

Ratio & Proportion

Lesson 1: Introduction

ratio (187)

define)

compare two or more product

are ~~as~~ as a result is

ratio

e.g.

$$A = 10,000 \quad B = 20,000$$

to

$$A : B$$

$$10000 : 20000$$

$$\boxed{1 : 2} \text{ or } \frac{1}{2}$$

$$\frac{A}{B} = \frac{1}{2}$$

Types of ratio

i) Duplicate Ratio

$$(3 : 7) = (9 : 27)$$

2) Sub-Duplicate Ratio

$$(\sqrt{9} : \sqrt{25} = 3 : 5)$$

Proportion

(27)

equality of 2 ratio

$$1 : 2 \quad \therefore \quad 3 : 5$$

means equal to

$$\frac{1}{2} = \frac{3}{5}$$

ratio 1

ratio 2

$$\frac{1}{2} = \frac{3}{5}$$

$$5 \times 1 = 3 \times 2$$

(3 : 7) (square)

ii) Triplicate ratio

$$3 : 7 = (27 : 343)$$

4) Sub-Triplicate ratio

$$\sqrt[3]{125} : \sqrt[3]{343} = 5 : 7$$

5) Inverse ratio

$$5 : 7$$

$$\boxed{7 : 5}$$

6) Compound ratio

$$1 : 3 \quad 2 : 9 \quad 4 : 7$$

$$a : b \quad c : d \quad e : f$$

$$\frac{1 \times 2 \times 4}{3 \times 9 \times 7}$$

~~(*) Ratio shouldn't be in fraction~~

$$a : b = 2 : 3$$

$$(1) \quad a : b = \frac{2}{9} : \frac{1}{3} \quad \text{X don't be fraction}$$

$$\frac{2 \times 3}{9} : \frac{1}{3}$$

$$= \frac{2 : 3}{9}$$

$$= 2 : 3$$

$$a : b = \frac{5}{7} : \frac{2}{14}$$

$$= 10 : 21 = 5 : 1$$

esson 2: Finding ratios (15 ques)

$$\text{In } a:b = 2:3 \rightarrow \begin{cases} a=2x \\ b=3x \end{cases}$$

Some ques are $a=2$ & $b=3$

In question given in ratio & ans should be ratio

$$a=2 \quad b=3$$

In question given in ratio ~~&~~ and in number

$$a=2x \quad b=3x$$

) $A:B:C = 2:3:4$ then what is the

value of $A/B : B/C : C/A$

given ratio & ans ask in ratio, so $\begin{cases} a=2 \\ b=3 \end{cases}$

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

$$\frac{2}{3} : \frac{3}{4} : \frac{4}{2} \rightarrow \text{don't be fraction}$$

so

$$(4 \times 2) : (3 \times 2) 3 : 2 : (3 \times 4)$$

$$= 8 : 6 : 24$$

$$2) A:B = 2:3 \quad B:C = 4:5$$



Find $A:B:C$

$$2:3:3$$

$$4:3:5$$

$$\underline{8:12:15}$$

$$3) A:B = \frac{1}{2} : \frac{1}{3} \quad B:C = \frac{1}{2} : \frac{1}{3}$$

$A:B:C$

$$A:B = 3:2 \quad B:C = 3:2$$

$$3:2:2$$

$$3:3:2$$

$$\underline{9:6:4}$$

$$A:B:C = 9:6:4$$

$$4) a:b = 5:7 \quad \& \quad c:d = 2a:3b$$



then $a:c:b:d \rightarrow$ ratio \rightarrow ratio

$$a:c = 5 \times 2 \boxed{a} \times 5 = \frac{50}{a}$$

$$b:d = 7 \times 3 \boxed{b} \times 7 = \frac{147}{b}$$

$$50:147$$

given 3 ratios
asked 2 ratios

$$a = a$$

$$b = b$$

3) If $3A = 5B$ and $4B = 6C$, then $\underline{A:C}$
equal to -

Find $A:C$

Find $A:B:C \Rightarrow A:C$

$$3A = 5B$$



$$\frac{A}{B} = \frac{5}{3} = 5:3$$

$$\frac{B}{C} = \frac{6}{4} = 6:4$$

$$5 : 3 \times 3$$

$$\underline{6 : 6 : 4}$$

$$30 : 18 : 12$$

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

$$\boxed{A:C = 5:2}$$

6) $a:5 = b:7 = c:8$ then $(a+b+c)/a$ is

$$\frac{a}{5} : \frac{b}{7} : \frac{c}{8} = \cancel{a(7 \times 8)} : \cancel{b(5 \times 8)} : \cancel{c(7 \times 5)}$$

given ratio & asked a number

$$a = ax$$

$$b = bx$$

$$c = cx$$

$$a = 5x$$

$$b = 7x$$

$$c = 8x$$

$$\frac{5x+7x+8x}{5x}$$

$$= \frac{20x}{5x} = 4$$

7) If $(x/y) = (6/5)$, find the value

$$(x^2 + y^2) / (x^2 - y^2)$$

Given number ask number

$$x = 6x \quad y = 5x$$
$$\frac{36}{25} \overline{)61}$$

$$\frac{6^2 x^2 + 5^2 x^2}{36x^2 - 25x^2} = \frac{61x^2}{11x^2} = \frac{61}{11}$$

