Ratio - Proportion

$$a:b = Ka:Kb$$
$$= \frac{a}{K} : \frac{b}{K}$$

Ram   Shyam   (Total)

$$a : b$$

Share of each.

Share of Ram $= \dfrac{a}{a+b}$ (Total)

Share of Shyam $= \dfrac{b}{a+b}$ (Total)

	Ram	:	Shyam
Direct	2	:	3
Indirect	1/3	:	1/2
Share of	$\dfrac{2}{2+3}$ (Total)		$\dfrac{3}{2+3}$ (Total)
%age	$\dfrac{2}{5} = 40\%$		$\dfrac{3}{5} = 60\%$

Direct $\longrightarrow$ Indirect $=$ Ratio - Proportion

$$2:3 = \frac{1}{6}(2:3)$$

$\underbrace{}_{LCM=6}$

$$= \frac{2}{6} : \frac{3}{6}$$

$$= \boxed{\frac{1}{3} : \frac{1}{2}}$$

Indirect $\longrightarrow$ Direct

$$\underbrace{\frac{1}{3} : \frac{1}{2}}_{LCM=\textcircled{6}} = \nearrow 6\left(\frac{1}{3} : \frac{1}{2}\right)$$

$$= \frac{6}{3} : \frac{6}{2}$$

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

Q. Divide among Rs $\textcircled{784}$ A, B, C, D Such that $\boxed{2A = 3B = 4C = 12D}$

$= k \text{ (say)}$

D = ?

~~wrong~~
~~A : B : C : D~~
~~2   3   4   12~~

$\textcircled{A}$	$\textcircled{B}$	$\textcircled{C}$	$\textcircled{D}$
$\dfrac{k}{2}$	$\dfrac{k}{3}$	$\dfrac{k}{4}$	$\dfrac{k}{12}$

$$\Rightarrow \frac{1}{2} : \frac{1}{3} : \frac{1}{4} : \frac{1}{12}$$

LCM
$\overline{2,3,4,12}$
$\rightarrow \textcircled{12}$

$$\Rightarrow 12\left(\frac{1}{2} : \frac{1}{3} : \frac{1}{4} : \frac{1}{12}\right)$$

$$\Rightarrow 6 : 4 : 3 : 1$$

$$A : B : C : \boxed{D}$$
$$\boxed{6 : 4 : 3 : 1}$$

$$\text{Share of } D = \frac{1}{6+4+3+1} (784)$$

$$= \frac{1}{14} \times 784 = \boxed{56}$$

Q. Total weight = (100 Kg)

$$\begin{array}{ccc} & \text{Ram} : \text{Shyam} \\ \text{Age} & 7 : 3 \end{array}$$

Ratio of same things can be solved?

Weight of Ram = ? — Data Insufficient

Q. Total values of coins = 210 Rs

	coin	coin	coin
	1 Rs	50 Paise	25 Paise
number of coins	5 :	6 :	8
Value	5 :	3 $\frac{6 \times 2}{2}$:	2 $\frac{8 \times 1}{4}$

$$\text{Value of } \boxed{25} \text{ Paise} \Rightarrow \frac{2}{5+3+2} (210)$$

$$\Rightarrow \frac{2}{10}(210) \Rightarrow \boxed{42} Rs$$

(a) What is the value of (25) Paise coins?

(42 Rs)

(b) How many (25) Paise coin?

(Value)   no-of (75) Paise coin

RS
(1) ⟶ 4 Paire

(42) ⟶ (42×4)   168 coins

Ratio and Proportion

#1

$$A : B \qquad\qquad B : C$$
$$2 : 3 \qquad\qquad 4 : 5$$

Concept

$$A : B : C$$
$$2 \quad 3 \quad 3$$
$$\underline{4 \quad 4 \quad 5}$$
$$8 : 12 : 15$$

khali space mei uske bagal wala aata hai

Q1 $a : b = 7 : 9$
and $b : c = 25 : 7$ then $A : B : C$

$$A : B : C$$
$$7 \quad 9^3 \quad 9^3$$
$$^5\cancel{15} \quad 15 \quad 7$$
$$\underline{7 \times 15 : \frac{9 \times 15}{3} : \frac{9 \times 7}{3}}$$
$$\quad\quad 5 \quad\quad 3 \quad\quad 3$$
$$35 : 45 : 21$$

