


$$a = 50$$
$$b = ? \underline{75}$$

Ratio

$$\frac{a:b = 2:3}{\frac{a}{b} = \frac{2}{3}}$$

$$a:b = \underline{4}:\underline{6}$$

a:b 2:3

$$\frac{25}{3-?}$$

$a:b$
 $\frac{2}{3} \rightarrow$
 $\cancel{50} \cancel{2} \quad 25$

$$2 \times 25 \rightarrow 50$$
$$3 \times 25 \rightarrow \underline{75}$$

$$x = ky$$

$k \rightarrow \text{constant}$

x is directly proportional to y .

$$x \propto \frac{1}{y}$$

$$x = \frac{k}{y}$$

inversely

$$\frac{a}{b} = \frac{c}{d}$$
$$\frac{d}{b} = \frac{c}{a}$$

$$\frac{a}{c} = \frac{b}{d}$$

$$\frac{a}{b} = \frac{c}{d}$$

$$\Rightarrow axd = cxb$$
$$\frac{d}{b} = \frac{c}{a}$$

$$\left. \begin{array}{l} \frac{a}{b} = \frac{c}{d} \\ \underline{ad = bc} \\ \frac{d}{b} = \frac{c}{a} \\ \underline{\frac{a}{c} = \frac{b}{d}} \end{array} \right\} \quad \begin{array}{l} \frac{2}{3} = \frac{6}{9} \\ 2 \times 9 = 3 \times 6 \\ 3 \frac{2}{3} = \frac{6}{2} - 3 \end{array}$$

$$\frac{a}{b} = \frac{4 \times 4}{5 \times 4} = \frac{16}{20} \cancel{\frac{4}{5}}$$

Componendo

$$\frac{a}{b} = \frac{c}{d}$$

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

Dividendo

$$\frac{a-b}{b} = \frac{c-d}{d}$$

C & D

$$\frac{a}{b} = \frac{c}{d}$$

$$\frac{a+b}{a-b} = \frac{c+d}{c-d}$$

$$a:b = 7:9 \times 5$$

$$b:c = 15:7 \times 3$$

$$a:c \Rightarrow ?$$

15×3

$$\frac{a:b}{b:c} = \frac{7:9}{15:7}$$

$$\frac{a}{b} = \frac{7}{9}$$

$$\frac{a}{b} \times \frac{b}{c} = \frac{a}{c}$$

$$\frac{a}{c} = \frac{5}{3}$$

$$a:b = 3:4$$

$$b:c = 5:2$$

$$c:d = 7:3$$

$$\underline{a:d = ?}$$

$$a:b:c:d = ?$$

$$2A = 3B = 4C$$

$A : B : C = ?$

$$2A = 3B = 4C$$

$A : B : C$

$$\frac{2 \cancel{A} : 3 \cancel{B} : 4 \cancel{C}}{G : 6 : 3}$$

$$A : B : C$$

$$12 : 8 : 6$$

$$6 : 4 : 3$$

Mean Proportion $\frac{a}{x} = \frac{x}{b} \rightarrow x^2 = ab$.

Third Proportion $\rightarrow \frac{a}{b} \neq \frac{b}{c} \rightarrow c = \frac{b^2}{a}$

Fourth proportion $\rightarrow a:b::c:x$

Mean proportion $x = \sqrt{ab}$

$$c = \frac{b^2}{a}$$

Fourth proportion $\frac{a}{b} = \frac{c}{d} \rightarrow d = \frac{bc}{a}$

If $x = \frac{1}{3}y$ and $y = \frac{1}{2}z$, then

$x : y : z$, is equal to :

- (1) 3 : 2 : 1 (2) 1 : 2 : 6
(3) 1 : 3 : 6 (4) 2 : 4 : 6

$$x : y = 1 : 3$$

$$x : y : z$$

$$1 : 3 : 6$$

$$x = \frac{1}{3}y \quad y = \frac{1}{2}z$$

$$\frac{x}{y} = \frac{1}{3} - \quad \frac{y}{z} = \frac{1}{2}$$

$$\frac{x}{y} = \frac{1}{3} \quad \frac{y}{z} = \frac{1}{2} \times 3$$

$$\frac{x}{y} = \frac{1}{3} \quad \frac{y}{z} = \frac{3}{6}$$

If $p : q = r : s = t : u = 2 : 3$,
then $\underline{(mp + nr + ot)} : \underline{(mq + ns + ou)}$ is equal to :

- (1) 1 : 3 (2) 1 : 2
(3) 2 : 3 ✓ (4) 3 : 2

$$\frac{P}{S} = \frac{r}{s} = \frac{t}{u} = \frac{2}{3}$$

$$\underline{(mp + nr + ot)} : \underline{(mq + ns + ou)}$$

$$\frac{P}{S} = \frac{2}{3}$$

$$P = \underline{2k} \\ S = \underline{3k}$$

$$r = \underline{2a} \quad t = \underline{2b}$$

$$s = 3a \quad u = 3b$$

$$(mx2k + ny2a + ox2b) : (mx3k + ny3a + ox3b)$$

$$2(mk + na + ob) : 3(mk + na + ob)$$

If $a : b = c : d = e : f = 1 : 2$,
then $(pa + qc + re) : (pb + qd + rf)$ is equal to :

- (1) $p : (q + r)$ (2) $(p + q) : r$
(3) $2 : 3$ (4) ~~1~~ : 2

$$\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{1}{2}$$

$$\frac{pa + qc + re}{pb + qd + rf} = \frac{1(p+q+r)}{2(p+q+r)}$$
$$= \frac{1}{2}$$

If $x : y = 3 : 1$, then $\underline{x^3} - \underline{y^3} : x^3 + y^3 = ?$

- (1) 13 : 14 (2) 14 : 13
(3) 10 : 11 (4) 11 : 10

$$\frac{x}{y} = \frac{3}{1}$$

$$x = 3k \quad y = k.$$

$$\frac{x^3 - y^3}{x^3 + y^3} \Rightarrow \frac{(3k)^3 - k^3}{(3k)^3 + k^3} = \frac{27k^3 - k^3}{27k^3 + k^3}$$

$$x:y = 3:1$$
$$\frac{3^3 - 1^3}{3^3 + 1^3} = \frac{27-1}{27+1} = \frac{26}{28} = \frac{13}{14}$$
$$= \frac{26k^3}{28k^3}$$

The ratio $2^{1.5} : 2^{0.5}$ is the same as :

- (1) ~~2 : 1~~ (2) 3 : 1
(3) 6 : 1 (4) 3 : 2

$$2^{1.5} : 2^{0.5}$$

$$2^{1.5} : 2^{0.5}$$

~~$$\underline{2^{0.5} \times 2^{0.5} \times 2^{0.5}} : \underline{2^{0.5}}$$~~

$$2^{(0.5+0.5)} : 1$$

$$2^1 : 1$$

$$\begin{aligned} a^x \times a^y &\rightarrow a^{(x+y)} \\ \cancel{\frac{a^x}{a^y}} &\rightarrow a^{x-y} \\ 2^{1.5-0.5} : 1 & \quad \frac{2^{1.5}}{2^{0.5}} : \frac{2^{0.5}}{2^{0.5}} \end{aligned}$$

$$\begin{array}{r} \underline{2^2} \times \underline{2^3} \rightarrow 2^5 \\ \underline{3^3} \times \underline{3^6} \rightarrow 3^9 \end{array}$$

If $m : n = 3 : 2$, then $(4m + 5n) : (4m - 5n)$ is equal to :

- (1) $4 : 9$ (2) $9 : 4$
(3) $11 : 1$ (4) $9 : 1$

$$\frac{m}{n} = \frac{3}{2}$$

$$\frac{4m+5n}{4m-5n}$$

$$\frac{4 \times 3 + 5 \times 2}{4 \times 3 - 5 \times 2} = \frac{22}{2}$$
$$= \frac{11}{1}$$

If $A : B = 3 : 4$, $B : C = 5 : 7$ and
 $C : D = 8 : 9$ then $A : D$ is equal to

(1) $3 : 7$ (2) $7 : 3$

(3) $21 : 10$ (4) $10 : 21$ ✓

$$\frac{A}{B} \times \frac{B}{C} \times \frac{C}{D} \Rightarrow \frac{A}{D}$$

$$\frac{3}{4} \times \frac{5}{7} \times \frac{8}{9} \Rightarrow \frac{10}{21}$$

If $a : b = \frac{2}{9} : \frac{1}{3}$,

$$b : c = \frac{2}{7} : \frac{5}{14} \text{ and } d : c = \frac{7}{10} : \frac{3}{5}$$

then $a : b : c : d$ is

- (1) $4 : 6 : 7 : 9$ ~~X~~
- (2) $16 : 24 : 30 : 35$ ✓
- (3) $8 : 12 : 15 : 7$ ~~X~~
- (4) $30 : 35 : 24 : 16$ ~~X~~

$$a:b = 2:3 \times 4$$

$$b:c = 4:5 \times 3$$

$$\begin{aligned} a:b &= 8:12 \\ b:c &= 12:15 \end{aligned}$$

$$a:b = \frac{2}{9} : \frac{1}{3}$$

$$a:b = 2:3$$

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

$$b:c = 4:5$$

$$c:d = \frac{3}{8} : \frac{7}{10}$$

$$c:d = 6:7$$

$$a:b:c \rightarrow 8:12:15$$
$$c:d \rightarrow 6:7 \rightarrow 30:35$$

$$a:b:c:d$$
$$16:24:30:35$$

(30)

If b is the mean proportional of a and c , then $(a - b)^3 : (b - c)^3$ equals

- (1) $a^3 : c^3 \times$ (2) $b^2 : c^2 \times$
 (3) $a^2 : c^2 \times$ (4) $a^3 : b^3 \checkmark$

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

$$\boxed{\underline{b^2 = ac}}$$

1) $\frac{4^3 : 1^3}{2^2 : 1^2} \rightarrow 64 : 1$

$$b = 2 \quad 4 = 4 \times 1$$

2) $\frac{2^2 : 1^2}{2^2 : 1^2} \rightarrow 4 : 1$

$$a = 4$$

3) $16 : 1$

$$c = 1$$

4) $4^3 : 2^3 \quad (4-2)^3 : (2-1)^3$

$$2^2 = 4 \times 1$$

~~$2^2 \times 4^2 \times 1^2 : 2^2 \times 2^2 \times 1^2$~~

$$\boxed{8 : 1}$$

₹ 6200 divided into three parts

proportional to $\frac{1}{2} : \frac{1}{3} : \frac{1}{5}$ are

respectively

- (1) ₹ 3000, ₹ 2000, ₹ 1200
(2) ₹ 3500, ₹ 1500, ₹ 1200
(3) ₹ 2500, ₹ 2000, ₹ 1700
(4) ₹ 2200, ₹ 3000, ₹ 1000

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

$$\frac{1}{2} \times 30 : \frac{1}{3} \times 30 : \frac{1}{5} \times 30 \quad (M \rightarrow 30)$$

$$15 : 10 : 6$$

$$\begin{matrix} 200 \\ 31 \rightarrow 6200 \\ 15 \rightarrow ? \end{matrix}$$

$$\begin{matrix} (15+10+6) \rightarrow 6200 \\ \hline 15 \rightarrow ? \end{matrix}$$

3000

The fourth proportional to 0.12,
0.21, 8 is :

- (1) 8.9 (2) 56
(3) 14 ✓ (4) 17

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

$$x = \frac{8 \times 0.21}{0.12} = \frac{8 \times 21}{12} = 14$$

94 is divided into two parts in such a way that the fifth part of the first and the eighth part of the second are in the ratio 3 : 4. The first part is :

- (1) 30 (2) 36
 (3) 40 (4) 28

$$94 \rightarrow x, 94-x$$

$$\frac{\frac{1}{5}x}{\frac{1}{8}x(94-x)} = \frac{3}{4}$$

$$\frac{4}{5}x = \frac{3}{8}x(94-x)$$

$$32x = 15(94-x) \Rightarrow 32x = 15 \times 94 - 15x$$

$$\cancel{47}x = 15 \times \cancel{94}^2$$

$$x = 30$$

If $a : b = 5 : 7$ and $c : d = 2a : 3b$,
then $ac : bd$ is :

- (1) 20 : 38 (2) 50 : 147 ✓
(3) 10 : 21 (4) 50 : 151

$$\frac{a}{b} = \frac{5}{7}; \quad \frac{c}{d} = \frac{2a}{3b}$$

$$\begin{aligned}\frac{ac}{bd} &= \frac{a \times 2a}{b \times 3b} = \frac{2a^2}{3b^2} = \frac{2 \times 25}{3 \times 49} \\ &= \frac{50}{147}\end{aligned}$$

If $x : y = 3 : 2$, then the ratio $2x^2 + 3y^2 : 3x^2 - 2y^2$ is equal to :

- (1) 12 : 5 (2) 6 : 5
(3) 30 : 19 (4) 5 : 3

$$\frac{x}{y} = \frac{3}{2}$$

$$\frac{2x^2 + 3y^2}{3x^2 - 2y^2} \Rightarrow \frac{2 \times 9 + 3 \times 4}{3 \times 9 - 2 \times 4}$$
$$\rightarrow \frac{18 + 12}{27 - 8} = \frac{30}{19}$$

If $a : b = b : c$, then $\underline{\underline{a^4 : b^4}}$ is equal to

- (1) $ac : b^2$ (2) $a^2 : c^2$ (3) $c^2 : a^2$ (4) $b^2 : ac$

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

$$a^4 : \underline{\underline{b^4}}$$

$$\cancel{a^4 : a^2 c^2}$$

$$a^2 : c^2$$

$$\boxed{ac = \underline{\underline{b^2}}}$$

$$\boxed{b^4 = a^2 c^2}$$

$$\text{If } A : B = \frac{1}{2} : \frac{3}{8}, B : C = \frac{3x}{3} : \frac{5}{9}$$

~~$B:C \rightarrow 3:5$~~

and $C : D = \frac{5}{6} : \frac{3}{4}$, then the ratio

$A : B : C : D$ is

- (1) 6 : 4 : 8 : 10 \times
- (2) 6 : 8 : 9 : 10 \times
- (3) 8 : 6 : 10 : 9 \checkmark
- (4) 4 : 6 : 8 : 10 \times

$$A : B = \frac{1}{2} : \frac{3}{8}$$

$$A : B = \frac{4}{8} : \frac{3}{8}$$

$$A : B = 4 : 3$$

If $A : B : C = 2 : 3 : 4$, then ratio

$\frac{A}{B} : \frac{B}{C} : \frac{C}{A}$ is equal to

- (1) 8 : 9 : 16 (2) 8 : 9 : 12
(3) 8 : 9 : 24 (4) 4 : 9 : 16

$$\left(\frac{2}{3} : \frac{3}{4} : \frac{4}{2} \right) \overset{12}{\text{---}}$$
$$\frac{2}{3} \cancel{\times 12}^4 : \frac{3}{4} \cancel{\times 12}^3 : \frac{4}{2} \cancel{\times 12}^6$$
$$8 : 9 : 24$$

If $a : b = c : d = e : f = 1 : 2$, then
 $(\underline{3a + 5c + 7e}) : (\underline{3b + 5d + 7f})$ is
equal to

- (1) 8 : 7 (2) 2 : 1
(3) 1 : 4 (4) ~~1 : 2~~

$$\frac{3x_1 + 5x_1 + 7x_1}{3x_2 + 5x_2 + 7x_2} = \frac{\cdot 15}{30} = \frac{1}{2}$$

If $a : (b+c) = 1 : 3$ and $c : (a+b) = 5 : 7$, then $b : (a+c)$ is equal to

- (1) 1 : 2 ✓ (2) 2 : 3
(3) 1 : 3 (4) 2 : 1

$$\frac{a}{b+c} = \frac{1 \times 3}{3 \times 3} \quad \frac{c}{a+b} = \frac{5}{7}$$

$$\frac{b}{a+c} = ? \quad \frac{a}{b+c} = \frac{3}{9} \quad \frac{c}{a+b} = \frac{5}{7}$$

$$a=3 \quad c=5 \\ b=4$$

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

If $p : q : r = 1 : 2 : 4$, then

$\sqrt{5p^2 + q^2 + r^2}$ is equal to

- (1) 5 (2) $2q$
(3) $5p$ ✓ (4) $4r$

$$\begin{aligned} p &= k \\ q &= 2k \\ r &= 4k \end{aligned}$$

$$\sqrt{5k^2 + (2k)^2 + (4k)^2}$$

$$\sqrt{5k^2 + 4k^2 + 16k^2}$$

$$\sqrt{25k^2} = \underline{5k} = 5p.$$

The mean proportional between

$(3 + \sqrt{2})$ and $(12 - \sqrt{32})$ is

- (1) $\sqrt{7}$ (2) $2\sqrt{7}$ ✓

- (3) 6 (4) $\frac{15 - 3\sqrt{2}}{2}$

$$(a+b)(a-b) = a^2 - b^2$$

$$2 \sqrt{3^2 - (\sqrt{2})^2} \\ 2 \sqrt{9 - 2} = 2\sqrt{7}$$

$$\sqrt{(3+\sqrt{2})(12-\underline{\sqrt{32}})}$$

$$\sqrt{(3+\sqrt{2})(12-\sqrt{16\times 2})}$$

$$\sqrt{(3+\sqrt{2})(12-\underline{4}\sqrt{2})}$$

$$\sqrt{(3+\sqrt{2})4(3-\sqrt{2})}$$

$$2\sqrt{(3+\sqrt{2})(3-\sqrt{2})}$$

If ₹ 1000 is divided between A and B in the ratio 3 : 2, then A will receive

- (1) ₹ 400 (2) ₹ 500
(3) ₹ 600 (4) ₹ 800

$$A : B = 3 : 2$$

$$(3+2) \rightarrow 5$$

$$5 \rightarrow 1000$$

$$3 \rightarrow x$$

$$x \cancel{\text{vs}} = 3 \times \frac{200}{5}$$

$$\boxed{x = 600}$$

- If $W_1 : W_2 = 2 : 3$ and $W_1 : W_3 = 1 : 2$ then $W_2 : W_3$ is
- (1) $3 : 4$ ✓ (2) $4 : 3$
 (3) $2 : 3$ (4) $4 : 5$

$$\frac{W_1}{W_2} = \frac{2}{3}$$

$$\frac{W_1}{W_3} = \frac{1}{2} \times \frac{2}{2} \quad \frac{W_2}{W_3} = ?$$

$$W_1 : W_2 : W_3$$

$$2 : 3 : 4$$

$$W_2 : W_1 : W_3$$

$$\rightarrow \begin{matrix} 3 & : & 2 \\ \swarrow & & \searrow \\ 3 & & 2 & 4 \end{matrix}$$

$$\frac{W_1}{W_3} = \frac{2}{4}$$

$$W_2 : W_1 : W_3$$

$$3 : 2 : 4$$

If $\underline{3x} = \underline{5y} = \underline{4z}$, then $x : y : z$ is equal to

- (1) 9 : 12 : 16 (2) 20 : 12 : 15
(3) 15 : 10 : 9 (4) 8 : 5 : 3

$$\underline{3x} = \underline{5y} = \underline{4z}$$

$$\underline{3x} = \underline{5y} = \underline{4z}$$

$$\begin{matrix} x & y & z \\ 20 & 12 & 15 \end{matrix}$$

$$3x = 5y$$

$$\frac{x}{y} = \frac{5}{3}$$

If a and b are rational numbers

and $a + b\sqrt{3} = \frac{1}{2 - \sqrt{3}}$, then a

: b is equal to

(1) $-2 : 1$ (2) $2 : 1$

(3) $\sqrt{3} : 1$ (4) $-\sqrt{3} : 1$

$$a+b\sqrt{3} = \frac{1}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}}$$
$$= \frac{2+\sqrt{3}}{(2-\sqrt{3})(2+\sqrt{3})}$$

$$(a-b)(a+b) = a^2 - b^2 = \frac{2+\sqrt{3}}{2^2 - (\sqrt{3})^2}$$

$$\textcircled{a} + b\sqrt{3} = \textcircled{2} + \sqrt{3}$$

$$\begin{array}{l} a = 2 \\ b = 1 \end{array}$$



$$= \frac{2+\sqrt{3}}{4-3}$$

If 78 is divided into three parts which are in the ratio $1:\frac{1}{3}:\frac{1}{6}$, the middle part is

- (1) $9\frac{1}{3}$ (2) 13
(3) $17\frac{1}{3}$ ✓ (4) $18\frac{1}{3}$

$$\frac{52}{3}$$

$$17\frac{1}{3}$$

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

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

$$6 : 2 : 1$$

$$(6+2+1) \rightarrow 78$$

$$2 \rightarrow ?$$

$$\begin{array}{r} 3 \cancel{9} \rightarrow \cancel{78} \\ 2 \rightarrow ? \end{array} \quad x = \frac{52}{3}$$

If two-third of A is four-fifth of B, then A : B = ?