8) If $x:y = 8:9$

then

$$5x - 4y : 3x + 2y$$

given ratio
ask number

$$10 : 36$$

$$5(8x) - 4(9x) = 4x$$

the ratio

$$3(8x) + 2(9x) = 42x$$

$$\frac{y^2}{42} = \frac{2}{21}$$

$$\boxed{2 : 21}$$

$$5x - 4y : 3x + 2y = 2 : 21$$

Answer: The L.C.M. of 3 is 21.

$$5x - 4y \rightarrow$$

$$5x - 4y \rightarrow$$

$$5x - 4y \rightarrow$$

$$3x + 2y \rightarrow$$

$$3x + 2y \rightarrow$$

$$3x + 2y \rightarrow$$

$$5x - 4y \rightarrow$$

$$5x - 4y \rightarrow$$

$$5x - 4y \rightarrow$$

Q) If $x/2y = 6/7$ find $(x-y)/(x+y) + 14/19$

$$x = 6x \quad 2y = \frac{7}{2}x$$

$$x - 2y = 6 : 7$$

$$\left(\frac{2x - 7x}{2} \right) = \frac{5x}{2}$$

$$\left(\frac{2x + 7x}{2} \right) = \frac{19x}{2}$$

$$\frac{\frac{5x}{2}}{\frac{19x}{2}} + \frac{14}{19}$$

$$\frac{5}{19} + \frac{14}{19} = \frac{19}{19} = 1$$

Q) If $a:b = 2:3$ & $b:c = 4:5$ find $a^2:b^2:bc$

$$\begin{matrix} a & 2 : 3 : 3 \\ b & 4 : 4 : 5 \end{matrix}$$

$$A:b:c = 8 : 12 : 15$$

$$a^2:b^2:bc = 64:144:12 \cancel{15}$$

$$= 16:36:3\cancel{4}5$$

~~$$= 8:18:15$$~~

$$4) A:B=2:3 \quad B:C=4:5 \quad C:D=6:7$$

$$A:B:C:D$$

$$2:3 : 3 : 3$$

$$4:4:5:5$$

$$6:6:6:7$$

$$\cancel{48:72:90:105}$$

$$\cancel{48:72:90:105} = 16:24:30:35$$

(Q)

$$(2 \times 4 \times 8^2) : (3 \times 4 \times 6) : (8 \times 5 \times 6) : (8 \times 5 \times 7)$$

$$16 : 24 : 30 : 35$$

$$12) a:b = 2/9 : 1/3 \quad b:c = 2/7 : 5/14$$

$$d:c = 7/10 : 3/5 \text{ then } a:b:c:d$$

$$a:b = \frac{2}{9} : \frac{1}{3} = 2:3 \quad b:c = \frac{2}{7} : \frac{5}{14} = 4:5$$

$$d:c = \frac{7}{10} : \frac{3}{5} = 7:6$$

$$2:3:3:3$$

$$4:4:5:5$$

$$6:6:6:7$$

$$(2 \times 4 \times 8^2) : (3 \times 4 \times 6) : (8 \times 5 \times 6) : (8 \times 5 \times 7)$$

$$16 : 24 : 30 : 35$$

$$1) a:b = \frac{1}{2} : \frac{3}{8} \quad b:c = \frac{1}{3} : \frac{5}{9}$$

$$c:d = \frac{5}{8} : \frac{3}{4} \quad a:b:c:d$$

$$a:b = 4:3 \quad b:c = 3:5 \quad c:d = 4 \times 5 : 3 \times 6$$

$$= \frac{20}{18} : \frac{18}{18}$$

$$= 10:9$$

$$4:3:3:3$$

$$3:3:5:5$$

$$\underline{10:10:10:9}$$

$$4 \times \cancel{3 \times 10^2} : 3 \times \cancel{3 \times 10} : \cancel{3 \times 5 \times 10} : \cancel{3 \times 5 \times 9}$$

$$8:6:10:9$$

$$2) A:B = 3:4 \quad B:C = 5:7 \quad C:D = 8:9$$

$$\textcircled{A} =$$

$$3:4:4:4$$

$$5:5:7:7$$

$$8:8:8:9$$

$$(3 \times 5 \times 8) : (\cancel{5:8}) : (4 \times 7 \times 8) : (4 \times 7 \times 9)$$

$$30:63$$

$$\boxed{10:21}$$

Lesson 3: Divided into parts (basic concept)

Given given = x

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

2nd and 3rd → different

A ration \times given amount
Total

1) If Rs. 1000 is divided b/w A & B in the ratio 3:2

then A will receive.

