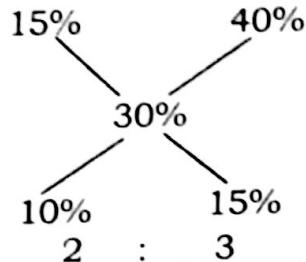


4.1; Short cut Method:-



$$5.1; \text{C.P. of } 30 \text{ kgs} = 30 \times 9.50 \\ = ₹ 285$$

$$\text{C.P. of } 40 \text{ kg} = 40 \times 8.50 \\ = ₹ 340$$

$$\text{Total C.P. of } 70 \text{ kgs} = 285 + 340 \\ = ₹ 625$$

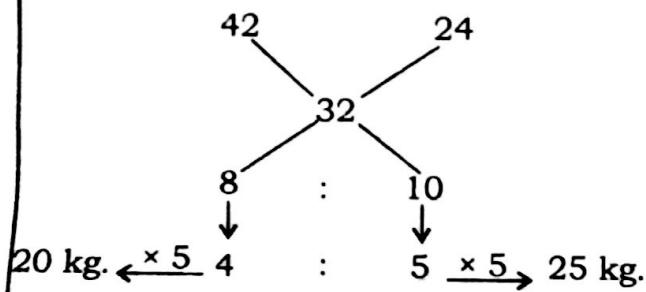
$$\text{S.P. of } 70 \text{ kgs} = 70 \times 8.90 \\ = ₹ 623$$

$$\text{Loss} = ₹ 625 - ₹ 623 \\ = ₹ 2$$

6. 1; Paramount concept :-

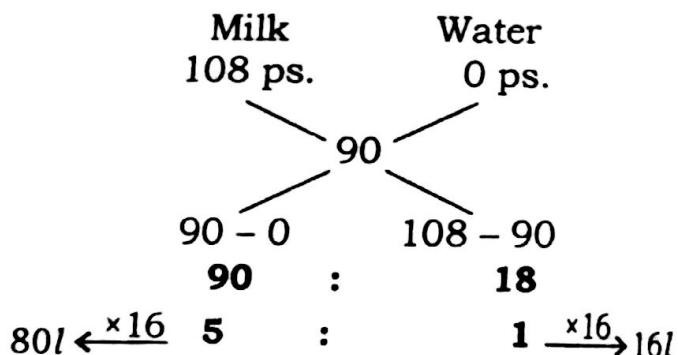
$$\text{New C.P.} = \frac{100}{100 + P\%} \times \text{S. P.}$$

$$= \frac{100}{100 + 25} \times 40 = \frac{100}{125} \times 40 \\ = 32$$



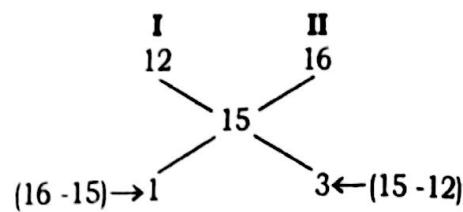
(5 when multiplied by 5 gives 25.
Hence 4 is also multiplied by 5)

7.4; The mean value is 90 paise and the price of water is zero paise.



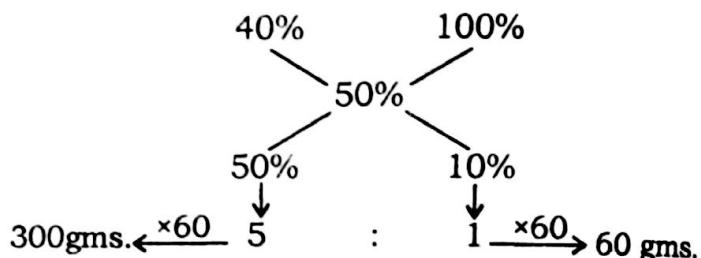
By the alligation rule, milk and water are in the ratio of 5 : 1.
if water = 16 l
then quantity of milk in the mixture = $5 \times 6 = 80$ litres.

8.1;



∴ He should mix both the qualities of gold in the ratio 1 : 3.

