Class - VIII Chapter - 9 Ratio & Proportion

Ex - 9(A)

1) iii) $6\frac{2}{3} : 7\frac{1}{2}$

$= \frac{20}{3} : \frac{15}{2}$ [LCM of 3 & 2 = 6]

$= \left(\frac{20}{3} \times 6^{2}\right) : \left(\frac{15}{2} \times 6^{3}\right)$

$= 40 : 45$

$= \frac{40}{45}^{8}_{9} = \boxed{8 : 9}$ (Ans)

1) vi) $3\frac{1}{5} : 5\frac{1}{3} : 6\frac{2}{3}$

$= \frac{16}{5} : \frac{16}{3} : \frac{20}{3}$ [LCM of 3, 5 = 15]

$= \left(\frac{16}{5} \times 15^{3}\right) : \left(\frac{16}{3} \times 15^{5}\right) : \left(\frac{20}{3} \times 15^{5}\right)$

$= 48^{12} : 80^{20} : 100^{25}$

$= \boxed{12 : 20 : 25}$ (Ans)

2) i) 75 paise : 4 rupees

$= 75$ paise : 400 paise

$= 75 : 400$

$= \frac{75}{400}^{3}_{16}$

$= \boxed{3 : 16}$ (Ans)

2. iii) 1 hour 15 minutes : 45 minutes

$= (60 + 15)$ minutes : 45 minutes

$= 75 : 45$

$= \frac{75}{45}^{5}_{3}$

$= \boxed{5 : 3}$ (Ans).

2) v) 1 year 9 months : 2 years 4 months

$= (12+9)$ months : $(24+4)$ months

$= 21$ months : 28 months

$= \frac{21}{28} \overset{3}{\underset{4}{}}$

$= \boxed{3:4}$ (Ans).

3. ii) $2\frac{1}{3} : 3\frac{1}{3}$

$= \frac{7}{3} : \frac{10}{3}$

$= \frac{7}{3} \times \frac{3}{10}$

$= \frac{7}{10}$

or $3.6 : 4.8$

$= \frac{36}{48} \overset{3}{\underset{4}{}}$

$= \frac{3}{4}$

$\frac{7 \times 2}{10 \times 2} = \frac{14}{20}$

$\frac{3 \times 5}{4 \times 5} = \frac{15}{20}$

as $\frac{15}{20} > \frac{14}{20}$

$\therefore (3.6 : 4.8) > (2\frac{1}{3} : 3\frac{1}{3})$ (Ans)

3) iv) $3\frac{1}{3} : 4\frac{1}{6}$ or $0.9 : 1$

$= \frac{10}{3} : \frac{25}{6}$ $= \frac{0.9}{1}$

$= \frac{\cancel{10}^{2}}{\cancel{3}} \times \frac{6^{2}}{\cancel{25}_{5}}$ $= \frac{9}{10}$

$= \frac{4 \times 2}{5 \times 2} = \frac{8}{10}$

as $\frac{9}{10} > \frac{8}{10}$

$\therefore (0.9 : 1) > (3\frac{1}{3} : 4\frac{1}{6})$ (Ans)

4) ii) $(5:7)$; $(9:14)$, $(20:21)$, $(3:8)$

$\frac{5 \times 24}{7 \times 24} = \frac{120}{168}$ $\frac{20 \times 8}{21 \times 8} = \frac{160}{168}$

$\frac{9 \times 12}{14 \times 12} = \frac{108}{168}$ $\frac{3 \times 21}{8 \times 21} = \frac{63}{168}$

LCM of $7, 14, 21, 8 = 168$

as, In ascending order $\Rightarrow \frac{63}{168} < \frac{108}{168} < \frac{120}{168} < \frac{160}{168}$

$\Rightarrow (3:8) < (9:14) < (5:7) < (20:21)$

6) $A:B:C = \frac{1}{3}:\frac{1}{4}:\frac{1}{6}$, Total money = ₹ 3726

LCM of 3, 4, 6 = 12

$\therefore A:B:C = \left(\frac{1}{3}\times 12^{4}\right):\left(\frac{1}{4}\times 12^{3}\right):\left(\frac{1}{6}\times 12^{2}\right)$

$\therefore A:B:C = 4:3:2$

Sum of Ratio terms $= 4+3+2 = 9$

Share of 'A' $= ₹\ 3726^{414} \times \frac{4}{9} = ₹\ 1656$

Share of 'B' $= ₹\ 3726^{414} \times \frac{3}{9} = ₹\ 1242$

Share of 'C' $= ₹\ 3726^{414} \times \frac{2}{9} = ₹\ 828$ (Ans).