$$A = 600 \quad 3$$

$$B = 400 \quad 2$$

$$1000 \rightarrow 3 : 2$$

$$A = \frac{3}{(3+2)} \times 1000$$

$$= \frac{3}{5} \times \frac{1000}{200} = 600$$

$$B = \frac{2}{3+2} \times 1000$$

$$= \frac{2}{5} \times 1000$$

$$= 400$$

2) If 78 is divided into three parts which are in

the ratio $1:(\cancel{1})_3 : \frac{1}{8}$ the middle part is

$$\cancel{6 \times 3} : \frac{6}{3} :$$

$$M: \cancel{\frac{6}{8 \times 3}} \times \frac{26}{8} = 26$$

$$(\cancel{6 \times 3} \times \cancel{6 \times 3})$$

$$6 \times 2 \times 1$$

$$fin: \cancel{\frac{6}{8 \times 2 \times 1}} \times \frac{39}{8} = 39$$

$$last = \frac{6}{6 \times 2 \times 1} \times \cancel{36}$$

$$= 13$$

$$\begin{array}{r} 26 \\ 13 \\ 39 \\ \hline 78 \end{array}$$

$$1 : \frac{1}{3} : \frac{1}{6}$$

Convert the fraction to decimal

$$x \times 6 : \frac{x^2}{a} : \frac{x^1}{b}$$

$$6 : 2 : 1$$

$$(6+2+1)x = 78$$

make mistake

$$\cancel{(6+2+1)} \times 78 = (08) \times 2 \left(\frac{18}{9} \right)$$

$$\cancel{x_2} \times 78 = \frac{52}{3}$$

3) Rs. 33,630 are divided among A, B & C in such a manner that the ratio of the amount of A to that of B is 3:7 and the ratio of the amount of B to that of C is 6:5. The amount of money received by B is

3 : 7 : 7

$$6 : 6 : 5$$

$$18 : 42 : 35$$

$$\frac{35}{95}$$

$$\cancel{\frac{42}{9+42+35}} \times 33630$$

$$\cancel{\frac{86}{43}} \times 33630$$

$$= 14868$$

$$\begin{array}{r} 42 \\ 18+42+35 \\ \hline 358 \\ 6726 \\ \hline 3151 \\ 1156726 \\ \hline 57 \\ 102 \\ \hline 354 \\ 42 \\ \hline 95 \\ 76 \\ \hline 76 \end{array}$$

$$\begin{array}{r} 42 \\ 18+42+35 \\ \hline 358 \\ 6726 \\ \hline 3151 \\ 1156726 \\ \hline 57 \\ 102 \\ \hline 354 \\ 42 \\ \hline 95 \\ 76 \\ \hline 76 \end{array}$$

4) Rs 3400 is A, B, C, D,

Share of A & B, D & C, C & D are 2:3, 4:
2:3

Find sum of share of B & D is

B + D

A B C D

2 3 3 3

4 4 3 3

2 2 2 3

16 : 24 : 18 : 27

16 + 24 + 18 + 27

= 85

$$\begin{array}{r} 24 \\ \times 3400 \\ \hline 85 \end{array} = 960$$

$$\begin{array}{r} 27 \\ \times 3400 \\ \hline 85 \end{array} = 1080$$

$$960 + 1080 = 2040$$

5) By mistake instead of dividing Rs. 117 among A and C, the ratio $1/2 : 1/3 : 1/4$ was divided in the ratio of 2:3:4. Who gains the most & by how much?

~~1/2 : 1/3 : 1/4~~ 117 *samanya*

we need to divide $1/2 : 1/3 : 1/4$

They divide wrongly to 2:3:4
who gain the most

117

by way

$$\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$$

$$2 : 3 : 4$$

$$12 : 8 : 8$$

✓ $\boxed{6 : 4 : 3}$

 $2x +$

$$(6+4+3)x = 117$$

$$13x = 117$$

$$x = \frac{117}{13} = 9$$

$$A = 6(9)$$

$$B = 4(9) \quad C = 3(9)$$

$$A = 54 \quad B = 36 \quad C = 27$$

find

of 117

$$\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$$

$$6 : 4 : 3$$

$$6x + 4x + 3x = 117$$

$$x = \frac{117}{13} = 9$$

wrong

$$2x + 3x + 4x = 117$$

~~$$9(9) \quad 3(9) \quad 4(9) = 117$$~~

28

27

36

right

$$\boxed{54 \quad 36 \quad 27}$$

$$x = \frac{117}{9} = 13$$

$\boxed{x=13}$

$$2(13) \quad 3(13) \quad 4(13) = 117$$

26

39

52

34

36

27

$$52 - 27 = 25$$

than original

6) If a sum of money is to be divided among A, B, C such that A's share is equal to twice B's share and B's share is 4 times C's share, then their shares are in the ratio.