9.3; The existing solution has 40% sugar. And sugar is to be mixed, so the other solution has 100% sugar.
So by alligation method:



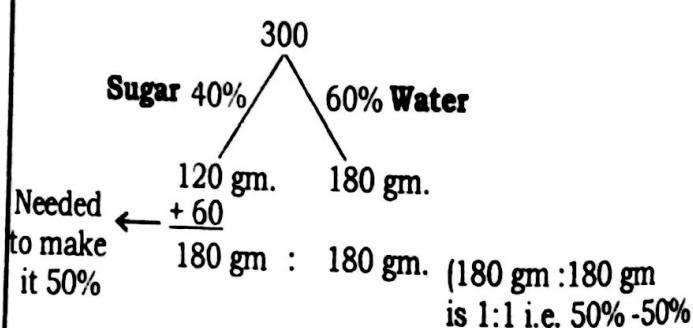
∴ The two mixture should be added in the ratio 5 : 1

$$5x = 300 \text{ gms}$$

Therefore, required sugar

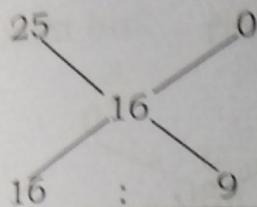
$$1x = \frac{300}{5} = 60 \text{ gms.}$$

Paramount concept :-

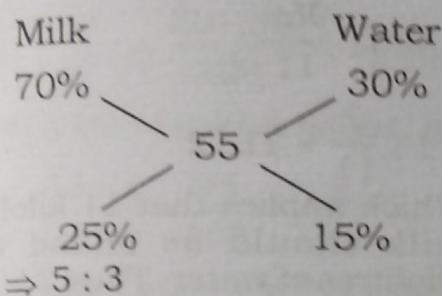


10.2; Paramount concept :-

$$C.P. = \frac{100}{100 + P\%} \times S.P. = \frac{100}{125} \times 20 \\ = ₹ 16/ltr.$$



11.4; Here the % values of milk and water that is taken from the vessel should be taken into consideration.



$$\therefore \text{Quantity of milk} = \frac{5}{5+3} \times 80 \\ = 50 \text{ litres}$$

$$\text{and quantity of water} = \frac{3}{5+3} \times 80 \\ = 30 \text{ litres}$$

12.4; Amount of liquid left after n^{th} operations, when the container originally contains x units of liquid from which y units is taken out each time is

$$x \left(\frac{x-y}{x} \right)^n \text{ units}$$

Thus, in the above case, amount of milk left

$$= 50 \left[\frac{80-8}{80} \right]^3 l = 58.32 l$$

Paramount concept :-

$$\frac{8}{80} = \frac{1}{10} \text{ taken out or } \begin{array}{l} \text{Mixture} \\ \text{10} \\ \text{10} \\ \text{10} \end{array} \quad \begin{array}{l} \text{Milk} \\ \text{9} \\ \text{9} \\ \text{9} \end{array} \left. \begin{array}{l} \text{operation} \\ \text{total 3 times} \end{array} \right. \\ \text{Remaining} = \left(\frac{9}{10} \right)^3 \quad \begin{array}{r} 1000 \\ \downarrow \\ 729 \end{array} \quad \begin{array}{r} 80 \text{ ltr.} \\ \downarrow \\ 58.32 \text{ ltr.} \end{array}$$

(If 1000 is 80 l then 729 is $\frac{729 \times 80}{1000} = 58.32 l$)

13.2; Let there be x litres water in the cask

After n^{th} operation, water left in the cask

Volume of cask

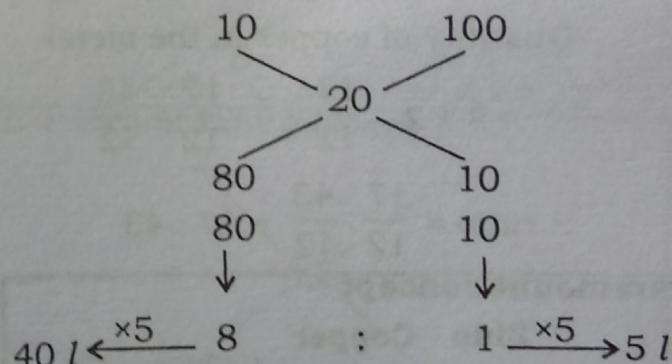
$$= \left(\frac{x-9}{x} \right)^2 = \frac{16}{25} \Rightarrow \frac{x-9}{x} = \frac{4}{5} \\ \Rightarrow x = 45 l.$$

