

Ratio & Proportion (Part-1)
Competitive Math by AB sir/7003097346

① $a:b = 2:3$
 $b:c = 4:5$

$a:b:c = 8:12:15$ ✓

② $a:b = \frac{4}{5} = 4:5$
 $b:c = \frac{5}{2} = 5:2$

$a:b:c = 4:5:2$ ✓

③ $a:b = 3:4$
 $b:c = 4:5$
 $c:d = 2:5$

$a:b:c:d = 24:32:40:100$
 $= 6:8:10:25$ ✓

④ $\frac{a}{b} = \frac{7}{3}, \frac{b}{c} = \frac{2}{4}, \frac{c}{d} = \frac{2}{5}$

$\rightarrow \frac{a}{b} \times \frac{b}{c} \times \frac{c}{d} = \frac{7}{3} \times \frac{2}{4} \times \frac{2}{5}$

$\Rightarrow \frac{a}{d} = \frac{7}{15}$

$\Rightarrow a:d = 7:15$ ✓

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

$\rightarrow \frac{a}{b} \times \frac{b}{c} = \frac{3}{2} \times \frac{5}{8}$

$\Rightarrow \frac{a}{c} = \frac{15}{16}$

$\Rightarrow a:c = 15:16$ ✓

⑥ $\frac{3a+5b}{3a-5b} = 5$

$\Rightarrow 15a - 25b = 3a + 5b$

$\Rightarrow 12a = 30b$

$\Rightarrow \frac{a}{b} = \frac{30}{12} \times \frac{5}{2} = \frac{5}{2}$

$\Rightarrow a:b = 5:2$ ✓

⑦ Sub-duplicate ratio $\rightarrow a:b \rightarrow \sqrt{a}:\sqrt{b}$

$576:289 \rightarrow \sqrt{576}:\sqrt{289}$
 $= 24:17$ ✓

⑧ $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{1}{2} \Rightarrow \frac{3a+5c+7e}{3b+5d+7f} = \frac{1}{2}$ ✓

$\Rightarrow a = \frac{b}{2}, c = \frac{d}{2}, e = \frac{f}{2}$

$\therefore \frac{3a+5c+7e}{3b+5d+7f}$

$= \frac{3 \times \frac{b}{2} + 5 \times \frac{d}{2} + 7 \times \frac{f}{2}}{3b+5d+7f}$

$= \frac{1}{2} \frac{(3b+5d+7f)}{3b+5d+7f} = \frac{1}{2}$ ✓

⑨ Inverse ratio of $x:yz, y:zx, z:xy$ is $yz:zx, zx:xy, xy:yz$.

The compound ratio of $yz:zx, zx:xy$ & $xy:yz$

is $yz \times zx \times xy : zx \times xy \times yz$

$\Rightarrow \frac{yz \times zx \times xy}{zx \times xy \times yz} = \frac{xyz}{xyz} = 1$ ✓

(10) $A = 75\% \times B \Rightarrow \frac{A}{B} = \frac{3}{4}$
 $B = 60\% \times C \Rightarrow \frac{B}{C} = \frac{3}{5}$
 $\Rightarrow \frac{A}{B} \times \frac{B}{C} = \frac{3}{4} \times \frac{3}{5}$
 $\Rightarrow \frac{A}{C} = \frac{9}{20}$
 $\Rightarrow A:C = (9:20) \checkmark$

(11) $10:7$
 difference = $10-7$
 $\Rightarrow 3 = 10-7$
 $\Rightarrow 1 = 35$
 $\therefore \text{Sum} = 10+7 = 17$
 $1 \Rightarrow 35 \Rightarrow 17 = 35 \times 17$
 $= (595) \checkmark$

(12) $A:B = 1:2$
 $B:C = 3:1$
 $C:D = 2:3$

$A:B:C:D = 6:12:4:6$

$= 3:6:2:3$

$\rightarrow 3+6+2+3 = 5600$

$\Rightarrow 14 = 5600$

$\Rightarrow 1 = 400$

$\therefore (A+B) = 3+6 = 9$

$1 \Rightarrow 400 \rightarrow 9 = 9 \times 400$

$= (3600) \checkmark$

(13) Sum = $20 \times 3 = 60$

Ratio of their ages = $3:4:5$.

