

### 38.1; 1st Method :

Let 5 years ago, ages of mother and her daughter were ' $7x$ ' years and ' $x$ ' years respectively.

$$\therefore \text{Present age of mother} = (7x + 5)$$

years

and present age of her daughter

$$= (x + 5) \text{ years}$$

According to question

Sum of their present age = 50

$$\Rightarrow (7x + 5) + (x + 5) = 50$$

$$\Rightarrow 8x + 10 = 50$$

$$\Rightarrow 8x = 40$$

$$\Rightarrow x = 5$$

$\therefore$  Present age of mother

$$= 7x + 5 = 7 \times 5 + 5 = 35 + 5 = 40 \text{ years}$$

and present age of her daughter

$$= x + 5 = 5 + 5 = 10 \text{ years.}$$

### 2nd Method:

$$M + D = 50 \dots \dots \dots \text{(i)}$$

$$M - 5 = 7(D - 5)$$

$$M - 5 = 7D - 35$$

$$M = 7D - 30 \dots \dots \text{(ii)}$$

from (i) & (ii)

$$M + D = 50$$

$$7D - 30 + D = 50$$

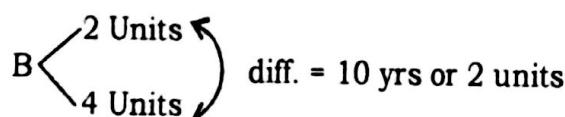
$$8D = 80$$

$$D = 10$$

$$M + D = M + 10 = 50$$

$$M = 50 - 10 = 40 \text{ yrs.}$$

### 38. 3rd Method:

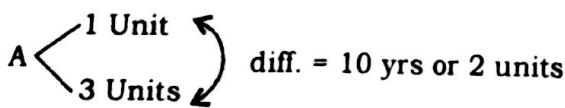


of 2 units = 10 yrs.

then 4 units = 20 yrs

i.e. B = 20 yrs.

Similarly



2 units = 10 yrs.

3 units = 15 yrs.

$$A + B = 20 + 15 = 35 \text{ units.}$$

### 39.3; Let the age of the son be ' $x$ ' years.

$$\therefore \text{Present age of father} = (56 - x) \text{ years}$$

After 4 years age of father

$$= \{(56 - x) + 4\} \text{ years}$$

$$= (60 - x) \text{ years}$$

and son's age =  $x + 4$

According to question

$$(60 - x) = 3(x + 4)$$

$$\Rightarrow 60 - x = 3x + 12$$

$$\Rightarrow 60 - 12 = 4x$$

$$\Rightarrow 48 = 4x$$

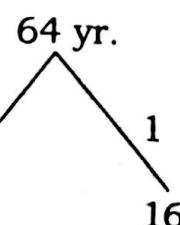
$$\Rightarrow x = 12$$

Age of son = 12 years.

### 39.3; Paramount concept:-

Sum of present age = 56 yr.

Sum of age after 4 yr. = 64 yr. ( $56 + 4 + 4$ )



Present age of son =  $16 - 4 = 12$  yr.

40.2; Let the age of father and his son be ' $4x$ ' years and ' $x$ ' years respectively

Product of their ages = 196

$$4x \times x = 196$$

$$\Rightarrow 4x^2 = 49$$

$$\Rightarrow x^2 = 49$$

$$\Rightarrow x = 7 \text{ or } -7x = 7$$

(because age can never be negative)

Son's present age = 7 years

Father's present age =  $4x$

$$= 4 \times 7$$

$$= 28 \text{ years}$$

After 5 years,

Father's age =  $28 + 5$

$$= 33 \text{ years}$$

and his son's age =  $7 + 5$

$$= 12 \text{ years}$$

.: Ratio of their ages after 5 years

$$= 33 : 12$$

$$= 11 : 4$$

### Short-cut Method

40.2;

Father

$$4x$$

Son

$$x$$

$$4x^2 = 196 \Rightarrow x^2 = 49$$

$$\therefore x : 7$$

$$28 \text{ yr.}$$

$$7 \text{ yr.}$$

$$+5$$

$$+5$$

$$33$$

$$12 \Rightarrow 11 : 4$$

41.1; Let the present ages of Rita and her mother be ' $3x$ ' years and ' $11x$ ' years respectively.

$$\therefore \text{Difference of their ages} = 11x - 3x \\ = 8x$$

$$\therefore 8x = 24 \text{ (It is given in the question)}$$

$$x = 3$$

$$\therefore \text{Rita's present age} = 3x \\ = 3 \times 3 \\ = 9 \text{ years.}$$

