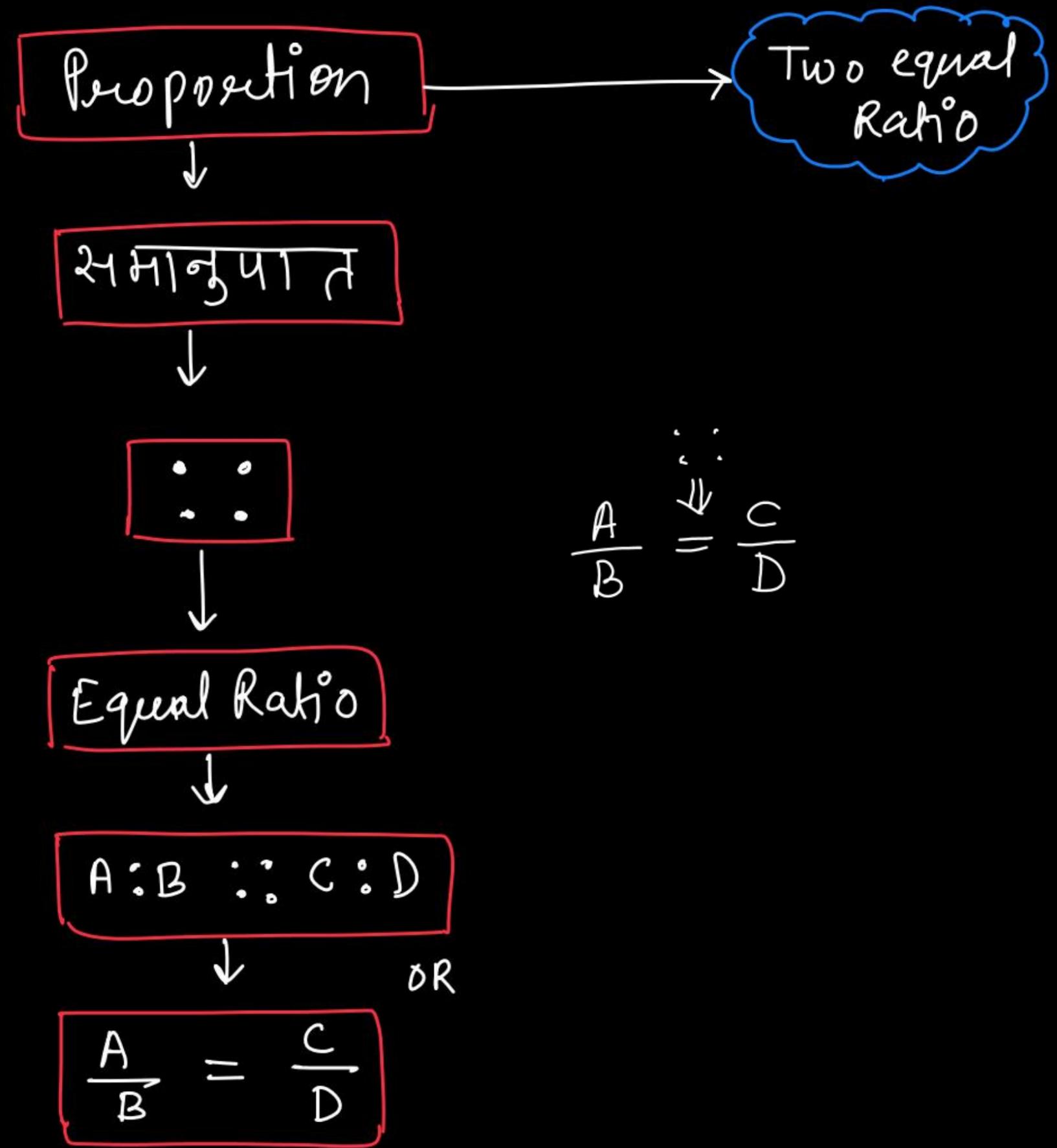
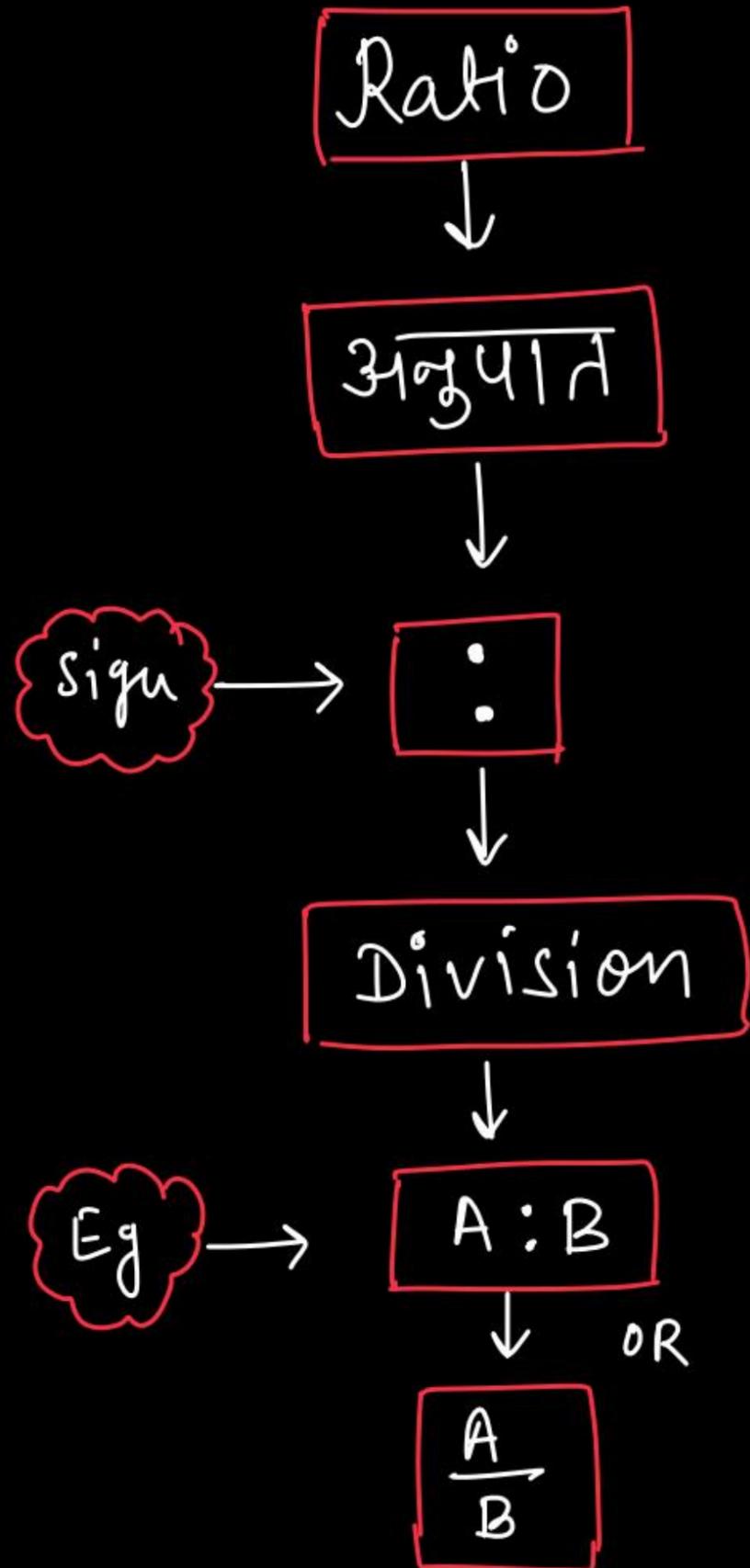