- (1) 5 : 6 (2) ~~6 : 5~~
(3) 10 : 9 (4) 9 : 10

$$\frac{2}{3}A = \frac{4}{5}B$$

$$\frac{A}{B} = \frac{\cancel{12}}{\cancel{10}} \frac{6}{5}$$

If $\frac{2}{3}$ of A = 75% of B = 0.6 of C

then A : B : C is

- (1) 2 : 3 : 3 \times (2) 3 : 4 : 5 \times
(3) 4 : 5 : 6 \times (4) 9 : 8 : 10 \checkmark

$$75\% \rightarrow \frac{75}{100} = \frac{3}{4}$$

$$\frac{6}{10} \stackrel{?}{=} \frac{3}{5}$$

$$\frac{2}{3}A = \frac{3}{4}B = \frac{3}{5}C$$

$$\frac{A}{B} = \frac{9}{8} \quad \frac{B}{C} = \frac{12}{15} \quad \frac{9}{5}$$

₹ 33,630 are divided among A, B and 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

- (1) ₹ 14,868 ✓ (2) ₹ 16,257
 (3) ₹ 13,290 (4) ₹ 12,390

$$18 + 42 + 35$$

$$95 \rightarrow 33630$$

$$42 \rightarrow B$$

$$\frac{A}{B} = \frac{3}{7} \quad \frac{B}{C} = \frac{6}{5}$$

$$A : B : C$$

$$\begin{matrix} 3 & 7 \\ \downarrow & \downarrow \\ 6 & 5 \end{matrix}$$

$$\underline{18 \quad 42 \quad 35}$$

$$B = \frac{42 \times 33630}{95 \cancel{19}} \quad \cancel{6726}$$

$$B = \underline{42 \times 354}$$

The ratio $4^{3.5} : 2^5$ is the same as

- (1) $4 : 1$ ✓ (2) $2 : 1$
(3) $1 : 2$ (4) $1 : 4$

$$4^{3.5} : 2^5$$

$$(a^m)^n = a^{mn}$$

$$(2^2)^{3.5} : 2^5$$

$$2^{7.5} : 2^5 \rightarrow 4 : 1$$

$$\overbrace{\begin{array}{c} 2^7 \\ 2^5 \end{array}}^{\text{cancel}} : 1$$

$$2^{7-5} : 1$$

If $A : B = 1 : 2$, $B : C = \underline{3 : 4}$

$C : D = 6 : 9$ and $D : E = 12 : 16$
then $A : B : C : D : E$ is equal to

- (1) $\underline{1 : 3} : 6 : 12 : 16 \times$
- (2) $2 : \underline{4} : \underline{6 : 9 : 16} \times \times$
- (3) $\underline{3 : 4} : 8 : 12 : 16 \times$
- (4) $3 : \underline{6 : 8 : 12 : 16} \checkmark \checkmark$

The third proportional to 0.8 and 0.2 is :

- (1) 0.05 ✓ (2) 0.8
(3) 0.4 (4) 0.032

$$\begin{matrix} a & b \\ 0.8 & 0.2 \end{matrix}$$

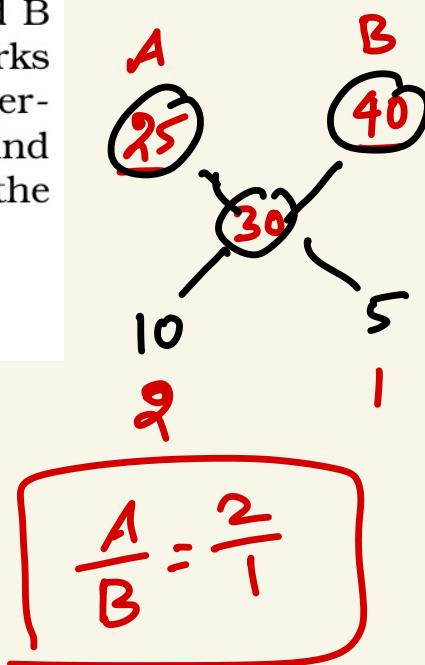
$$\frac{a}{b} = \frac{b}{c}$$

$$20 \left| \begin{array}{r} .05 \\ 100 \\ \hline 20 \end{array} \right.$$

$$\begin{aligned} c &= \frac{b^2}{a} = \frac{0.2 \times 0.2}{0.8} \\ &= \frac{1 \times 0.2}{4} \rightarrow \frac{2}{40} = \frac{1}{20} \end{aligned}$$

On mixing two classes A and B of students having average marks 25 and 40 respectively, the overall average obtained is 30. Find the ratio of the students in the class A and B.

- (1) 2 : 1 (2) 5 : 8
(3) 5 : 6 (4) 3 : 4



A fruit seller sold big, medium and small sized apples for ₹ 15, ₹ 10 and ₹ 5 respectively. The total number of apples sold were in the ratio 3 : 2 : 5. Find the average cost of an apple.

- (1) ₹ 8 (2) ₹ 10
 ✓ (3) ₹ 9 (4) ₹ 7

B	M	S
15	10	5
3k	2k	5k

$$\frac{3k \times 15 + 2k \times 10 + 5k \times 5}{(3k + 2k + 5k)} = \frac{45k + 20k + 25k}{50k} = \frac{90k}{50k} = 9$$

A, B and C are batsmen. The ratio of the runs scored by them in a certain match are given below :

$A : B = 5 : 3$ and $B : C = 4 : 5$. In all they scored 564 runs. The number of runs scored by B is:

- (1) 124 (2) 104
(3) 114 (4) 144

$$A : B : C$$

$$\begin{matrix} 5 & 3 \\ \searrow & \downarrow \\ 4 & 5 \end{matrix}$$

$$20 \quad 12 \quad 15$$

$$A : B : C = \underline{\underline{20 : 12 : 15}}$$

$$\cancel{47} \rightarrow \cancel{564} \quad 12$$

$$12 \rightarrow ?$$

$$\underline{\underline{B = 144}}$$

If $(a + b) : (b + c) : (c + a) = 6 : 7 : 8$ and $\underline{(a + b + c) = 14}$,
then the value of c is

- 1 (1) 6 (2) 7
(3) 8 (4) 14

$$a+b = 6k$$

$$b+c = 7k$$

$$c+a = 8k$$

$$a+b = 6 \times \frac{4}{3}$$

$$a+b = 8$$

$$a+b+c = 14$$

$$8+c = 14$$

$$a+b+b+c+c+a = 21k$$

$$2(a+b+c) = 21k.$$

$$2 \times 14 = 21k.$$

$$k = \frac{28}{21} = \frac{4}{3}$$

$$(c=6)$$

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 number of boys in the college is

- (1) 300 (2) 400
~~(3)~~ 500 (4) 600

$$\begin{array}{ccc} B & G & \\ \cancel{5x_2} & \cancel{3x_2} & 8 \\ \hline 9 & 7 & 16 \end{array}$$

$$\begin{array}{ccc} B & G & \\ \frac{10}{9} & \frac{7}{7} & +1 \\ \text{Initial} & \text{Final} & \\ -1 & & \\ \hline 1 \rightarrow 50 & 10 \rightarrow ? & \underline{500} \end{array}$$

A person distributes his pens among four friends A, B, C, D in

the ratio $\frac{1}{3} : \frac{1}{4} : \frac{1}{5} : \frac{1}{6}$. What is the

minimum number of pens that the person should have?

- (1) 57 (2) 65
(3) 75 (4) 45

$$\frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}$$

$$3, 4, 5, 6 \rightarrow \underline{60}$$

$$\frac{1}{3} \times 60 : \frac{1}{4} \times 60 : \frac{1}{5} \times 60 : \frac{1}{6} \times 60.$$

$$A : B : C : D \rightarrow \underline{20} : \underline{15} : \underline{12} : \underline{10}$$

$$(20+15+12+10) \quad k=1$$

If x runs are scored by A, y runs by B and z runs by C, then $x : y : z = 3 : 2$. If total number of runs scored by A, B and C is 342, the runs scored by each would be respectively

- (1) 144, 96, 64 • (2) 162, 108, 72
 (3) 180, 120, 80 • (4) 189, 126, 84

$$\begin{matrix} x & y & z \\ 3 & 2 & \\ \downarrow 3 & \downarrow 2 & \end{matrix}$$

$$x:y:z = 9:6:4$$

$$\begin{matrix} 18 \\ 19 \rightarrow 342 \\ 4 \rightarrow ? \end{matrix}$$

$$\begin{matrix} 190 & & \\ 190 & & \\ \hline 380 & & \\ & 19 \times 18 \rightarrow 342 & \\ & \hline & 72 \end{matrix}$$

If 18, x and 50 are in continued proportion, then the value of x is

- (1) 30 (2) 3
(3) 5 (4) 32

$$\frac{18}{x} = \frac{x}{50}$$

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

$$x^2 = 900$$

$$x = 30$$

If $(a+b) : \sqrt{ab} = 4 : 1$, where $a > b > 0$, then $a : b$ is

- (1) $(2 + \sqrt{3}) : (2 - \sqrt{3})$ ✓
- (2) ~~$(2 - \sqrt{3}) : (2 + \sqrt{3})$~~ ✓
- (3) $(3 + \sqrt{2}) : (3 - \sqrt{2})$ ✗
- (4) ~~$(3 - \sqrt{2}) : (3 + \sqrt{2})$~~ ✗

$$a+b = 2+\sqrt{3} + 2-\sqrt{3}$$

$$a+b = 4$$

$$\sqrt{ab} = \sqrt{(2+\sqrt{3})(2-\sqrt{3})}$$

$$(a+b)(a-b) = a^2 - b^2 = \sqrt{2^2 - (\sqrt{3})^2} = \sqrt{4-3} = 1$$

What must be added to each term of the ratio $2 : 5$ so that it may equal to $5 : 6$?

- (1) 65 (2) 78
(3) 13 (4) 12

$$\frac{2+x}{5+x} = \frac{5}{6}$$

$$12+6x = 25+5x$$

$$\boxed{x=13}$$

If $(x^3 - y^3) : (x^2 + xy + y^2) = 5 : 1$
 and $(x^2 - y^2) : (x - y) = 7 : 1$, then
 the ratio $2x : 3y$ equals

- (1) 4 : 1 (2) 2 : 3
 (3) 4 : 3 (4) 3 : 2

$$\begin{array}{l} x-y=5 \\ x+y=7 \\ \hline 2x=12 \\ x=6 \\ y=1 \end{array}$$

$$\frac{x^3 - y^3}{x^2 + xy + y^2} = \frac{5}{1} \quad \left| \frac{x^2 - y^2}{x-y} = \frac{7}{1} \right.$$

$$\frac{(x-y)(x^2 + xy + y^2)}{x^2 + xy + y^2} = \frac{5}{1} \quad \left| \frac{(x+y)(x-y)}{x-y} = \frac{7}{1} \right.$$

$$x-y=5 \qquad \qquad \qquad x+y=7$$

The numbers x , y and z are respectively proportional to 2, 3 and 5 and the sum of x , y and z is 80. If the number z is given by the equation $z = ax - 8$, then a is

(1) 6

(2) $\frac{3}{2}$

(3) $\frac{5}{2}$ ✓

(4) $\frac{5}{2}$

$$x : y : z = 2 : 3 : 5$$

$$x + y + z = 80$$

$$2k + 3k + 5k = 80$$

$$10k = 80 \quad k = 8$$

$$x = 16 \quad y = 24 \quad z = 40$$

$$z = ax - 8$$

$$40 = ax \times 16 - 8$$

$$16a = 48$$

$$a = 3$$

Among 132 examinees of a certain school, the ratio of successful to unsuccessful students is 9 : 2. Had 4 more students passed, then the ratio of successful to unsuccessful students would have been

- (1) 14 : 3 (2) 14 : 5
(3) 28 : 3 (4) 28 : 5

$$\frac{S}{U} = \frac{9}{2}$$

$$\cancel{1} \rightarrow \cancel{12}$$
$$9 \rightarrow ?$$

$$\frac{S}{U} = \frac{108}{24}$$

$$\frac{108+4}{20} = \frac{112}{20} = \frac{28}{5}$$

In a regiment the ratio between the number of officers to soldiers was 3 : 31 before battle. In a battle 6 officers and 22 soldiers were killed and the ratio became 1 : 13, the number of officers in the regiment before battle was

- (1) 31 (2) 38
~~(3) 21~~ (4) 28

$$\frac{O}{S} = \frac{3}{31}$$

$$\frac{3k-6}{31k-22} = \frac{1}{13}$$

$$\underline{3k \times 13 - 6 \times 13 = 31k - 22}$$

$$8k = 78 - 22$$

$$8k = 56$$

$$k = 7$$

$$3k = 3 \times 7 \\ = 21$$

Sum of two numbers is thrice their difference. Their ratio is

- (1) 1:2 (2) 2:1
(3) 3:1 (4) 1:3

$$x+y = 3(x-y)$$

$$x+y = 3x - 3y$$

$$2x = 4y$$

$$\boxed{\frac{x}{y} = \frac{2}{1}}$$

The compound ratio of the inverse ratios of the ratios

$x : yz, y : zx, z : xy$ is :

- (1) $1 : xyz$ (2) ~~$xyz : 1$~~
(3) $1 : 1$ (4) $x : yz$

$$\frac{1}{b} \times \frac{c}{d}$$

$$\frac{x}{yz}, \frac{y}{zx}, \frac{z}{xy}$$

$$\frac{yz}{x}, \frac{zx}{y}, \frac{xy}{z}$$

$$\frac{yz}{x} \times \frac{zx}{y} \times \frac{xy}{z} = \frac{xyz}{1}$$

Answe

If $\left(x + \frac{1}{x}\right) : \left(x - \frac{1}{x}\right) = 5 : 3$,

then the value(s) of x is/are

- (1) ± 1 ~~(2)~~ ± 2
(3) ± 3 (4) 0

$$\frac{x + \frac{1}{x}}{x - \frac{1}{x}} = \frac{5}{3}$$

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

$$2x = \frac{3}{x} + \frac{5}{x} \Rightarrow 2x = \frac{8}{x}$$

$$x^2 = 4 \quad x = \pm 2$$

If the three numbers in the ratio
3 : 2 : 5 be such that the sum of
the squares is equal to 1862 then
which number is the middle one ?