Paramount concept :-

16 → Water $\Rightarrow \sqrt{\frac{16}{25}} = \frac{4}{5}$ diff. = 1 which is
25 → Mixture $\Rightarrow \sqrt{\frac{25}{25}} = \frac{5}{5}$ equal to 9 l
if 1 = 9, then 5 = 45

(Square root of $\frac{16}{25}$ is done as operation was done two times)

14.3;



($8 \times 5 = 40 l$ which is the initial quantity. Hence 1 is also multiplied by 5)

Short cut :-

$$(40 + x) \times 20\% = 4 + x \\ x = 5l$$

Total milk in three vessels
15. 1; Total water in three vessels

$$= \frac{\left(\frac{2}{3} + \frac{3}{4} + \frac{3}{5}\right) \times 10}{\left(\frac{1}{3} + \frac{1}{4} + \frac{2}{5}\right) \times 10} = \frac{121}{59}$$

Paramount concept :-

A $2 : 1 \stackrel{(2+1)}{=} 3 \times 20 \rightarrow (4 \times 5)$

B $3 : 1 \stackrel{(3+1)}{=} 4 \times 15 \rightarrow (3 \times 5)$

C $3 : 2 \stackrel{(3+2)}{=} 5 \times 12 \rightarrow (4 \times 3)$

$$2 \times 20 \rightarrow 40 : 20 \leftarrow 1 \times 20$$

$$3 \times 15 \rightarrow 45 : 15 \leftarrow 1 \times 15$$

$$3 \times 12 \rightarrow 36 : 24 \leftarrow 2 \times 12$$

$$121 : 59$$

L.C.M. of
3, 4 & 5
is $3 \times 4 \times 5$.
Hence 3 is
multiplied by
 4×5 ; 4 is
multiplied by
 3×5 ; 5 is
multiplied by
 3×4 .

16. 2; Quantity of zinc in the mixture

$$= 2\left(\frac{1}{3}\right) + 3\left(\frac{1}{4}\right) = \frac{2}{3} + \frac{3}{4} = \frac{8+9}{12} = \frac{17}{12}$$

Quantity of copper in the metal

$$= 3 + 2 - \frac{17}{12} = 5 - \frac{17}{12} = \frac{43}{12}$$

$$\therefore \text{ratio} = \frac{17}{12} : \frac{43}{12} = 17 : 43$$

Paramount concept :-

Zinc Copper

$$1 : 2 \stackrel{(1+2)}{=} 3 \times 4$$

$$1 : 3 \stackrel{(1+3)}{=} 4 \times 3$$

$$(1 : 2) \times 4 = (4 : 8) \times 2 \text{ kg.} \Rightarrow 8 : 16$$

$$(1 : 3) \times 4 = (3 : 9) \times 3 \text{ kg.} \Rightarrow 9 : 27$$

$$17 : 43$$

17. 3; Cost of milk when two qualities are mixed

$$= \frac{5 \times 600 + 6 \times 540}{5+6} = \frac{6240}{11} \text{ per kilolitre}$$

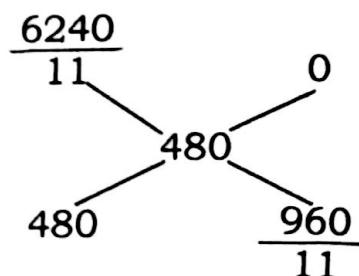
Cost of water = ₹ 0/kilolitre

So,

First mixture

(milk & water)

2nd mixture



∴ Ratio of milk and water

$$= 480 : \frac{960}{11}$$

$$= 1 : \frac{2}{11} = 11 : 2$$

Which implies that 11 kilolitres of milk should be mixed with 2 kilolitres of water. Thus 2 kilolitres of water should be added.