$$x : 2x^2 : 4x^2$$

x
A salary is twice of B

$$A : B = 2 : 1$$

B salary is 4 times of C

$$B : C = 4 : 1$$

A B C

2 1 1

4 4 1

8 : 4 : 1

7) Divide ₹ 1250 among A, B, C, so that A gets $\frac{2}{9}$ of B's share & C gets $\frac{3}{4}$ of A's share. Find the shares of A, B, C

$$A : B =$$

$$A = \frac{2}{9} B \quad \frac{A}{B} = \frac{2}{9}$$

$$C = \frac{3}{4} A$$

$A : C$
convert into
 $B : C$

~~$\frac{C}{A} = \frac{3}{4}$~~

A	B	C
2	9	9
4	3	3
6 : 27 : 36		
2 : 9 : 12		

$$2x + 9x + 12x = 1250$$

$$\frac{21}{21}$$

$$\frac{5}{5}$$

$$21x = 1250$$

$$x = \frac{1250}{21}$$

Substitution

$$C = \frac{3}{4} \left(\frac{2}{9} \right) B$$

$$\boxed{\frac{C}{B} = \frac{1}{6}}$$

$$\frac{A}{B} = \frac{2}{9}$$

A	B	C
2	9	9
6	6	1
4 12 54 3		

$$4x + 18x + 3x = 1250$$

$$25x = 1250$$

$$x = \frac{1250}{25}$$

$$x = 50$$

$$A = 4(50)$$

$$B = 18(50)$$

$$C = 3(50)$$

$$A = 200\pi$$

$$B = 1800\pi$$

$$C = 150\pi$$

8) Rs. 2010 are to be divided among A, B, C such a way that if A gets Rs 5, then B must get Rs. 12 and if B gets Rs. 4 then C must get Rs. 5.50. The share of C will exceed that of A by

$$A : B = 5 : 12$$

$$B : C = 4 : \frac{5.50}{12} = 4 : \frac{55}{120} = 4 : \frac{11}{24}$$

$$= 8 : 11$$

A B C

5 12 12

8 8 11

$$5 \times 8^2 : 12 \times 8^2 : 12 \times 11^2$$

$$10 : 24 : 33$$

\rightarrow Rs not ratio

What C is

$$C - B = 33 - 24$$

$$= 9$$

$$\frac{9}{(10+24+33)} \times 2010$$

$$(10+24+33)$$

$$\frac{9}{67} \times 2010 = 270 \text{ times}$$

H/W

1) Re 68000 is divided among A, B, C in the ratio

$\frac{1}{2} : \frac{1}{4} : \frac{5}{16}$ the difference between largest & smallest share is

$$\frac{1}{2} : \frac{1}{4} : \frac{5}{16}$$

$$8x : 4 : 5$$

$$\begin{array}{r} 2 \\ 17 \\ - 16 \\ \hline 1 \end{array}$$

$$\begin{array}{r} 4 \\ 68 \\ - 64 \\ \hline 4 \end{array}$$

$$(8 + 4 + 5)x = 68000$$

$$x = \frac{68000}{17}$$

$$x = 4000$$

$$\begin{array}{r} 4000 \\ 8 \times 4000 : 44000 : 5 \times 4000 \\ 32000 : 16000 : 20000 \end{array}$$

difference = 16000 rs.

Rs 6400 are divided among 3 workers in the ratio

of $\frac{3}{5} : 2 : \frac{5}{3}$. The share of 2nd worker is

$$\frac{3 \times 3}{5 \times 3} : \frac{2(5 \times 3)}{5 \times 3} : \frac{5 \times 5}{5 \times 3}$$

$$9 : 30 : 25$$

$$9x + 30x + 25x = 6400$$

$$x = \frac{64000}{64} = 100$$

$$30x = 30 \times 100 = 3000$$

$$\begin{array}{r} 3 \\ 740 \\ - 686 \\ \hline 54 \\ - 54 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 3 \\ 640 \\ - 592 \\ \hline 480 \\ - 480 \\ \hline 0 \end{array}$$

Lesson 4:Based on numbers

X.

- 1) The ratio of two number $3:8$ & their difference is 115. The largest number is

(So wrong)

$$(3+8)x = 115$$

$$x = \frac{115}{11}$$

Key point is different

$$(3-8)x = 115$$

$$x = \frac{115}{5} = 23$$

$8 \times 23 = 184$	largest
$3 \times 23 = 69$	smallest

- 2) The ratio of two numbers is $10:7$ & their difference is 105. The sum of the numbers

$$(10-7)x = 105$$

$$3x = 105$$

$$x = \frac{105}{3}$$

$$10(35) + 7(35) =$$

$$350 + 245 = 595$$

3) The sum of two numbers is 40 & difference is 10.

4. Find the numbers

$$x + y = 40$$

$$x - y = 4$$

$$2x = 44$$

$$10 \times 2 = 20$$

$$22 + y = 40$$

$$y = 10^{-22}$$

$$\sqrt{y} = 18$$

$$22 - 18 = 4$$

22 : 18

11 9 9

4) Three numbers are in the ratio $3:2:5$

8. If the sum of their squares is 1862. What

are the 3 numbers?