After 3 years,

$$\begin{aligned} \text{Rita's age} &= 9 + 3 \\ &= 12 \text{ years} \end{aligned}$$

and after 3 years her mother's age

$$= 11x + 3$$

$$= 33 + 3$$

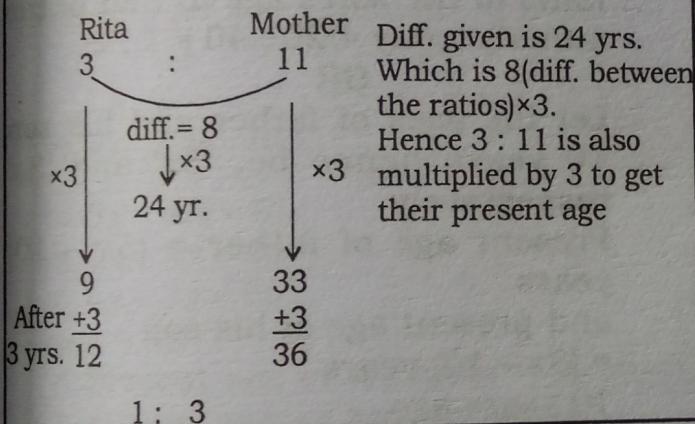
$$= 36 \text{ years}$$

$\therefore$  the ratio of their ages after 3 years

$$= 12 : 36$$

$$= 1 : 3$$

#### 41.1; Paramount concept:-



42.4; Let the present ages of father and his son be ' $6x$ ' years and ' $x$ ' years respectively.

After 5 years,

$$\text{Age of father} = (6x + 5) \text{ years}$$

$$\text{and his son} = (x + 5) \text{ years}$$

According to the question

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

$$\Rightarrow (6x + 5) \times 2 = (x + 5) \times 7$$

$$\Rightarrow 12x + 10 = 7x + 35$$

$$\Rightarrow 12x - 7x = 35 - 10$$

$$\Rightarrow 5x = 25$$

$$\Rightarrow x = 5$$

$$\therefore \text{Present age of son} = x = 5 \text{ years}$$

#### Short-cut-Method

Father : Son  
6 : 1  
7 : 2  
Diff. of time = 5 yrs.

$$x = 7 - 6 = 2 - 1 = 1$$

$\therefore$  Present age of son = 5 years.

OR

$$\text{Son's age} = \frac{1 \times 5}{6 \times 2 - 7 \times 1} \times (7 - 2)$$

$$= \frac{5}{12 - 7} \times 5$$

$$= \frac{5 \times 5}{5} = 5 \text{ yrs.}$$

43.2; Let the present age of man be ' $x$ ' years.

Age of man, 10 years ago =  $(x - 10)$  years

Age of man, 10 years hence =  $(x + 10)$  years

According to the question

$$\frac{150}{100} \times (x - 10) = x = \frac{75}{100} (x + 10)$$

$$\Rightarrow \frac{150}{100} (x - 10) = \frac{75}{100} (x + 10)$$

$$\Rightarrow 2 \times (x - 10) = (x + 10)$$

$$\Rightarrow 2x - 20 = x + 10$$

$$\Rightarrow 2x - x = 10 + 20$$

$$\Rightarrow x = 30$$

Present age of man = 30 years.

#### 43.2; Short-cut-Method

$$\begin{array}{ccc} 100 & \rightarrow & 150\% \\ \downarrow & \downarrow & \downarrow \\ 20\text{yr.} & 10\text{yr.} & 30\text{yr.} \end{array}$$

#### 43.2; Other -Method

10 years before	Present age
$x$	$1.5x$
Now, $1.5x - x = 10$	
or, $0.5x = 10$	
$\therefore 1.5x = 10 \times 3$	
	= 30 years

44.2; Let the age of Ram's father be ' $6x$ ' years

$\therefore$  Age of Ram =  $x$  years

Difference of their ages =  $6x - x = 5x$   
 $5x = 35$  (It is given in the question)

$$\therefore x = 7$$

Father's present age

$$= 6x = 6 \times 7 = 42 \text{ years.}$$

45.3; Let the present ages of Sunita and Vinita be ' $4x$ ' years and ' $5x$ ' years respectively.

6 years hence, the age of Sunita

$$= (4x + 6) \text{ years}$$

and age of Vinita =  $(5x + 6)$  years

According to question

$$\frac{4x+6}{5x+6} = \frac{14}{17}$$

$$\Rightarrow (4x+6) \times 17 = (5x+6) \times 14$$

$$\Rightarrow 68x + 102 = 70x + 84$$

$$\Rightarrow 102 - 84 = 70x - 68x$$

$$\Rightarrow 2x = 18$$

$$\Rightarrow x = 9$$

Present age of Sunita

$$= 4x = 4 \times 9 = 36 \text{ years}$$

Present age of Vinita

$$= 5x = 5 \times 9 = 45 \text{ years}$$

After 12 years

$$\text{Age of Sunita} = 36 + 12 = 48 \text{ years}$$

$$\& \text{Age of Vinita} = 45 + 12 = 57 \text{ years}$$

Ratio of their ages after 12 years

$$= 48 : 57 = 16 : 19$$

#### 45.3; Short-cut Method

$$\frac{4x+6}{5x+6} = \frac{14}{17} \Rightarrow 2x = 18 \Rightarrow x = 9$$

	Sunita	Vinita
Present $\rightarrow$	$4 \times 9$	$5 \times 9$
	36	45
	+12	+12
After 12 yr.	48	57
	16	: 19