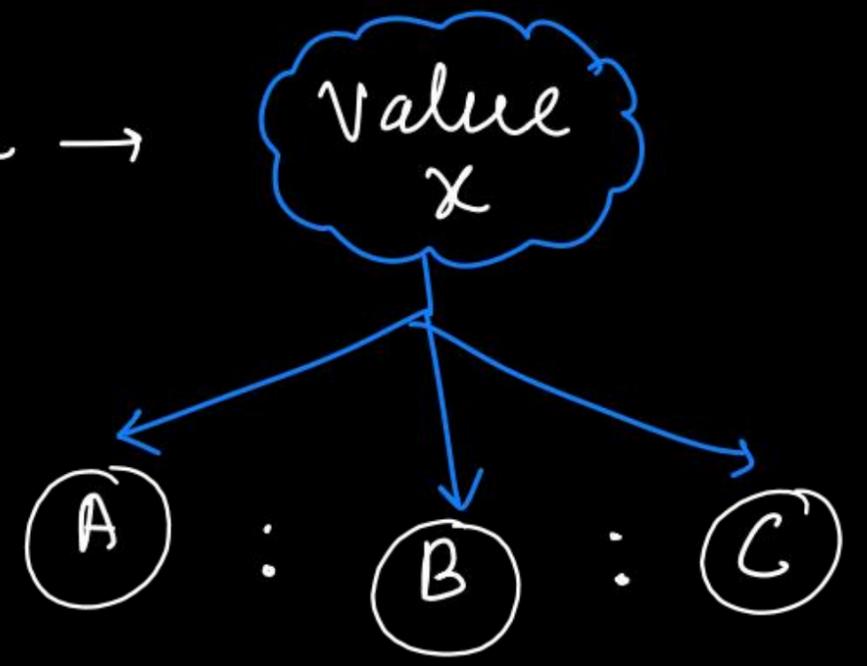