$\rightarrow 3+4+5 = 60$

$\Rightarrow 12 = 60$

$1 = 5$



(14) $F:M$

$\times 2 \begin{pmatrix} 16 & : & 9 \end{pmatrix}$

$F = 32$

$16 \Rightarrow 32$

$1 = 2$

Total = $16+9$
 $= 25$

Total Students = 25×2

$= (50)$

$\therefore \% \text{ of female} = \frac{32}{50} \times 100\% = (64\%) \checkmark$

(15) $(a+b):(b+c):(c+d) = 6:7:9$

$\Rightarrow 2(a+b+c) = 6+7+9 = 22$

$\Rightarrow 2 \times \frac{3}{2} = 22$

$\Rightarrow 3 = 11$

$a+b = 6 \times 3 = (18)$ & $a+b+c = 33$

$b+c = 7 \times 3 = (21) \Rightarrow c = 33 - (a+b)$

$= 33 - 18$

$c+a = 9 \times 3 = (27)$

$= (15) \checkmark$

16 $(a+b):(b+c):(c+a) = 3:7:8$
 $\Rightarrow 2(a+b+c) = 3+7+8 = 18.$

$\Rightarrow 2 \times \frac{108}{2} = 18$

$\Rightarrow \boxed{12 = 1}$

$\therefore a+b = 3 \times 12 = 36$

$b+c = 7 \times 12 = 84$

$c+a = 8 \times 12 = 96$

$\neq a+b+c = 108.$

$\Rightarrow a = 108 - (b+c)$
 $= 108 - 84$
 $= 24$

$\neq e = 108 - (a+b)$
 $= 108 - 36$
 $= 72$

\therefore difference of a & e
 $= 72 - 24 = 48 \checkmark$

17 $(p-a):(p-b):(p-c) = 11:12:13.$

$\Rightarrow 3p - (a+b+c) = 11+12+13.$

$\Rightarrow 3p - 2p = 11+12+13. \left[\because p = \frac{a+b+c}{2} \right]$

$\Rightarrow p = 11+12+13. \text{---(i)} \Rightarrow a+b+c = 2p.$

$\Rightarrow p-a = 11 \text{---(ii)}$

$(i) - (ii) \Rightarrow p-p+a = 11+12+13-11$
 $\Rightarrow a = 12+13 = 25$

$p-b = 12 \text{---(iii)}$

$(i) - (iii) \Rightarrow p-p+b = 11+12+13-12$
 $\Rightarrow b = 11+13 = 24$

$p-c = 13 \text{---(iv)}$

$(i) - (iv) \Rightarrow p-p+c = 11+12+13-13$
 $\Rightarrow c = 11+12 = 23$

$a = 25$
 $b = 24$
 $c = 23$
 $\therefore a:b:c = 25:24:23$

18 $\frac{a}{b} = \frac{c}{d} = 5 \Rightarrow \frac{3a+4c}{3b+4d} = 5 \checkmark$

$\Rightarrow a = 5b$ & $c = 5d.$

$\therefore \frac{3a+4c}{3b+4d} = \frac{3 \times 5b + 4 \times 5d}{3b+4d}$
 $= \frac{5(3b+4d)}{3b+4d}$
 $= 5 \checkmark$

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A	B
6	: 5
+15	+15
9	: 8

 $48-45 = 15 \times 9 - 15 \times 8$
 $\Rightarrow 3 = 15(9-8)$
 $\Rightarrow 3 = 15$
 $\Rightarrow \boxed{L = 5}$