- (1) 16 ✓ (2) 14
(3) 13 (4) 15

3k $\textcircled{2k}$ 5k

$$9k^2 + 4k^2 + 25k^2 = 1862$$

$$38k^2 = 1862$$

$$k^2 = \frac{1862}{38}$$

$$k^2 = 49$$

$$\begin{array}{r} 49 \\ 38 \sqrt{1862} \\ -152 \\ \hline 342 \end{array}$$

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

$$k = 7$$

If $2r = h + \sqrt{r^2 + h^2}$ then the ratio

$r : h$ ($r \neq 0$) is

- (1) 1 : 2 (2) 2 : 3
~~(3)~~ 4 : 3 (4) 3 : 5

$$2r - h = \sqrt{r^2 + h^2}$$

$$(2r - h)^2 = (\sqrt{r^2 + h^2})^2$$

$$\cancel{4r^2} - \cancel{4rh} = r^2 + h^2$$

$$\cancel{3r^2} = \cancel{4rh}$$

$$3r = 4h$$

$$\frac{r}{h} = \frac{4}{3}$$

In a college union, there are 48 students. The ratio of the number of boys to the number of girls is 5 : 3. The number of girls to be added in the union, so that the ratio of boys to girls is 6 : 5 is

- (1) 6 (2) 7
(3) 12 (4) 17

$$\begin{array}{r} 48 \\ \text{B} \\ 5 \\ \hline \end{array} \quad \begin{array}{r} 3 \\ \text{G} \\ 3 \\ \hline \end{array}$$

$$8 \rightarrow 48$$

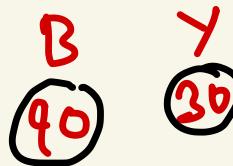
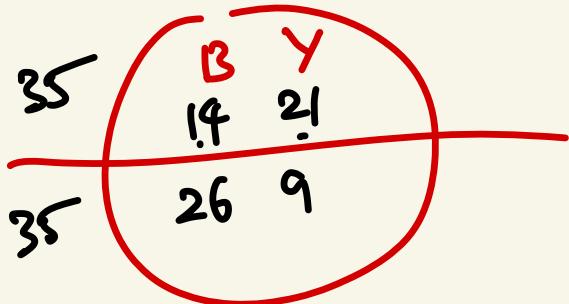
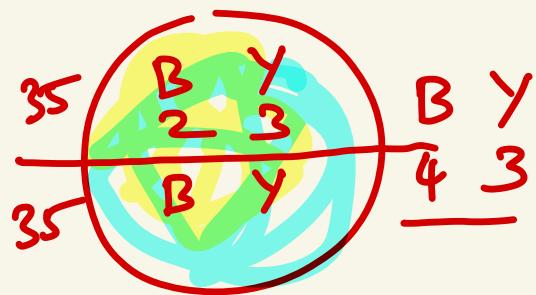
$$\begin{array}{r} 5 \rightarrow ? \\ \text{B} \\ 30 \\ \hline \end{array} \quad \begin{array}{r} ? \\ \text{G} \\ 18 \\ \hline \end{array}$$

$$\frac{30}{18+x} = \frac{6}{5}$$
$$25 = 18 + x$$

$$x = 7$$

In a coloured picture of blue and yellow color, blue and yellow colour is used in the ratio of 4 : 3 respectively. If in upper half, blue : yellow is 2 : 3, then in the lower half blue : yellow is

- (1) 1 : 1 (2) 2 : 1
~~(3)~~ 26 : 9 (4) 9 : 26



$$\frac{7}{2} - ?$$

$$\begin{array}{cc} B & Y \\ 4 & 3 \end{array}$$

$$\begin{array}{cc} B & Y \\ 2 & 3 \end{array}$$

$$\frac{\frac{2}{5} + x}{2} = \frac{4}{7}$$

$$\begin{array}{cc} B & Y \\ 26 & 9 \end{array}$$

$$\frac{2}{5} + x = \frac{8}{7} \rightarrow x = \frac{8}{7} - \frac{2}{5}$$

$$x = \frac{26}{35}$$

$$x = \frac{40-14}{35}$$

To get the ratio $p : q$ (for $p \neq q$), one has to add a number to each term of the ratio $x : y$, the number is

$$\cancel{\frac{px + qy}{p - q}} \quad \checkmark \quad (2) \quad \frac{qx - py}{p - q}$$

$$\cancel{\frac{px - qy}{p - q}} \quad (4) \quad \frac{py - qx}{p - q}$$

$$\frac{x+k}{y+k} = \frac{P}{Q}$$

$$\underline{\Sigma x + \Sigma k = Py + Pk}$$

$$\Sigma x - Py = Pk - Qk$$

$$Qx - Py = k(P - Q)$$

$$\Sigma k - Pk = Py - \Sigma x$$

$$k(\Sigma - P) = Py - \Sigma x$$

$$k = \frac{Py - \Sigma x}{\Sigma - P} = \frac{Py - \Sigma x}{P - Q} = \frac{(\Sigma x - Py)}{P - Q}$$

$$k = \frac{\Sigma x - Py}{P - Q}$$

A and B together have Rs. 6300.

If $\frac{5}{19}$ th of A's amount is equal to

$\frac{2}{5}$ th of B's amount. The amount
of 'B' is

- (1) Rs. 2500 (2) Rs. 3800
(3) Rs. 2300 (4) Rs. 4000

$$\frac{5}{19}A = \frac{2}{5}B$$

$$25A = 38B$$

$$\frac{A}{B} = \frac{38}{25} |$$

$$\cancel{63} \xrightarrow{\text{100}} \cancel{6300}$$

$$25 \rightarrow ?$$

$$\underline{\text{Rs. } 2500}$$

There is a ratio of 5 : 4 between two numbers. If 40 per cent of the first is 12, then 50% of the second number is

- (1) 12 (2) 24
(3) 18 (4) 20

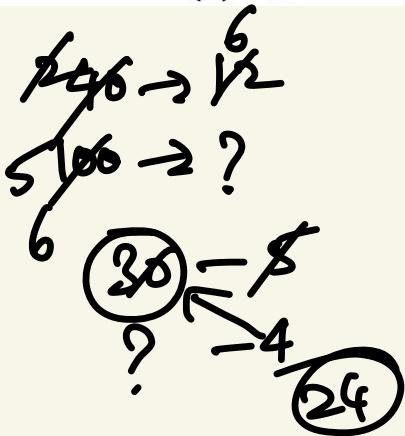
$$5x \quad 4x$$

$$\frac{40}{100} \times 5x = 12$$
$$6$$

$$x = 6$$

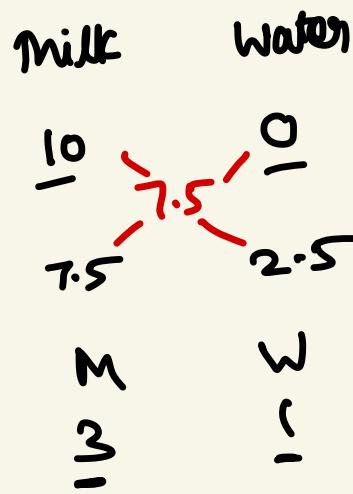
$$30 \quad 24$$

$$\frac{24}{2} = 12$$



A milkman makes 20% profit by selling milk mixed with water at ₹ 9 per litre. If the cost price of 1 litre pure milk is ₹ 10, then the ratio of milk and water in the mixture is

- (1) 3 : 1 (2) 4 : 1
 (3) 3 : 2 (4) 4 : 3



A man ordered 4 pairs of black socks and some pairs of brown socks. The price of a black sock ~~NDS~~ is double that of a brown pair. While preparing the bill the clerk interchanged the number of black and brown pairs by mistake which increased the bill by 50%. The ratio of the number of black and brown pairs of socks in the original order was :

- (1) 2 : 1 (2) 1 : 4
 (3) 1 : 2 (4) 4 : 1

$$8+x \rightarrow 100$$

$$2x+4 \rightarrow 150$$

Black	Brown
4	x
2	1
<hr/>	
(8+x)	→ original

Black	Brown
x	4
2	1
<hr/>	
Total	(2x+4) → NewBill

$$8+x \rightarrow 16^2$$
$$2x+4 \rightarrow 16^3$$

$$3(8+x) = 2(2x+4)$$

$$24 + 3x = 4x + 8$$

$$\boxed{x = 16}$$

$$4 : 16$$

$$1 : 4.$$

The ratio of the number of boys and girls in a school is 8 : 12. If 50% of boys and 25% of girls are getting scholarships for their studies, what is the percentage of school students who are not getting any scholarships ?

- (1) ~~65~~ (2) 66
(3) 67 (4) 68

$$\begin{matrix} B \\ 8 \end{matrix} \qquad \begin{matrix} G \\ 12 \end{matrix}$$

④

③

$$12 \times \frac{1}{4}$$

$$\frac{4+9}{20} \Rightarrow \frac{13}{20} \times 100 = 65\%$$

Two numbers A and B are in the ratio 5 : 2, If 4 is added to each number then this ratio becomes 9 : 4. If 5 is subtracted from each of the original numbers, then the ratio of A and B will be :

- (1) 3 : 1 (2) 8 : 3
(3) 7 : 2 (4) 4 : 1

$$\frac{5x+4}{2x+4} = \frac{9}{4}$$

$$20x + 16 = 18x + 36$$

$$2x = 20$$

$$x = 10$$

$$\frac{50-5}{20-5} = \frac{45}{15} = \frac{3}{1}$$

The ratio of two numbers is 3 : 5. If eight is added to the first, and seven to the second, then the ratio becomes 2 : 3. What will be the ratio become if 6 is added to each?

- (1) 5 : 9 (2) 5 : 7
(3) 7 : 9 (4) 9 : 14

$$\frac{3x+8}{5x+7} = \frac{2}{3}$$

$$9x + 24 = 10x + 14$$

$$x = 10$$

$$\frac{30+6}{50+6} = \frac{36}{56} = \frac{9}{14}$$

The ratio of present age of two brothers is 1 : 2 and 5 years back, the ratio was 1 : 3. What will be the ratio of their age after 5 years?

- (1) 1 : 4 (2) 2 : 3
~~(3)~~ 3 : 5 (4) 5 : 6

1 : 2

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

$$3x - 15 = 2x - 5$$

$$x = 10$$

10 20

$$\frac{10+5}{20+5} = \frac{15}{25} = \frac{3}{5}$$

The sum of the age of a father and his son is 100 years now. 5 years ago their age were in the ratio of 2 : 1. The ratio of the age of father and son after 10 years will be

- ~~(1) 5 : 3 (2) 4 : 3~~
 (3) 10 : 7 (4) 3 : 5

$$\begin{array}{ccc} 60 & 65 & 75 \\ 30 & 35 & 45 \end{array}$$

$$\begin{matrix} 75 : 45 \\ 5 : 3 \end{matrix}$$

$$F + S = 100$$

Five years ago

$$\begin{matrix} 2x \\ -5 \end{matrix} \quad \begin{matrix} x \\ -5 \end{matrix}$$

$$\begin{matrix} 2x+5 \\ x+5 \end{matrix}$$

$$2x+5+x+5=100$$

$$x=30.$$

Four years ago, the ratio of A's age to B's age was 11 : 14 and four years later their age will be in the ratio 13 : 16. The present age of A is

- (1) 48 years (2) 26 years
 (3) 44 years (4) 28 years

$$\begin{array}{c} -4 \xrightarrow{+4} \text{Now} \xrightarrow{+4} +4 \\ \underline{\quad} \qquad \cdot \qquad \underline{\quad} \\ \underline{\quad} \qquad \cdot \qquad \underline{\quad} \\ \underline{\quad} \qquad \cdot \qquad \underline{\quad} \end{array}$$

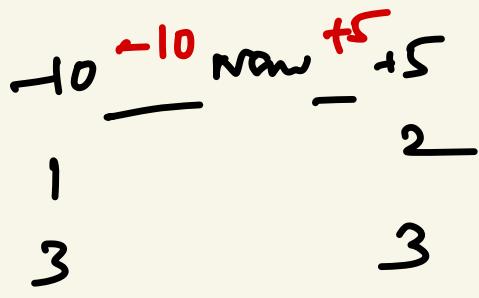
$$\begin{array}{r} 11 \\ 14 \\ \hline 13 \\ 16 \end{array}$$

$$\frac{11x+8}{14x+8} = \frac{13}{16}$$

$$\frac{16 \times 11x + 16 \times 8}{3 \times 8} = \frac{13 \times 14x + 13 \times 8}{182x - 176x} \Rightarrow \boxed{x=4}$$

The ratio of the age of Ram and Rahim 10 years ago was 1 : 3. The ratio of their age five years hence will be 2 : 3. Then the ratio of their present age is

- (1) 1 : 2 ~~(2) 3 : 5~~
 (3) 3 : 4 (4) 2 : 5



$$\frac{5+10}{15+10} = \frac{x+15}{3x+15} = \frac{2}{3} \Rightarrow 3(x+15) = 2(3x+15)$$

$$3x + 45 = 6x + 30$$

$$3x = 15$$

$$x = 5$$

The ratio of the age of a father to that of his son is 5: 2. If the product of their ages in years is 1000, then the father's age (in years) after 10 years will be :

- (1) 50 ~~(2)~~ 60
(3) 80 (4) 100

$$F \rightarrow 5x + 10 = 60$$
$$S \rightarrow 2x$$

$$F \rightarrow 5x$$
$$S \rightarrow 2x.$$
$$5x \times 2x = 1000$$
$$10x^2 = 1000$$

$$x^2 = 100$$
$$x = 10$$

Harsha is 40 years old and Ritu is 60 years old. How many years ago was the ratio of their ages $3 : 5$?

- (1) ~~10 years~~ (2) 20 years
(3) 37 years (4) 5 years

$$40 - 10 \quad 36$$

$$60 - 10 \quad 50$$

$$\frac{3x+k}{5x+k} = \frac{40}{60} \frac{2}{3}$$

$$9x + 3k = 10x + 2k.$$

$$x = k$$

$$\frac{30 + 10}{50 + 10} \quad \frac{40}{60}$$

The average age of boys in the class is twice the number of girls in the class. The ratio of boys and girls in the class of 50 is 4 : 1. The total of the ages (in years) of the boys in the class is

- (1) 2000 (2) 2500
(3) 800 (4) 400

B G
4 1

Total \rightarrow 50

S \rightarrow 50

4 \rightarrow ?

B G
40 10

$$\overbrace{40 \times 20}^{\text{Sum of obs}} = \underline{\underline{800}}$$

$$\frac{\text{Sum of obs}}{\text{No. of obs}} = A$$

The ratio of age of two boys is 5 : 6. After two years the ratio will be 7 : 8. The ratio of their age after 12 years will be

- (1) $\frac{22}{24}$ (2) $\frac{15}{16}$
~~(3) $\frac{17}{18}$~~ (4) $\frac{11}{12}$

$$\frac{5x+2}{6x+2} = \frac{7}{8}$$

$$40x + 16 = 42x + 14.$$

$$2x = 2$$
$$\boxed{x = 1}$$

$$\frac{5+12}{6+12} \quad \frac{17}{18}.$$

The ratio of the ages of a father and his son 10 years hence will be 5 : 3, while 10 years ago, it was 3:1. The ratio of the age of the son to that of the father today, is

- (1) 1 : 2 (2) 1 : 3
 (3) 2 : 3 (4) 2 : 5

~~-10~~ ~~3~~ ~~1~~ ~~+10~~ ~~5~~ ~~3~~

Now.

$$\frac{3x+20}{x+20} = \frac{5}{3}$$

$$9x + 60 = 5x + 100$$

$$4x = 40$$

$$x = 10$$

$$\begin{matrix} 30+10 & \rightarrow & 40 \\ 10+10 & & 20 \\ \hline 2 & & 1 \end{matrix}$$

My grandfather was 9 times older than me 16 years ago. He will be 3 times of my age 8 years from now. Eight years ago, the ratio of my age to that of my grandfather was

- (1) 3 : 8 (2) 2 : 5
 (3) 1 : 2 (4) 1 : 5

$$G \frac{16 \text{ now} + 8}{9x} + 16 + 8$$

$$S \frac{x}{x} + 16 + 8$$

$$3 \frac{(x+16+8)}{x} = \frac{9x+24}{x}$$

$$3x + 72 = 9x - 24$$

$$6x = 48 \quad x = 8$$

$$G \quad 72 + 8 \rightarrow 80$$

$$S \quad 8 + 8 \rightarrow 16$$

Eighteen years ago, the ratio of A's age to B's age was 8 : 13. Their present ratios are 5 : 7. What is the present age of A ?

- (1) 60 years (2) 70 years
~~(3)~~ 50 years (4) 40 years

$$A \rightarrow 32 + 18 \\ = 50$$

$$\frac{8x+18}{13x+18} = \frac{5}{7}$$

$$56x + 7 \times 18 = 65x + 5 \times 18$$

$$7x(8 - 5) = 9x$$

$$2x(7) = 9x$$

$$x = 4$$

If 4 years ago the ratio between the ages of P and Q was 5 : 6 and the sum of their ages at present is 52 years, what is the ratio of their present ages ?

- (1) 5 : 6 (2) ~~6 : 7~~
(3) 7 : 8 (4) 4 : 5

Now

$$P \quad 5x+4$$

$$Q \quad 6x+4$$

$$5x+4 + 6x+4 = 52$$

$$11x+8 = 52$$

$$11x = 44$$

$$x = 4$$

$$\begin{matrix} 20+4 \rightarrow & \frac{24}{28} & \frac{6}{7} \\ 24+4 & & \end{matrix}$$

The ratio of two numbers is 3 : 8 and their difference is 115. The smaller of the two numbers is :

- (1) 184 (2) 194
(3) 69 (4) 59

$$8k - 3k = 115$$

$$5k = 115$$

$$\boxed{k = 23}$$

$$3k \rightarrow 3 \times 23 \rightarrow 69$$

Four numbers are in the ratio
1 : 2 : 3 : 4. Their sum is 16.
The sum of the first and fourth
number is equal to :

- (1) 5 (2) 8
(3) 10 (4) 80

$$10 \rightarrow 16$$
$$(1+4) \rightarrow ?$$

$$5 \rightarrow 8.$$

The sum of two numbers is 40
and their difference is 4. The
ratio of the numbers is :

- (1) 21 : 19 \times (2) 22 : 9 \times
(3) 11 : 9 (4) 11 : 18 \times

$$\cancel{x+y=40}$$

$$\cancel{x-y=4}$$

$$2x = 44$$

$$\boxed{x=22}$$

$$x+22=40$$

$$\boxed{y=18}$$

$$x:y$$

$$22:18$$

$$11:9$$

The product of two positive integers is 1575 and their ratio is 9 : 7. The smaller integer is

- (1) 25 \times (2) 35 \checkmark
(3) 45 \times (4) 70 \times

$$9k \times 7k = 1575$$

$$9 \times 7 \times k^2 = \cancel{1575}^{175}$$

$$90 \times 70 = 6300 \times$$

$$k^2 = \frac{175}{7} = 25$$

$$\boxed{k=5}$$

$$\underline{45} \quad \underline{35}$$

Three numbers are in the ratio of 3 : 2 : 5 and the sum of their squares is 1862. The smallest of these numbers is

- (1) 24 (2) 21
(3) 14 ✓ (4) 35

$\frac{7}{38}$
 $\frac{1}{342}$

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

$$9k^2 + 4k^2 + 25k^2 = 1862$$

$$38k^2 = 1862$$

$$k^2 = \frac{1862}{38}$$

$$2 \times 7 = 14$$

$$\begin{array}{r} 49 \\ 38 \sqrt{1862} \\ \underline{-152} \\ \hline 342 \end{array}$$

$$k = \sqrt{\frac{38}{49}} \rightarrow k = 7$$

The sum of three numbers is 116. The ratio of second to the third is 9 : 16 and the first to the third is 1 : 4. The second number is