Ratio & Proportion

अनुपात & समानुपात



* Suppose \rightarrow



C का भाग
या
Part of C

$$x \times \frac{C}{A+B+C}$$

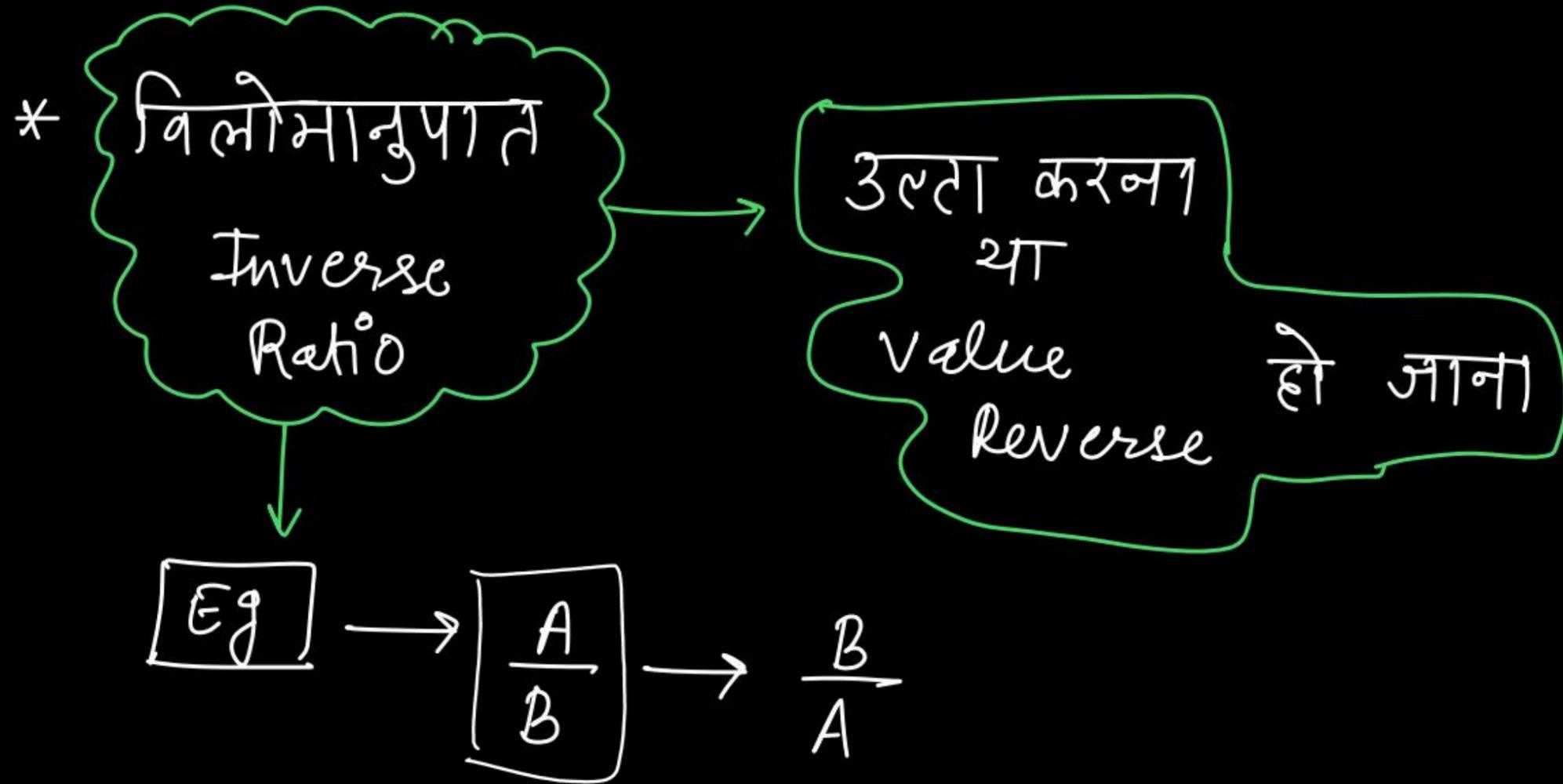
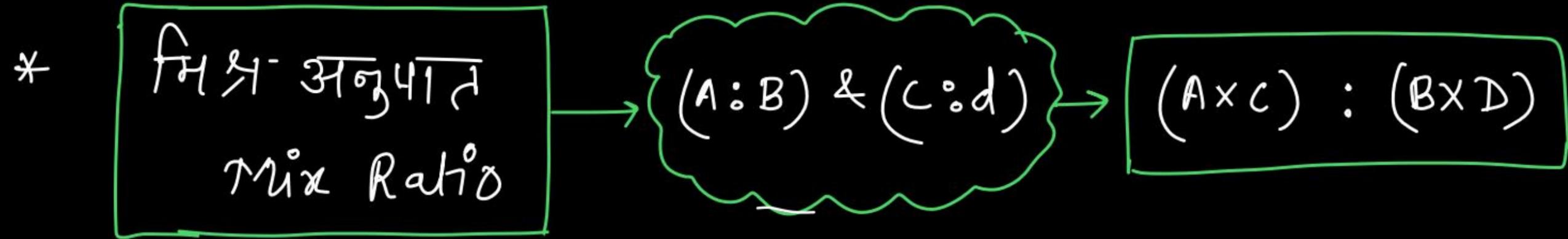
* A का भाग
या
Part of A

$$x \times \frac{A}{A+B+C}$$

\rightarrow Sum of Ratio
(सभी अनुपातों का योग)

* B का हिस्सा
या
Part of B

$$x \times \frac{B}{A+B+C}$$



TYPE-1

Q.1 If $a:b = 3:4$ and $b:c = 8:9$ find $a:c$?

$$\frac{2}{2} \times \frac{a}{b} = \frac{3 \times 2}{4 \times 2}$$

$$\frac{b}{c} = \frac{8}{9}$$

$$\frac{a}{b} = \frac{6}{8}$$

$$\frac{b}{c} = \frac{8}{9}$$

$$\boxed{\begin{matrix} a : c \\ 6 : 9 \end{matrix}}$$

OR

$$\boxed{\begin{matrix} a : c \\ 2 : 3 \end{matrix}}$$

Ans

TYPE-2

Q. (2)

gf $A : B = 6 : 5$ then find $A : B : C = ?$
 $B : C = 3 : 4$

$$\frac{A}{B} = \frac{6 \times 3}{5 \times 3}$$

$$\frac{A}{B} = \frac{18}{15}$$

$$\frac{B}{C} = \frac{3 \times 5}{4 \times 5}$$

$$\frac{B}{C} = \frac{15}{20}$$

A	B	C
18	15	20

Ans

TYPE-3

Q. (3) यदि
(यदि)

$$A : B = 2 : 3$$

$$B : C = 4 : 5$$

$$C : D = 6 : 5$$

find $A : B : C : D = ?$

$$A : B : C : D$$

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

$$\textcircled{4} : \boxed{4} : \boxed{5} : \textcircled{5}$$

$$\times \textcircled{6} : \textcircled{6} : 6 : 5$$

$$\boxed{48 : 72 : 90 : 75}$$

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

$$B : C \Rightarrow 9 : 7$$

$$C : D \Rightarrow 14 : 15$$

$$A : B : C : D = ?$$

$$\begin{array}{cccc} A & : & B & : & C & : & D \\ 2 & : & 3 & : & \boxed{3} & : & \boxed{3} \end{array}$$

$$\begin{array}{cccc} \boxed{9} & : & 9 & : & 7 & : & \boxed{7} \end{array}$$

$$\times \begin{array}{cccc} \boxed{14} & : & \boxed{14} & : & 14 & : & 15 \end{array}$$