$$(3x + 2x + 5x)^2 = 1862$$

$$1 \theta^2 x^2 = 1862$$

$$3^2 x^2 + 2^2 x^2 + 5^2 x^2 = 1862$$

$$(4 + 25)x^2 = 1862$$

$$38 \chi^2 = 18.62$$

$$OC^2 = \frac{1862}{38} 49$$

1862
9.31

$$38 x^2 = 1862$$

$$OC^2 = \frac{1862}{38} 49$$

$$\begin{array}{r} 186 \\ 152 \\ \hline 342 \end{array}$$

$$x = \sqrt{49} = 7$$

$$\begin{array}{r}
 14 \\
 \times 14 \\
 \hline
 206 \\
 + 25 \\
 \hline
 1972
 \end{array}
 \quad
 \begin{array}{r}
 14 \\
 \times 14 \\
 \hline
 56 \\
 + 140 \\
 \hline
 196
 \end{array}$$

$$\begin{array}{r} 14 \\ \times 1225 \\ \hline 21 \\ 21 \\ \hline 21 \end{array}$$

$$\frac{y^2}{4} + \frac{x^2}{16} = 1$$

5) of the three numbers, the ratio of the first & the second is 8:9 & that of the second & third is 3:4. If the product of the first & third number is 2400, then the second number is

$$A:B = 8:9$$

$$A:B = 3:4$$

$$\begin{matrix} A & : & B & : & C \\ 8 & & 9 & & 9 \end{matrix}$$

$$\begin{matrix} 3 & : & 3 & : & 4 \end{matrix}$$

$$8 \times B : 9 \times B : 9 \times 4$$

$$8 : 9 : 12$$

$$(8 \times 25) x^2 = 2000$$

$$\begin{array}{r} 2025 \\ -2 \\ \hline 45 \\ -45 \\ \hline 0 \end{array}$$

$$8(45) \times 12(45)$$

$$x^2 = 5$$

$$9(s) = 45$$

$$B = 45$$

6) 3 numbers are in the ratio $1/2 : 2/3 : 3/4$. The difference between the greatest & the smallest number is 36. The numbers are

$$\begin{matrix} 1 & : & 2/3 & : & 3/4 \\ 2 & & 8 & & 6 \end{matrix}$$

$$3 \times 4 : 2(2 \times 4) : 3(3 \times 8)$$

$$6 : 8 : 9$$

$$9x - 6x = 36$$

$$3x = 36$$

$$\boxed{12} = x$$

$$6(12); 8(12); 9(12)$$

$$= 72; 96; 108$$

$$\begin{array}{r} 108 \\ 72 \\ \hline 36 \end{array}$$

7) There is a ratio of 5 : 4 b/w two numbers.
If 60% of the first number is 12 then what
would be the 50% of the second number?

$$5 : 4 \quad \frac{60}{100} = \frac{12}{x}$$

$$5x : 4x$$

$$\frac{3x \times 100}{100} = 4x$$

$$\boxed{30} = x$$

$$5x = \frac{30}{x}$$

$$\boxed{12} = x$$

$$4(6) = 24$$

$$24 \quad 100\%$$

$$12 \quad 50\%$$

the 50% of second number is 12

Lessons

Boys + girl

$$500 = 150 + 250$$

50 $+50$

Find ratio

- Fund Ratio

1) The ratio of the number of boys to girls of a school with 504 students is 13:11. What will be the new ratio if 12 more girls are admitted?

$$i\vec{z}: 11 \quad B_{\text{outer}} = 504$$

$$(13+11)x = 504$$

$$x = \frac{504}{24}$$

$$DC = 21$$

$$13 \times 21 = 231$$

$$13 \times 24 = \underline{243}^8$$

$$13 \times 24 = 312$$

$$\begin{array}{r}
 & 21 \\
 2) & \underline{\overline{2\ 3\ 1}} \\
 & 1 \\
 2) & \cancel{2\ 4\ 3} \\
 & 23 \\
 & \cancel{2} \\
 & 13 \\
 & \underline{\overline{9\ 7}}
 \end{array}$$

97 : 81

- 2) In GR, Boys & girls are in the ratio of 5:3.
 If 9 left from each of them, their ~~new~~^{ratio} becomes
 7:1. The difference of Boys & girls is

$$\begin{array}{l} B : G \\ S : 7 \end{array}$$

B are left 9

Ch are left 9

$$\frac{5x - 9}{7x - 9} = \frac{7}{11}$$

$$(5x - 9) \text{ ll } = 7(7x - 9)$$

$$55x - 99 = 49x - 63$$

$$55x - 49x = 99 - 63$$

$$6x = 36$$
$$\boxed{x = 6}$$

$$5(6) - 9 =$$

$$30 - 9 = 21$$
$$\begin{array}{r} 33 \\ 21 \\ \hline 12 \end{array}$$

$$7(6) - 9 =$$

$$42 - 9 = 33$$

The different of L & R = 12

- 3) The student in three classes are in the ratio 2 : 3 : 5. If 40 students are increased in each class the ratio changes to 4 : 5 : 7. Originally the total number of students was.

$$\begin{matrix} 2 & : & 3 & : & 5 \\ \downarrow & & \downarrow & & \downarrow \\ 8x & & 12x & & 20x \\ \downarrow & & \downarrow & & \downarrow \\ 4 & & 6 & & 10 \end{matrix}$$

$$2x + 3x + 5x = 10x$$

$$(2x + 40) : (3x + 40) : (5x + 40) = 4 : 5 : 7$$

Take any two value to find x.