18. 3; **By Alligation-Method/ Paramount concept :-**

Quantity of milk in vessel A

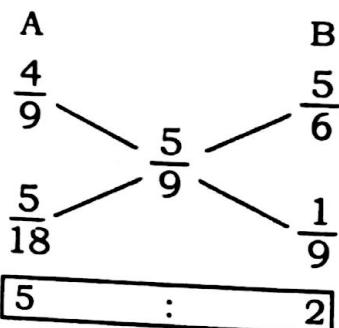
$$= \frac{4}{4+5} = \frac{4}{9}$$

Quantity of milk in vessel B

$$= \frac{5}{5+1} = \frac{5}{6}$$

Quantity of milk in final mixture

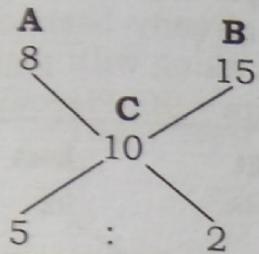
$$= \frac{5}{5+4} = \frac{5}{9}$$



So, mixture of vessels A and B are mixed in ratio of 5 : 2.

18.3; 3rd Method:-

Milk	Water		M	W
A : 4	: $5 \frac{(5+4)}{=}$ 9 $\times 2 \Rightarrow (4:5) \times 2 \Rightarrow A : 8$		8	10
B : 5	: $1 \frac{(5+1)}{=} 6 \times 3 \Rightarrow (5:1) \times 3 \Rightarrow B : 15$		15	3
C : 5	: $4 \frac{(5+4)}{=} 9 \times 2 \Rightarrow (5:4) \times 2 \Rightarrow C : 10$		10	8



19.2; Quantity of gold in the alloy

$$= \frac{80 \times 50}{100} = 40 \text{ gm}$$

Let x gm of gold is added, then

$$\therefore \frac{40+x}{50+x} = \frac{95}{100}$$

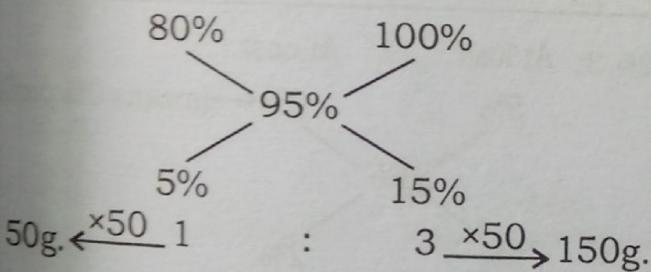
$$\Rightarrow 400 + 100x = 4750 + 95x$$

$$\Rightarrow 100x - 95x = 4750 - 4000$$

$$\therefore x = \frac{750}{5} = 150 \text{ gm.}$$

19.2; By Alligation-Method

Paramount concept :-



1 unit when multiplied by 50 gives 50g.
Hence 3 is also multiplied by 50

19.2; 3rd Method:-

Gold	Silver			
80	20	$\Rightarrow \text{diff.} = 300$	80	20
95	5×4		380	20
		to make silver equal		

$80 + 20 \text{ i.e. } 100 \text{ units} = 50\text{g.}$

$$\therefore 1 \text{ unit} = \frac{1}{2} \text{ g}$$

diff. between 80 and 380 i.e. 300 units = 150 gm.

20.4; Quantity of milk in new mixture

$$= x \left(\frac{x-y}{x} \right)^n$$

$$= 81 \left(\frac{81-27}{81} \right)^2 = \frac{81 \times 54 \times 54}{81 \times 81} = 36 \text{ litres}$$

and quantity of water in new mixture

$$= 81 - 36 = 45 \text{ litres}$$

$\therefore \text{Reqd. Ratio} = 36 : 45 = 4 : 5$

Paramount concept :-

$$\begin{aligned} \text{Mixture} & \quad \frac{3}{2} \times \frac{3}{2} = \frac{9}{4} \\ \text{Milk} & \quad = 9 - 4 = 5 \\ \text{Water} & \quad \text{Milk : Water} \Rightarrow 4 : 5 \end{aligned}$$