$$\boxed{\quad : \quad : \quad : \quad}$$

TYPE-4

Q. ④ यदि $\frac{A}{3} = \frac{B}{4} = \frac{C}{5}$ find $A : B : C = ?$
(If)

$$\frac{A}{3} = \frac{B}{4} = \frac{C}{5} = k \text{ (let)}$$

$$\frac{A}{3} = k$$
$$\boxed{A = 3k}$$

$$\frac{B}{4} = k$$
$$\boxed{B = 4k}$$

$$\frac{C}{5} = k$$
$$\boxed{C = 5k}$$

$$A : B : C$$
$$3k : 4k : 5k$$

$$\boxed{3 : 4 : 5}$$

TYPE-5

Q.5 If $a:b = 3:4$ then find $\frac{a+b+c}{c} = ?$
 $b:c = 4:7$

$$\frac{a}{b} = \frac{3}{4}$$

$$\frac{b}{c} = \frac{4}{7}$$

$$\frac{a+b+c}{c}$$

$$\Rightarrow \frac{3+4+7}{7}$$

$$\Rightarrow \frac{14}{7} \Rightarrow \boxed{2}$$

TYPE-6

Q.6. यदि $\frac{a}{3} = \frac{b}{4} = \frac{c}{7}$

$$\frac{a}{3} = \frac{b}{4} = \frac{c}{7} = k \text{ (let)}$$

$\frac{a}{3} = k$ $a = 3k$	$\frac{b}{4} = k$ $b = 4k$	$\frac{c}{7} = k$ $c = 7k$
-------------------------------	-------------------------------	-------------------------------

find $\frac{a+b+c}{c} = ?$

$$\frac{a+b+c}{c}$$
$$\frac{3k+4k+7k}{7k}$$

$$2 \frac{14k}{7k} \Rightarrow \boxed{2} \text{ Ans}$$

TYPE-7

Q.7 If $a:b = 2:3$
 $b:c = 4:5$

$$\frac{a}{b} = \frac{2 \times 4}{3 \times 4}$$

$$\frac{b}{c} = \frac{4 \times 3}{5 \times 3}$$

$$\frac{a}{b} = \frac{8}{12}$$

$$\frac{b}{c} = \frac{12}{15}$$

Then find $(a+b) : (b+c) = ?$

$$\frac{(a+b)}{(b+c)} \Rightarrow \frac{(8+12)}{(12+15)}$$

$$\frac{20}{27} \quad \underline{\underline{\text{Ans}}}$$

TYPE-8

Q.8 If $x:y = 2:5$ find $(3x+2y) : (2x+5y) = ?$

Given, $\frac{x}{y} = \frac{2}{5}$

$$\frac{(3x+2y)}{(2x+5y)} \Rightarrow \frac{3 \times 2 + 2 \times 5}{2 \times 2 + 5 \times 5} \Rightarrow \frac{6+10}{4+25} \Rightarrow \frac{16}{29} \underline{\underline{\text{Ans}}}$$

TYPE-9

Q.9. If $(2a + 3b) : (3a - 2b) = 19 : 9$, find $a : b = ?$

$$\frac{2a + 3b}{3a - 2b} = \frac{19}{9}$$

$$(2a + 3b) \times 9 = (3a - 2b) \times 19$$

$$\begin{aligned} 2a \times 9 + 3b \times 9 &= 3a \times 19 - 2b \times 19 \\ 18a + 27b &= 57a - 38b \end{aligned}$$