- (1) 30 (2) 32
(3) 34 (4) 36 ✓

?	<u>11</u>	<u>11</u>
1×4	4×4	
	16	9
4	16	9
$4 + 16 + 9 \rightarrow 116$		
$9 \rightarrow ?$		
		$21 \rightarrow 116$
		$9 \rightarrow ?$
		36 //

In a 45 litres mixture of milk and water, the ratio of the milk to water is 2 : 1. When some quantity of water is added to the mixture, this ratio becomes 1 : 2. The quantity of water added is
 (1) 10 litres (2) 21 litres
 (3) 35 litres (4) 45 litres

45

M W
 2 1

$3 \rightarrow 45$
 $2 \rightarrow ?$

M W
30 15

$$\frac{30}{15+x} = \frac{1}{2}$$

$$60 = 15 + x \quad \boxed{x = 45}$$

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

- (1) 45 ✓ (2) 40
 (3) 30 (4) 55

$$\begin{array}{c} \underline{1} & \underline{\underline{11}} & \underline{\underline{11}} \\ 8 & 9 & \\ 3 \times 3 & 4 \times 3 & \end{array}$$

$$\begin{array}{c} \underline{8} & \textcircled{9} & \underline{12} \\ & & \end{array}$$

$$8x \times 12x = \frac{2400}{25}$$

$$\begin{array}{c} x^2 = 25 \\ \boxed{x=5} \end{array}$$

$$\cancel{9 \times 5 = 45}$$

When a particular number is subtracted from each of 7, 9, 11 and 15, the resulting numbers are in proportion. The number to be subtracted is :

- (1) 1 ~~X~~ (2) 2 ~~X~~
 (3) 3 ~~✓~~ (4) 5

$$\frac{7-x}{9-x} = \frac{11-x}{15-x}$$

$$(7-x)(15-x) = (11-x)(9-x)$$

$$105 - 7x - 15x + x^2 = 99 - 11x - 9x + x^2$$

$$105 - 22x = 99 - 20x$$

$$6 = 2x$$

$$\boxed{x=3}$$

$$\frac{7-x}{9-x} = \frac{11-x}{15-x}$$

$$\frac{6}{8} = \frac{10}{14} x \quad \frac{5}{7} = \frac{9}{13} x$$

$$\frac{2}{36} = \frac{8}{12} \frac{2}{3} \text{ through options.}$$

Three numbers are in the ratio
5 : 6 : 7. If the product of the
numbers is 5670, then the greatest
number is

- (1) 15 (2) 18
(3) 21 ✓ (4) 28

$$\begin{array}{r} 135 \\ 840 \\ \hline 5670 \end{array}$$

$$5x \times 6x \times 7x = 5670$$

$$x^3 = 27$$

$$\boxed{x=3}$$

$$7x \rightarrow \underline{\underline{21}}$$

Three numbers are in the ratio
3 : 4 : 5. The sum of the largest
and the smallest equals the sum
of the second and 52. The small-
est number is

- (1) 20 ~~X~~ (2) 27
(3) 39 ~~✓~~ (4) 52

$$\begin{array}{r} 3k + 5k = 4k + 52 \\ \hline 4k = 52 \\ k = 13 \\ \hline 3 \times 13 = 39 \end{array}$$

Which number when added to each of the numbers 6, 7, 15, 17 will make the resulting numbers proportional?

- (1) 6 (2) 5
(3) 4 (4) 3 ✓

$$\frac{6+x}{7+x} = \frac{15+x}{17+x}$$

$$\frac{12}{13} = \frac{21}{23}x \quad \frac{11}{12} = \frac{20}{22}x \quad \frac{10}{11} = \frac{19}{21}x$$
$$\frac{9}{10} = \frac{18}{20}x$$

The ratio between a two - digit number and the sum of the digits of that number is 4 : 1. If the digit at the unit's place is 3 more than the digit at the ten's place, then the number is

- (1) 47 (2) 69
(3) 36 ✓ (4) 25

$xy \rightarrow$

$$\frac{10x+y}{x+y} = \frac{4}{1}$$

$$y = x+3$$

$$10x + 3 = 8x + 12$$

$$3x = 9$$

$$x = 3$$

$$\frac{10x+x+3}{x+x+3} = \frac{4}{1}$$

$$y = 6$$

The ratio of number of balls in bags x, y is $2 : 3$. Five balls are taken from bag y and are dropped in bag x . Number of balls are equal in each bag now. Number of balls in each bag now is

- (1) 45 (2) 20
(3) 30 ~~(4)~~ 25

$$x = 2k \quad y = 3k$$

$$3k - 5 = 2k + 5$$

$$k = 10$$

$$x = 20 \quad y = 30$$

$$x = 25; y = 25$$

If the square of the sum of two numbers is equal to 4 times of their product, then the ratio of these numbers is :

- (1) 2 : 1 (2) 1 : 3
(3) 1 : 1 \checkmark (4) 1 : 2

$$(x+y)^2 = 4xy$$

$$x^2 + y^2 + 2xy = 4xy$$

$$x^2 + y^2 - 2xy = 0$$

$$(x-y)^2 = 0$$

$$x = y$$

The average of two numbers is 62. If 2 is added to the smallest number, the ratio between the numbers becomes 1 : 2. The difference of the numbers is

- (1) 62 (2) 40
(3) 84 (4) 44 ✓

$$\begin{array}{r} x = 40 \\ y = 84 \\ \hline 44 \end{array}$$

$$\frac{x+y}{2} = 62$$

$$\frac{x+2}{y} = \frac{1}{2}$$

$$2x+4 = y$$

$$\frac{x+2x+4}{2} = 62$$

$$3x+4 = 124 \rightarrow 3x = 120$$

$$x = 40$$

Three numbers are in the ratio 5:7:12. If the sum of the first and the third numbers is greater than the second number by 50. The sum of the three numbers is

- (1) 125 (2) 120 ✓
(3) 95 (4) 85

$$5+12 \rightarrow 17$$
$$7 \leftarrow$$

$$10 \rightarrow 50$$

$$1 \rightarrow 5$$

$$24 \times 5 \rightarrow 120.$$

$$5+7+12$$

$$\textcircled{24}$$

The students 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 :

- (1) 100 (2) 180
 ✓ (3) 200 (4) 400

$$\begin{matrix} 2 & : & 3 & : & 5 \\ \downarrow & & \downarrow & & \downarrow \\ 4 & : & 5 & : & 7 \end{matrix} + 2$$

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

$$10k + 200 = 12k + 160$$

$$2k = 40$$

$$k = 20$$

$$10k = ?$$

$$10 \times 20 = 200$$

$$\begin{matrix} \cancel{2} & \rightarrow & 40 \\ 10 & \rightarrow & ? \end{matrix}$$

The ratio of 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

- (1) 20 (2) 30
✓ (3) 40 (4) 50

$$B = 2(G - 15)$$

$$B = 2G - 30$$

$$\frac{B}{G-15} = \frac{2}{1} \quad \text{--- (1)}$$

$$\frac{B-45}{G-15} = \frac{1}{5} \quad \text{--- (2)}$$

$$5B - 5 \times 45 = G - 15$$

$$5(2G - 30) - 5 \times 45 = G - 15$$

$$10G - 150 - 225 = G - 15$$

$$9G = 360 \rightarrow \boxed{G = 40}$$

The number of students in three classes are in the ratio $2 : 3 : 4$. If 12 students are increased in each class, this ratio changes to $8 : 11 : 14$. The total number of students in the three classes at the beginning was

- (1) 162 (2) 108
(3) 96 (4) 54

$$\begin{array}{ccc} 2 & 3 & 4 \\ 8 & 11 & 14 \end{array}$$

$$\frac{2k+12}{3k+12} = \frac{8}{11}$$

$$22k + 11 \times 12 = 24k + 8 \times 12$$

$$9k \\ 9 \times 18 = 162$$

$$2k = 3 \times 12$$

$$k = 18$$

The total number of students in a school was 660. The ratio between boys and girls was 13 : 9. After some days, 30 girls joined the school and some boys left the school and new ratio between boys and girls became 6 : 5. The number of boys who left the school is :

- (1) 50 (2) 40
 (3) 30 (4) 60

$$\begin{array}{c} 660 \\ B \quad G \\ 13 \quad 9 \\ \hline 390 \quad 270 \\ 2x \rightarrow 660 \\ 13 \rightarrow ? \end{array}$$

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

$$\frac{390-x}{\cancel{300}} = \frac{6}{5}$$

$$390-x=360$$

$x=30$

If there is a reduction in the number of workers in a factory in the ratio $15 : 11$ and an increment in their wage in the ratio $22 : 25$, then the ratio by which the total wage of the workers should be decreased is

- (1) $6 : 5$ (2) $5 : 6$
(3) $3 : 7$ (4) $3 : 5$

T

$$\begin{array}{r} 15 \quad 11 \\ 22 \quad 25 \\ \hline \cancel{15 \times 22}^3 : \cancel{11 \times 25}^5 \\ 6 : 5 \end{array}$$

Zinc and copper are in the ratio of 5 : 3 in 200 gm of an alloy. How much grams of copper be added to make the ratio as 3 : 5?

- (1) $133\frac{1}{3}$ (2) $\frac{1}{200}$
 (3) 72 (4) 66

$$625 - 225 = 3x$$

$$x = \frac{400}{3}$$

$$x = 133\frac{1}{3}$$

Alloy	200
Z	C
5	3

$8 \rightarrow 200$

$5 \rightarrow ?$

$\frac{2}{125} \quad \frac{75}{75+x} = \frac{3}{5}$

The ratio of copper and zinc in brass is 13 : 7. How much zinc will be there in 100 kg of brass?

- (1) 20 kg. (2) 55 kg.
~~(3)~~ 35 kg. (4) 40 kg.

Brass \rightarrow C + Z

$$\frac{7}{20} \times 100 = 35$$

$$\frac{13 \times 5}{65} + \frac{7 \times 5}{35} = \underline{\underline{100}}$$

In 30 litres mixture of acid, the ratio of acid and water is 2 : 3 . What amount of water should be added to the mixture so that the ratio of acid and water becomes 2 : 5 ?

- (1) 10 litres (2) 15 litres
 (3) 18 litres (4) 12 litres

$$60 = 36 + 2x$$

$$2x = 24$$

$$\boxed{x=12}$$

30

$$\frac{2}{5} \times 30 = 12$$

$$\frac{3}{5} \times 30 = 18.$$

$$\begin{matrix} A & W \\ 12 & 18 \end{matrix}$$

$$\frac{12}{18+x} = \frac{2}{5}$$

In an alloy, the ratio of copper and zinc is 5 : 2. If 1.250 kg of zinc is mixed in 17 kg 500 g of alloy, then the ratio of copper and zinc will be

- (1) 2 : 1 (2) 2 : 3
(3) 3 : 2 (4) 1 : 2

$$\begin{matrix} C & 2 \\ S & 2 \end{matrix}$$

17.5 kg of alloy

$$\frac{2}{7} \times 17.5 \rightarrow S \text{ kg.}$$

$$\begin{matrix} C & 2 \\ 12.5 & S \end{matrix}$$

$$\frac{12.5}{5+1.25} = \frac{12.5}{6.25}$$

$$\frac{C}{S} = \frac{2}{1}$$

There are three containers of equal capacity. The ratio of Sulphuric acid to water in the first container is 3 : 2, that in the second container is 7 : 3 and in the third container it is 11 : 4. If all the liquids are mixed together, then the ratio of Sulphuric acid to water in the mixture will be :

- (1) 61 : 29 (2) 61 : 28
 (3) 60 : 29 (4) 59 : 29

$A : W$		$\text{LCM} \rightarrow 30$
$3 : 2$	5	$18 : 12$ 30
$7 : 3$	10	$21 : 9$ 30
$11 : 4$	15	$22 : 8$ 30

$$\begin{array}{ccc}
 S.A & & W \\
 (18+21+22) : (12+9+8) & & \\
 61 : 29 & &
 \end{array}$$

200 litres of a mixture contains milk and water in the ratio 17 : 3. After the addition of some more milk to it, the ratio of milk to water in the resulting mixture becomes 7 : 1. The quantity of milk added to it was

- (1) 20 litres (2) 40 litres
(3) 60 litres (4) 80 litres

$$\frac{170}{30} = \frac{7x}{1x30}$$

$$210 = 170 + x$$

$$x = 40$$

A can contains a mixture of two liquids A and B in the ratio 7 : 5. When 9 litres of mixture are drawn off and the can is filled with B, the ratio of A and B becomes 7 : 9. Litres of liquid A contained by the can initially was

- (1) 10 (2) 20
~~(3)~~ 21 (4) 25

$$\begin{array}{l} 7:5 \\ \downarrow 4 \rightarrow 9 \\ 7:9 \end{array}$$

$$\begin{array}{l} 4 \rightarrow 9 \\ 16 \rightarrow ? \end{array}$$

36 litre.

$$\text{Lit A} = \frac{7}{12} \times 36 = 21.$$

A container contains two liquids A and B in the ratio 7 : 5. When 9 litres of mixture are drawn off and the container is filled with B, the ratio of A and B becomes 1:1. How many litres of liquid A was in the container initially ?

$$7:5 \quad \downarrow 2$$

$$7:7$$

$$2 \rightarrow 9$$

$$14t \rightarrow ?$$

? $\textcircled{63} \rightarrow \text{Total litres.}$

$$\frac{7}{12} \times 63 = 21$$
$$\frac{147}{4}$$

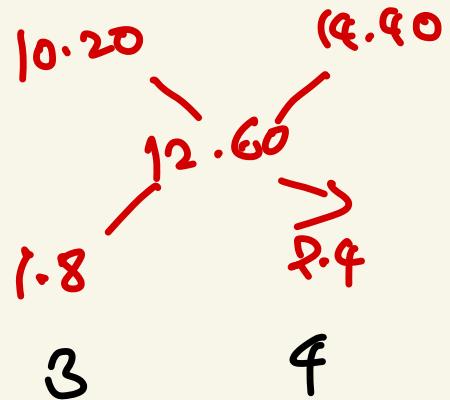
A and B are two alloys of gold and copper prepared by mixing metals in ratios 7 : 2 and 7 : 11 respectively. If equal quantities of the alloys are melted to form a third alloy C, the ratio of gold and copper in C will be ;

- (1) 7 : 5 (2) 5 : 9
(3) 9 : 5 (4) 5 : 7

	A	C
A	(7	2)
	7	9
B	(7	11)
	11	18
A	14	4 → 18
B	7	11 → 18
C	21	15
C	7	5
	<hr/>	

The ratio in which a man must mix rice at ₹ 10.20 per kg and ₹ 14.40 per kg so as to make a mixture worth ₹ 12.60 per kg, is

- (1) 4 : 3 (2) 2 : 5
(2) 18 : 24 ~~(4)~~ 3 : 4



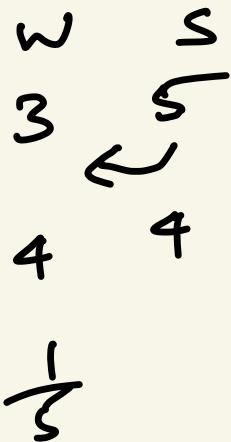
A vessel is filled with liquid, 3 parts of which are water and 5 parts syrup. How much of the mixture must be drawn off and replaced with water so that the mixture may be half water and half syrup ?

(1) $\frac{1}{3}$

(2) $\frac{1}{4}$

(3) $\frac{1}{5}$

(4) $\frac{1}{7}$



Two vessels A and B contain milk and water mixed in the ratio 4 : 3 and 2 : 3. The ratio in which these mixtures be mixed to form a new mixture containing half milk and half water is

- (1) 7 : 5 (2) 6 : 5
(3) 5 : 6 (4) 4 : 3

M

$$\frac{4}{7} \text{ } \cancel{y2x5x7}$$

W

$$\frac{2}{5} \text{ } \cancel{y2x\$x7}$$

$$\frac{1}{2} \text{ } \cancel{y2x5x7}$$

$$\begin{array}{ccc} 40 & & 28 \\ & \swarrow 35 \downarrow & \searrow \\ 2 & & 5 \end{array}$$

A container contains 60 kg of milk. From this container 6 kg of milk was taken out and replaced by water. This process was repeated further two times. The amount of milk left in the container is

- (1) 34.24 kg (2) 39.64 kg
~~(3)~~ 43.74 kg (4) 47.6 kg

$$\text{Rem. Lit} = x \left(1 - \frac{y}{x}\right)^n$$

$x \rightarrow$ Original Lit

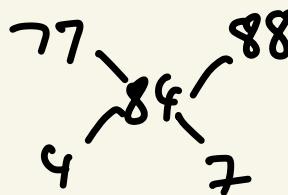
$y \rightarrow$ Lit Taken out

$n \rightarrow$ No. of times

$$\begin{aligned}\text{Rem. L} &= 60 \left[1 - \frac{6}{60}\right]^3 \\ &= 60 \left[\frac{9}{10}\right]^3 = \frac{60 \times 729}{1000} =\end{aligned}$$

Two alloys are both made up of copper and tin. The ratio of copper and tin in the first alloy is $1 : 3$ and in the second alloy is $2 : 5$. In what ratio should the two alloys be mixed to obtain a new alloy in which the ratio of tin and copper be $8 : 3$?

- (1) $3 : 5$ (2) ~~$4 : 7$~~
 (3) $3 : 8$ (4) $5 : 11$



$$\begin{matrix} C & T \\ 1 & 3 \\ 2 & 5 \end{matrix}$$

$$\frac{1}{4} \quad \frac{2}{7}$$

$$\frac{3}{11}$$

$$\frac{1}{4} \times 4 \times 7 \times 11$$

$$\frac{2}{7} \times 4 \times 11 \times 7$$

$$\frac{3}{11} \times 4 \times 7 \times 11$$

A mixture contains alcohol and water in the ratio 4 : 3. If 5 litres of water is added to the mixture, the ratio becomes 4 : 5. The quantity of alcohol in the given mixture is

- (1) 3 litres (2) 4 litres
(3) 15 litres (4) 10 litres

$$\frac{4k}{3k+5} = \frac{4}{5}$$

$$5k = 3k + 5$$

$$2k = 5$$

$$\underline{4k = 10}$$

$$\begin{matrix} A & W \\ 4 & 3 \\ 4:3 \\ 4:5 & \downarrow \\ 2 & 5 \\ 4 & \rightarrow ? \end{matrix}$$

In two alloys A and B, the ratio of zinc to tin is 5 : 2 and 3 : 4 respectively. Seven kg of the alloy A and 21 kg of the alloy B are mixed together to form a new alloy. What will be the ratio of zinc and tin in the new alloy ?