9) Given :- Total Money = ₹ 747

& $4A = 5B = 7C$, LCM of 4, 5, 7 = 140

$\frac{4A}{140} = \frac{5B}{140} = \frac{7C}{140}$

35 28 20

$\therefore \frac{A}{35} = \frac{B}{28} = \frac{C}{20}$

$\therefore A:B:C = 35:28:20$

Sum of Ratio terms $= (35+28+20) = 83$

$\therefore$ Share of 'A' $= ₹\ 747^{9} \times \frac{35}{83} = ₹\ 315$

$\therefore$ Share of 'B' $= ₹\ 747^{9} \times \frac{28}{83} = ₹\ 252$

$\therefore$ Share of 'C' $= ₹\ 747^{9} \times \frac{20}{83} = ₹\ 180$ (Ans).

10) Number of (one rupee coins : 50 p coins : 25 p coins)

$= 5 : 6 : 8$

Let Number of one rupee coins be $5x$, $\therefore$ its value $= ₹\, 5x$

Number of 50p coins be $6x$, $\therefore$ its value $= ₹\, \frac{6x}{2} = ₹\, 3x$

& Number of 25p coins be $8x$, $\therefore$ its value $= ₹\, \frac{8x}{4} = ₹\, 2x$

ATQ $(5x + 3x + 2x) = 210$

$\Rightarrow 10x = 210$

$\Rightarrow x = \frac{210}{10} = 21$ $\quad \therefore \boxed{x = 21}$

$\therefore$ Number of one rupee coins $= 5 \times 21 = 105$

" " 50 p coins $= 6 \times 21 = 126$

" " 25 p coins $= 8 \times 21 = 168$ (Ans)

11) ii) $A : B = 3 : 4$, $B : C = 6 : 11$

$\therefore \frac{A}{B} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$ $\quad \therefore \frac{B}{C} = \frac{6 \times 2}{11 \times 2} = \frac{12}{22}$

We have to make the common term 'B' equal.

$\therefore A : B : C = 9 : 12 : 22$ (Ans)

13) $A : C = 5 : 8$, $B : C = 5 : 6$

$\therefore \frac{A}{C} = \frac{5 \times 3}{8 \times 3} = \frac{15}{24}$ $\quad \therefore \frac{B}{C} = \frac{5 \times 4}{6 \times 4} = \frac{20}{24}$

We have to make the common term 'C' equal.

$\therefore A : B : C = 15 : 20 : 24$

$\therefore A : B = 15 : 20 = \frac{15}{20} = \frac{3}{4}$

$= 3 : 4$ (Ans)

15. Mohan's share : Sohan's share = 5 : 7

Let Mohan's share be ₹ 5x & Sohan's share be ₹ 7x

Given, Sohan's share = ₹ 665

ATQ $7x = 665$

$\Rightarrow x = \frac{665}{7} = 95$ $\therefore \boxed{x = 95}$

$\therefore$ Total amount $= (5x + 7x)$

$= ₹\ 12x$

$= ₹\ (12 \times 95) = ₹\ 1140$ (Ans).

18) Number of boys : Number of girls = 7 : 5

Total students = 1440. , Sum of Ratio terms = 7 + 5 = 12

$\therefore$ No. of boys $= 1440 \times \frac{7}{12} = 840$, No. of Girls $= (1440 - 840) = 600$

After admission of 40 new boys new number of boys $= (840 + 40)$

$= 880$

Let number of girls admitted be 'x'

ATQ $880 : (600 + x) = 4 : 3$

$\Rightarrow \frac{880}{600 + x} = \frac{4}{3}$

$\Rightarrow 4(600 + x) = 3 \times 880$

$\Rightarrow 2400 + 4x = 2640$

$\Rightarrow 4x = 2640 - 2400$ $\therefore \boxed{x = 60}$

$\Rightarrow x = \frac{240}{4} = 60$

$\therefore$ 60 new girls should be admitted. (Ans)

21) Age of Mr Sen : Age of his Son = 17 : 9

Let their ages be $17x$ years and $9x$ years.

9 years ago Age of Mr. Sen was $= (17x - 9)$ years

Age of his Son was $= (9x - 9)$ years.