$$18a - 57a = -38b - 27b$$

$$+ 39a = +65b$$

$$\frac{a}{b} = \frac{65}{39} = \frac{5}{3}$$

$$a : b = 5 : 3$$

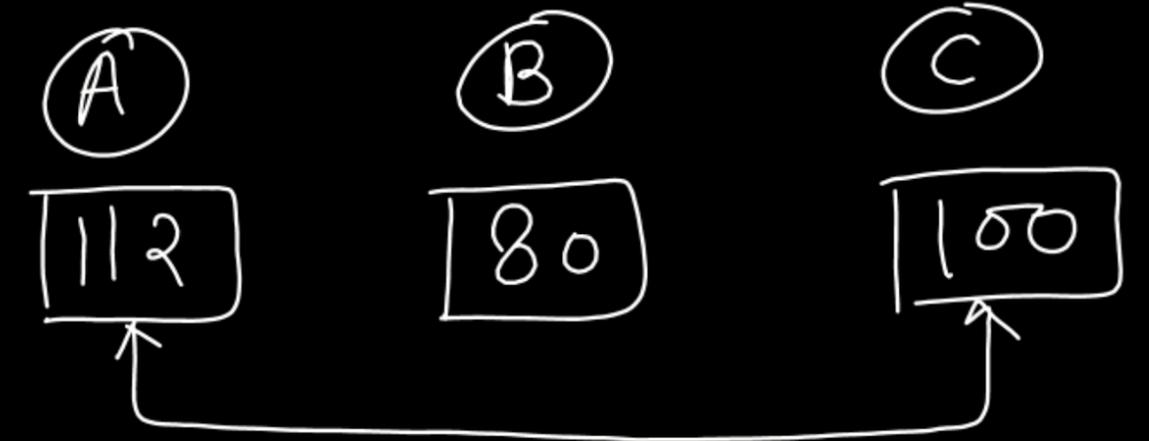
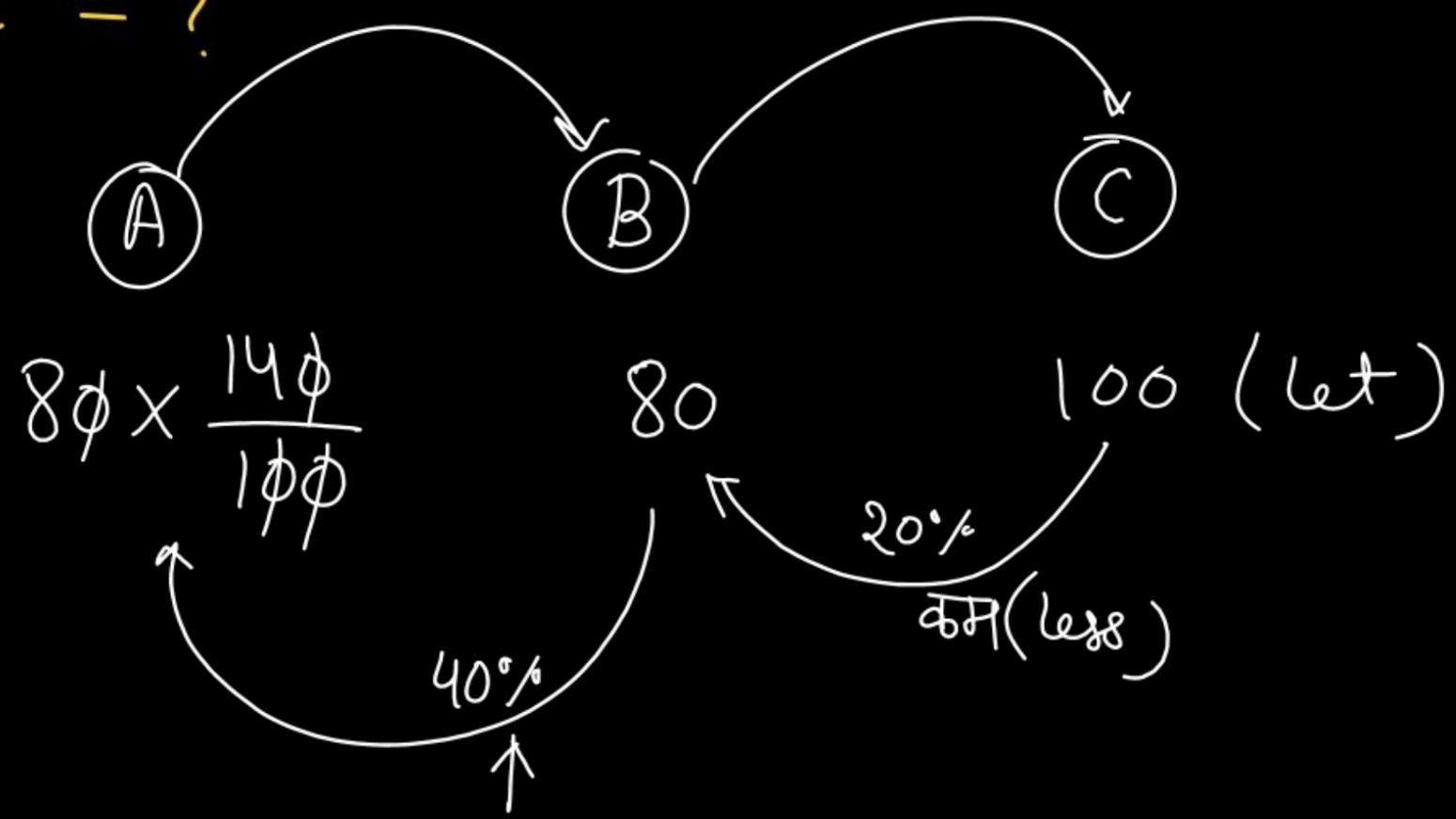
Ans

$$\text{OR} \quad \frac{a}{b} = \frac{5}{3}$$

TYPE-10

Q.10. यदि A, B से 40% अधिक हो तथा B, C से 20% कम हो तो $A:C = ?$

if A, is 40% more than B & B, is 20% less than C then find $A:C = ?$



$$\frac{A}{C} = \frac{112}{100} \Rightarrow \frac{56}{50} \Rightarrow \frac{28}{25}$$

Ans

TYPE-11

Q.11 यदि A का $\frac{1}{3}$ = B का $\frac{3}{4}$ = C का $\frac{1}{6}$ है तो $A : B : C = ?$

IF $\frac{1}{3}$ of A = $\frac{3}{4}$ of B = $\frac{1}{6}$ of C Then find
 $A : B : C = ?$

$$A \times \frac{1}{3} = B \times \frac{3}{4} = C \times \frac{1}{6}$$

$$\boxed{\frac{A}{3}} = \boxed{\frac{3B}{4}} = \frac{C}{6} = K \text{ (let)}$$

$$\frac{A}{3} \rightarrow K = \boxed{A = 3K}$$

$$\frac{3B}{4} \rightarrow K = \boxed{B = \frac{4K}{3}}$$

$$\frac{C}{6} = K$$

$$\boxed{C = 6K}$$

$$\begin{array}{ccc} A : B : C \\ \frac{3K}{1} : \frac{4K}{3} : \frac{6K}{1} \end{array}$$