- (1) 2 : 1 (2) 1 : 2
(3) 2 : 3 ~~(4) 1 : 1~~

$$\begin{array}{r} \text{Z} \quad \text{T} \\ \text{A} \quad (5 \quad 2) \quad 7 \\ \text{B} \quad (3 \quad 4) \quad \underline{\underline{21}} \\ \hline (9 \quad 12) \quad 21 \end{array}$$

$$(5+9) : (2+12)$$

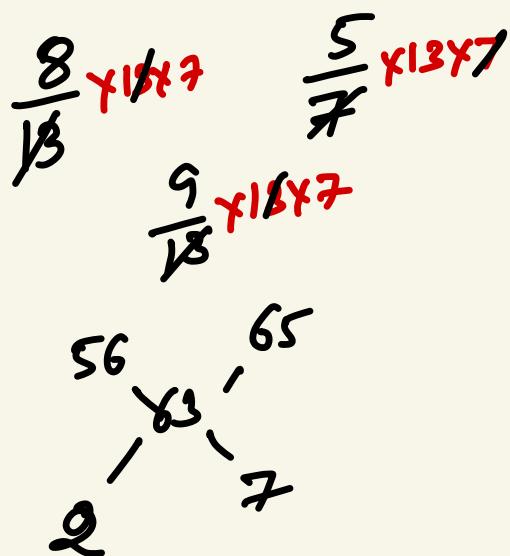
$$14 : 14$$

$$1 : 1$$

Two vessels A and B contain milk and water mixed in the ratio 8 : 5 and 5 : 2 respectively. The ratio in which these two mixtures be mixed to get a new mixture

containing $69\frac{3}{13}\%$ milk is:

- (1) 3 : 5 (2) 5 : 2
(3) 5 : 7 ~~(4)~~ 2 : 7



A barrel contains a mixture of wine and water in the ratio $3 : 1$. How much fraction of the mixture must be drawn off and substituted by water so that the ratio of wine and water in the resultant mixture in the barrel becomes $1 : 1$?

$$\begin{array}{c} \cancel{3 : 1} \\ \underline{2 : 2} \\ \frac{1}{3} \end{array}$$

- (1) $\frac{1}{4}$ (2) $\frac{1}{3}$
(3) $\frac{3}{4}$ (4) $\frac{2}{3}$

There is 81 litres pure milk in a container. One-third of milk is replaced by water in the container. Again one-third of mixture is extracted and equal amount of water is added. What is the ratio of milk to water in the new mixture?

- (1) 1 : 2 (2) 1 : 1
 (3) 2 : 1 ~~(4) 4 : 5~~

$$\text{Rem Lit} = x \left[1 - \frac{1}{x} \right]^n$$

$$= 81 \left[1 - \frac{27}{81} \right]^2$$

$$= 81 \times \frac{4}{9} = 36$$

<u>Milk</u>	<u>water</u>
36	45
4	5

Two types of alloy possess gold and silver in the ratio of 7 : 22 and 21 : 37. In what ratio should these alloys be mixed so as to have a new alloy in which gold and silver would exist in the ratio 25 : 62 ?

- (1) 13 : 8 (2) 8 : 13
(3) 13 : 12 (4) 6 : 9

$$\begin{array}{r} \cancel{\frac{7}{21}} \times \cancel{8} \cancel{7} \cancel{x} 2 \\ \cancel{\frac{21}{37}} \times \cancel{8} \cancel{7} \cancel{x} 2 \\ \hline \cancel{\frac{25}{84}} \end{array}$$

$$\begin{array}{r} 42 \\ 63 \\ \hline 13 \end{array}$$

8.

The ratio of spirit and water in two mixturers of 20 litre and 36 litre is 3 : 7 and 7 : 5 respectively. Both the mixtures are mixed together. Now the ratio of the spirit and water in the new mixture is

- (1) 25 : 29 (2) 9 : 10
 (3) 27 : 29 (4) 27 : 31

$$\begin{array}{r}
 S \quad W \\
 6 \quad 14 \rightarrow 20 \\
 21 \quad 15 \rightarrow 36 \\
 \hline
 27 \quad 29
 \end{array}$$

$$\begin{array}{r}
 12 \rightarrow 36 \\
 7 \rightarrow ? \\
 5 \rightarrow ?
 \end{array}$$

The ratio of milk and water in mixtures of four containers are 5 : 3, 2 : 1, 3 : 2 and 7 : 4 respectively. In which container is the quantity of milk, relative to water, minimum?

- (1) First (2) Second
- (3) Third (4) Fourth

M	W	M %
5	3	$\rightarrow 66\frac{2}{3}\%$
2	1	$\rightarrow 100\%$
3	2	$\rightarrow 50\%$
7	4	$\rightarrow 75\%$

$$\frac{3+100}{2+100} = \frac{3}{3+2} \times 100 = 66\frac{2}{3}\%$$

An alloy contains copper, zinc and nickel in the ratio of 5 : 3 : 2. The quantity of nickel (in kg) that must be added to 100 kg of this alloy to have the new ratio 5 : 3 : 3 is

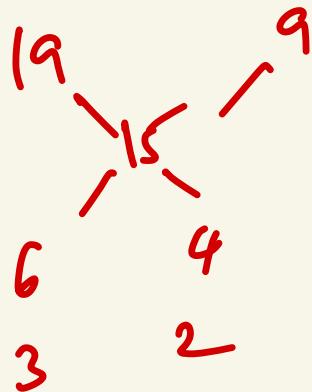
- (1) 8 (2) 10
(3) 12 (4) 15

C	2	N	(100)
5	3	2	
50	30	20	
5	3	3	
50	30	30	

10 kg of N.
added.

Gold is 19 times as heavy as water and copper is 9 times as heavy as water. In what ratio should these be mixed to get an alloy 15 times as heavy as water?

- (1) 1 : 1 (2) 1 : 2
(3) 2 : 3 (4) 3 : 2

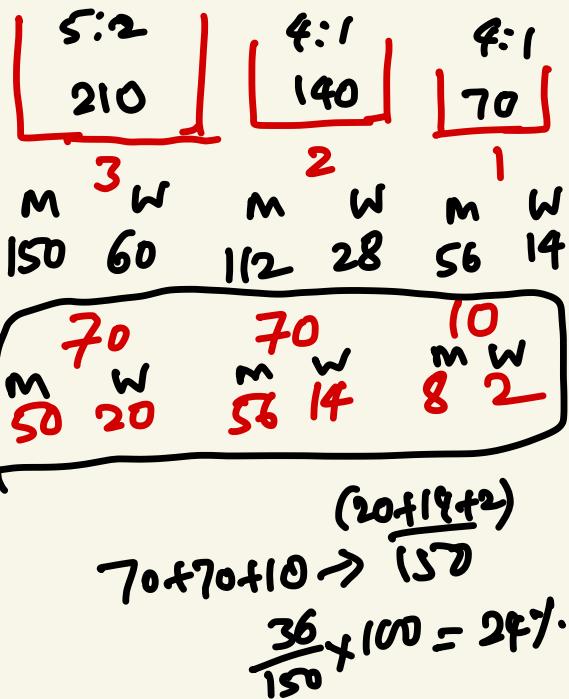


Three vessels whose capacities are $3 : 2 : 1$ are completely filled with milk mixed with water. The ratio of milk and water in the mixture of vessels are $5 : 2$, $4 : 1$ and $4 : 1$ respectively.

Taking $\frac{1}{3}$ of first, $\frac{1}{2}$ of second and $\frac{1}{7}$ of third mixtures, a

new mixture kept in a new vessel is prepared. The percentage of water in the new mixture is

- | | |
|--------|-------------------|
| (1) 28 | (2) 32 |
| (3) 30 | (4) 24 |



Income = Exp + Savings

The income of A, B and C are in the ratio 3 : 7 : 4 and their expenses in the ratio 4 : 3 : 5. If A saves ₹ 300 out of an income of ₹ 2,400, the savings of B and C are :

- (1) ₹ 4025 and ₹ 575
(2) ₹ 1575 and ₹ 2,625
(3) ₹ 2750 and ₹ 1,525
(4) ₹ 3725 and ₹ 1,525

A	B	C
2400	5600	3200
2100	1575	2625
300	4025	575

Between two consecutive years my income are in the ratio of 2 : 3 and expenses in the ratio 5 : 9. If my income in the second year is ₹ 45000 and my expenses in the first year is ₹ 25000 my total savings for the two years is :

- (1) Nil (2) ₹ 15000
(3) ₹ 10000 (4) ₹ 5000



2020	2021
2 30000	3 45000
5 25000	9 45000
<hr/>	<hr/>
5000	0
<hr/>	<hr/>

A and B have monthly incomes in the ratio 5 : 6 and monthly expenditures in the ratio 3 : 4. If they save ₹ 1800 and ₹ 1600 respectively, find the monthly income of B :

- (1) ₹ 3400 (2) ₹ 2700
 (3) ₹ 1720 (4) ₹ 7200

A	B
? $5x$	6 x
E $3y$	$4y$

$$5x - 3y = 1800$$

$$3x - 2y = 800$$

$$3x - 2y = 800$$

$$3x = 800 + 2x 1400$$

$$\cancel{3x} = \cancel{3600}$$

~~$$15x - 9y = 5400$$~~
~~$$15x - 10y = 4000$$~~

$$y = 1400$$

The ratio of income of two persons is 5 : 3 and that of their expenditures is 9 : 5. Find the income of each person, if they save ₹ 1,300 and ₹ 900 respectively.

- I 5 3
E 9 5
- (1) ₹ 4,000, ₹ 2,400 2700 1500
(2) ₹ 3,000, ₹ 1,800 1700 900
(3) ₹ 5,000, ₹ 3,000 3700 2100
(4) ₹ 4,500 ₹ 2,700 3200 1800

$$5x - 9y = 1300 \quad \text{--- (1)}$$

$$3x - 5y = 900 \quad \text{--- (2)}$$

Through option

The annual income of A and B are in the ratio 4 : 3 and the ratio of their expenditures is 3 : 2. If each of them saves ₹ 600 in the year, the annual income of A is

- (1) ₹ 4800 (2) ₹ 1800
(3) ₹ 1200 (4) ₹ 2400

$$\begin{array}{ccc} \text{I} & \textcircled{4} & 3 \\ \text{E} & 3 & 2 \\ \hline S & \overline{600} & \overline{600} \\ \end{array}$$

1 → 600
4 → ? 2400

The income of A, B and C are in the ratio 7 : 9 : 12 and their spendings are in the ratio

8 : 9 : 15. If A saves $\frac{1}{4}$ th of his

income, then the savings of A, B and C are in the ratio of :

- (1) 56 : 99 : 69 (2) 69 : 56 : 99
 (3) 99 : 56 : 69 (4) 99 : 69 : 56

	A	B	C
I	7	9	12
E	8	9	15

$$I - E = S$$

$$A \rightarrow 7x - 8y = 7x \times \frac{1}{4}$$

$$7x - 8y = ?$$

$$7x \times \frac{3}{4} = 8y$$

$$7x \times 32 - 8x \times 21$$

$$7x \times [4 - 3] = 56$$

$$\frac{x}{y} = \frac{32}{21}$$

$$7x - \frac{7x}{4} = 8y$$

$$7x \left[1 - \frac{1}{4}\right] = 8y$$

A man spends a part of his monthly income and saves a part of it. The ratio of his expenditure to his saving is 26 : 3. If his monthly income is ₹ 7250, what is the amount of his monthly savings ?

- (1) ₹ 350 (2) ₹ 290
(3) ₹ 750 ✓ (4) ₹ 780

$$\frac{E}{S} = \frac{26}{3}$$

$$\begin{aligned} I &= E + S \\ 29 &\rightarrow 7250 \\ 3 &\rightarrow ? \end{aligned}$$

750.

A person bought some rice and wheat for ₹ 380. The ratio of weight of rice and wheat is 4 : 3 and the price of equal amount of rice and wheat is in the ratio 5 : 6. The rice was bought of worth

- (1) ₹ 380 (2) ₹ 300
~~(3) ₹ 200~~ (4) ₹ 180

$$\begin{aligned}4 \times 5k &= 20k \\&= 20 \times 10 \\&= \underline{\underline{200}}\end{aligned}$$

P	W	
4	3	
P	5k	6k.

$$\begin{aligned}4 \times 5k + 3 \times 6k &= 380 \\20k + 18k &= 380\end{aligned}$$

$$\begin{aligned}38k &= 380 \\k &= 10\end{aligned}$$

The income of A and B are in the ratio 5 : 3. The expenses of A, B and C are in the ratio 8 : 5 : 2. If C spends ₹ 2000 and B saves ₹ 700, then A saves

- (1) ₹ 1500 (2) ₹ 1000
 (3) ₹ 500 (4) ₹ 250

	A	B	C
I	5	3	
E	8000	5000	2000
	<hr/>		
	700		

$$\begin{array}{l} \text{I} \\ \text{E} \\ \hline \end{array} \begin{array}{l} 1900 \\ 8 \rightarrow 5700 \\ 5 \rightarrow ? \end{array}$$

$$\begin{array}{r} 5 \times 1900 \rightarrow 9500 \\ - 8000 \\ \hline 1500 \end{array}$$

$$\begin{aligned} E &= 8000 \\ S &= 700 \\ I &= E + S = 8700 \end{aligned}$$

The ratio of income and expenditure of a person is 11 : 10. If he saves ₹ 9,000 per annum, his monthly income is

- (1) ₹ 8,000 (2) ₹ 8,800
(3) ₹ 8,500 (4) ₹ 8,250

11 : 10

1 → 9000

11 → ?

9000 p.c

$$\frac{9000}{12} = \underline{8250}$$

The ratio of weekly income of A and B is 9 : 7 and the ratio of their expenditures is 4 : 3. If each saves ₹ 200 per week, then the sum of their weekly income is

- (1) ₹ 3,600 ~~X~~ (2) ₹ 3,200 ~~✓~~
 (3) ₹ 4,800 (4) ₹ 5,600 ~~X~~

$$(9:7) \rightarrow \underline{16}$$

$$\begin{array}{r} 4 \\ - 3 \\ \hline 200 \end{array}$$

$$9x - 4y = 7x - 3y$$

$$\begin{array}{l} 9x - 4y = 200 \\ 9x - 8x = 200 \end{array}$$

$$\begin{array}{r} 2x = y \\ \hline x = 200 \end{array}$$

$$16x = 3200$$

The ratio of the incomes of A and B as well as of B and C is 3 : 2.
If one third of A's income exceeds one fourth of C's income by ₹1000, what is B's income in ₹?

- (1) 3000 ✓ (2) 2500
(3) 3500 (4) 4000

$$\begin{array}{ccc} A & B & C \\ 3 & 2 & \\ \swarrow & \downarrow & \searrow \\ 9 & 6 & 4 \end{array}$$

$$6x$$
$$6x - 500 = 3000$$

$$\frac{1}{3} \times 9x - \frac{1}{4} \times 4x = 1000$$

$$3x - x = 1000$$

$$2x = 1000$$

$$x = 500$$

If the annual income of A, B and C are in the ratio 1 : 3 : 7 and the total annual income of A and C is ₹ 8,00,000, then the monthly salary of B (in ₹) is

- (1) 20,000 (2) 25,000
(3) 30,000 (4) 15,000

A B C
1 3 7

$$8 \rightarrow ₹ 8,00,000$$

$$\begin{array}{r} 160000 \quad 300000 \quad 700000 \\ \hline \frac{300000}{12} = 25000 \end{array}$$

₹ 180 contained in a box consists of one rupee, 50 paise and 25 paise coins in the ratio 2 : 3 : 4. What is the number of 50 paise coins?

- (1) 60 (2) 120
(3) 150 (4) 180

$$\begin{array}{cccc} 1 & 50 & 25 \\ \underline{2} & \underline{3} & \underline{4} \\ \hline 2x + 1.5x + 1x = 180 \\ x = 40 \\ 80 \quad 60 \quad 40 \\ \hline 120 \end{array}$$

If 378 coins consist of rupees, 50 paise and 25 paise coins, whose values are in the ratio of 13 : 11 : 7, the number of 50 paise coins will be :

- (1) 132 (2) 128
(3) 136 (4) 133

13 : 11 : 7

Total coins = 378

$$13x + \underline{22x} + 7x = 378$$

$$63x = 378$$

$$x = \frac{378}{63} = 6.$$

22x

$$22x = \underline{132}$$

A bag contains ₹ 90 in coins of denominations of 50 paise, 25 paise and 10 paise. If coins of 50 paise, 25 paise and 10 paise are in the ratio 2 : 3 : 5, then the number of 25 paise coins in the bag is

- (1) 80 ~~(2)~~ 120
 (3) 100 (4) 135

50	25	10
2	3	5

$$1x + \frac{0.75x + 0.5x}{2.25} = 90$$

$$2.25x = 90$$

$$x = \frac{90}{2.25} = \frac{90 \times 4}{9}$$

$$x = 40$$

$$3 \times 40 = \underline{120}$$

$$5 \times 40 = \underline{200}$$

There are ₹ 225 consisting of one rupee, 50 paise and 25 paise coins. The ratio of their numbers in that order is 8 : 5 : 3. The number of one-rupee coins is :

- (1) 80 (2) 112
~~(3) 160~~ (4) 172

$$\begin{array}{r} 1 \quad 8x \\ 8 \quad 8x \end{array} \quad \begin{array}{r} 50 \\ 5 \\ 3 \end{array}$$

$$8x + 2.5x + 0.75x = 225$$

$$11.25x = 225$$

$$x = \frac{225}{11.25}$$

$$x = \frac{10}{\cancel{225}} \times \cancel{225}$$

$$\boxed{x = 20}$$

A box contains 1-rupee, 50-paise and 25-paise coins in the ratio 8 : 5 : 3. If the total amount of money in the box is ₹ 112.50, the number of 50-paise coins is

- (1) 80 (2) 50
(3) 30 (4) 42

$$1 \quad 0.50 \quad 0.25$$

8 5 3

$$8x + 2.5x + 0.75x = 112.5$$

$$11.25x = 112.5$$

$$\boxed{x = 10}$$

$$5 \times 10 = 50$$

$$80 \quad 50 \quad 30$$

$$80 + 25 + 7.5$$

$$\underline{112.5}$$

In a bag, there are three types of coins — 1-rupee, 50 paise and 25-paise in the ratio of 3 : 8 : 20. Their total value is ₹ 372. The total number of coins is

- (1) 1200 ~~(2)~~ 961
(3) 744 (4) 612

$$\begin{array}{ccc} 1 & 0.50 & 0.25 \\ \hline 3 & 8 & 20 \end{array}$$

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

$$12x = 372$$

$$x = 31$$

$$31 \times 31 = 961$$

A box has 210 coins of denominations one-rupee and fifty paise only. The ratio of their respective values is 13 : 11. The number of one-rupee coins is

- (1) 65 (2) 66
(3) 77 ✓(4) 78

$$13x + 22x = 210$$

$$(0.50)$$

$$13 : 11$$

$$13x + 22x = 210$$

$$35x = 210$$

$$x = \frac{210}{35} = \frac{30}{5}$$

$$x = 6$$

A boy has a few coins of denominations 50 paise, 25 paise and 10 paise in the ratio 1 : 2 : 3. If the total amount of the coins is ₹ 6.50, the number of 10 paise coins is

- (1) 5
- (2) 10
- (3) 15
- (4) 20

A man has in all ₹ 640 in the denominations of one-rupee, five-rupee and ten-rupee notes. The number of each type of notes are equal. What is the total number of notes he has?