46.1; Let the present age of the father and his son be  $F$  years and  $S$  years respectively. According to 1st condition of question.

$$\frac{F+10}{S+10} = \frac{5}{3}$$

$$\begin{aligned} &\Rightarrow (F+10) \times 3 = (S+10) \times 5 \\ &\Rightarrow 3F + 30 = 5S + 50 \\ &\Rightarrow 3F - 5S = 20 \end{aligned}$$

According to 2nd condition of question

$$\frac{F-10}{S-10} = \frac{3}{1}$$

$$\Rightarrow F - 10 = (S - 10) \times 3$$

$$\Rightarrow F - 10 = 3S - 30$$

$$\Rightarrow F - 3S = -30 + 10$$

$$\Rightarrow F - 3S = -20$$

On solving (i) and (ii) we get,  
 $S = 20$

Putting the value of  $S$  in eq. (i), we get

$$3F - 5 \times 20 = 20$$

$$3F - 100 = 20$$

$$3F = 120$$

$$F = 40$$

Father's present age = 40 years  
 and her son's present age = 20 years

$\therefore$  Ratio of the son's age to that of the father's today =  $20 : 40 = 1 : 2$

**OR**

Let the ages of father and his son 10 years hence be, ' $5x$ ' and ' $3x$ ' respectively.

Present age of father =  $(5x - 10)$  years

and present age of his son

$$= (3x - 10) \text{ years}$$

10 years ago,

the age of father

$$= \text{Present age of father} - 10$$

$$= (5x - 10) - 10 = (5x - 20) \text{ years}$$

and age of his son

$$= \text{present age of his son} - 10$$

$$= (3x - 10) - 10 = (3x - 20) \text{ years}$$

According to 2nd condition of question

$$\frac{5x-20}{3x-20} = \frac{3}{1}$$

$$\Rightarrow 5x - 20 = 3(3x - 20)$$

$$\Rightarrow 5x - 20 = 9x - 60$$

$$\Rightarrow 60 - 20 = 9x - 5x$$

$$\Rightarrow 4x = 40$$

$$\Rightarrow x = 10$$

$\therefore$  Present age of father  
 $= 5x - 10 = 5 \times 10 - 10 = 40$  years  
 and present age of his son  
 $= 3x - 10 = 3 \times 10 - 10 = 20$  years  
 $\therefore$  Ratio of the present ages of the son to that of father  $= 20 : 40 = 1 : 2$

### 6.1; Paramount concept:-

Father	:	Son
10 yrs. ago	3	: 1
After 10 yrs.	5	: 3
$\therefore$ Present	4	: 2
or 2		: 1      Somewhere in between the two
Son : father $\Rightarrow$ 1		: 2

7.5; Let the present age of Michelle be ' $x$ ' years.

9 years ago, the age of Michelle

$$= (x - 9) \text{ years}$$

According to question

$$x = 1 \frac{1}{3} \times (x - 9)$$

$$\Rightarrow x = \frac{4}{3}(x - 9)$$

$$\Rightarrow 3x = 4(x - 9)$$

$$\Rightarrow 3x = 4x - 36$$

$$\Rightarrow 4x - 3x = 36$$

$$\Rightarrow x = 36$$

$\therefore$  Present age of Michelle = 36 years

$\therefore$  Present age of her daughter

$$= \frac{1}{6} \text{ of present age of Michelle}$$

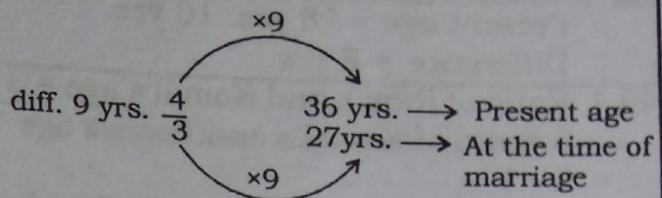
$$= \frac{1}{6} \times 36 \text{ years} = 6 \text{ years}$$

Her daughter age two years ago

$$= (6 - 2) = 4 \text{ years}$$

### 47.5; Paramount concept:-

Michellis present age  $= \frac{4}{3}$  of marriage's age



$$\text{age of daughter} = \frac{1}{6} \times 36 = 6 \text{ yr.}$$

Her daughter's sister 2 years ago  
 $= 6 - 2$   
 $= 2 \text{ years}$

48.5; Let the ages of Sonal and Nitya be ' $9x$ ' year and ' $5x$ ' years respectively.