21.2;

Gold Copper

$$19 \quad \quad \quad 9$$

$$15 \quad \quad \quad 15$$

$$6 \quad \quad \quad 4$$

$$\therefore \text{Gold : Copper} = 6 : 4 = 3 : 2$$

22.4; **Paramount concept :-**

$$4 \quad \quad \quad 10$$

$$6.5 \quad \quad \quad 6.5$$

$$3.5 \quad \quad \quad 2.5$$

$$21 \text{ kg.} \quad \quad \quad 15 \text{ kg.}$$

$$7 \quad \quad \quad 5 \times 3$$

(gives 15 kg. Hence 7 must also be multiplied by 3)

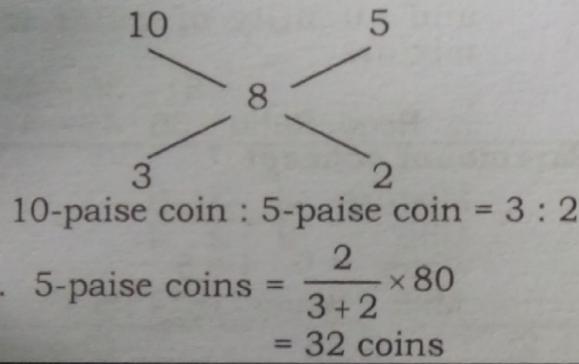
23. 3; x = no. of 10 paise coins
 y = no. of 5 paise coins
 $x + y = 80$ _____(i) \rightarrow as no. of total coins is 80
 $10x + 5y = 640$ _____(ii) as the total amount is 640 p.
or $5(2x + y) = 640$
or $2x + y = 128$ _____(ii)
Solving the two equations-

$$\begin{array}{rcl} x & + & y = 80 \\ 2x & + & y = 128 \\ \hline -x & & = -48 \\ \hline x & = 48 & y = \end{array}$$

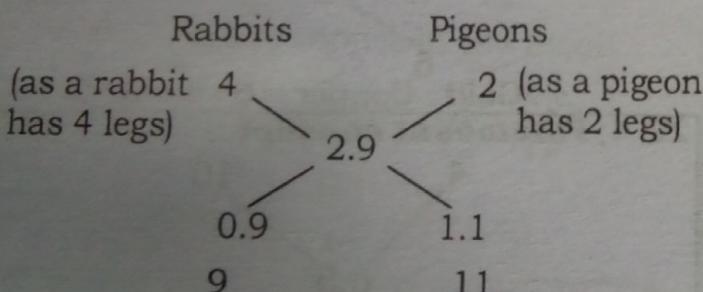
$$x = 48, \quad y = 32$$

Paramount concept :-

$$\text{Average value per coin} = \frac{640 \text{ ps.}}{80} \\ = 8 \text{ Ps.}$$



$$24.2; \text{ Average legs per head} = \frac{580}{200} = 2.9$$



$$\text{Pigeons} = \frac{11}{9+11} \times 200$$

$$= \frac{11}{20} \times 200 = 110$$

Short cut Method:-

For 200 heads least no. of legs
= 400
Legs left = 180

But rabbits have 4 legs so = $\frac{180}{2}$
 = 90 pairs (divided by 2 as 2 legs
 have already been counted when
 taken along with pigeons)
 Rabbits = 90, Pigeons = 110

25.4;

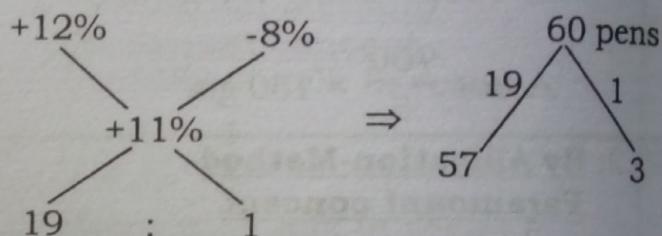
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graph TD
    Profit[Profit] --> P1[112]
    Profit --> P2[111]
    P2 --> P3[19]
    P2 --> P4[1]
    