- (1) 150 (2) 120
(3) 100 (4) 90

$$\begin{array}{r} 1 \quad 5 \quad 10 \\ \hline 1 \quad 1 \quad 1 \\ \hline x + 5x + 10x = 640 \end{array}$$

$$3x = 120$$

$$16x = 640$$

$$\begin{array}{ccc} 40 & 40 & 40 \\ 40 + 200 + 400 \rightarrow \underline{640} \end{array}$$

$$x = 40$$

A bag contains three types of coins-rupee-coins. 50p-coins and 25 p-coins totalling 175 coins. If the total value of the coins of each kind be the same, the total amount in the bag is

- (1) ₹ 75 (2) ₹ 175
(3) ₹ 300 (4) ₹ 126

1 1 1

$$1x + 2x + 4x = 175$$

$$7x = 175$$

$$x = 25$$

$$25 \quad 25 \quad 25 = 75$$

By mistake, instead of dividing ₹, 117 among A, B and C in the ratio $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$ it was divided in the

ratio of 2 : 3 : 4. Who gains the most and by how much?

- (1) A, ₹ 28 (2) B, ₹ 3
(3) C, ₹ 20 (4) C, ₹ 25

$$\frac{1}{2} : \frac{1}{3} : \frac{1}{4} \times \cancel{\frac{6}{6}} : \frac{1}{3} \times \cancel{\frac{4}{4}} : \frac{1}{4} \times \cancel{\frac{3}{3}}$$

$$(2 : 3 : 4)$$

$$(6 : 4 : 3) \rightarrow 13 \rightarrow 117$$

$$2 : 3 : 4 \quad 6 \rightarrow ?$$

$$4 \rightarrow ?$$

$$3 \rightarrow ?$$

$$\frac{54}{26} \quad \frac{36}{39} \quad \frac{27}{52} \quad \frac{52}{25}$$

$$(2 : 3 : 4) \quad 13 \rightarrow 117$$

$$2 \rightarrow ?$$

$$\begin{matrix} A \\ B \\ C \end{matrix} \quad \begin{matrix} \underline{54} \\ \underline{26} \end{matrix}$$

Divide ₹ 7,500 among A, B and C such that A's share to B's share is in ratio 5 : 2 and B's share to C's share is in the ratio 7 : 13. How much will B receive?

- (1) ₹ 1,400 (2) ₹ 3,500
(3) ₹ 2,600 (4) ₹ 7,000

$$\begin{array}{ccc} A & B & C \\ 5 & 2 & \\ \xrightarrow{7} & 7 & \downarrow 13 \\ 35 & 14 & 26 \\ \hline \end{array}$$

$$\begin{array}{c} 35 \\ 14 \\ 26 \\ \hline 75 \end{array}$$

$$\begin{array}{l} 14 \rightarrow ? \\ 75 \rightarrow \frac{7500}{100} \\ \text{Rs. } 1400 \end{array}$$

₹ 3400 is divided among A, B, C, D in such a way that the share of A and B, B and C, C and D may be as 2 : 3, 4 : 3 and 2 : 3 respectively. The sum of shares of B and D is

- (1) ₹ 2040 (2) ₹ 1680
 (3) ₹ 2000 (4) ₹ 1720

A	B	C	D
2	3	3	3
4	4	3	3
2	2	2	3
	16	24	18 27

$$\begin{array}{l} \cancel{5} \\ \cancel{85} \rightarrow \cancel{3400} \\ 51 \rightarrow ? \\ 51 \times 40 = \underline{\underline{2040}} \end{array}$$

$$\begin{array}{l} (16 + 24 + \underline{\underline{18 + 27}}) \rightarrow 3400 \\ (24 + 27) \rightarrow ? \end{array}$$

₹ 68000 is divided among A, B

and C in the ratio of $\frac{1}{2} : \frac{1}{4} : \frac{5}{16}$.

The difference of the greatest and the smallest part is :

- (1) ₹ 6000 (2) ₹ 14440
(3) ₹ 9200 (4) ₹ 16000

$$\left(\frac{1}{2} : \frac{1}{4} : \frac{5}{16} \right) \times 16$$

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

$$\underline{\underline{8 : 4 : 5}}$$

~~1/2 → 68000~~
~~40000~~

~~4 → ?~~

16000

An amount of money is to be distributed among P, Q and R in the ratio of 2 : 7 : 9. The total of P's and Q's share is equal to R's share. What is the difference between the shares of P and Q ?

- (1) ₹ 5000 (2) ₹ 7500
- (3) ₹ 9000
- (4) Information inadequate

P Q R
2 7 9

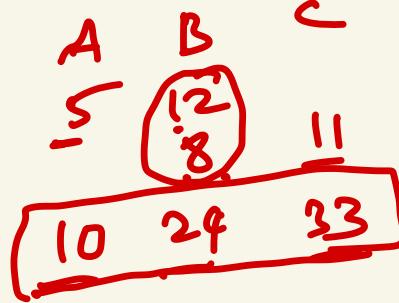
$$P + Q = R$$

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

- (1) ₹ 620 (2) ₹ 430
 (3) ₹ 360 ~~(4) ₹ 270~~

$$\frac{A}{B} = \frac{5}{12}; \quad \frac{B}{C} = \frac{4}{5.5}$$

$$\frac{A}{B} = \frac{5}{12}; \quad \frac{B}{C} = \frac{8}{11}$$



$$9 \rightarrow ? \\ 67 \rightarrow 2010 \\ 270$$

₹ 600 are divided among A, B and C so that ₹ 40 more than $\frac{2}{5}$

of A's share, ₹ 20 more than $\frac{2}{7}$ of B's share and ₹ 10 more than $\frac{9}{17}$ of C's share are all equal. A's share is

- (1) ₹ 180 (2) ₹ 160
~~(3)~~ ₹ 150 (4) ₹ 140

$$\underline{\frac{2}{5}A+40 = \frac{2}{7}B+20 = \frac{9}{17}C+10}$$

$$\underline{A+B+C=600}$$

$$\underline{\frac{2}{5}A+40 = \frac{9}{17}C+10}$$

$$\underline{\frac{2}{5}A+30 = \frac{9}{17}C}$$

$$\underline{\frac{34}{5}A + 510 = 9C}$$

$$C = \frac{\frac{34}{5}A + 510}{9}$$

$$A + B + C = 600$$

$$A + \frac{7}{5}A + 70 + \frac{34A}{45} + \frac{510}{9} = 600$$

$$A + \frac{7}{5}A + \frac{34A}{45} = 530 - \frac{510}{9}$$

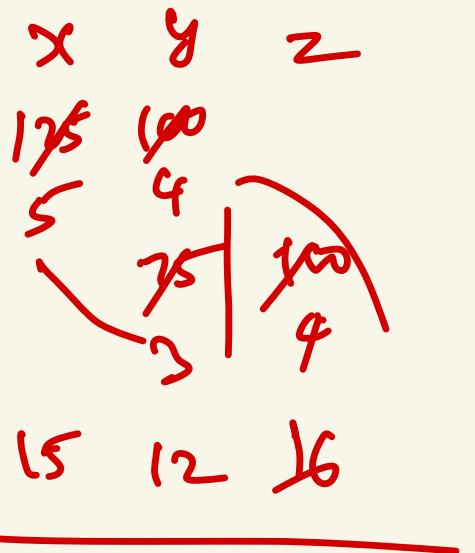
$$\frac{45A + 63A + 34A}{45} = \frac{4260}{9}$$

$$142A = \frac{4260 \times 5}{9}$$

$$A = \frac{30 \times 5}{9} = 150.$$

A certain amount of money is divided among x , y and z . If x receives 25% more than y and y receives 25% less than z , then $x : y : z$ is equal to

- (1) 14 : 12 : 13 \times
- (2) 15 : 12 : 16 \checkmark
- (3) 10 : 9 : 12 \times
- (4) 12 : 10 : 11 \times



A sum of ₹ 76 is divided among A, B and C in such a way that A gets ₹ 7 more than what B gets and B gets ₹ 6 more than what C gets. The ratio of their shares is

- (1) 19 : 24 : 33 (2) 32 : 25 : 19
(3) 32 : 24 : 20 (4) 19 : 25 : 33

$$\begin{array}{ccc} A & B & C \\ x+7 & x & x-6 \end{array}$$

$$x+7+x+x-6=76$$

$$\begin{array}{ccc} A & B & C \\ 32 & 25 & 19 \\ \hline \end{array}$$

$$3x+1=76$$

$$3x=76-1=75$$

$$\boxed{x=25}$$

₹ 3,000 is divided between A, B and C, so that A receives $\frac{1}{3}$ as much as B and C together receive and B receives $\frac{2}{3}$ as much as A and C together receive. Then the share of C is

- (1) ₹ 600 (2) ₹ 525
 (3) ₹ 1,625 (4) ₹ 1,050

$$3000 - \underline{(750 + 1200)}$$

$\rightarrow 1050$

$$A = \frac{1}{3} (B+C) \Rightarrow B+C=3A$$

$$B = \frac{2}{3} (A+C) \Rightarrow A+C=\frac{3B}{2}$$

$$A+B+C = 3000$$

$$A+3A = 3000$$

$$4A = 3000 \quad \boxed{A=750}$$

$$\frac{3B}{2} + B = 3000$$

$$5B = 6000 \rightarrow \boxed{B=1200}$$

Two numbers are in the ratio 17 : 45. One-third of the smaller is

less than $\frac{1}{5}$ of the bigger by 15.

The smaller number is

$$(1) 25\frac{1}{2} \quad (2) 67\frac{1}{2}$$

\checkmark (3) $76\frac{1}{2}$ (4) $86\frac{1}{2}$

17 : 45

17x 45x

$$\frac{1}{3} + 17x = \frac{1}{5} \times 45x - 15$$

$$\frac{17}{3}x = 9x - 15$$

$$9x - \frac{17}{3}x = 15$$

$$27x - 17x = 45$$

$$10x = 45$$

$$x = 9/2$$

17x

$$17 \times 9/2$$

$$\frac{153}{2}$$

The ratio of the first and second class train fares between two stations is 3 : 1 and that of the numbers of passengers travelling between the two stations by first and second classes is 1 : 50. If on a particular day, ₹ 1,325 are collected from passengers travelling between the two stations, then the amount collected from the second class passengers is

- ~~(1)~~ ₹ 1,250 (2) ₹ 1,000
 (3) ₹ 850 (4) ₹ 750

$$50x \rightarrow 50x \times 25$$

$$\underline{125 \cdot 1250}$$

$$\begin{array}{r} \text{I} \\ \text{II} \\ 3 \\ \hline 3x \end{array} \qquad \begin{array}{r} 1 \\ 1 \\ \hline x \\ 50 \\ \hline 50x \end{array}$$

$$3x \times 1 + x \times 50 = 1325$$

$$3x + 50x = 1325$$

$$53x = 1325$$

$$x = 25$$

In an examination, the number of those who passed and the number of those who failed were in the ratio $25 : 4$. If five more had appeared and the number of failures was 2 less than earlier, the ratio of passers to failures would have been $22 : 3$. The total number who appeared at the examination is

- (1) 145 (2) 150
 (3) 155 (4) 180

$$\begin{array}{ccc} P & F & T \\ \underline{25x} & \underline{4x} & \underline{29x} \end{array}$$

$$\frac{29x + 5}{4x - 2} = \frac{25}{3}$$

$$87x + 15 = 100x - 50$$

$$13x = 65$$

$$\boxed{x = 5}$$

$$29x = 145$$

The ratio of the numbers of boys and girls in a school was 5 : 3. Some new boys and girls were admitted to the school, in the ratio 5 : 7. At this, the total number of students in the school became 1200, and the ratio of boys to girls changed to 7 : 5. The number of students in the school before new admissions was

- (1) 700 (2) 720 (3) 900 (4) 960

$$\frac{B}{G} = \frac{5}{3}$$

$$B = 5x \quad G = 3x$$

$$\frac{5x + 5k}{3x + 7k} = \frac{7}{5}$$

$$25x + 25k = 21x + 49k$$

$$5x + 5k = 700$$

$$30k + 5k = 700$$

$$8x = 960$$

$$4x = 24k$$

$$x = 6k$$

$$x = 120$$

Three persons walk from place A to place B. Their speeds are in the ratio 4 : 3 : 5. The ratio of the time taken by them to reach B will be :

- (1) 10 : 15 : 13 (2) 2 : 3 : 4
~~(3)~~ 15 : 20 : 12 (4) 16 : 18 : 15

$$\begin{array}{ll} S & 4 : 3 \\ T & 3 : 4 \end{array}$$

Speed ratio
Time ratio

$$4 : 3 : 5$$
$$\left(\frac{1}{4} : \frac{1}{3} : \frac{1}{5} \right) 60$$

$$\frac{1}{4} \times 60 : \frac{1}{3} \times 60 : \frac{1}{5} \times 60$$
$$(15 : 20 : 12)$$

From each of the two given unequal numbers, half the smaller number is subtracted. Then, of the resulting numbers, the larger one is five times than the smaller one. Then the ratio of the larger to smaller one is

- (1) 2 : 1 (2) 3 : 2
~~(3)~~ 3 : 1 (4) 1 : 4

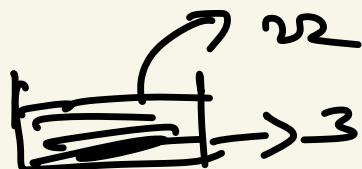
x y
 ↓ ↓
 Large Small

$$\frac{x - \frac{y}{2}}{y - \frac{y}{2}} = \frac{5}{1}$$

$$x = \frac{y}{2} (3) \\ x = 3y \\ \boxed{\frac{x}{y} = \frac{3}{1}} \\ x - \frac{y}{2} = 5x \frac{y}{2} \\ x = 5 \frac{y}{2} + \frac{y}{2}$$

A box filled with paper bundles weighs 36 kg. If the weight of the box and paper bundles respectively are in the ratio of 3 : 22, then the weight of the papers (in grams) is

- (1) 30680 grams (2) 30710 grams
(3) 31500 grams (4) ~~31680 grams~~



36 kg

$$22+3 \rightarrow 36$$

$$22 \rightarrow ?$$

$$\frac{22 \times 36}{25} \text{ kg}$$

Two numbers are such that the square of one is 224 less than 8 times the square of the other. If the numbers are in the ratio $\textcircled{3:4}$, then their values are

- (1) 12, 16 (2) 6, 8
 (3) 9, 12 (4) 12, 9

$8, 6$

$$\begin{aligned}x &= 4k \\y &= 3k\end{aligned}$$

$$\frac{256}{024}$$

$x \quad y$

$$x^2 = 8y^2 - 224$$

$$8y^2 - x^2 = 224$$

$$8x^2 - 16k^2 = 224$$

$$72k^2 - 16k^2 = 224$$

$$56k^2 = 224 \quad | :4$$

$$\boxed{k=2}$$

In a school, 10% of number of girls is equal to $\frac{1}{20}$ th of number of boys. Ratio between the number of boys to number of girls is

(1) ~~1 : 2~~ (2) 2 : 1
(3) 1 : 4 (4) 4 : 1

$$\frac{10}{100} G = \frac{1}{20} B$$

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

An office opens at 10 AM and closes at 5 PM. The lunch interval is for 30 minutes. The ratio of lunch interval to the total period of office hours is

- (1) 1 : 7 ~~(2) 1 : 14~~
(3) 7 : 1 (4) 14 : 1

$$\begin{array}{l} \text{10 AM} \quad \text{5 PM} \\ 30 \text{ min} : 7 \times 60^2 \\ \quad \quad \quad (\because 14 \end{array}$$

$$\begin{array}{l} \frac{1}{2} : 7 \\ \underline{1 : 14} \end{array}$$

In an army selection process, the ratio of selected to unselected candidates was 3 : 1. If 80 less had applied and 40 less selected, the ratio of selected to unselected candidates would have been 4 : 1. How many candidates had applied for the process?

- (1) 480 (2) 960
(3) 240 (4) 1440

(SSC CHSL (10+2) Tier-I (CBE)

Exam. 15.01.2017) (IIInd Sitting)

In an army selection process, the ratio of selected to unselected candidates was 4:1. If 90 less had applied and 20 less were selected, the ratio of selected to unselected candidates would have been 5:1. How many candidates had applied for the process ?

- (1) 1650 (2) 3300
(3) 825 (4) 4950

$$\frac{S}{U} = \frac{3}{1} \Rightarrow \frac{S}{T} = \frac{3}{4}$$

$$\frac{3k-40}{4k-80} = \frac{4}{5}$$

$$15k - 200 = 16k - 320$$

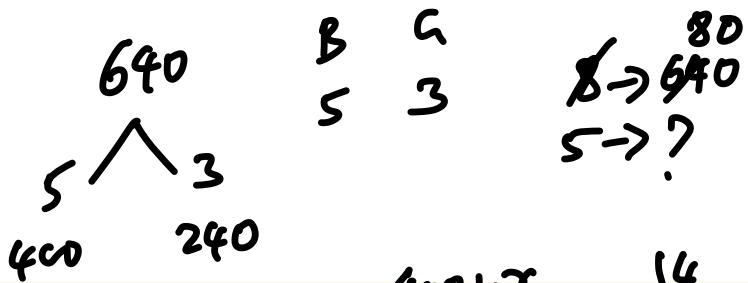
$$k = 120$$

$$4k = 4 \times 120 = 480.$$

SSC CGL 2019 Tier 1 .
ALL RATIO AND PROPORTION QUESTIONS.