Q2 $A : B = 3 : 4$
$B : C = 5 : 7$ then $A : B : C : D$
$C : D = 8 : 9$

$$A : B : C : D$$
$$3 \quad 4 \quad 4 \quad 4$$
$$5 \quad 5 \quad 7 \quad 7$$
$$^2 8 \quad 8 \quad 8 \quad 9$$
$$\underline{3 \times 5 \times 8^2 : 4.5 : 8 : 4 \times 7 \times 8 : 4 \times 7 : 9}$$
$$\quad\quad\quad 2$$
$$30 : 40 : 56 : 63$$

Q1 $A : B : C : D : E$

$$1 : 2 \quad 2 \quad 2 \quad 2$$
$$3 \quad 3 : 4 \quad 4 \quad 4$$
$$3^6 \quad 6 \quad 6 : 9^3 \quad 9^3$$
$$3^{11} \quad 11 \quad 12 \quad 12 : 16$$
$$\underline{9 : 18 : 24 : 36 : 48}$$
$$\quad 3 \quad\quad 6 \quad\quad 8 \quad\quad 12 \quad\quad 16$$
$$3 : 6 : 8 : 12 : 16$$

Q.1 ① $\underset{\text{+ve Integers}}{a,b,c}$ $a:b = 3:4$ $b:c = 2:1$

possible value of $(a+b+c) = ?$

ⓐ 201   ⓑ 205   ⓒ 207   ⓓ 210
$2+0+1$ $2+0+5=7$ $2+0+7=9$ $2+1+0=3$
$\Rightarrow 3$

$$A : B : C$$
$$3 \quad 4_2 \quad 4_2$$
$$2 \quad 2 \quad 1$$
$$\overline{3 : 4 : 2}$$ $\underline{9x}$

Q.1 ②   If A is 25% more than B and B is 15% less than
C then $A:B:C = ?$

$$\nearrow 2/4$$

$$\begin{array}{ccc} A & B \\ 5 & : & 4 \end{array} \qquad \begin{array}{cc} B & C \\ \cancel{85} & \cancel{100} \\ 17 & 20 \end{array}$$

$$\begin{array}{ccc} A : & B : & C \\ 5 & 4 & 4 \\ 17 & 17 & 20 \\ \hline 85 : & 68 : & 80 \end{array}$$

Concept

$$\nearrow P : Q : R$$

$$500 \boxed{\dfrac{1}{②} : \dfrac{1}{③} : \dfrac{1}{⑩}} \times 30$$

$$\underset{\text{LCM}}{\underbrace{\qquad\qquad}}$$

$$\longrightarrow 15 : 10 : 3$$

Q.1 ① A sum of x is
divided b/w A, B, C in
the ratio $\boxed{\dfrac{4}{⑤} : \dfrac{2}{③} : \dfrac{3}{⑨}} \times 60$
LCM$(5,3,9)=60$
the share of B is 2,600
what is the value of x?
$$\underset{A}{} \quad \underset{B}{} \quad \underset{C}{}$$
$$x \rightarrow 48 : 40 : \cancel{45}$$
$$\Rightarrow \boxed{133} \; (48+40+45)$$

 # Unitary Method
$$40 \longrightarrow 2600$$
$$1 \longrightarrow \dfrac{2600}{40}$$
$$133 \longrightarrow \dfrac{2600}{40} \times 133$$
$$\Rightarrow \boxed{8645}$$

Q1 Soham's initial expenditure and savings were in the ratio 5:1. His income increases by 25%, while his savings increase by 20%. If Soham's current expenditure is 4347, what was his initial income?

→ Income = Expenditure + Saving

I	E	S
60 =	50 :	10

+15 | 1/4   +2 | 1/5

75 = $\boxed{63}$ 12
     75-12

63 → 4347

2 → $\dfrac{4347}{63}$

60 → $\dfrac{4347}{63}$ × 60

$\boxed{4140}$ Ans

Q2 A sum is divided among A, B, C and D such that the ratio of the shares of A and B is 2:3, that of B and C is 1:2 and that of C and D is 3:4. If the difference b/w the shares of A and D is ₹648, then the sum of the share is

A	B	C	D
2	3	3	3
1	1	2	2
3	3	3	4
②:	3:	6:	⑧

6 → 648

1 → $\dfrac{648}{6}$

29 → $\dfrac{648}{6}$ × 19

$\boxed{2052}$ Ans

Q1 A person divided a certain sum b/w his three sons in the ratio 3:4:5. Had he divided again the sum in the ratio $\frac{1}{3}:\frac{1}{4}:\frac{1}{5}$ the son, who got the least share earlier, would have got ₹ 2288 more. The sum (in ₹) was:

Sum {Tehsanij} {in ratio}   MEn

$\boxed{47 \times 12} \longrightarrow 3 : 4 : 5$

$12 \times 47 \longrightarrow 20 : 15 : 12$

$\left[\frac{1}{3} : \frac{1}{4} : \frac{1}{5}\right] \times 60$

$47 \times 3 = 241 \nwarrow$
$12 \times 20 = 240 \swarrow$ $\Big\} 99$

$99 \rightarrow 1188$

$\cdot \rightarrow \dfrac{1188}{99} \times 12 \times 47$

Q2 The ratio of boys and girls in a college is 5:3. If 50 boys leave the college and 50 girls join the college, the ratio becomes 9:7. The no. of boys in the college is :

50 gaye 50 aaye mtlb total toh same rahega

Total same bang diya

B : G

$\boxed{8 \times 2}$ 5 : 3

$\boxed{16 \times 1}$ $\underline{9}$: 7

$$\Rightarrow$$

B   G
↓
10   6

$\left.\begin{array}{c}\\\end{array}\right\}-1 \quad \Big|+1 = 50$

9   7

✱ **Basic Method**

let B = 5x
   G = 3x

$\boxed{\dfrac{5x - 50}{3x + 50} = \dfrac{9}{7}}$

$1 \rightarrow 50$

$B\rightarrow 10 \rightarrow 500$

$G\rightarrow 6 \rightarrow 300$

Q1 Raju and Lalitha originally had marbles in the ratio 4:9. Then Lalitha gave some of her marbles to Raju. As a result, the ratio of the number of marbles with Raju to that with Lalitha became 5:6. What fraction of her original number of marbles was given by Lalitha to Raju?

	R	L	Total
	4×11	9×11	13×11
	5×13	6×13	11×13

$$\text{difference} = |99 - 78| = 21$$

$$\text{fraction} = \frac{21}{99} = \boxed{\frac{7}{33}} \quad \text{Ans.}$$

Concept

Proportion ⟶ **Ratio Equal**

$$A : B : C : D$$
$$2 : 3 : 4 : ?$$

4th proportion $\boxed{\dfrac{A}{B} = \dfrac{C}{D}}$

$$A : B : C$$
$$2 : 3 : ?$$

$\boxed{\dfrac{A}{B} = \dfrac{B}{C}}$ 3rd proportion

Mean proportion

$$A : B : C$$
$$2 : ? : 3$$

$$\dfrac{2}{x} = \dfrac{x}{3}$$

$$x^2 = 2 \times 3$$

$$\boxed{x = \sqrt{ab}}$$

Q.① The fourth proportional to 0.12, 0.21, 8 is :

$$\overline{0.12, 0.21, 8, ?}$$

$$\dfrac{0.12}{0.21} = \dfrac{8}{x}$$

$$\boxed{x = 14}$$

Q.② In a proportion, the 1st, 2nd and 4th terms are 15, 25 and 75, respectively. What is the 3rd term.

$$\overline{15, 25, ?, 75}$$

$$\dfrac{15}{25} = \dfrac{x}{75}$$

$$\boxed{x = 45}$$

Q.③ What is Ratio of fourth proportional to 2, 5, 4 and the mean proportional between 2.5 and 0.016 ?

$$2, 5, 4, x$$

$$\dfrac{2}{5} = \dfrac{4}{x} \quad \boxed{x = 10}$$

$$2.5, x, 0.016$$

$$\dfrac{2.5}{x} = \dfrac{x}{0.016}$$

$$x = \sqrt{2.5 \times 0.016}$$

$$x = \dfrac{5 \times 4}{100} = 0.20$$

$$\dfrac{1000}{0.20} \boxed{\dfrac{50}{1}}$$

Q₁) The total no. of students in three sections A, B and C of a class in a school is 340. The no. of students in sections A and B in the ratio 3:5 and those in sections B and C are in the ratio 3:2. What is the mean proportional b/w number of students in section A and the number of students in section C.