$$3K \times 3 : 4K : 6K \times 3$$

$$9K : 4K : 18K$$

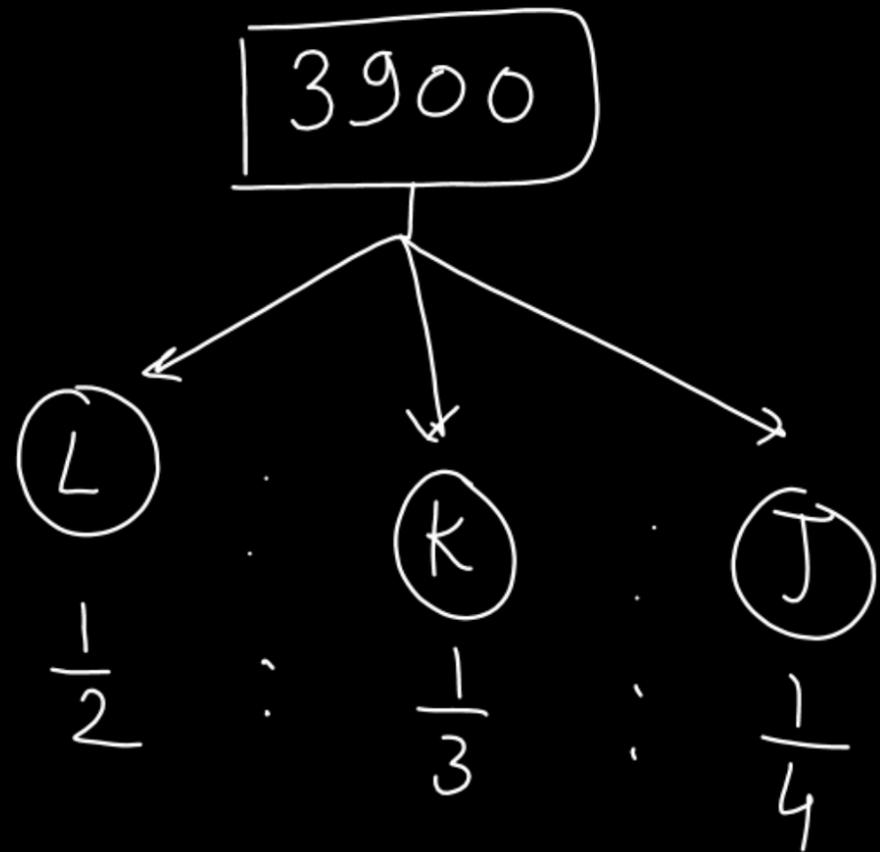
Ans

$$\boxed{9 : 4 : 18}$$

TYPE-12

Q.12. 3900 Rs. को (L) (K) और (J) के बीच $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$ के अनुपात में बाँटने पर K को कितनी राशि प्राप्त होगी ?

on dividing of 3900 in b/w L, K & J by the ratio of $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$
what amount will K get ? LCM of 2, 3, 4 \Rightarrow (12)



$$L : K : J \\ \frac{1}{2} : \frac{1}{3} : \frac{1}{4} \\ 1 \times 6 : 1 \times 4 : 1 \times 3$$

$$6 : 4 : 3 \\ L : K : J$$

$$3900 \times \frac{4}{6+4+3}$$

300

$$\cancel{3900} \times \frac{4}{\cancel{12}}$$

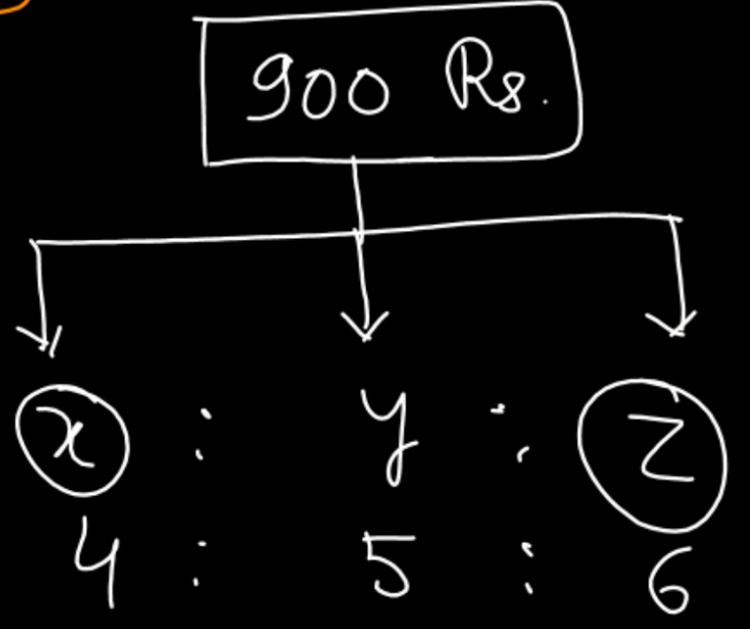
$$300 \times 4$$

$$\boxed{1200} \Rightarrow K$$

TYPE-13

Q. 13. x, y, z के बीच वृमशः 4:5:6 के अनुपात में 900 Rs. की राशि वितरित की गई है तो x और z की राशि के बीच कितना अंतर होगा ?

On dividing of 900 Rs. in b/w x, y & z by the ratio of 4:5:6, find the difference amount b/w x & z ?



$$900 \times \frac{4}{4+5+6}$$
$$\overset{60}{\cancel{900}} \times \frac{4}{15}$$
$$60 \times 4 = 240 = x$$

$$900 \times \frac{6}{4+5+6}$$
$$\overset{60}{\cancel{900}} \times \frac{6}{15}$$
$$60 \times 6 \Rightarrow 360 = z$$

$$\begin{array}{r} z = 360 \\ - x = 240 \\ \hline \end{array}$$

diff $x \text{ \& } z \Rightarrow \boxed{120}$ Ans

TYPE-14

Q. 14) यदि त्रिभुज के कोण $5:6:7$ के अनुपात में हैं तो उस Δ को क्या कहा जायेगा ?

if the ratio of triangle is $5:6:7$ then that ~~triangle~~ would be ?

$$\text{Sum of angle of } \Delta = 180^\circ$$

$$5 : 6 : 7$$
$$\underbrace{5x + 6x + 7x = 180}$$

$$18x = 180$$

$$\boxed{x = 10}$$

$$\text{I}^{\text{st}} \rightarrow 5x \Rightarrow 50^\circ$$

$$\text{II}^{\text{nd}} \Rightarrow 6x \Rightarrow 60^\circ$$

$$\text{III}^{\text{rd}} \Rightarrow 7x = 70^\circ$$

less than 90°

Acute Angle.

TYPE-15

Q.15 यदि एक चतुर्भुज के कोणों का अनुपात $3:5:9:13$ है तो सबसे बड़ा कोण ज्ञात करो ?