$$\frac{2x + 40}{3x + 40} = \frac{4}{5}$$

$$5(2x + 40) = 4(3x + 40)$$

$$10x + 200 = 12x - 10x$$

$$10x = 2x$$

$$\boxed{x = 20}$$

$$2x = 2(20) = 40$$

$$3x = 3(20) = 60$$

$$5x = 5(20) = 100$$

$$\boxed{40 + 60 + 100 = 200}$$

$$(or)$$

$$2 : 3 : 5 \Rightarrow 4 : 5 : 7$$

2 part 2 part

$$Part = 20$$

$$\boxed{Part = 20}$$

4) The ratio of boys & girls in a college is 5:7. If 50 boys leave the college & 50 girls join the college, the ratio becomes 9:7. The number of boys in the college is.

$$5 : 3 = 9 : 7$$

4 pa 4 pa

$$\frac{5x - 50}{3x + 50} = \frac{4}{7}$$

$$35x - 350 = 27x + 450$$

$$8x = 800$$

$$7(5x - 50) = 9(3x + 50)$$

$$35x - 350 = 27x + 450$$

$$35x - 27x = 450 + 350$$

$$8x = 800$$

$$\sqrt{2c = 100}$$

✓ 500 boys totals boyd

after 50 boys leave

$500 - 50 = 450$ boys are present

3) The ratio of the number of boys to that of girls in a group becomes $2:1$ when 15 girls leave. But afterwards, when 45 boys also leave, the ratio become $1:5$. Originally the number of girl in the group was.



$$B = x \quad G = y$$

i) $2:1$ when

$$\frac{x}{y-15} = \frac{2}{1}$$

$$x = 2y - 30$$

ii) boys leave

$$\frac{x-45}{y-15} = \frac{1}{5}$$

$1:5$

$$\frac{2y - 30 - 45}{y-45} = \frac{1}{5}$$

$$\frac{2y - 75}{y-45} = \frac{1}{5}$$

$$5(2y - 75) = y - 45$$

$$10y - 375 = y - 45$$

$$10y - y = 75 \times 5 - 15$$

$$9y = 225 - 15$$

$$9y = 210$$

$$y = \frac{70}{2}$$

$$y - 15 = 1$$

$$\frac{70}{3} - 15 = 5$$

$$\frac{70}{3} - 45 = 3 \times 15$$

$$25 = 3$$

5) The ratio of the number of boys to that of girls in a group becomes $2:1$ when 15 girls leave. But afterwards when 45 boys also leave, the ratio becomes $1:5$. Originally the number of girls in the group was.

In Given

$$\text{The no. of boys} = x \quad \text{total}$$

()
no. of girls = y No. given of ~~ratio~~
ratio given after leaving of 15 is $2:1$

So

$$\frac{x}{y-15} = \frac{2}{1}$$

$$x = 2y - 30$$

Next boys also gone 45

$$\frac{y-45}{y-15} = \frac{1}{5}$$

$$5(x-45) = y-15$$

$$5x - 225 = y - 15$$

$$x = 2y - 30$$

place \leftarrow $5(2y-30) = y-15 + 225$

$$10y - 150 = y + 210$$

$$9y = 360$$

$$y = 40$$

~~120~~ girls = 40

gc

$$x = 2(40) - 30$$

$$x = 80 - 30$$

$$x = 50$$

$$y = 40 - 15$$

$$= 25$$

6) The total number of students in the school was 660.

The ratio b/w boy & girl was 13:9. After some days,

30 girls joined the school & some boys left the school

& new ratio b/w of boys who left the school is
13 x + 9x = 660

$$22x = 660$$

$$x = 30$$

$$13(30) + 9(30) = 660$$

$$390 + 270 = 660$$

$B = 390$ $g = 270$
Then 30 girls are joined

$$\frac{390 + x}{270 + 30} = \frac{6}{5}$$

$$5(390 - x) = 6(270) + 6(30)$$

$$390(5) - 5x = 6(270) + 6(30)$$

$$1950 - 5x = 1620 + 180$$

$$1950 - 5x = 1800$$

$$5x = 1950 - 1800$$

$$5x = 150$$

$$x = 30$$

∴ 30 boys are left

7) In a college union, there are 48 students. If ratio of the number of boys to the no. of girls is 5:3. The number of girls to be added in the union so that the no. of boys to girls is 6:5 is