A	B	C
3	5	5
3	3	2

$$9 : 15 : 10$$

$340 \rightarrow$

$34 \rightarrow 340$ (Total) $\boxed{2 \rightarrow 10}$
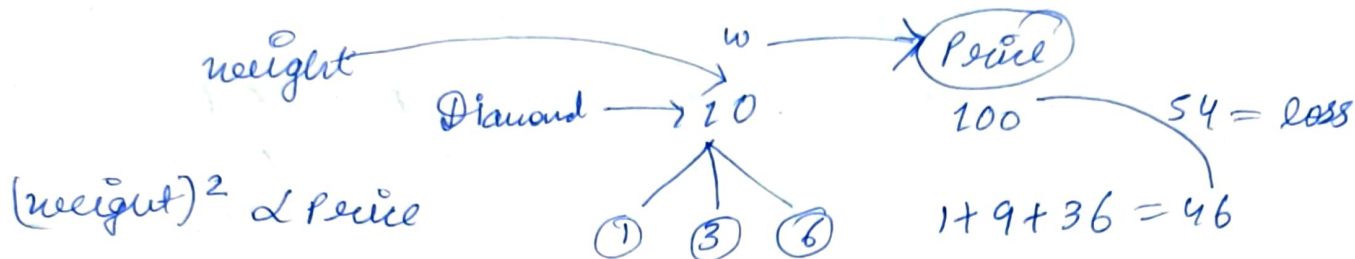
$\rightarrow \boxed{90} : 150 : \boxed{100}$
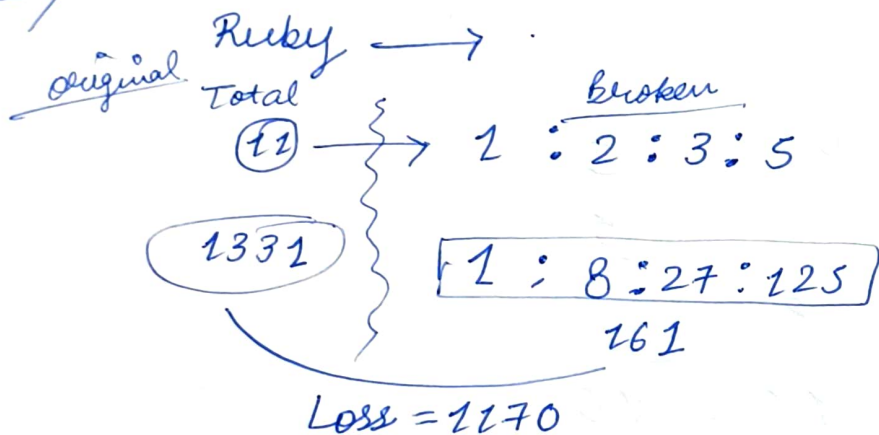
$\sqrt{90 \times 100}$

$\boxed{30\sqrt{10}}$ Ans

Q₂) Kishore had a precious ruby worth RS 63,888 with him. While showing it to one of his friends, it fell down and broke into 4 pieces, the weights of which are proportional to 1:2:3:5. The value of each of the pieces is directly proportional to ruke of its weight. What is the loss that Kishore is going to face, as the stone fell down and broke into pieces??

Concept →

weight $\longrightarrow$ w $\longrightarrow$ (Price)

Diamond $\longrightarrow$ 10

$(weight)^2 \propto Price$

① ③ ⑥

100   54 = loss

$1 + 9 + 36 = 46$

$\longrightarrow$

original   Ruby $\longrightarrow$

Total

⑪ $\longrightarrow$ broken   1 : 2 : 3 : 5

(1331)

$\boxed{1 : 8 : 27 : 125}$

161

Loss = 1170

56160   Ans

Unitary method

$1331 \rightarrow 63888$

$1 \rightarrow \dfrac{63888}{1331}$

$1170 \rightarrow \dfrac{63888}{1331} \times 1170$

Q The income of A and B are in the ratio 3:2 and their expenditures are in the ratio 5:3. If each saves Rs 2000, what is their income?

method ① (Basic)   I   3 : 2

$3I - 5E = 2000 \times 3$ E   5 : 3

$2I - 3E = 2000 \times 2$ 2000   2000

Method ②

3 —— 2
5 —— 3

Method ③ (✓)
Cross-product rule

I   3 : 2
E   5 : 3
S $\rightarrow$ 2000 × 2000

1 = 4000
3 = 12000
2 = 8000

Q) X and Y have their monthly incomes in the ratio 9:7 while their monthly expenditure are in the ratio 5:3. If they have saved Rs 16,000 and Rs 14,000 monthly respectively, then the difference in their monthly incomes is:

I	9	7
E	5	3
S	16000	14000

(above 9 is written 35, above 7 is written 27)

CROSS-METHOD (Jab initial dekar rakha hei usko badhaya aur final).

48 K
70 K
22

$8 = 22000$

$1 \rightarrow \dfrac{22000}{8}$

diff in their monthly income
$9 - 7 = 2$

$2 \rightarrow \dfrac{22000}{8} \times 2$

(5500) **Ans**