If the ratio of angle of parallelogram is $3:5:9:13$ then find the greatest angle ?

$$\text{Sum of angle of } \square = 360^\circ$$

$$3x + 5x + 9x + 13x = 360^\circ$$

$$x = \square$$

Greatest angle \rightarrow $\square 156^\circ$

\hookrightarrow $\bigcirc 13x$

↑
Bia

TYPE-16

Q.16. यदि एक Δ के कोणों का अनुपात $2:3:7$ है तो बड़े कोण का सबसे छोटे कोण से अनुपात ज्ञात करो ?

If the ratio of triangle is $2:3:7$ then find the ratio b/w greatest angle to smallest angle.

$$2x + 3x + 7x = 180^\circ$$

$$12x = 180^\circ$$

$$x = \frac{180^\circ}{12}$$

$$x = 15^\circ$$

$$\begin{array}{ccc} 2x : & 3x : & 7x \\ \uparrow & & \uparrow \\ \text{Smallest} & & \text{Greatest} \\ (2 \times 15) & & (7 \times 15) \\ 30^\circ & & 105^\circ \end{array}$$

$$\frac{\text{Greatest angle}}{\text{Smallest angle}}$$

$$\Rightarrow \frac{105^\circ}{30^\circ}$$

$$\Rightarrow \frac{7}{2} \Rightarrow 7:2 \text{ Ans}$$

TYPE-17

Q.17 A और B के वेतनों का अनुपात $3:4$ है। A और B दोनों के वेतनों में 3000 Rs. की वृद्धि करने पर उनके वेतनों का नया अनुपात $18:23$ हो जाता है। वृद्धि के बाद A का वेतन = ?

The salaries of A and B are in the ratio of $3:4$. On increasing the salaries of both A & B by Rs 3000 each, then the new ratio of their salaries becomes $18:23$. Find the salary of A after the increase?

Salary
Ratio

$$\textcircled{A} : \textcircled{B}$$
$$3x : 4x$$

After
Incr.

$$\frac{3x + 3000}{4x + 3000} = \frac{18}{23}$$

$$(3x + 3000) \times 23 = 18 \times (4x + 3000)$$

$$(3x \times 23) + (3000 \times 23) = (18 \times 4x) + (3000 \times 18)$$

$$\underline{\underline{69x}} + 69000 = \underline{\underline{72x}} + 54000$$

$$69x - 72x = 54000 - 69000$$

$$\boxed{x = 5000}$$

$$A's \text{ salary} \Rightarrow 3x$$

$$\text{After Incr} \Rightarrow 3x + 3000$$

$$\Rightarrow (3 \times 5000) + 3000$$

$$\Rightarrow 15000 + 3000$$

$$\Rightarrow \boxed{18000} \underline{\underline{Ans}}$$

TYPE-18

Q.18. दो संख्याओं का अनुपात $5:8$ है। यदि पहली संख्या में 40% की वृद्धि होती है, और दूसरी संख्या में 15% की कमी होती है तो नया अनुपात क्या होगा ?

Two numbers are in the ratio of $5:8$. If the first no. is increased by 40% & second no. decreases by 15% then the new ratio becomes ?

$$\begin{array}{ccc}
 \text{I} & : & \text{II} \\
 5x & : & 8x \\
 \Downarrow & & \Downarrow \\
 5x \times \frac{140}{100} & : & 8x \times \frac{85}{100} \\
 5x \times \frac{28}{7} & : & 8x \times \frac{17}{2} \\
 5x \times 140 & : & 8x \times 85
 \end{array}$$

$$5x \times 7 : 2x \times 17$$

$$35x : 34x$$

Ans 35 : 34

TYPE-19

Q. 19. अनुपात $7:11$ के प्रत्येक पद में क्या जोड़ा जाना चाहिए कि इसका मान $4:5$ के बराबर हो जाए ?

What should be added to each term of the ratio $7:11$, to make it equal to $4:5$?