After 8 years,

Age of Sonal  $= (9x + 8)$  years  
 and Age of Nitya  $= (5x + 8)$  years

According to question

$$\frac{9x + 8}{5x + 8} = \frac{13}{9}$$

$$\Rightarrow (9x + 8) \times 9 = (5x + 8) \times 13$$

$$\Rightarrow 81x + 72 = 65x + 104$$

$$\Rightarrow 81x - 65x = 104 - 72$$

$$\Rightarrow 16x = 32$$

$$\Rightarrow x = 2$$

Difference of their ages

$$= 9x - 5x = 4x = 4 \times 2 = 8 \text{ years.}$$

### 48.5; Paramount concept:-

Sonal      Nitya

$$9 : 5$$

Diff. of time = 8 years

$$13 : 9$$

$\therefore$  Difference of their ages

$$= \frac{(9 - 5) \times 8}{9 \times 9 - 13 \times 5} \times (13 - 9)$$

$$= \frac{4 \times 8 \times 4}{81 - 65} = \frac{4 \times 8 \times 4}{16} = 8 \text{ years.}$$

**48.5; Paramount concept:-**

$$\begin{array}{rcl} \text{Sonal} & & \text{Nitya} \\ +8 \left( \begin{array}{r} 9 \\ 13 \end{array} \right) & : & \left( \begin{array}{r} 5 \\ 9 \end{array} \right) +8 \\ 4 \text{ units} = 8 \text{ yrs.} \therefore 1 \text{ unit} = 2 \text{ yrs.} & & \\ \text{Present age} = 18 \text{ yrs. } 10 \text{ yrs.} & & \\ \text{Difference} = 8 \text{ yrs.} & & \end{array}$$

49.4; Ratio of Rani's and Komal's age = 3 : 5 Ratio of Komal's and Pooja's age

$$= 2 : 3$$

$\therefore$  Rani's Age : Komal's Age : Pooja's Age  
 $3^{\times 2}, 5^{\times 2}$

$2^{\times 5}, 3^{\times 5} = 6 : 10 : 15$  [upper ratio multiplied by 2 and lower multiplied by 5 to make B equal]

To find the actual age of Rani, we require actual age of either Komal or Pooja.

$\therefore$  Can not be determined.

50.4; Let the present ages of father and son be ' $5x$ ' and ' $2x$ ' years respectively.

After 4 years, Son's age =  $(2x + 4)$  years

According to question

$$\frac{\text{age of son after 4 years}}{\text{age of mother}} = \frac{1}{2}$$

$$\Rightarrow \frac{(2x+4)}{\text{age of mother}} = \frac{1}{2}$$

$$\Rightarrow \text{Age of mother} = 2 \times (2x+4) = 4x+8 \text{ years}$$

Ratio between the present age of the father and mother =  $5x : (4x+8)$

$\therefore$  We can not find the exact value of ratio.

51.4; Let the present ages of P, Q & R be p years, Q years and R years respectively.

According to 1st condition of question  
 $P + 2Q + R = 59 \dots (1)$

According to 2nd condition of question  
 $3P + Q + R = 68 \dots (2)$

According to 3rd condition of the question  
 $P + 3Q + 3R = 108 \dots (3)$

From (2), we get

$$Q + R = 68 - 3P \dots (4)$$

From (3), we get

$$P + 3(Q + R) = 108$$

$$P + 3(68 - 3P) = 108 \dots \text{using (4)}$$

$$P + 204 - 9P = 108$$

$$\Rightarrow 8P = 96$$

$$\therefore P = 12$$

P's Present age = 12 yrs

52.2; According to question,  
 Present age of Ritu =  $(x + 3)$  years  
 Present age of Rahul  
 $= (x + 3) - 8$  years  
 $= (x - 5)$  years.

53.2;

$$\begin{array}{lll} \mathbf{A} & & \mathbf{B} \\ \text{Present age} & 2x & y \\ \text{Some years before} & y & x \\ \text{Here, } 2x - y & = & y - x \\ 2x + x & = & y + y \\ 3x & = & 2y \\ \frac{x}{y} & = & \frac{2}{3} \end{array}$$

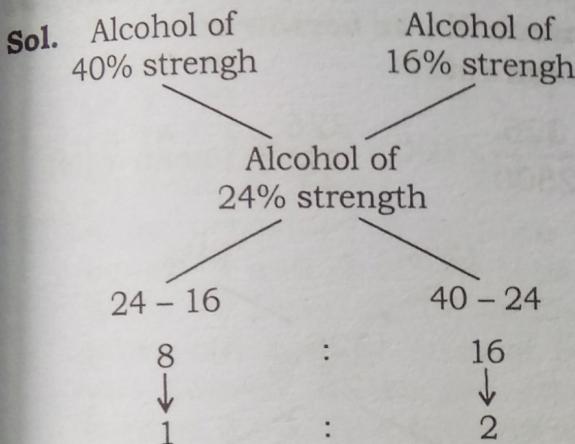
$$\begin{array}{ccc} \mathbf{A} & : & \mathbf{B} \\ 2x & & y \\ 2 \times 2 & & 3 \\ \text{Present age} & 4 & : \\ & & 3 \end{array}$$

Now, the required difference in ages

$$= \frac{63 \times (4 - 3)}{(4 + 3)} = 9 \text{ years}$$

## Mixture and Alligation

**Ex.1.** A butler stole wine from a butt of sherry which contained 40% spirit and he replaced what he had stolen by wine containing only 16% spirit. The butt was then of 24% strength only. How much of the butt did he steal?



