## Application of Ratio & Proportion :

Variation :

(Joint Variation)

c) If A is directly proportional to B and inversely proportional to C, then we can say that

$$A \propto B$$

$$A = kB$$

$A_1 = 20$	$B_1 = 5$
$A_2 = ?$	$B_2 = 16$

$$20 = k(5)$$

$$k = 4$$

$$\frac{A_1}{A_2} = \frac{B_1}{B_2} \times \frac{C_2}{C_1}$$

$$\frac{A_1}{A_2} = \frac{B_2}{B_1}$$

$$A \propto B$$

$$A \propto \frac{1}{C}$$

$$A \propto \frac{1}{B}$$

$$A = \frac{k}{B} \implies 8 = \frac{k}{3}$$

$A_1 = 8$	$B_1 = 3$
$A_2 = g$	$B_2 = 12$

$$g = \frac{24}{3} = 8$$

$$B_2 = \frac{24}{8} = 3$$

$$A \propto \frac{B}{C}$$

$$A = k \frac{B}{C}$$

## Application of Ratio & Proportion :

Variation :

$$\boxed{A \propto \frac{B}{C}}$$

$$A \propto \frac{1}{C}$$

$$\left[ \frac{A_1}{A_2} = \frac{B_1}{B_2} \times \frac{C_2}{C_1} \right] \Rightarrow \frac{6}{A_2} = \frac{2}{8} \times \frac{6}{3}$$

Example: If A varies directly as B and inversely as C and  $A = 6$ , when  $B = 2$  and  $C = 3$ , what is the value of A when  $B = 8$  and  $C = 6$  ?

$$\begin{cases} A \propto B \\ A \propto \frac{1}{C} \end{cases} \rightarrow$$

$$A \propto \frac{B}{C}$$

$$A = k \frac{B}{C}$$

$$\begin{cases} A_1 = 6 \\ B_1 = 2 \\ C_1 = 3 \end{cases}$$

$$6 = k \left( \frac{2}{3} \right)$$

$$\frac{18}{2} = k$$

$$9 = k$$

$$\frac{6}{A_2} = \frac{1}{\frac{8}{6}}$$

$$A_2 = 12$$

$$A = 3 \times \frac{8 \times 9}{6} = 12$$

**QUESTION- 6**

#Q. A precious stone weighing 35 grams worth Rs. 12250 is accidentally dropped and gets broken into two pieces having weights in the ratio of 2:5. If the price varies as the square of the weight then find the loss incurred.

- A** Rs. 5750
- B** Rs. 6000
- C** Rs. 5500
- D** Rs. 5000

$$(P) T \cdot \text{Price} = 12250$$

$$(W) T \cdot w_t = 35 \text{ gm}$$

$$P \propto W^2$$

$$P = k w^2$$

$$12250 = k (35)^2$$

~~$$12250 = k (1225)$$~~

$$10 = k$$

$$T \cdot w_t = 35 \text{ gm}$$

$$w_1 = 2$$

$$w_1 = \frac{2}{7} \times 35$$

$$w_1 = 10$$

$$P_1 = k w_1^2$$

$$= 10 (10)^2$$

$$P_1 = 1000$$

$$w_2 = 5$$

$$w_2 = \frac{5}{7} \times 35$$

$$w_2 = 25$$

$$P_2 = k \cdot w_2^2$$

$$= 10 (25)^2$$

$$P_2 = 6250$$

$$\text{Loss} = 12250 - \frac{7250}{5000}$$

$$T \cdot \text{Price} = 7250$$

directly  
proportional



# CAT PYQs

## QUESTION- 7

#Q. A sum of money is split among Amal, Sunil and Mita so that the ratio of the shares of Amal and Sunil is 3:2, while the ratio of the shares of Sunil and Mita is 4:5. If the difference between the largest and the smallest of these three shares is Rs 400, then Sunil's share, in rupees, is

$$\begin{array}{c}
 A:S \quad S:M \\
 \boxed{3:2} \quad \boxed{4:5} \\
 \hline
 A:S:M
 \end{array}$$

$$\begin{array}{c}
 3:2 \rightarrow 2 \\
 4 \leftarrow 4:5 \\
 \hline
 12:8:10
 \end{array}$$

$$\begin{array}{c}
 A:S:M \\
 12:8:10 \\
 \boxed{3:4:5} = 15 \\
 \text{diff} = 2
 \end{array}$$