```

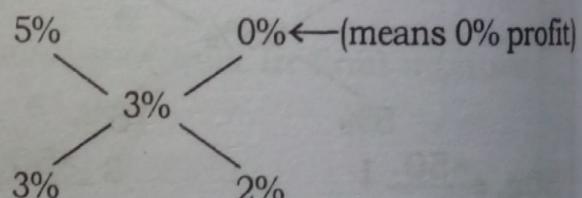
Therefore, ratio of pens sold at profit & loss
 $= 19 : 1$

$$= \frac{19}{19+1} \times 60 = 57$$

Paramount concept :-



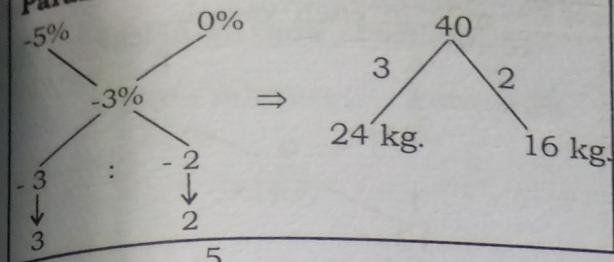
26.3; At loss At cost



Ratio of quantity of tea sold at loss and cost price = 3 : 2

$$\therefore \text{quantity sold at cost price} = \frac{2}{5} \times 40 \\ = 16 \text{ kg}$$

Paramount concept :-



$$27.2; \text{ Milk} = \frac{5}{6} \times 66 = 5 \times 11 = 55 \text{ l}$$

$$\text{Water} = 66 - 55 = 11 \text{ l}$$

Let n l of water is added

$$\frac{55}{11+n} = \frac{5}{3}$$

$$\frac{11}{11+n} = \frac{1}{3}$$

$$33 = 11 + n$$

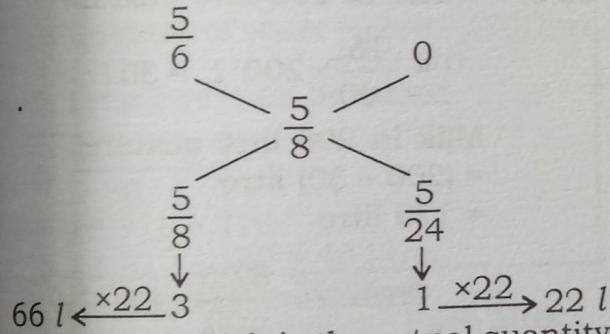
$$n = 33 - 11 \\ = 22 \text{ l}$$

27.2; By Alligation-Method

$$\text{Milk in old mixture} = \frac{5}{6}$$

$$\text{Milk in new mixture} = \frac{5}{8}$$

Quantity of milk in mixture Quantity of added water



($3 \times 22 = 66$ l which is the actual quantity of the mixture Hence 1 is also multiplied by 22)

27.2; Paramount concept :-

$$5 : 1 \quad \text{diff.} = 2 \text{ units}$$

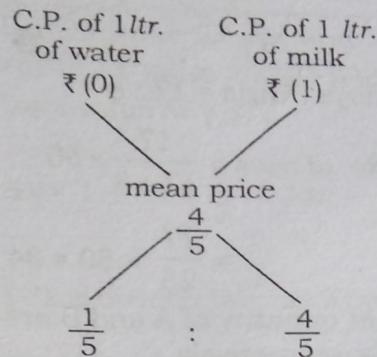
$$5 : 3 \quad 6 \text{ units} = 66 \text{ ltr. } (66 \text{ l is in ratio } 5 : 1 \text{ i.e. } 5+1 = 6 \text{ units})$$

$$2 \text{ units} = 22 \text{ ltr.}$$

28.5; Let C.P. of milk be ₹ 1 per liter. Then the S.P. of 1lt. of mixture = ₹ 1 gain = 25%

$$\therefore \text{C.P. of 1ltr. of mixture} = \frac{100}{125} = \frac{4}{5}$$

$$\therefore \frac{\text{Quantity of water}}{\text{Quantity of milk}} = \frac{1/5}{4/5} = \frac{1}{4}$$



$$\therefore \text{Required proportion} = 1 : 4$$

$\therefore \text{Percentage of water}$

$$= \frac{4}{(1+4)} \times 100 = 20\%$$

28.5; Paramount concept :-

In such type of problem, where mixture is sold at the cost price and also we are earning profit then we can write our answer directly without using the concept of Alligation. Here we have to understand that since the S.P. and C.P. are the same, the amount of water which is mixed with milk is the only reason behind the profit. Here it is given that the profit percent is 25%. This means we mix. 25 liters of water with 100 liters of milk.