5 : 3

$$5x + 3x = 48$$

$$x = \frac{48}{8} = 6$$

$$x = 6$$

$$\frac{30}{18+x} = \frac{6}{5}$$

$$30 \times 5 = 6(18) + 6x$$

$$\frac{41}{108}$$

$$150 - 108 = 6x$$

$$42 = 6x$$

$$\boxed{x = 7}$$

$$\frac{70}{25} = \frac{6}{5}$$

Lesson 6

Income / Expenditure

40,000 - Income

20,000 - rent
25,000 3,000 - food } Expenditure
 2,000 - transport

15,000 - saving

Basics

$$\boxed{\text{Income} = \text{Exp} + \text{Savings}}$$

Ques given monthly salary = ans $\times 12$

& calculate yearly salary

Some

given yearly salary = ans

& calculate monthly salary $\frac{1}{12}$

1) The ratio of income of P & Q is 3:4 & the ratio of their expenditure is 2:3. If both of them save Rs 6000 each, the income of P is

$$3x : 4x \quad I = E + S$$

$$\text{Income } 3x : 4x \quad Exp = 2:3$$

Saving 6000 rs

$$\begin{array}{c} \text{total} \\ \uparrow \\ 3x - 6000 = 2 \\ \hline 4x - 6000 \end{array} \quad \begin{array}{c} \text{Savings} \\ \uparrow \\ 3 \\ \hline 4 \end{array} \quad \begin{array}{c} \text{Exp} \\ \uparrow \\ 2 \\ \hline 3 \end{array}$$

$$3(3x - 6000) = 2(4x - 6000)$$

$$9x - 18000 = 8x - 12000$$

$$x = 6000$$

$$\begin{array}{c} 3(6000) = 18000 \text{ Rs} \\ \hline P = 18000 \end{array} \quad \begin{array}{c} 4(6000) = 24000 \\ Q = 24000 \end{array}$$

2) A & B have monthly incomes in the ratio 5:6 & monthly expenditure in the ratio 3:4. If they save £ 1800 & £ 1600 respectively. Find the monthly income of B

$$\frac{5x - 1800}{6x - 1600} = \frac{3}{4} \quad \rightarrow \text{Exp}$$

$$4(5x - 1800) = 3(6x - 1600)$$

$$20x - 7200 = 18x - 4800$$

$$80x - 18x = 7200, 4800$$

$$\begin{array}{r} 67200 \\ -18x \\ \hline 2400 \end{array}$$

$$2x = 2400$$

$$\boxed{x = 1200}$$

The monthly income of B is $6(1200) = 7200$

- 3) A man spends a part of his monthly income & saves a part of it. The ratio of his expenditure to his saving is $26:3$. If his monthly income is $\text{₹}7250$, what

is the amount of his monthly savings?

$$\text{Expt + Savin} = \text{Total salary}$$

$$26x + 3x = 7250$$

$$29x = \frac{250}{7250}$$

$$\boxed{9x = 250}$$

$$\begin{array}{r} 3172 \\ -27 \\ \hline 45 \\ -35 \\ \hline 120 \\ 23 \\ \hline 120 \\ 26 \\ \hline 58 \\ -58 \\ \hline 145 \\ 625 \\ -625 \\ \hline 15 \\ 650 \\ -650 \\ \hline 0 \end{array}$$

$$26(250) + 3(250) =$$

$$6500 + 750 =$$

monthly saving is 750

- 4) The ^{next salary} of A, B, C is in the proportion of $2:3:5$. If C's monthly salary is $\text{₹}12000$ more than that of A, then

B's annual salary is

$$2 : 3 : 5$$

$$5x = 12000$$

$$3(4000)$$

$$\boxed{B = 12000 \times 12}$$

$$= 1,44,000 \text{/- annual}$$

easy

$$A = x$$

$$C = x + 12000$$

$$3x = 12000$$

$$x = 4000$$

5) The incomes of A & B are in the ratio 5:3. The expenses of A, B & C are in the ratio 8:5:
 If C spends Rs. 2000 & B saves Rs. 700
then A saves.

~~$\text{Income } 5:3 \quad \text{Exp} = 8:5:2$~~



$$\text{C spend Rs. 2000} \quad \bar{B} = \text{saves } 700$$

A saves

$$\frac{5}{3}$$

$$\frac{5}{2}$$

C expenses is 2 in ratio of Rs. 2000.

$$2x = 2000$$

$$x = 1000$$

$$\rightarrow B \text{ expenses + saving} = 3B$$

ratio of total income

$$1000 + 700 = 3B$$

$$1900 = 3B$$

A's (income) spend = 8 (1000)

$$1900 - x = 8000 \quad 1900 - x = 8(1000)$$

$$1900 - 8000 = x$$

$$x = 1500$$

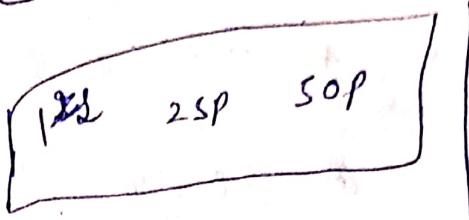
A saves 1500Rs

Lesson 7

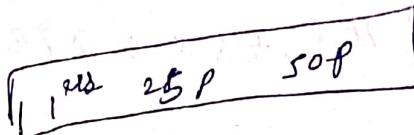
Coins

model

inside box



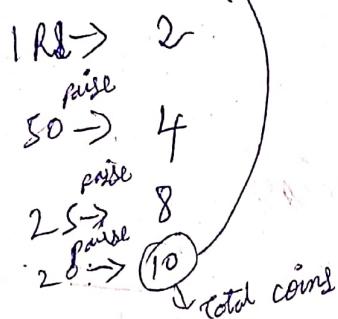
Total value \rightarrow 420 Rs
 \rightarrow how much coin not determine



$$\text{Total coins} = 420$$

\rightarrow The ~~value~~ is not Rs

Mistake Rs. 2 value



- 1) In a bag, there are three types of coins - 1 rupee, 50 paise & 25 paise in the ratio $3:8:20$. Their total value is Rs. 372. Find the total number of coins.