Both the types of wine were in the ratio of 1 : 2

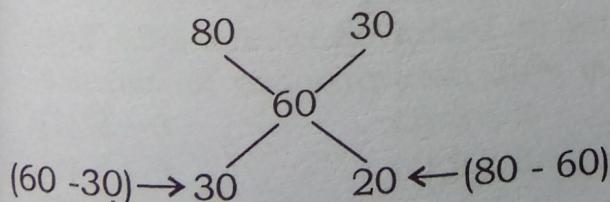
The butt with alcohol of 40% strength = 1/3

The butler stole 2/3 part.

**Ex 2.** There are 65 students in a class. 39 rupees are distributed among them so that each boy gets 80 P and each girl gets 30 P. Find the number of boys and girls in that class.

**Sol.** The average money received by every

$$\text{student} = \frac{3900 \text{ ps.}}{65} = 60 \text{ ps.}$$



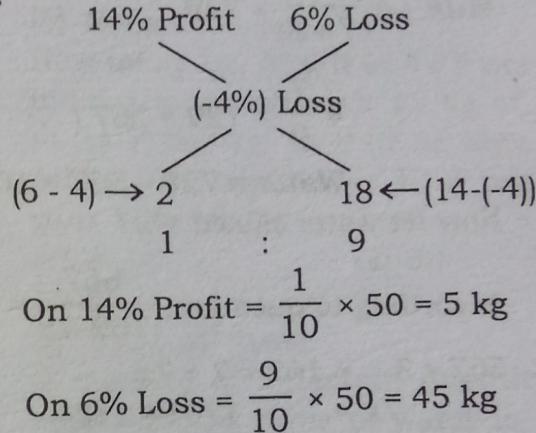
The ratio of boys and girls = 3 : 2

$$\text{The number of boys} = \frac{3}{5} \times 65 = 39$$

$$\text{The number of girls} = \frac{2}{5} \times 65 = 26$$

**Ex 3.** A trader has 50 kg of rice, a part of which he sells at 14% profit and the rest at 6% loss. On the whole his loss is 4%. What is the quantity sold at 14% profit and that at 6% loss?

**Sol.**



**Ex 4.** A container contained 80 l milk. From this container 8 l of milk was taken out and replaced by water. This process was further repeated two times. How much milk is now contained in the container?

**Sol.** Let quantity of milk =  $x$  litres and quantity taken out in each operation =  $y$  litres

Amount of milk remaining after  $n$ th operation

Initial amount of milk

$$= x \times \left(1 - \frac{y}{x}\right)^n$$

Amount of milk after nth operation

$$= x \cdot \left( \frac{x-y}{x} \right)^n = 80 \cdot \left( \frac{80-8}{80} \right)^3$$

$$= 80 \cdot \left( \frac{72}{80} \right)^3 = 80 \times \left( \frac{9}{10} \right)^3$$

$$= 80 \times \frac{729}{1000} = 8 \times 7.29 l$$

$$= 58.32 l$$

**Ex 5.** 729 litres of a mixture contains milk and water in the ratio 7 : 2. How much water is to be added to get a new mixture containing milk and water in the ratio 7 : 3?

**Sol.** Milk : Water = 7 : 2

$$\text{Milk} = \frac{7}{7+2} \times 729$$

$$= \frac{7}{9} \times 729 = 567 l$$

$$\text{Water} = 729 - 567 = 162 l$$

Now let water mixed =  $x l$

$$\text{According to question: } \frac{567}{162+x} = \frac{7}{3}$$

$$567 \times 3 = 162 \times 7 + 7x$$

$$7x = 1701 - 1134$$

$$7x = 567$$

$$x = \frac{567}{7} = 81 l$$

**Paramount concept :-**

Milk

Water

Initial Ratio 7 : 2

Ratio after adding water 7 : 3

Quantity of milk	Quantity of water
567	162
567	243
Quantity of added water	243 - 162 = 81

OR

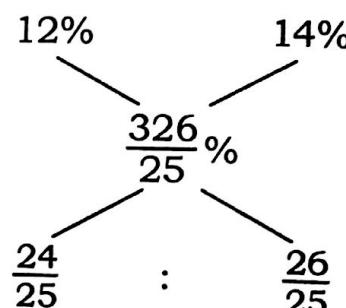
PC :  
7 : 2  
7 : 3

7 + 2 = 729 (as 7 : 2 is initial quantity which is equal to 729 l)

$$\text{Hence diff. 1} = \frac{729}{7+2} = \frac{729}{9} = 81 l$$

**Ex 6.** A merchant borrowed ₹ 2500 from two money lenders. For one loan he paid 12% p.a. and for the other 14% p.a. The total interest paid for one year was ₹ 326. How much did he borrow at each rate?