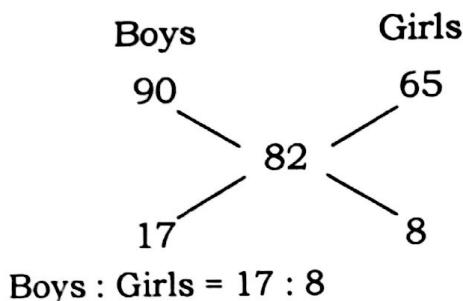
$$\therefore \text{Required proportion} = 25 : 100 \\ = 1 : 4$$

$$\therefore \text{Percentage water} = \frac{4}{(1+4)} \times 100$$

$$= \frac{100}{5} = 20\%$$

29.2; Apply the alligation method on paise per head

$$\text{Paise per student} = \frac{4100 \text{ P}}{50} = 82 \text{ P}$$



$$\text{Boys : Girls} = 17 : 8$$

$$\therefore \text{No. of boys} = \frac{17}{17+8} \times 50 \\ = \frac{17}{25} \times 50 = 34$$

30.5; Let quantity of A and B are $7x$ and $5x$ respectively.

According to questions

$$\frac{7x - 9 \times \frac{7}{12}}{5x + 9 \times \frac{7}{12}} = \frac{7}{9}$$

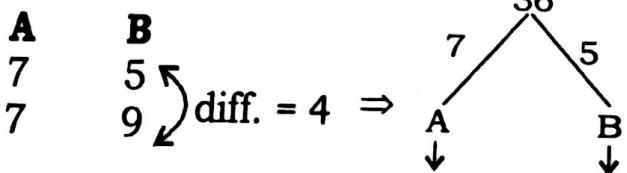
$$\Rightarrow \frac{7x - \frac{21}{4}}{5x + \frac{21}{4}} = \frac{7}{9} \Rightarrow \frac{28x - 21}{20x + 21} = \frac{7}{9}$$

$$\Rightarrow 28x \times 9 - 21 \times 9 = 20x \times 7 + 21 \times 7$$

$$\Rightarrow x = \frac{16 \times 21}{112} \Rightarrow x = 3$$

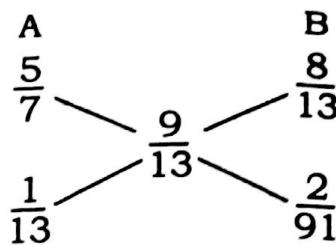
$$\text{Quantity of liquid A in the 'can'} = 7 \times 3 \\ = 21 \text{ l}$$

Short cut Method:-



4 units = 9 l (as 9 l of B is filled. Hence 4 units diff. = 9 l)

31.1; Apply the alligation on fraction of milk in each vessel.

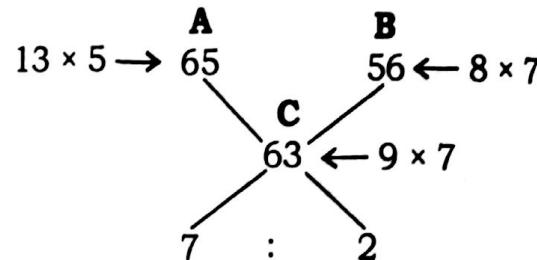


Ratio of quantity taken from vessels

$$\text{A and vessel B} = \frac{1}{13} : \frac{2}{91} = 7 : 2$$

Short cut Method:-

Milk	Water	
A : 5	2 $\frac{(5+2)}{=}$ 7	$\times 13$
B : 8	5 $\frac{(8+5)}{=}$ 13	$\times 7$
C : 9	4 $\frac{(9+4)}{=}$ 13	$\times 7$



32.3; Water in 200 litre mixture

$$= \frac{15}{100} \times 200 \text{ l} = 30 \text{ l}$$

$$\begin{aligned} \text{Milk in 200 litre mixture} \\ &= (200 - 30) \text{ litre} \\ &= 170 \text{ litre} \end{aligned}$$

$$\therefore 170 + x = \frac{87.5}{100} (200 + x)$$

$$\Rightarrow 170 + x = \frac{875}{100 \times 10} (200 + x)$$

$$= 170 + x = \frac{7}{8} (200 + x)$$

$$= 1360 + 8x = 1400 + 7x$$

$$\therefore x = 40 \text{ litre}$$

By Alligation-Method / Paramount concept :-