ATQ $(17x - 9) : (9x - 9) = 7 : 3$

$$\Rightarrow \frac{17x - 9}{9x - 9} = \frac{7}{3}$$

$$\Rightarrow 7(9x - 9) = 3(17x - 9)$$

$$\Rightarrow 63x - 63 = 51x - 27$$

$$\Rightarrow 63x - 51x = 63 - 27$$

$$\Rightarrow 12x = 36$$

$$\Rightarrow x = \frac{36}{12} = 3$$

$$\Rightarrow \boxed{x = 3}$$

∴ Present age of Mr Sen $= 17 \times 3 = 51$ years

and Present age of his son $= 9 \times 3 = 27$ years. (Ans)

23) Ratio of Salaries of A, B and C = 2 : 3 : 5

Let their salaries be ₹2x, ₹3x, ₹5x

Increments in their Salaries are 15%, 10% and 20% respectively.

Let salaries of A, B & C be ₹2x, ₹3x, ₹5x respectively.

∴ Ratio of New salaries

$= (115\% \text{ of } 2x) : (110\% \text{ of } 3x) : (120\% \text{ of } 5x)$

$= \frac{115}{100} \times 2x : \frac{110}{100} \times 3x : \frac{120}{100} \times 5x$

$= 230 : 330 : 600 = 23 : 33 : 60$ (Ans).

25) Total volume of mixture = 60 litres

component A : Component B = 2 : 1

Sum of the ratio = 2+1 = 3

$\therefore$ Volume of 'A' = $60^{20} \times \frac{2}{3}$ = 40 litres

Volume of 'B' = $60^{20} \times \frac{1}{3}$ = 20 litres.

Let 'x' litres of component 'B' should be added.

ATQ $40 : (20+x) = 1 : 2$

$\Rightarrow \frac{40}{20+x} = \frac{1}{2}$

$\Rightarrow 20+x = 80$

$\Rightarrow x = 80 - 20$

$\Rightarrow \boxed{x = 60 \text{ l.}}$

$\therefore$ 60 l of Component 'B' should be added. (Ans)

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End of Ex – 9(A)

Class - VIII / Mathematics / Ex - 9B / Ratio and Proportion

Q.1. Which of the following statements are true:-

$$\begin{array}{r} 36 \\ 45 \\ \hline 180 \\ 144 \times \\ \hline 162.0 \end{array}$$

(i) $27 : 36 = 4.5 : 6$

We have,

Product of extremes $= 27 \times 6 = 162$

Product of means $= 36 \times 4.5 = 162$.

Since, Product of means = Product of extremes

$\therefore$ True.

(ii) $\frac{3}{4} : \frac{15}{16} :: \frac{2}{3} : \frac{5}{6}$

Product of extremes $= \frac{3}{4} \times \frac{5}{6_2} = \frac{5}{8}$.

Product of means $= \frac{15}{16_8} \times \frac{2}{3} = \frac{5}{8}$.

Since, Product of extremes = Product of means.

$\therefore$ True.

(iii) ₹14 : ₹21 = 2 pens : 3 pens.

Product of extremes $= 14 \times 3 = 42$.

Product of means $= 21 \times 2 = 42$.

Since, Product of means = Product of extremes.

$\therefore$ True.

Q.2. Check whether the following numbers are in proportion or not:

(i) 8, 12, 18, 24

Product of extremes = $8 \times 24 = 192$

" " means = $12 \times 18 = 212$

$\therefore$ Product of extremes $\neq$ Product of means.

$\therefore$ not in proportion.

(ii) 6·4, 3·6, 4·8, 2·7

Product of extremes = $6 \cdot 4 \times 2 \cdot 7$

$= 17 \cdot 28$

Product of means = $3 \cdot 6 \times 4 \cdot 8 = 17 \cdot 28$

$\therefore$ Product of extremes = Product of means.

$\therefore$ in proportion.

(iii) $11\frac{1}{3}, 9\frac{1}{3}, 8\frac{1}{2}, 7$

Product of extremes = $11\frac{1}{3} \times 7 = \frac{34}{3} \times 7 = \frac{238}{3}$

Product of means = $9\frac{1}{3} \times 8\frac{1}{2} = \frac{28}{3} \times \frac{17}{2} = \frac{238}{3}$

$\therefore$ Product of extremes = Product of means

$\therefore$ in proportion.

Q.3. Find the value of x:

(i) $8 : x :: 6 : 27$.

$\Rightarrow \frac{8}{x} = \frac{6}{27}$.

$\Rightarrow 6x = 8 \times 27$

$\Rightarrow x = \frac{48 \times 27}{6} = 36$

$\therefore x = 36$

(ii) $5.6 : 3.5 :: x : 1.25$

$\Rightarrow \frac{5.6}{3.5} = \frac{x}{1.25}$.