~~$3(12) = 36$~~

$$1 \quad 50 \quad 25 \\ 3 : 8 : 20 \quad 372$$

$$x + 2x + 4x = 372$$

~~$8(12) = 96$~~

$$3x + 16x + 80x = 372$$

$$x(3+8+20) = 372$$

~~$20(12) = 240$~~

~~(99)~~

$$x = 372$$

$$31 = 372$$

~~$36 + 48 + 80 = 164 \text{ coins}$~~

$$x = 12$$

another method , value

$$3x + 8x + 20x = 372$$

$$12x \text{ } @ \text{ } 50\text{paise} \quad \frac{25}{4}$$

$$3x + \frac{8x}{2} + \frac{20x}{4} = 372$$

$$3x + 4x + 5x = 372$$

$$12x = 372$$

$$x = 31$$

$$3(31) = 93$$

$$8(31) = 248$$

$$\begin{array}{r} 20(31) = 620 \\ \hline 961 \text{ coins} \end{array}$$

2) In a bag, there are three types of coins - 1 ₹ , 50p, 25p in the ratio 2:3:4. Their total value is $\text{₹} 180$. Find the total value as $\text{₹} 100$. per coin.

~~100~~ coins $\text{₹} 100$ rupee

$$2x + 3x + 4x = 180$$

rupees

$$2x + \frac{3x}{2} + \frac{4x}{4} = 180$$

$$\frac{8x + 3x + 2x}{2} = 180$$

$$4x + 3x + 2x = 180 \times 2$$

$$8x = 180 \times 2$$

$$x = 40$$

another method

value

$$3x + 8x + 20x = 372$$

12x ~~10x~~ 80paise $\frac{25}{4}$ rupee

$$3x + \frac{8x}{2} + \frac{20x}{4} = 372$$

$$3x + 4x + 5x = 372$$

$$12x = 372$$

$$\boxed{x = 31}$$

$$3(31) = 93$$

$$8(31) = 248$$

$$\begin{array}{r} 20(31) = 620 \\ \hline 961 \text{ coins} \end{array}$$

Q) In a bag, there are three types of coins - 1R, 50P, 25P in the ratio 2:3:4. Their total value is Rs 180. Find the total value is Rs ~~100~~ 5 rupee.

~~total~~ coins

rupee

$$2x + 3x + 4x = 180$$

rupees

$$2x + \frac{3x}{2} + \frac{4x}{4} = 180$$

$$\frac{8x + 3x + 2x}{2} = 180$$

$$4x + 3x + 2x = 180 \times 2$$

$$9x = 180 \times 2$$

$$\boxed{x = 40}$$

$$2(40) \\ 3(40) = 120 \text{ coins in } 50 \text{ bags}$$

3) In a bag, there are three types of coins -
1 rupee, 50 paisa & 25 paisa in the 8:5:3. Their
total value is Rs. 225. Find the total number
of 1 rupee coins.

$$8x + 5x + 3x = 225$$

$$\frac{8x}{2} + \frac{5x}{4} + \frac{3x}{1} = 225$$

$$\begin{array}{r} 3 \\ 17 \\ \hline 5 \\ 25 \\ \hline 225 \end{array}$$

$$32x + 10x + 3x = 225 \times 4$$

$$\cancel{18x} = 225 \times 4 \\ \cancel{17x} = 900 \\ x = \frac{900}{17}$$

$$4.5x = 225 \times 4$$

$$x = 20$$

$$8(20) = 160 \text{ coins of 1 rupee}$$

model 2

- 4) A box contains 420 coins of 1 rupee, 50 paisa & 20 paisa coins. The ratio of their values is $13:11:7$.

The number of 50 paisa coins is,

$$13 \text{ } \cancel{x} + 11 \cancel{x} + 7 \cancel{x} = 420$$

↓
convert to coins

$$13x \times 1 = 13$$

$$11x \times 2 = 22$$

$$20 \text{ paisa } 7x \times \frac{1}{4} = 35$$

coins

$$13x + 22x + 35x = 420$$

$$70x = 420$$

$$\boxed{x = 6}$$

$$22(6) = 132 \rightarrow \text{total 50 paisa}$$

- 5) A box contains 280 coins of 1 rupee, 50 paisa & 20 paisa

coins. The ratio of their values is $8:4:3$. The

number of 50 paisa coins is

$$12(80) = 96$$

$$8x + 4x + 3x = 280 \text{ coins}$$

$$8x + 8x + 12x = 280$$

$$\boxed{x = 280}$$

$$2(40) = 80 \text{ coins} \rightarrow$$