$$\text{Sol. } \frac{326}{2500} \times 100 = \frac{326}{25} \% \text{ (mean rate)}$$



Ratio of borrowed amount

$$= \frac{24}{25} : \frac{26}{25} = 12 : 13$$

Amount given on 12% interest

$$= \frac{2500}{12+13} \times 12 = 1200/-$$

Amount given on 14% interest  
 $= 2500 - 1200 = 1300/-$

## Exercise

1. In an alloy, zinc and copper are in the ratio  $1 : 2$ . In the second alloy, the same elements are in the ratio  $2 : 3$ . If these two alloys be mixed to form a new alloy in which two elements are in the ratio  $5 : 8$ , the ratio of these two alloys in the new alloys is:  
 (1)  $3 : 10$       (2)  $3 : 7$   
 (3)  $10 : 3$       (4)  $7 : 3$   
 (5) None of these
2. A jar contained a mixture of two liquids A and B in the ratio  $4 : 1$ . When 10 litres of the mixture was taken out and 10 litres of liquid B was poured in the jar, this ratio became  $2 : 3$ . The quantity of liquid A contained in the jar initially was:  
 (1) 4 litres      (2) 8 litres  
 (3) 16 litres      (4) 32 litres  
 (5) None of these
3. In a mixture of 75 litres, the ratio of milk to water is  $2 : 1$ . The amount of water to be further added to the mixture so as to make the ratio of the milk to water  $1 : 2$  will be:  
 (1) 45 litres      (2) 60 litres  
 (3) 75 litres      (4) 80 litres  
 (5) None of these
4. The ratio in which two sugar solutions of the concentrations 15% and 40% are to be mixed to get a solution of concentration 30% is:  
 (1)  $2 : 3$       (2)  $3 : 2$   
 (3)  $8 : 9$       (4)  $9 : 8$   
 (5) None of these
5. Nikita bought 30 kg of wheat at the rate of ₹ 9.50 per kg and 40 kg of wheat at the rate of ₹ 8.50 per kg and mixed them. She sold the mixture at the rate of ₹ 8.90 per kg. Her total profit or loss in the transaction was:  
 (1) ₹ 2 loss      (2) ₹ 2 profit  
 (3) ₹ 7 loss      (4) ₹ 7 profit  
 (5) None of these
6. How many kg. of salt at 42 P per kg. must a man mix with 25 kg of salt at 24 P per kg, so that he may, on selling the mixture at 40 P per kg, gain 25% on the outlay?  
 (1) 20      (2) 30  
 (3) 40      (4) 50  
 (5) None of these
7. A mixture of a certain quantity of milk with 16 litres of water is sold at 90 paise per litre. If pure milk be worth ₹ 1.08 per litre. How much milk is there in the mixture?  
 (1) 40 litres      (2) 50 litres  
 (3) 60 litres      (4) 80 litres  
 (5) None of these
8. A goldsmith has two qualities of gold one of 12 carats and another of 16 carats purity. In what proportion should he mix both to make an ornament of 15 carats purity?  
 (1)  $1 : 3$       (2)  $2 : 3$   
 (3)  $3 : 2$       (4)  $3 : 1$   
 (5) None of these

9. 300 gm of sugar solution has 40% sugar in it. How much sugar should be added to make it 50% in the solution?  
 (1) 40 gm                          (2) 50 gm  
 (3) 60 gm                          (4) 80 gm  
 (5) None of these
10. A person has a chemical of ₹ 25 per litre. In what ratio should water be mixed the mixture at ₹ 20 litres he may get a profit of 25%?  
 (1) 14 : 9                          (2) 16 : 9  
 (3) 9 : 14                          (4) 9 : 16  
 (5) None of these
11. A vessel of 80 litre is filled with milk and water. 70% of milk and 30% of water are taken out of the vessel. It is found that the vessel is empty by 55%. Find the initial quantity of milk and water.  
 (1) 20 litres, 30 litres  
 (2) 30 litres, 50 litres  
 (3) 40 litres, 40 litres  
 (4) 50 litres, 30 litres  
 (5) None of these
12. A container contained 80 l of milk. From this container 8 l of milk was taken out and replaced by water. This process was further repeated two times. How much milk is now contained in the container?  
 (1) 54.23 l                          (2) 54.26 l  
 (3) 56.32 l                          (4) 58.32 l  
 (5) None of these
13. Nine litres are drawn from a cask full of water and it is then filled with milk. Nine litres of mixture are drawn and the cask is again filled with milk. The quantity of water now left in the cask to that of the milk in it is 16 : 9. How much does the cask hold?  
 (1) 40 litres                          (2) 45 litres  
 (3) 50 litres                          (4) 55 litres  
 (5) None of these
14. A mixture of 40 litres of milk and water contains 10% water. How much water must be added to make 20% water in the new mixture?  
 (1) 3 litres                          (2) 4 litres  
 (3) 5 litres                          (4) 6 litres  
 (5) None of these
15. In three vessels each of 10 l capacity, mixture of milk and water is filled, the ratios of milk and water are 2 : 1, 3 : 1 and 3 : 2 in the three respective vessels, if all the three vessels are emptied into a single large vessel, find the proportion of milk and water in the mixture.  
 (1) 121 : 59                          (2) 123 : 59  
 (3) 125 : 59                          (4) 127 : 59  
 (5) None of these
16. If 2 kg of metal, of which  $\frac{1}{3}$  is zinc and the rest is copper, be mixed with 3 kg of metal, of which  $\frac{1}{4}$  is zinc and the rest is copper, what is the ratio of zinc to copper in the mixture?  
 (1) 13 : 42                          (2) 17 : 43  
 (3) 19 : 43                          (4) 15 : 42  
 (5) None of these
17. A man mixes 5 kilolitres of milk at ₹ 600 per kilolitre with 6 kilolitres at ₹ 540 per kilolitre. How many kilolitres of water should be added to make the average value of the mixture ₹ 480 per kilolitre?  
 (1) 7 : 2                                  (2) 9 : 2  
 (3) 11 : 2                                  (4) 13 : 2  
 (5) None of these
18. Vessels A and B contain mixtures of milk and water in the ratios 4 : 5 and 5 : 1 respectively. In what ratio should quantities of mixture be taken from A and B to form a mixture in which milk to water is in the ratio 5 : 4?  
 (1) 2 : 5                                  (2) 4 : 3  
 (3) 5 : 2                                  (4) 2 : 3  
 (5) None of these