$\Rightarrow 3.5x = 5.6 \times 1.25$

$\Rightarrow x = \frac{56 \times 125}{10 \times 10 \times 35}$

$\Rightarrow x = 2$

(iii) $1\frac{4}{5} : 2\frac{4}{5} :: x : 3\frac{1}{2}$.

$\Rightarrow \frac{9}{5} : \frac{14}{5} = x : \frac{7}{2}$.

$\Rightarrow \frac{9}{5} \times \frac{5}{14} = x \times \frac{2}{7}$.

$\Rightarrow x = \frac{9 \times 5 \times 7}{5 \times 14 \times 2} = \frac{9}{4} = 2\frac{1}{4}$.

Q. 4. Find the 4th proportional to:

(i) 2.8, 14 and 3.5

Let the 4th proportion $= x$.

$\therefore 2.8 : 14 :: 3.5 : x$

$\Rightarrow 2.8x = 14 \times 3.5$

$\Rightarrow x = \frac{14 \times 35 \times 10}{28 \times 10} = \frac{35}{2} = 17.5$.

$\therefore x = 17.5$.

Q.4. (iii) $1\frac{5}{7}, 2\frac{3}{14}, 3\frac{3}{5}$.

Let the 4th proportion $= x$

$\therefore 1\frac{5}{7} : 2\frac{3}{14} :: 3\frac{3}{5} : x$

$\Rightarrow \frac{12}{7} : \frac{31}{14} = \frac{18}{5} : x$

$\Rightarrow \frac{12}{7} x = \frac{31}{14} \times \frac{18}{5}$

$\Rightarrow x = \frac{31 \times 18^{3} \times 7}{12 \times 14_{2} \times 5} = \frac{31 \times 3}{2 \times 2 \times 5} = \frac{93}{20}$

$= 4\frac{13}{20}$.

Q.5. Find the 3rd proportional to:

(i) 12, 16, Let the 3rd proportion $= x$

The required proportion is,

$12 : 16 :: 16 : x$

$\Rightarrow 12x = 16 \times 16$

$\Rightarrow x = \frac{4\cancel{16} \times 16}{\cancel{12}_{3}} = \frac{64}{3} = 21\frac{1}{3}$.

(ii) 4.5, 6.

Let the 3rd proportion $= x$.

The required proportion is,

$4.5 : 6 :: 6 : x$

$\Rightarrow 4.5x = 6 \times 6$

$\Rightarrow x = \frac{\cancel{6}^{2} \times 6 \times \cancel{6}^{2}}{\cancel{45}_{5}} = 8$.

$\therefore x = 8$.

(iii) $5\frac{1}{2}, 16\frac{1}{2}$

Let the 3rd proportion $= x$

∴ The required proportion,

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

$\Rightarrow \frac{11}{2} : \frac{33}{2} = \frac{33}{2} : x$

$\Rightarrow \frac{11}{2} \times x = \frac{33}{2} \times \frac{33}{2}$

$\Rightarrow x = \frac{33 \times \cancel{33}^{3} \times 2}{2 \times 2 \times \cancel{11}} = \frac{99}{2} = 49\frac{1}{2}$

(iv) $3\frac{1}{2}, 8\frac{3}{4}$

Let the 3rd proportion $= x$.

∴ The required proportion,

$3\frac{1}{2} : 8\frac{3}{4} :: 8\frac{3}{4} : x$

$\Rightarrow \frac{7}{2} : \frac{35}{4} = \frac{35}{4} : x$

$\Rightarrow \frac{7}{2} x = \frac{35}{4} \times \frac{35}{4}$

$\Rightarrow x = \frac{\cancel{35}^{5} \times 35 \times \cancel{2}}{\cancel{4}_{2} \times 4 \times \cancel{7}}$

$= \frac{175}{8} = 21\frac{7}{8}$.

Q.6. Find the mean proportional between:

(i) 8 and 18.

Let the mean proportion = x.

∴ The required proportion,

$8 : x :: x : 18$

$\Rightarrow x^2 = 8 \times 18$.

$\Rightarrow x = \sqrt{8 \times 18}$

$= \sqrt{2 \times 2 \times 2 \times 2 \times 3 \times 3}$

$= 2 \times 2 \times 3 = 12$.

(ii) 0.3 and 2.7.

Let the mean proportion = x.

∴ The required proportion,

$0.3 : x :: x : 2.7$.

$\Rightarrow x^2 = 0.3 \times 2.7$

$\Rightarrow x^2 = \frac{3 \times 27}{10 \times 10}$.