The ratio of the number of boys to the number of girls in a school of 640 students, is 5 : 3. If 30 more girls are admitted in the school, then how many more boys should be admitted so that the ratio of boys to that of the girls, becomes 14 : 9.

- 1. 15
- 2. 30
- 3. 20
- 4. 25



$$\frac{400+x}{\cancel{270} \overline{)30}} = \frac{14}{9}$$

$$400+x = 420$$

$$\boxed{x=20}$$

If the base radius of 2 cylinders are in the ratio 3 : 4 and their heights are in the ratio 4 : 9, then the ratio of their volumes is:

- 1. 1 : 2
- 2. 2 : 1
- 3. 4 : 1
- 4. 1 : 4

radius 3 : 4
height 4 : 9

vol ratio $\rightarrow 1 \times 4 : 16 \times 9$

1 : 4

$$\boxed{\text{Vol} = \pi r^2 h}$$



$$\cancel{1 \times 4 \times 4 : \pi \times 16 \times 9} \\ 1 : 4$$

If x is the mean proportional between 12.8 and 64.8 and y is the third proportional to 38.4 and 57.6, then $2x : y$ is equal to:

✓ 1. $2 : 3$

✗ 2. $1 : 2$

✗ 3. $3 : 4$

✗ 4. $4 : 5$

$$x = \sqrt{12.8 \times 64.8}$$
$$= \sqrt{\frac{128}{10} \times \frac{648}{10}}$$

$$y = \frac{3576 \times 576}{2384}$$
$$y = 3 \times 28.8$$

$$x = \frac{8744 \times 9}{10} \quad y = 3 \times 28.8$$
$$\underline{2 \times 8744 \times 9} : 3 \times 288$$
$$2 : 3$$

Two numbers are in the ratio 5 : 7. If the first number is 20, then the second number will be:

- 1. 8
- 2. 22
- 3. 28
- 4. 18

$$\begin{array}{r} 5 - 20 \\ 7 - ? \\ \hline 7 \rightarrow 28. \end{array}$$

The ratio of boys and girls in a group is 7 : 6. If 4 more boys join the group and 3 girls leave the group, then the ratio of boys to girls becomes 4 : 3. What is the total number of boys and girls initially in the group?

- 1. 117
- 2. 78
- 3. 91
- 4. 104

$$\begin{matrix} \text{B} \\ 7x \end{matrix} \quad \begin{matrix} \text{G} \\ 6x \end{matrix}$$

$$\frac{7x+4}{6x-3} = \frac{4}{3}$$

$$21x + 12 = 24x - 12$$

$$\begin{matrix} (7x+6x) & 3x = 24 \\ 13x \rightarrow ? & \boxed{x=8} \\ (3+8) \rightarrow 04 & \end{matrix}$$

A sum of ₹ x was divided between A, B, C and D in the ratio $\frac{1}{3} : \frac{1}{5} : \frac{1}{6} : \frac{1}{9}$. If the difference between the shares of B and D is ₹832, then the value of x is:

✓ 1. ₹7,592 ✓

✗ 2. ₹7,384

✗ 3. ₹7,696

✗ 4. ₹7,488

$$\frac{1}{3} \quad \frac{1}{5} \quad \frac{1}{6} \quad \frac{1}{9}$$

$$\frac{1}{3} \times 90 : \frac{1}{5} \times 90 : \frac{1}{6} \times 90 : \frac{1}{9} \times 90$$

$$9 \times 5 = 45$$

$$9 \times 10 = 90$$

$$A \quad B \quad C \quad D \\ 30 : 18 : 15 : 10$$

$$\overbrace{30}^{104} \quad 18 \rightarrow 832 \quad 15 \quad 10$$

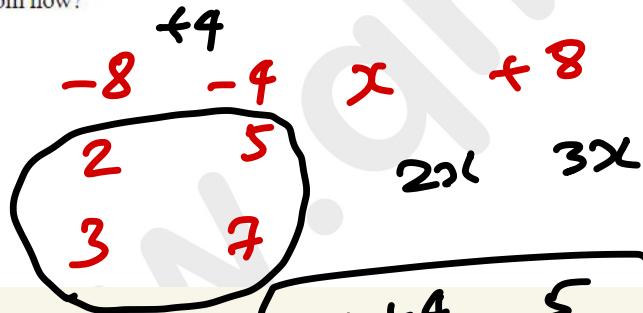
$$8 \rightarrow 832 \\ 73 \rightarrow ?$$

$$\begin{array}{r} 30 \\ 18 \\ 15 \\ 10 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 164 \quad 73 \\ \hline 2 \end{array}$$

The ratio of the ages of A and B, 8 years ago, was 2 : 3. Four years ago, the ratio of their ages was 5 : 7. What will be the ratio of their ages 8 years from now?

- 1. 4 : 5
- 2. 3 : 4
- 3. 7 : 8
- 4. 5 : 6



$$16 + 16 = 32$$

$$24 + 16 = 40$$

$$\begin{matrix} 32 : 40 \\ 4 : 5 \end{matrix}$$

$$\frac{2x+4}{3x+4} = \frac{5}{7}$$

$$(4x+28) = 15x+20$$

$$x = 8$$

A certain amount is divided among Sunita, Amit and Vibha in the ratio of 2 : 3 : 4. If Vibha gets ₹14,416, then the total amount is:

- 1. ₹16,219
- 2. ₹32,436
- 3. ₹3,604
- 4. ₹43,248

$4 \rightarrow 14416$

$9 \rightarrow ?x$

$x \rightarrow 32436$

If angles of a triangle are in the ratio of $2 : 3 : 4$, then the measure of the smallest angle is:

- 1. 20°
- 2. 30°
- 3. 40°
- 4. 50°



$$\begin{array}{rcl} 2+3+4 & = & 20 \\ \downarrow & & \downarrow \\ 1 & \rightarrow & 180 \\ 2 & \rightarrow & ? \end{array}$$

If a sum of ₹1,180 is to be divided among A, B and C, such that 2 times A's share, 5 times B's share and 7 times C's share, are equal, then A's share is:

- 1. ₹500 ✗
- 2. ₹750 ✗
- 3. ₹650 ✗
- 4. ₹700 ✓

$$2A = 5B = 7C$$

$$\begin{array}{ccc} A & B & C \\ 35 & 14 & 10 \end{array}$$

$$\begin{array}{c} 59 \rightarrow 1180 \\ 35 \rightarrow ? \end{array}$$

$$59 \times 2 = 118$$

The sum of the squares of 3 natural numbers is 1029, and they are in the proportion 1 : 2 : 4. The difference between greatest number and smallest number is:

✓ 1. 21

✗ 2. 18

✗ 3. 15

✗ 4. 31

$$x \quad 2x \quad 4x$$

$$x^2 + 4x^2 + 16x^2 = 1029$$

$$21x^2 = 1029$$

$$4x - x = 3x$$

$$x^2 = \frac{1029}{21} = \frac{147}{3}$$

$$= 3 \times 7$$

$$= 21$$

$$x^2 = 49$$

$$\boxed{x = 7}$$

In $\triangle ABC$, if the ratio of angles is in the proportion $3 : 5 : 4$, then the difference between the biggest and the smallest angles (in degrees) is:

1. 35°

2. 25°

3. 30°

4. 20°

$12 \rightarrow 180$

$2 \rightarrow ?x$

$$x = \frac{2(4+5+3)0}{12} \\ x = \underline{\underline{120}}$$

If $A : B = 3 : 5$, and $B : C = 2 : 3$, then $A : B : C$ is equal to:

1. $3 : 8 : 6$

2. $3 : 7 : 3$

3. $6 : 10 : 15$

4. $6 : 15 : 10$

$$\begin{array}{r} 3 : 5 \\ 2 : 3 \\ \hline 6 : 10 : 15 \end{array}$$

The total number of students in a class is 65. If the total number of girls in the class is 35, then the ratio of the total number of boys to the total number of girls is:

- 1. 7 : 6
- 2. 6 : 7 ✓
- 3. 13 : 7
- 4. 7 : 13

$$\begin{array}{ccc} & 65 & \\ B & 30 & G \\ & 35 & \\ & 6 : 7 & \end{array}$$

SSC CGL 2018 TIER 2 ALL RATIO QUESTIONS

1. The ratio of the income of A to that of B is 5 : 7. A and B save Rs.4,000 and Rs.5,000 respectively. If the expenditure of A is equal to $66\frac{2}{3}\%$ of the expenditure of B, then the total income of A and B is :
 A और B की आय का अनुपात 5: 7 है। A और B क्रमशः रु 4000 और Rs.5,000 बचाते हैं। यदि A का व्यय B के व्यय के $66\frac{2}{3}\%$ के बराबर है, तो A और B की कुल आय है:
 (a) Rs.28,800 (b) Rs.26,400 (c) Rs.25,200 (d) Rs.24,000

	A	B
T	$5x$	$7x$
F	$2y$	$3y$
S	4000	5000
$(2x \rightarrow 12x = 2000)$		
$\therefore 24000$		

$$\cancel{x} \quad 5x - 2y = 4000$$

$$+ \cancel{2} \quad 7x - 3y = 5000$$

$$(7x - 6y = 12000)$$

$$\underline{\underline{14x - 6y = 10000}}$$

$$x = 2000$$

2. In a school, $\frac{4}{9}$ of the number of students are girls and the rest are boys. $\frac{3}{5}$ of the number of boys are below 12 years of age and $\frac{5}{12}$ of the number of girls are 12 years or above 12 years of age. If the number of students below 12 years of age is 480, then $\frac{5}{18}$ of the total number of students in the school will be equal to:

एक स्कूल में, छात्रों की संख्या में $\frac{4}{9}$ लड़कियां हैं और बाकी लड़के हैं। लड़कों की संख्या का $\frac{3}{5}$, 12 वर्ष से कम है और लड़कियों की संख्या का $\frac{5}{12}$, 12 वर्ष या 12 वर्ष से अधिक है। यदि 12 वर्ष से कम आयु के छात्रों की संख्या 480 है, तो स्कूल में कुल छात्रों की संख्या का $\frac{5}{18}$ के बराबर होगा:

- (a) 240 (b) 315 ~~(c) 225~~ (d) 270

$$\begin{array}{l}
 \text{B} \quad C \\
 \cancel{5x} \quad 4x \\
 \frac{3}{5}x + \frac{5}{12}x = 480 \\
 \frac{3}{5}x + \frac{7}{12}x = 480 \rightarrow \frac{16x}{20} = 480 \rightarrow x = 90
 \end{array}$$

below yrs $\frac{3}{5}x + 5x$
 below 12 yrs $\frac{7}{12}x + 4x$

$$9x + \frac{5}{18}$$

$$\begin{array}{r} 9x + \frac{45}{18} \\ - 9x - 90x \cancel{\frac{5}{18}} \\ \hline 2 \end{array}$$

225

3. When x is added to each of 2, 3, 30 and 35, then the numbers obtained in this order, are in proportion. What is the mean proportional between $(x + 7)$ and $(x - 2)$?

जब 2, 3, 30 और 35 में से प्रत्येक में x जोड़ा जाता है, तो इस क्रम में प्राप्त संख्याएं, समानुपातिक होती है।
 $(x+7)$ और $(x-2)$ के बीच का मध्यानुपातिक क्या होगा?

- (a)7 (b)4 (c)5 (d)6

$$\frac{2+x}{3+x} = \frac{30+x}{35+x}$$

$$\sqrt{(x+7)(x-2)}$$

$$(2+x)(35+x) = (30+x)(1+x)$$

$$\sqrt{12 \times 3} = \sqrt{36}$$

$$70+2x+35x+x^2 = 90+30x+3x+x^2$$

$$\frac{70+2x+35x+x^2}{4x+20} = \boxed{x=5}$$

4. One year ago, the ratio of the age (in years) of A to that of B was 4 : 3. The ratio of their respective ages, 3 years from now, will be 6 : 5. What will be the ratio of respective ages of A and B, 9 years from now?

एक वर्ष पहले, A और B की आयु (वर्षों में) का अनुपात 4:3 था। उनकी पारस्परिक आयु का अनुपात, अब से 3 वर्ष बाद, 6:5 होगा। अब से 9 साल A और B की पारस्परिक आयु का अनुपात क्या होगा,?

- (a) 8 : 7 (b) 10 : 9 (c) 9 : 8 (d) 7 : 6

$$\begin{array}{ccccc}
 & -1 & \xrightarrow{\text{Now}} & +3 & \\
 \begin{matrix} A \\ B \end{matrix} & \begin{matrix} 4 \\ 3 \end{matrix} & \underline{4yrs} & \begin{matrix} 6 \\ 5 \end{matrix} & \underline{9:8} \\
 \begin{matrix} 8 \\ 6 \end{matrix} & \begin{matrix} 9 \\ 7 \end{matrix} & \textcircled{18} & \begin{matrix} 4x+4 \\ 3x+4 \end{matrix} & \begin{matrix} 6 \\ 5 \end{matrix} \rightarrow \begin{matrix} 20x+20 \\ = 18x+24 \end{matrix} \\
 & & \begin{matrix} 16 \\ 15 \end{matrix} & & 2x=4 \\
 & & & & x=2
 \end{array}$$

5. Two-third of the number of employees of a company are males and the rest are females. If $\frac{3}{8}$ of the male employees and $\frac{2}{5}$ of the female employee are temporary employees and the total number of permanent employees is 740, the $\frac{7}{15}$ of the total number of the employees exceeds the number of temporary female employees by: a) 320 b) 308 c) 400 d) 340

$$\begin{matrix} M & F \\ 2 & 1 \end{matrix}$$

$$\frac{5}{8}x \cancel{\times} 2x + \frac{3}{5}x \cancel{\times} 1x = 740$$

$$3x = \underline{1200}$$

$$\frac{25x + 12x}{20} = 740$$

$$\cancel{\frac{7}{15}} \times \underline{1200} = \underline{560}$$

$$400x \cancel{\times} \frac{2}{5} = \underline{160}$$

$$37x = 740 \times 20$$

$$\boxed{x = 400}$$

6. What is the ratio of the third proportional to 0.4 and 0.8, to the mean proportional between 13.5 and 0.24?

0.4 और 0.8 के तीसरे आनुपातिक और 13.5 और 0.24 के बीच मध्यआनुपातिक का अनुपात क्या है?

- (a) 9:10 (b) 8:9 (c) 5:4 (d) 7:8

$$\frac{0.8 \times 0.8}{0.4}$$

$$: \quad \sqrt{13.5 \times 0.24}$$

$$1.6$$

$$: \quad \sqrt{\frac{27}{10} \times \frac{24}{100}}$$

$$1.6 : \frac{3 \times 6}{10} \rightarrow 16 : 18 \\ 8 : 9$$

7. The ratio of the incomes of A and B last year was 4:3, respectively. The ratios of their individual incomes of the last year and the present year are 3:4 and 5:6, respectively. If their total income for the present year is ₹8.04 lakh, then the income of B last year was:

पिछले वर्ष A और B की आय का अनुपात क्रमशः 4:3 था। पिछले वर्ष और वर्तमान वर्ष के उनके व्यक्तिगत आय के अनुपात क्रमशः 3:4 और 5:6 हैं। यदि वर्तमान वर्ष के लिए उनकी कुल आय ₹8.04 लाख है, तो पिछले वर्ष B की आय थी:

- (a) ₹3.6 lakh (b) ₹2.4 lakh (c) ₹2.7 lakh (d) ₹2.8 lakh

Last year A B

A	B	L.Y	P.Y	L.Y	P.Y
4x	3x	3y	4y	5z	6z

$$4x = 3y$$
$$3x = 5z$$
$$4y + 6z = 8.04$$

$$4y + 62 = 8.04$$

$$\frac{16}{3}x + \frac{18}{5}x = 8.04$$

$$2 \left[\frac{8}{3}x + \frac{9}{5}x \right] = 8.04$$

$$\frac{40x + 27x}{15} = 4.02$$

$$3x \cdot \frac{9}{10}$$

$$67x = 15 \times 4.02$$

$$x = \frac{15 \times 4.02}{67} = \frac{9}{10}$$

7.7

watch.

~~467
6
802~~

8. 5 years ago, the ratio of the age of A to that of B was 4:5. Five years hence, the ratio of the age of A to that of B will be 6:7. If at present, C is 10 years younger than B, then what will be the ratio of the present age of A to that of C?

5 साल पहले, A और B की आयु का अनुपात 4:5 था। पांच साल बाद, A और B की आयु का अनुपात 6:7 होगा। यदि वर्तमान में, C, B से 10 वर्ष छोटा है, तो A और C की वर्तमान आयु का अनुपात क्या होगा?

- (a) 5:4 (b) 3:2 (c) 4:3 (d) 5:3

$$\frac{4x+10}{5x+10} = \frac{6}{7}$$

$$28x + 70 = 30x + 60$$

$$2x = 10$$

$$x = 5$$

$$A:C \rightarrow 25:20$$

9. A sum of ₹x is divided among A, B and C such that the ratio of the shares of A and B is 6:7 and that of B and C is 3:2. If the difference the shares of A and C is ₹540, then the value of x is :
 ₹x को A, B और C के बीच विभाजित किया जाता है जैसे कि A और B के शेयरों का अनुपात 6:7 है और B और C का अनुपात 3:2 है। यदि A और C के शेयर का अंतर ₹540 है, तो x का मान है:
 ✓ (a) 7155 (b) 7290 ✗ (c) 7020 ✗ (d) 7425

$$\begin{array}{ccc}
 A & B & C \\
 6 & 7 & 2 \\
 \downarrow & 3 \downarrow & 2 \\
 18 & 21 & 14
 \end{array}
 \quad
 \begin{array}{l}
 x \rightarrow 135 \\
 53 \rightarrow ? \\
 7(55)
 \end{array}
 \quad
 \begin{array}{r}
 135 \\
 \hline
 51 \\
 \hline
 405 \\
 405 \\
 \hline
 0
 \end{array}$$

10. A, B and C started a business. Thrice the investment of A is equal to twice the investment of B and also equal to four times the investment of C. If C's share out of the total profit is Rs4863, then the share of A in the profit is : a) 9726 b) 6484 c) 7272 d) 8105

$$3A = 2B = 4C$$

$$\begin{array}{ccc} A & B & C \\ 8 & 12 & 6 \end{array}$$

$$6 \rightarrow 4863$$

$$8 \rightarrow ?$$

$$\frac{4863}{6} = 810.5$$

11. 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 between the shares of A and D is Rs 648, then the sum of their shares is :

एक राशि को **A**, **B**, **C** और **D** में इस प्रकार बांटा जाता है कि **A** और **B** के भाग का अनुपात 2 : 3, **B** और **C** के भाग का अनुपात 1 : 2 तथा **C** और **D** के भाग का अनुपात 3 : 4 होता है। यदि **A** और **D** के हिस्सों में रु.648 का अंतर है, तो उनके हिस्से की राशि का योग क्या होगा?