Given, $7:11$

$$\frac{7+x}{11+x} \neq \frac{4}{5}$$

$$(7+x) \times 5 = 4 \times (11+x)$$

$$5(7+x) = 4 \times (11+x)$$
$$35 + 5x = 44 + 4x$$

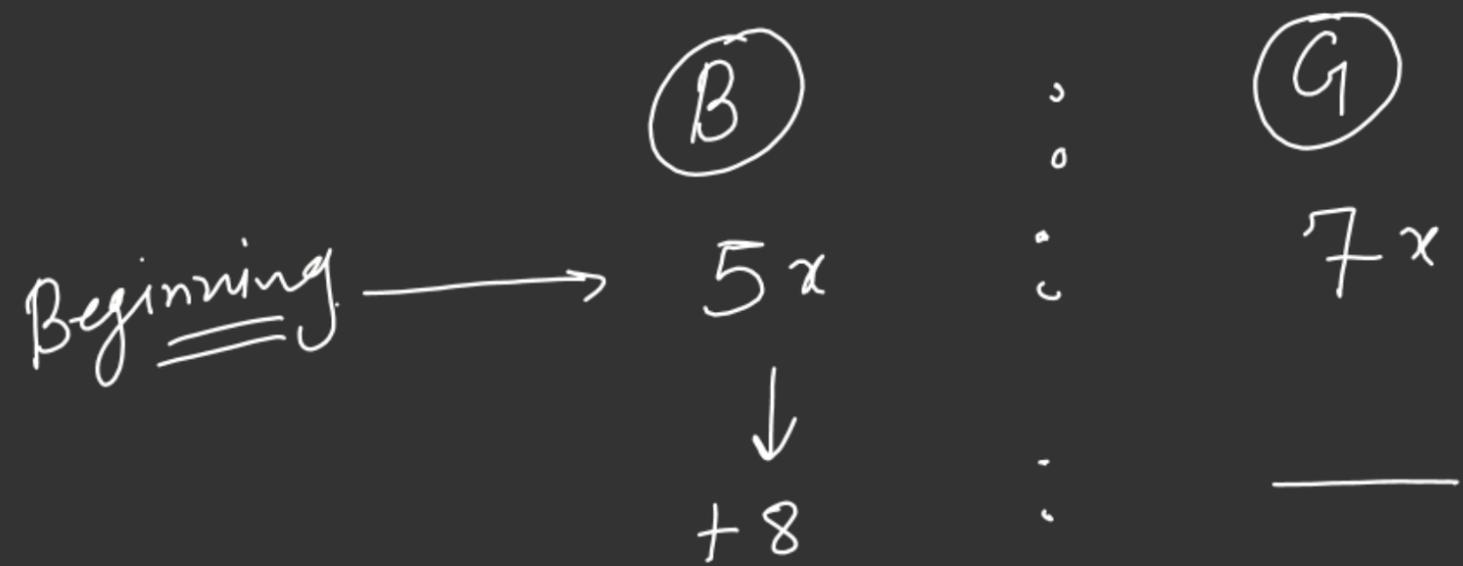
$$5x - 4x = 44 - 35$$

$$\boxed{x = 9} \text{ Ans}$$

TYPE-20

Q.20. किसी school में Boys और Girls की संख्या का अनुपात $5:7$ था।
सत्र के दौरान 8 और Boys का परिवर्तन हो गया Girls और Boys का
नया अनुपात $1:1$ हो गया। तो आरंभ में लड़कों और लड़कियों की
संख्या के बीच कितना अंतर था ?

In a school no. of boys & girls were in the ratio $5:7$.
8 more boys admitted during the session. Then new ratio of
girls & boys is $1:1$. In the beginning, the difference b/w
the no. of boys & that of girls was ?



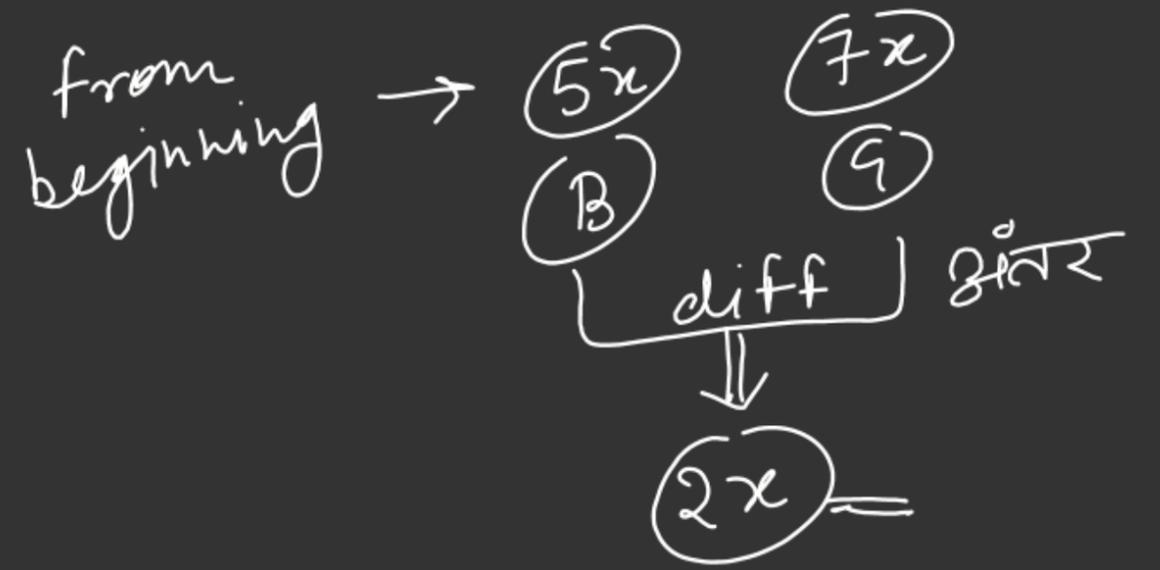
$$\frac{B}{G} = \frac{5x + 8}{7x} = \frac{1}{1}$$

$$(5x + 8) \times 1 = 1 \times (7x)$$

$$5x + 8 = 7x$$

$$8 = 7x - 5x \Rightarrow 2x = 8$$

$$\boxed{x = 4}$$



$$2x \Rightarrow 2 \times 4 = \boxed{8} \text{ Ans}$$

Ratio b/w B : G

$$5x \Rightarrow 5 \times 4 \Rightarrow 20$$

$$7x \Rightarrow 7 \times 4 \Rightarrow 28$$

$$\boxed{B : G = 20 : 28}$$

TYPE-21

Q. (21) शिवानी और परिणिता के बीच कोई धनराशि 5:7 के अनुपात में बांटी गयी। यदि परिणिता, शिवानी को 5 रु. दे देती है तो अनुपात बदलकर 3:4 हो जाएगा। विभाजित की गई धनराशि = ?

Any amount is divided b/w Shivani & Parinita in the ratio of 5:7. If Parinita gives Rs 5 to Shivani, then the ratio will be changed to 3:4. Then what is divided = ?

$\textcircled{S} \quad \therefore \quad \textcircled{P}$

$5x \quad \therefore \quad 7x$

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

$$(5x+5) \times 4 = 3(7x-5)$$

$$\underline{20x} + 20 = \underline{21x} - 15$$

$$20 + 15 = 21x - 20x$$

$$\boxed{35 = x}$$

$$\text{Shivani} \rightarrow 5x \Rightarrow 5 \times 35 = \boxed{}$$

$$\text{Parinita} \rightarrow 7x \Rightarrow 7 \times 35 = \boxed{}$$

$$\underline{\underline{\text{Ans}}} + \boxed{420}$$