Milk in mixture Pure Milk

85% 100%

87.5

12.5

2.5

5 : 1

Quantity of old mixture

$$\text{Pure milk added in the mixture} = \frac{5}{1}$$

$$= 200 \times \frac{1}{5} = 40 \text{ l}$$

Paramount concept :-

Milk Water Milk Water

17 3 17 3
 $\Rightarrow \text{diff.} = 4$

(7) 1) $\times 3 \rightarrow$ water is made equal
 because it remains
 same when milk is
 added

17 + 3 i.e. 20 units = 200 ltr.
 4 unit = 40 ltr.

33.2; Quantity of milk in 200 litre

$$\text{mixture} = \frac{17}{20} \times 200 \text{ l} = 170 \text{ litre}$$

$$\therefore \text{Quantity of water} = (200 - 170) \text{ litre} = 30 \text{ litre}$$

Let x litre milk be added

$$\therefore \frac{170+x}{30} = \frac{7}{1}$$

$$x + 170 = 210$$

$$\therefore x = 210 - 170 = 40 \text{ litre.}$$

By Alligation-Method

Milk in mixture Pure Milk

17 1

20 7

1 8

8 1

So, quantity of pure milk.

$$= \frac{1}{5} \text{ of quantity of old mixture}$$

$$= \frac{1}{5} \times 200 \text{ l} = 40 \text{ l}$$

Paramount concept :-

$$17 : 3 \rightarrow \\ (7 : 1) \times 3 \rightarrow \text{diff.} < 17 : 3$$

↓
 4 units \rightarrow milk added
 When 20 units = 200 l
 then 4 units = 40 l

34.2; Let there be $3x$, $8x$ and $20x$ of 1 rupee, 50 paise and 25 paise giving total value of ₹ 372.

$$\therefore 3x \times 1 + 8x \times \frac{1}{2} \times 20x \times \frac{1}{4} = 372$$

($8x$ is divided by $\frac{1}{2}$ as 2 coins of 50 paise is 1/- and $20x$ is divided by 4 as 4 coins of 25 paise is 1/-)
 $\text{or } 3x + 4x + 5x = 372$

$$\Rightarrow x = \frac{372}{12} = 31$$

$$\begin{aligned} \text{Total no. of coins} &= 3x + 8x + 20x \\ &= 31x = 31 \times 31 \\ &= 961 \end{aligned}$$

Short cut Method:-

$$3x + \frac{8x}{2} + \frac{20x}{4} = 372$$

$$12x = 372 \quad \therefore x = 31$$

$$\begin{aligned} \text{Total coins} &= (20x + 8x + 3x) \times 31 \\ &= 961 \end{aligned}$$

35.2; Average price

$$= \frac{7 \times 280 + 9 \times 240}{7+9} \text{ per kg}$$

$$= ₹ \frac{1960 + 2160}{16} \text{ per kg}$$

$$= ₹ \frac{4120}{16} \text{ per kg}$$

$$= ₹ 257.50 \text{ per kg.}$$