[CAT 2020 : Slot 2]

$$\begin{array}{c}
 \times 2 \rightarrow \text{Rs. } 400 \\
 \times 15 \rightarrow \text{Rs. } 800 \\
 x = 800
 \end{array}$$

$$\begin{array}{c}
 2x = 1600 \\
 x = 800
 \end{array}$$

## QUESTION- 8



$$\cancel{(M)_L = 3600}$$

#Q. In a village, the ratio of number of males to females is 5 : 4. The ratio of number of literate males to literate females is 2 : 3. The ratio of the number of illiterate males to illiterate females is 4 : 3. If 3600 males in the village are literate, then the total number of females in the village is

$$\frac{T \cdot \text{Male}}{T \cdot \text{female}} = \frac{5}{4}$$

$$\frac{(M)_L + (M)_I}{(F)_L + (F)_I} = \frac{5}{4}$$

$$\frac{(3600 + 4x)}{(5400 + 3x)} \times \frac{5}{4}$$

$$14400 + 16x = 27000 + 15x \\ x = 12600$$

$$\frac{(M)_L}{(F)_L} = \frac{2}{3} \quad \left| \frac{(M)_I}{(F)_I} = \frac{5}{3} \right.$$

$$\frac{3600}{(F)_L} \times \frac{2}{3}$$

$$\cancel{(F)_L = 10800}$$

$$\cancel{(F)_L = 5400}$$

$$(M)_I = 4x$$

$$(F)_I = 3x$$

[CAT 2022 : Slot 1]

$$\therefore T \cdot \text{Female} = (F)_L + (F)_I$$

$$= 5400 + 37800$$

$$= \boxed{43200}$$

## QUESTION- 9

#Q. In an examination, Rama's score was one-twelfth of the sum of the scores of Mohan and Anjali. After a review, the score of each of them increased by 6. The revised scores of Anjali, Mohan, and Rama were in the ratio 11:10:3. Then Anjali's score exceeded Rama's score by

A 26

B 32

C 24

D 35

$$R = \frac{1}{12} (M + A)$$

$$3x - 6 = \frac{1}{12} (10x - 6 + 11x - 6)$$

$$(3x - 6) = \frac{1}{12} \cdot (21x - 12)$$

$$36x - 72 = 21x - 12$$

$$15x = 72 - 12 = 60$$

$$x = 4$$

Revised Score

$$A : M : R = 11 : 10 : 3$$

$$\left. \begin{array}{l} A = 11x \\ M = 10x \\ R = 3x \end{array} \right\} \text{Revised Scores}$$

$$A = 44$$

$$R = 12$$

$$\cancel{32}$$

[CAT 2019 : Slot 2]

Original Score

$$A = 11x - 6 = 11(4) - 6 = 38$$

$$M = 10x - 6$$

$$R = 3x - 6 = 3(4) - 6 = \frac{6}{32}$$

**QUESTION- 10**

**#Q.** When Rajesh's age was same as the present age of Garima, the ratio of their ages was  $3 : 2$ . When Garima's age becomes the same as the present age of Rajesh, the ratio of the ages of Rajesh and Garima will become

[CAT 2024 : Slot 2]

A  $4 : 3$ B  $2 : 1$ C  $3 : 2$ D  $5 : 4$ 

(1)

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

Let,  $R = 30$

Present Age of Garima

+10 yrs

$$\begin{aligned} G &= 40 \\ R &= 50 \\ \frac{50}{40} &= \frac{5}{4} \end{aligned}$$

Present Age of Rajesh =  $30 + 10$

= 40

**QUESTION- 11**

#Q. Rajesh and Vimal own 20 hectares and 30 hectares of agricultural land, respectively, which are entirely covered by wheat and mustard crops. The cultivation area of wheat and mustard in the land owned by Vimal are in the ratio of 5 : 3. If the total cultivation area of wheat and mustard are in the ratio 11 : 9, then the ratio of cultivation area of wheat and mustard in the land owned by Rajesh is

[CAT 2024 : Slot 3]

TRY ✓  
(Next Class)

- A** 1:1
- B** 7:9
- C** 4:3
- D** 3:7



## 2 Mins Summary

- 1) Concept & Numerical based on 'Ratio'
- 2) Concept & Numerical based on 'Proportion'
- 3) Concept & Numerical based on 'Partnership'
- 4) Concept & Numerical based on 'Variation'
- 5) Problems for Practice & CAT PYQs



Thank  
You