$\therefore A$'s present age = $6 \times 5 = 30 \checkmark$

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B	G
3	: 2
+6	+6
6	: 5

$15-12 = 36.$

$\Rightarrow 3 = 36$
 $\Rightarrow \boxed{L = 12}$

\therefore Boys = $3 \times 12 = 36 \checkmark$

21)
$$\begin{array}{r} 3 : 5 \\ +x \quad +x \\ \hline 5 : 6 \end{array}$$

$$25 - 18 = 6x - 5x$$

$$\Rightarrow \boxed{7 = x} \checkmark$$

22) $1\frac{1}{2} : 2\frac{2}{3} = \frac{3}{2} : \frac{8}{3} = 9 : 16$

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

$$\begin{array}{r} 9 : 16 \\ +15 \quad +15 \\ \hline 2 : 3 \end{array}$$

$$32 - 27 = 45 - 30$$

$$\Rightarrow 5 = 15$$

$$\Rightarrow \boxed{1 = 3} \checkmark$$

Larger no. = $16 \times 3 = \boxed{48} \checkmark$

23)
$$\begin{array}{r} A : B \\ I \rightarrow 3 : 2 \\ S \rightarrow -100 \quad -100 \\ E \rightarrow 5 : 3 \end{array}$$

$$10 - 9 = 500 - 300$$

$$\Rightarrow \boxed{I = 200} \checkmark$$

$\therefore A$'s income = $3 \times 200 = \boxed{600} \checkmark$

24)
$$\begin{array}{r} M \quad W \\ 5 : 1 \\ +5 \quad +5 \\ \hline 5 : 2 \end{array}$$

$$10 - 5 = 25$$

$$\Rightarrow 5 = 25$$

$$\Rightarrow \boxed{1 = 5} \checkmark$$

\therefore Milk = $5 \times 5 = \boxed{25} \checkmark$

25)
$$\begin{array}{l} a : (b+c) = (1:2) = 3 \times 6 = 6 : 12 \\ c : (a+b) = (7:11) = 18 \times 1 = 7 : 11 \end{array}$$

$a = \boxed{6}$, $c = \boxed{7}$.
 $\& b+c = 12 \Rightarrow b = 12 - 7 = \boxed{5}$

$\therefore b : (a+c)$
 $= 5 : (6+7)$
 $= \boxed{5 : 13} \checkmark$

26)
$$\begin{array}{l} a : (b+c) = (2:3) = 5 \times 9 = 18 : 27 \\ b : (c+a) = (4:5) = 9 \times 5 = 20 : 25 \end{array}$$

$a = \boxed{18}$, $b = \boxed{20}$

$\& b+c = 27 \Rightarrow c = 27 - b$
 $= 27 - 20 = \boxed{7}$

$\therefore c : (a+b) = 7 : (18+20)$
 $= \boxed{7 : 38} \checkmark$

27) $20\% \times (p+q) = 50\% \times (p-q)$
 $\Rightarrow \frac{1}{5} \times (p+q) = \frac{1}{2} \times (p-q)$

$\Rightarrow 5p - 5q = 2p + 2q$

$\Rightarrow 3p = 7q \Rightarrow \frac{p}{q} = \frac{7}{3} \Rightarrow p : q = \boxed{7 : 3} \checkmark$

28) $A \times 30\% = B \times 0.75 = C \times \frac{1}{4}$

$\Rightarrow \frac{3A}{10} = \frac{3B}{4} = \frac{C}{4}$

$\Rightarrow \frac{A}{10} = \frac{B}{4} = \frac{C}{3 \times 4}$

$\Rightarrow A : B : C = 10 : 4 : 12 = \boxed{5 : 2 : 6} \checkmark$

29)
$$\begin{array}{r} 2 : 3 \\ -2 \quad +2 \\ \hline 1 : 2 \end{array}$$

$4 - 3 = 2 + 4 \Rightarrow \boxed{1 = 6} \checkmark$

Sum = $2 + 3 = 5 \times 6 = \boxed{30} \checkmark$

30)
$$\begin{array}{r} 2 : 3 : 5 \\ +20 \quad +20 \quad +20 \\ \hline 4 : 5 : 7 \end{array}$$

$12 - 10 = 100 - 80$

$\Rightarrow 2 = 20$

$\Rightarrow \boxed{1 = 10} \checkmark$

Sum = $2 + 3 + 5 = 10 \times 10 = \boxed{100} \checkmark$