Mixture and Alligation Exercise

1. Gold is 19 times and copper is 9 times as heavy as water In what ratio must these metals be mixed so that the mixture may be 15 times as heavy as water?
   (a) 2:3   (b) 3:2
   (c) 1:3   (d) 2:1

2. Six litres of a 20% solution of alcohol in water are mixed with 4 litres of a 60% solution of alcohol in water. The % alcoholic strength of the mixture is
   (a) 80   (b) 40
   (c) 36   (d) 48

3. A merchant lent out `1,000 in two parts, one at 8% and the other at 10% interest. The yearly average comes out to be 9.2%. Find the amount lent in two parts.
   (a) `400, `600   (b) `500, `500
   (c) `300, `700   (d) cannot be determined

4. One litre of water was mixed to 3 litres of sugar. Solution containing 4% of sugar. What is the, percentage of sugar in the solution?
   (a) 3   (b) 4
   (c) 6   (d) insufficient data

5. How much water must be added to 60 litres of milk at $1\frac{1}{2}$ litres for `20 so as to have a mixture worth `$10\frac{2}{3}$litre?
   (a) 10 litres   (b) 12 litres
   (c) 15 Itres   (d) 18 litres

6. How many kg of salt at 42 paise per kg must a man mix with 25 kg of salt at 24 paise per kg so that he may, on selling the mixture at 40 paise per kg gain 25% on the outlay?
   (a) 15 kg   (b) 18 kg
   (c) 20 kg   (d) 24 kg

7. A trader mixes 80 kg of tea at `15 per kg with 20 kg of tea at cost price of `20 per kg. In order to earn a profit of 25%, what should be the sale price of the mixed tea?
   (a) `23.75        (b) `22
   (c) `20        (d) `19.20

8. A company blends two varieties of tea from two different tea gardens, one variety costing `20 per kg and other `25 per kg. in the ratio 5:4. He sells the blended tea at `23 per kg. Find his profit percent:
   (a) 5% profit   (b) 3.5% loss
   (c) 3.5%profit   (d) no profit, no loss

9. Equal amounts of water were poured into two empty jars of different capacities, which made one $\frac{1}{4}$jar full and the otherjar $\frac{1}{3}$ full. If the water in the jar with lesser capacity is thenpoured into the jar with greater capacity, then the part of the larger jar filled with water is 20.
   (a) $\frac{1}{2}$ (b) $\frac{7}{12}$
   (c) $\frac{1}{4}$ (d) $\frac{1}{3}$

10. Pure milk costs `3.60 per litre. Amilkman adds water to 25 litres of pure milk and sells the mixture at `3 per litre. How many litres of water docs he add?
    (a) 2 litres   (b) 5 litres
    (c) 7 litres   (d) 11 litres

11. In what ratio must water be mixed with milk to gain 20% by selling the mixture at cost price?
    (a) 1:3   (b) 1:5   (c) 1:7   (d) 1:10

12. Two liquids are mixed in the proportion of 3:2 and the mixture is sold at? 11 per kg at a 10% profit. If the first liquid costs `2 more per kg than the second, what does it cost per litre?

(a) `11      (b) `10.50

(c) `11.50      (d) `10.80

13. A chemist has 10 litres of a solution that is 10 per cent nitric acid by volume. He wants to dilute the solution to 4 per cent strength by adding water. How many litres of water must he add?
(a) 15   (b) 20   (c) 18   (d)25

14. How much water must be added to a cask which contains 40 litres of milk at cost price ` 3.5/litres so that the cost of milk reduces to `2/litre?
(a) 20   (b) 35
(c) 45   (d) None of these

15. The number of millilitres of water added to reduce 9 ml of aftershave lotion, containing 50% alcohol, to a lotion containing 30% alcohol is
(a) 3   (b) 4
(c) 5   (d) 6

16. In my pocket there are `25 consisting of only the denominations of 20 paise and 50 paise. Thus there are total 80 coins in my pocket. The no. of coins of the denomination of 50 paise is
(a) 30   (b) 70
(c) 50   (d) 25

17. 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.
(a) 45,20   (b) 40,25
(c) 39, 26   (d) 29,36

18. The ratio of milk and water in 55 litres of adulterated milk is7:4. How much water must be added to make the mixture's ratio 7:6?
(a) 5 *lt*   (b) 10 *lt*
(c) 15 *lt*   (d) 25 *lt*