9. 50 g of an alloy of gold and silver contains 80% gold (by weight). The quantity of gold, that is to be mixed up with this alloy, so that it may contain 95% gold, is  
 (1) 200 g                                 (2) 150 g  
 (3) 50 g                                     (4) 10 g  
 (5) None of these
10. A pot contains 81 litres of pure milk.  $\frac{1}{3}$  of the milk is replaced by the same amount of water. Again  $\frac{1}{3}$  of the mixture is replaced by that amount of water. The ratio of the milk and water in the new mixture is  
 (1) 1 : 2                                     (2) 1 : 1  
 (3) 2 : 1                                     (4) 4 : 5  
 (5) None of these
11. Gold is 19 times as heavy as water and copper is 9 times as heavy as water. In what ratio should these metals be mixed so that the mixture may be 15 times as heavy as water?  
 (1) 2 : 3                                     (2) 3 : 2  
 (3) 2 : 4                                     (4) 4 : 2  
 (5) None of these
12. How much tea at ₹ 4 a kg should be added to 15 kg of tea at ₹ 10 a kg so that the mixture be worth ₹ 6.50 a kg?  
 (1) 15 kg                                     (2) 35 kg  
 (3) 25 kg                                     (4) 21 kg  
 (5) None of these
13. A sum of ₹ 6.40 is made up of 80 coins which are either 10-paise or 5-paise coins. How many are coins of 5-paise?  
 (1) 24   (2) 28  
 (3) 32   (4) 36  
 (5) None of these
24. In a zoo, there are rabbits and pigeons. If the heads are counted, there are 200 and if legs are counted, there are 580. How many pigeons are there?  
 (1) 105   (2) 110  
 (3) 115   (4) 120  
 (5) None of these
25. A man has 60 pens. He sells some of these at a profit of 12% and the rest at 8% loss. On the whole, he gets a profit of 11%. How many pens were sold at 12% profit.  
 (1) 47   (2) 52  
 (3) 55   (4) 57  
 (5) None of these
26. A man has 40 kg of tea, a part of which he sells at 5% loss and the rest at the cost price. In this business he incurs a loss of 3%. Find the quantity which he sells at the cost price.  
 (1) 12 kg   (2) 14 kg  
 (3) 16 kg   (4) 18 kg  
 (5) None of these
27. The ratio of milk and water in 66 l of adulterated milk is 5 : 1. Water is added to it to make the ratio 5 : 3. The quantity of water added is  
 (1) 20 litres                                     (2) 22 litres  
 (3) 24 litres                                     (4) 28 litres  
 (5) None of these
28. A dishonest milkman professes to sell his milk at cost price but he mixes it with water and thereby gains 25%. The percentage of water in the mixture is:  
 (1) 25%   (2) 35%  
 (3) 45%   (4) 50%  
 (5) None of these
29. A sum of ₹ 41 was divided among 50 children. Each boy gets 90 paise and each girl 65 paise. The number of boys is  
 (1) 32   (2) 34  
 (3) 36   (4) 38  
 (5) None of these