$\Rightarrow x = \sqrt{\frac{3 \times 27}{10 \times 10}}$.

$= \sqrt{\frac{3 \times 3 \times 3 \times 3}{10 \times 10}}$

$= \frac{3 \times 3}{10} = \frac{9}{10} = 0.9$.

(iii) $66\frac{2}{3}$ and 6

Let the mean proportion $= x$.

∴ The required proportion,

$66\frac{2}{3} : x :: x : 6$

$\Rightarrow \frac{200}{3} : x = x : 6$

$\Rightarrow \frac{200}{3} \times 6 = x^2$

$\Rightarrow x^2 = 400 \Rightarrow x = \sqrt{400} \Rightarrow x = 20.$

(iv) 1·25 and 0·45.

Let the mean proportion $= x$.

∴ The required proportion,

$1{\cdot}25 : x :: x : 0{\cdot}45$

$\Rightarrow x^2 = 1{\cdot}25 \times 0{\cdot}45$

$\Rightarrow x = \sqrt{\frac{125 \times 45}{100 \times 100}}$.

$125 = 5 \times 5 \times 5$

$45 = 5 \times 3 \times 3$

$= \frac{5 \times 5 \times 3}{100} = \frac{75}{100} = 0{\cdot}75$

(v) $\frac{1}{7}$ and $\frac{4}{63}$.

Let the mean proportion $= x$.

∴ The required proportion,

$\frac{1}{7} : x :: x : \frac{4}{63}$.

$\Rightarrow x^2 = \frac{1}{7} \times \frac{4}{63}$.

$\Rightarrow x = \sqrt{\frac{4}{7 \times 63}} = \sqrt{\frac{2 \times 2}{7 \times 7 \times 3 \times 3}}$

$x = \frac{2}{7 \times 3} = \frac{2}{21}$.

Q. 7. If 28 is the 3rd proportional to 7 and x, find the value of x.

Soln:- Given, 28 is the 3rd proportional to 7 and x.

∴ The required proportion,

$$7 : x :: x : 28.$$

$$\Rightarrow x^2 = 7 \times 28.$$

$$\Rightarrow x = \sqrt{7 \times 28}.$$

$$= \sqrt{7 \times 2 \times 2 \times 7}$$

$$x = 7 \times 2 = 14.$$

Q. 8. If 18, x, 50 are in continued proportion find the value of x.

Soln:- Given, 18, x, 50 are in continued prop.

∴ The required proportion,

$$18 : x :: x : 50$$

$$\Rightarrow x^2 = 18 \times 50$$

$$\Rightarrow x = \sqrt{18 \times 50}$$

$$= \sqrt{3 \times 3 \times 2 \times 2 \times 5 \times 5}$$

$$= 3 \times 2 \times 5 = 30.$$

Q. 9. A rod was cut into two pieces in the ratio 7:5. If the length of the smaller piece was 45.5 cm, then find the length of the longer piece.

11. What number must be subtracted from each of the numbers 41, 55, 36, 48, so that the difference are proportional?

Soln :- Let x should be subtracted.

$\therefore$ ATQ, the required proportion is,

$$41-x : 55-x :: 36-x : 48-x$$

$$\Rightarrow (41-x)(48-x) = (55-x)(36-x)$$

$$\Rightarrow 1968 - 41x - 48x + x^2 = 1980 - 55x - 36x + x^2$$

~~$\Rightarrow 55x - 41x = 1980 - 1968$~~

~~$\Rightarrow 14x = 12$~~

$$\Rightarrow 1968 - 89x = 1980 - 91x$$

$$\Rightarrow 91x - 89x = 1980 - 1968$$

$$\Rightarrow 2x = 12.$$

$$\Rightarrow x = 6.$$

41 × 48 = 328 + 164 × = 1968

55 × 36 = 330 + 165 × = 1980

9.12. An alloy is to contain copper and zinc in the ratio 9:4. Find the quantity of zinc to be melted with $2\frac{2}{5}$ kg of copper, to get the desired alloy?

Soln :- The ratio of copper & zinc = 9:4

Amount of copper = $2\frac{2}{5}$ kg.

$= \frac{12}{5}$ kg.

Let Amt. of zinc = x kg.

∴ The required proportion is,

$$9 : 4 :: \frac{12}{5} : x$$

$$\Rightarrow 9x = 4 \times \frac{12}{5}$$

$$\Rightarrow x = \frac{4 \times 12^{4}}{5 \times 9_{3}} = \frac{16}{15} \text{ kg}.$$

$$= 1\frac{1}{15} \text{ kg}.$$

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