- (a) Rs 1944 (b) Rs 2484
(c) Rs 2052 ✓ (d) Rs 2160

A	B	C	D	
2	3	3	3	$A:B:C:D$
1	1	2	2	2:3:6:8
3	3	3	4	$6 \rightarrow 648$
6	9	18	24	$16 \rightarrow ?$

$108 + 19 = 2052$

12. In an office, $\frac{5}{8}$ of the total number of employees are males and the rest are females. $\frac{2}{5}$ of the number of males ~~and~~^{one} non-technical workers while $\frac{2}{3}$ of the number of females are technical workers. What fraction of the total number of employees are technical workers?

एक कार्यालय में, कर्मचारियों की कुल संख्या के $\frac{5}{8}$ पुरुष हैं और बाकी महिलाएं हैं। पुरुषों और गैर-

तकनीकी श्रमिकों की संख्या का $\frac{2}{5}$ जबकि महिलाओं की संख्या का $\frac{2}{3}$ तकनीकी कार्यकर्ता हैं।

कर्मचारियों की कुल संख्या का कितना हिस्सा तकनीकी कर्मचारी हैं?

(a) $\frac{1}{2}$

(b) $\frac{3}{8}$

(c) $\frac{5}{8}$

(d) $\frac{2}{5}$

13. Two numbers are in the ratio 3:5. If 13 is subtracted from each, the new numbers are in the ratio 10:21. If 15 is added to each of the original numbers, then the ratio becomes :

दो संख्याएँ 3 : 5 के अनुपात में हैं। यदि प्रत्येक में से 13 घटाया जाए, तो नई संख्या 10 : 21 के अनुपात में प्राप्त होती है। यदि मूल संख्याओं में 15 जोड़ दिया जाए, तो संख्याओं के बीच अनुपात क्या हो जाएगा?

- 2
(a) 24 : 35 (b) 4 : 5
(c) 23 : 33 (d) 5 : 7

$$\frac{3x-13}{5x-13} = \frac{10}{21}$$

$$63x - 21 \times 13 = 50x - 10 \times 13$$

$$13x = 21 \times (13 - 10)$$

$$13x = 3 \times 13$$
$$x = 3$$

$$\frac{33+15}{55+15} = \frac{48}{70}$$

48 : 70
24 : 35

14. If $(a+b) : (b+c) : (c+a) = 7 : 6 : 5$ and $a+b+c = 27$, then what will be the value of $\frac{1}{a} : \frac{1}{b} : \frac{1}{c}$?

यदि $(a+b) : (b+c) : (c+a) = 7 : 6 : 5$ और $a+b+c = 27$, तो $\frac{1}{a} : \frac{1}{b} : \frac{1}{c}$ का मान क्या होगा ?

- ~~(a)~~ 4 : 3 : 6 (b) 3 : 4 : 2
(c) 3 : 2 : 4 (d) 3 : 6 : 4

$$a+b = 7k; b+c = 6k; c+a = 5k$$

$$2(a+b+c) = 18k$$

$$a+b+c = 9k$$

$$27 = 9k$$

$$\boxed{k=3}$$

$$\frac{1}{9} : \frac{1}{12} : \frac{1}{6}$$

$$a+b = 21$$

$$b+c = 18$$

$$c+a = 15$$

$$c=6; a=9; b=12$$

$$\left(\frac{1}{9} : \frac{1}{12} : \frac{1}{6}\right) \times 36$$

4: 3:6

SSC CGL 2019 TIER 2 ALL RATIO QUESTIONS

1. In a school, $\frac{3}{8}$ of the number of students are girls and the rest are boys. One –third of the number of boys are below 10 years and $\frac{2}{3}$ of the number of girls are also below 10 years. If the number of students of students of age 10 or more years ~~is~~ 260, then the number of boys in the school is:

(a) 280

(b) 300

(c) 234

(d) 312

$$\begin{array}{r} G \quad B \\ 3x \quad 5x \\ \hline \end{array}$$

$$\frac{2}{3} \times 5x + \frac{1}{3} \times 3x = 260$$

$$\frac{10x + 3x}{3} = 260$$

$$\frac{13x}{3} = 260$$

$$x = 20 \times 3 = 60.$$

$$5x = 300$$

2. The sum of the present ages of a father and son is 52 years. Four years hence, the son's age will be $\frac{1}{4}$ that of the father. What will be the ratio of the ages of the son and father, 10 years from now?

- (a) 2:7 (b) 2:5 (c) 3:8 ✓ (d) 1:3

$$F = 44 \quad S = 8$$

$$F + S = 52$$

$$\frac{1}{4}(F+4) = S+4$$

$$F+4 = 4S+16$$

$$52 - S + 4 = 4S + 16$$

$$5S = 40 \quad \boxed{S=8}$$

$$\begin{matrix} S & F \\ \cancel{18} & \cancel{54} \end{matrix}$$

$$1 : 3$$

3. When x is added to each of 9, 15, 21 and 31, the numbers so obtained are in proportion
 what is the mean proportional between the numbers $(3x-2)$ and $(5x+4)$? $(5x+4) ?$
 (a) 35 (b) 20 (c) 30 (d) 42

$$\frac{9+x}{15+x} = \frac{21+x}{31+x}$$

$$9 \times 31 + 40x + x^2 = 15 \times 21 + 36x + x^2$$

$$\begin{aligned} \sqrt{(3x-2)(5x+4)} &= 4x = \frac{15 \times 21 - 9 \times 31}{9} \\ &= 9 [35 - 31] = 9 \times 4 \\ 25x \times 49 &= 5 \times 7 \quad 4x = 9 \times 4 \quad x = 9 \\ &= 35 // - \end{aligned}$$

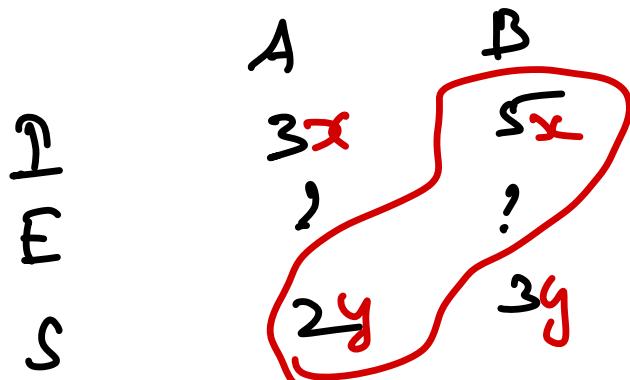
4. The monthly incomes of A and B are in the ratio 3:5 and the ratio of their savings is 2:3. If the incomes of B is equal to three times the savings of A, then what is the ratio of the expenditures of A and B?

(a) 5:8

(b) 8:15

(c) 7:11

(d) 3:7



$$5x = 3x \cdot 2y$$

$$5x = 6y$$

$$\frac{3x}{5} \times \frac{5x}{5} = \frac{6y}{5} \times \frac{3}{5}$$

$$3x = ?$$

$$(3x - 2y) : (5x - 3y)$$

$$\left(\frac{18y}{5} - 2y \right) : (6y - 3y)$$

$$3x = \frac{18y}{5}$$

$$: 3y \rightarrow 8:15$$

5. If $(10a^3 + 4b^3) : (11a^3 - 15b^3) = 7:5$, then $(3a + 5b) : (9a - 2b) = ?$

(a) ~~10:13~~

(b) 5:4

(c) 3:2

(d) 8:7

$$\frac{10a^3 + 4b^3}{11a^3 - 15b^3} = \frac{7}{5}$$

$$50a^3 + 20b^3 = 77a^3 - 105b^3$$

$$125b^3 = 27a^3$$

$$\frac{3a+5b}{9a-2b}$$

$$\frac{a^3}{b^3} = \frac{125}{27} \Rightarrow \frac{a}{b} = \frac{5}{3}$$

$$\frac{15+15}{45-6} \rightarrow \frac{30}{39} \rightarrow \frac{10}{13}.$$

6. A person divided a certain sum between his three sons in the ratio 3:4:5. Had he divided 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 rs 1,188 more. The sum (in rs) was:

- (a) 6,840 (b) 6,768 (c) 7,008 ~~X~~ (d) 5,640

A B C

$$3x : 4x : 5x \rightarrow$$

$$20y : 15y : 12y \rightarrow$$

$$3x + 4x + 5x = 20y + 15y + 12y$$

$$12x = 47y$$

$$\overline{12x = 47 \times 4 \times 36}$$

$$20y - \underline{3x} = 1188$$

$$80y - 12x = 4 \times 1188$$

$$\left. \begin{array}{l} \\ \\ \end{array} \right\}$$

$$80y - 47y = 4 \times 1188$$

$$8 \cancel{33}y = 4 \times \cancel{1188}^{108}$$

$$y = 4 \times 36$$

7. The ratio of the money incomes of X and Y is 5:4 and that of their monthly expenditures is 9:7. If the income of Y is equal to the expenditure of X, then what is the ratio of the savings of X and Y?

- (a) 6:7 (b) 8:9 (c) 7:6 ~~(d) 9:8~~

$$\begin{array}{ccc}
 & X & Y \\
 \text{I} & \cancel{5x} & 4x \\
 \text{E} & 9y & 7y \\
 S & &
 \end{array}$$

$4x = 9y$
 $\frac{28}{9}x = 7y$
 $(5x - 9y) : (4x - 7y)$
 $(5x - 4x) : (4x - \frac{28}{9}x)$
 $x : \frac{8x}{9} \rightarrow 9:8.$

8. A certain sum is divided between A,B,C and D such that the ratio of the shares of A and B is 1:3, that of B and C is 2:5, and that of C and D is 2:3. If the difference between the shares of A and C is rs 3,150 then the share of D is:

(a) Rs.6,075

(b) Rs.4,050

(c) Rs.4,320

(d) Rs.3,240

3510

A	B	C	D
1	3	3	3
2	2	5	5
2	2	2	3
(4)	12	30	45
		<u>30</u>	45
		26	26 → 3810
		45 → ?	45 × 135 =

9. Raju ate $\frac{3}{8}$ part of a pizza and Adam ate $\frac{3}{10}$ part of the remaining pizza. Then Renu ate $\frac{4}{7}$ part of the pizza that was left. What fraction of the pizza is still left?

- (a) $\frac{1}{4}$ (b) $\frac{5}{12}$ (c) $\frac{3}{16}$ (d) $\frac{1}{8}$

$$\frac{\cancel{3}}{8} \times \frac{\cancel{7}}{\cancel{10}} \times \frac{3}{\cancel{4}} = \frac{3}{16}$$

$$\left(\frac{3}{8} \times \frac{7}{10} \right) \times \frac{3}{7}$$

10. A, B,C invested capital in the ratio 5:7:4, the timing of their investments being in the ratio x:y:z. if their profits are distributed in the ratio 45:42:28, then x:y:z=?

- ✓ (a) 9:6:7 (b) 6:7:9 (c) 9:4:7 (d) 7:9:4

$$5:7:4$$

$$x:y:z$$

$$45:42:28$$

$$\frac{5x}{5y}: \frac{7y}{5y}: \frac{4z}{5y} = \frac{45}{5 \times 9}: \frac{42}{5 \times 6}: \frac{28}{5 \times 7}$$

\downarrow \downarrow \downarrow
9 6 7

11. The monthly salaries of A and B are the same. A, B and C donate 10%, 8% and 9% respectively, of their monthly salaries to a charitable trust. The difference between the donations of A and B is Rs 400. The total donation by A and B is Rs. 900 more than that of C. what is the monthly salary of C?

- (a) Rs.25000 (b) Rs.36000 ~~(c) Rs.30000~~ (d) Rs. 27000

<p>S D</p> <p>A B 20000 20000 2000 1600 10% - 8% 3600</p> <p>C → 9% 9% → 2700 100% → ?</p>	<p>C → 3600 - 900 C → 2700 (donation) 3000/-</p>
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12. When 5 children from class A join B, the number of children in both classes is the same.

If 25 children from B, join A, then the number of children in A becomes double the number of children in B. the ratio of the number of children in A to those in B is:

- (a) 9:8 b) 9:17 c) 18:17 d) 19:18

$$\boxed{A - 5 = B + 5}$$
$$A - B = 10 \quad \text{--- } ①$$

$$\boxed{2(B - 25) = A + 25}$$

$$2B - 50 = A + 25$$

$$2B - 50 = B + 10 + 25$$

$$B = 85$$

$$A = 95$$
$$B = 85$$

$$95 : 85$$

$$19 : 17$$

13. If $a:b:c = \frac{1}{4} : \frac{1}{3} : \frac{1}{2}$, then $\frac{a}{b} : \frac{b}{c} : \frac{c}{a} = ?$
- (a) 12:9:8 (b) 8:9:24 ~~(c) 9:8:24~~ (c) 9:12:8

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

$$a:b:c = 3:4:6$$

$$\left(\frac{3}{4} : \frac{4}{6} : \frac{6}{3} \right) 12$$

$$\frac{3}{4} \times 12 : \frac{4}{6} \times 12 : \frac{6}{3} \times 12$$

$$9 : 8 : 24.$$

14. When x is subtracted from each of 19, 28, 55 and 91, the numbers so obtained in this order, are in proportion. What is the mean proportional between $(x+9)$ and x^2 ?

- (a) 28 (b) 24 (c) 32 (d) 27

$$\frac{19-x}{28-x} = \frac{55-x}{91-x}$$

$$19x \cdot 91 - 110x + x^2 = 55 \cdot 28 - 83x + x^2$$

$$27x = 19 \cdot 91 - 55 \cdot 28$$

$$\begin{aligned} &= 7[19 \cdot (3 - 55 \cdot 4)] \\ &= 7[247 - 220] \end{aligned}$$

$$27x = 7 \cdot 27$$

$$x = 7$$

$$\sqrt{(x+9)x^2}$$

$$\sqrt{16 \cdot 49}$$

$$4 \cdot 7 = 28.$$

15. The sum of three numbers is 280. If the ratio between the first and second numbers is 2 : 3 and the ratio between second and third numbers is 4 : 5, then find the second number.

- (a) 90 (b) 86 (c) 96 (d) 80

$$\begin{aligned} & \begin{matrix} 2 : 3 \\ \rightarrow 4 : 5 \end{matrix} \\ & \underline{8 : 12 : 15} \\ & 35 \rightarrow 280 \\ & 12 \rightarrow ? \end{aligned}$$

16. If $\frac{b}{a} = 0.7$, find the value of $\frac{a-b}{a+b} + \frac{11}{34}$.

- (a) 1 (b) 0.2 (c) 0.5 (d) 0.3

~~(c) 0.5~~

$$\frac{b}{a} = 0.7 \quad b = 0.7a$$

$$\frac{a - 0.7a}{a + 0.7a} + \frac{11}{34}$$

$$\frac{0.3a}{1.7a} + \frac{11}{34}$$

$$\frac{3}{17} + \frac{11}{34} \quad \frac{6+11}{34} = \frac{17}{34} = \frac{1}{2} = 0.5$$

17. A sum of Rs.1,50,000 is distributed among three persons – A,B and C – so that they receive and 20%, 30% and 50%, respectively. A receives the same amount from another sum of money which is distributed among them so that they receive 50%, 30%, and 20%, respectively. Find the total amount received from both sums of money, by **B**

- (a) Rs.55,000 (b) Rs.60,000 (c) Rs.63,000 (d) Rs.58,000

$$\begin{array}{ccccccc} & & 1,50,000 & & & & \\ & A & & B & & C & \\ 30000 & \underline{+} & & 45000 & & 75000 & \\ \hline 30000 & & \underline{+} & 18000 & & 12000 & \\ \hline 60000 & & & 63000 & & & \end{array}$$

18. The sum of weights of A and B is 80kg. 50% of A's weight is $\frac{5}{6}$ times the weight of B. find the difference between their weights.

- ~~a) 20 kg~~ b) 10 kg c) 25 kg d) 15 kg.

$$A + B = 80 \text{ kg.}$$

$$\cancel{\frac{1}{2} \times A} = \frac{5}{6} B$$

$$3A = 5B$$

$$A : B \rightarrow 5 : 3$$

$$\begin{array}{ccc} 50 & 30 & \rightarrow 20 \\ \swarrow & \searrow & \end{array}$$

19. The ratio of boys and girls in a school is 27 : 23. If the difference between the number of boys and girls is 200, then find the number of boys.

- (a) 1250 (b) 1200 (c) 1350 (d) 1300

$$\begin{array}{l} 4 \rightarrow 200 \\ 27 \rightarrow ? \end{array}$$

20. The ratio between the present ages of A and B is 3:5. If the ratio of their ages five years hence becomes 13:20, then the present age B is:

- (a) 32 years
- (b) 35 years
- (c) 30 years
- (d) 40 years

21. The train ticket fare from places A to B in 2nd class AC and 3rd class AC is Rs.2,500 and Rs.2,000. Respectively. If the fares of 2nd class AC and 3rd class AC are increased by 20% and 10%, respectively, then find the ratio of the new fares of 2nd class AC and class AC.

- (a) 12:11 (b) 13:11 (c) 15:11 (d) 15:13

$$\begin{array}{ccc} \text{2}^{\text{nd}} & & \text{3}^{\text{rd}} \\ \cancel{2500} & & \cancel{2000} \\ \cancel{3000} & & 2200 \\ \hline 15:11 \end{array}$$