30. A can contains a mixture of two liquids A and B in proportion 7 : 5. When 9 litres of mixture are drawn off and the can is filled with B, the proportion of A and B becomes 7 : 9. How many litres of liquids A was contained in the can initially?
- (1) 32 litres    (2) 34 litres  
(3) 36 litres    (4) 38 litres  
(5) None of these
31. Milk and water are mixed in vessel A in the ratio of 5 : 2 and in vessel B in the ratio of 8 : 5. In what ratio should quantities be taken from the two vessels so as to form a mixture in which milk and water will be in the ratio of 9 : 4?
- (1) 7 : 2    (2) 5 : 2  
(3) 2 : 7    (4) 2 : 5  
(5) None of these
32. 200 litres of mixture contains 15% water and the rest is milk. The amount of milk that must be added so that the resulting mixture contains 87.5% milk is:
- (1) 30 litres    (2) 35 litres  
(3) 40 litres    (4) 45 litres  
(5) None of these
33. 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  
(5) None of these
34. In a bag, there are three types of coins 1 rupee, 50-paise and 25-paise in the ratio 3 : 8 : 20. The total value is ₹ 372. The total number of coins is:
- (1) 1200    (2) 961  
(3) 744    (4) 612  
(5) None of these
35. 7 kg of tea costing ₹ 280 per kg is mixed with 9 kg of tea costing ₹ 240 per kg. The average price per kg of the mixed tea is:
- (1) ₹ 255.80    (2) ₹ 257.50  
(3) ₹ 267.20    (4) ₹ 267.50  
(5) None of these

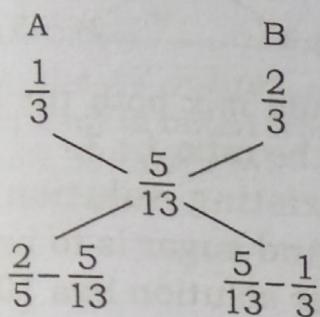
## Answers with explanations

1; In the first alloy, zinc =  $\frac{1}{3}$

In second alloy, zinc =  $\frac{2}{5}$

In the new alloy, zinc =  $\frac{5}{13}$

By the rule of Alligation,



$\therefore$  Required ratio =

$$\left(\frac{2}{5} - \frac{5}{13}\right) : \left(\frac{5}{13} - \frac{1}{3}\right)$$

$$= \frac{26 - 25}{65} : \frac{15 - 13}{39}$$

$$= \frac{1}{65} : \frac{2}{39} = \frac{1}{5} : \frac{2}{3}$$

$$= 3 : 10$$

### Paramount concept :-

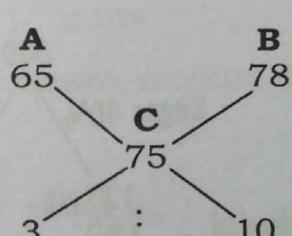
Zinc	Copper	
1	2 out of 3 $\times$ 65	L.C.M. of 3,5 and 13 = $3 \times 5 \times 13$ .
2	3 out of 5 $\times$ 39	Hence 3 is multiplied by $5 \times 13$ .
5	8 out of 13 $\times$ 15	5 is multiplied by $3 \times 13$ and 13 is multiplied by $3 \times 5$

### Zinc

$$A \rightarrow 1 \times 65 = 65$$

$$B \rightarrow 2 \times 39 = 78$$

$$C \rightarrow 5 \times 15 = 75$$



2.2; Let the quantities of A & B are  $4x$  and  $x$  respectively.  
According to question

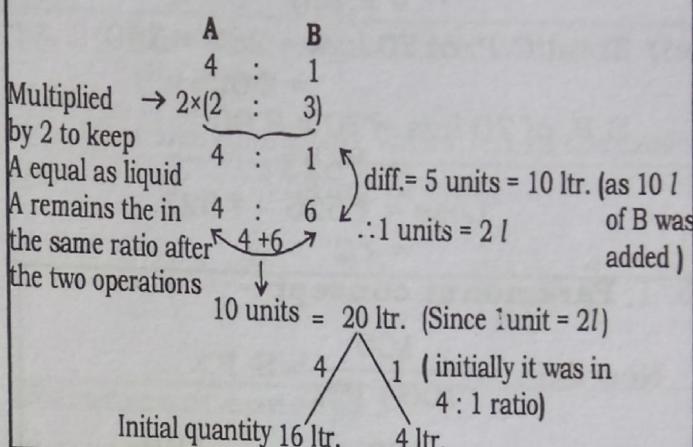
$$\frac{4x - 10 \times \frac{4}{5}}{x + 10 \times \frac{4}{5}} = \frac{2}{3}$$

$$\Rightarrow \frac{4x - 8}{x + 8} = \frac{2}{3}$$

$$\Rightarrow x = 4$$

So, quantity of liquid A in the jar  
 $= 4 \times 4 = 16 l$

### Paramount concept :-



3.3; In 75 litres of the mixture,

$$\text{Milk} = \frac{2}{3} \times 75 = 50 \text{ litres}$$

$$\text{Water} = \frac{1}{3} \times 75 = 25 \text{ litres}$$

Let  $x$  litres of water be added,

$$\text{Then, } \frac{50}{x + 25} = \frac{1}{2}$$

$$\Rightarrow x + 25 = 100$$

$$\Rightarrow x = 75 \text{ litres.}$$

### Paramount concept :-