19. A and B are two alloys of gold and copper prepared by mixing metals in the ratio 7:2 and 7:11 respectively. If equal quantities of the alloys are melted to form a third alloy C, then the ratio of gold and copper in alloy C will be
(a) 5:7   (b) 5:9   (c) 7:5   (d) 9:5

20. A cane contains a mixture of two liquids A and B in the ratio 7:5. When 9 litres of mixture are drawn off and the cane is filled with B, the ratio of A and B becomes 7:9. How many litres of liquid A was contained by the cane initials
(a) 10   (b) 20   (c) 21   (d) 25

21. Given that 24 carat gold is pure gold, 18 carat gold is $\frac{3}{4}$ gold and 20 carat gold is $\frac{5}{6}$ gold, the ratio of the pure gold in 18 carat gold to pure gold in 20 carat gold is:
(a) 3:8   (b) 9:10
(c) 15:24   (d) 8:5

22. Five litres of water is added to a certain quantity of pure milk costing `3 per litre. If by selling the mixture at the same price as before, a profit of 20% is made, what is the amount of pure milk in the mixture?
(a) 22 litres   (b) 25 litres
(c) 27 litres   (d) None of these

23. A jar full of whisky contains 40% alcohol. A part of this whisky is replaced by another containing 19% alcohol and now the percentage of alcohol was found to be 26%. The quantity of whisky replaced is:
(a) $\frac{1}{3}$ (b) $\frac{2}{3}$
(c) $\frac{2}{5}$ (d) $\frac{3}{5}$

24. A mixture consists of 15 parts of coffee, purchased at `2.10 per kg and 1 part of chicory, purchased at 98 paise per kg. If it is sold at `2.25 per kg, what profit would be made on the sale of 5 quintals?
(a) `100      (b) `105

(c) `110      (d) `115

25. How many litres of pure alcohol must be added to 10 litres of mixture which is 15%

alcohol to make a mixture which will be 25% alcohol?

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

(c) $\frac{3}{4}$ (d) $\frac{4}{3}$

26. How many kg of custard powder costing `40 kg must be mixed with 16 kg of custard powder costing `55 kg so that 25% may be gained by selling the mixture at ` 60 kg?

(a) 11 kg   (b) 14 kg

(c) 12kg   (d) 20 kg

27. From a cask full of milk, 10 litres are taken out of 50 litres and is filled with water. This was done twice. What is the quantity of milk now left in the cask?

(a) 20 litres   (b) 32 litres

(c) 25 litres   (d) 30 litres

28. Two vessels A and B contain spirit and water mixed in the ratio 5:2 and 7:6 respectively. Find the ratio in which these mixture be mixed to obtain a new mixture in vessel C containing spirit and water in the ratio 8:5?

(a) 4:3   (b) 3:5

(c) 5:6   (d) 7:9

29. 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:

(a) 2:7   (b) 3:5

(c) 5:2   (d) 5:7

30. Three bars of gold, weighing 6, 5, 4 and 15, 14, $12\frac{1}{2}$ carats fineness are mixed together. What is the fineness of the compound?

(a) 16 carats   (b) 20 carats

(c) 11 carats   (d) 14 carats

31. A butler stole wine from a butt of sherry which contained 32% of spirit and then replaced what he stole, by wine containing only 18% spirit. The butt was then of 24% strength only. How much of the butt had he stolen?

(a) $\frac{3}{8}$ (b) $\frac{5}{7}$

(c) $\frac{4}{7}$ (d) $\frac{7}{11}$

32. Three containers A, B and C are having mixture of milk and water in the ratio 1:5, 3:5 and 5:7, respectively. If the capacities of the containers are in the ratio 5: 4: 5, then find the ratio of the milk to the water if the mixtures of all the three containers are mixed together.

(a) 51:115   (b) 52:115

(c) 53:115   (d) 54:115

33. Tea worth %126 per kg and ` 135 per kg are mixed with a third variety in the ratio 1:1:2. If the mixture is worth ` 153 per kg, then the price of the third variety per kg is:

(a) `169.50          (b) ` 170

(c) `175.50          (d) `180

34. Several litres of acid were drawn off from a 54 litre vessel, full of acid and and equal amount of water was added. Again the same volume of the mixture was drawn off and replaced by water. As a result now, the vessel contained 24 litres of pure acid. How much of the acid was drawn off initially?

(a) 12L   (b) 16L

(c) 18L   (d) 24L

35. An empty fuel tank of a car was filled with A type petrol. When the tank was half-empty, it was filled with B type petrol. Again when the tank was half-empty again, it was filled with A type petrol. When the tank was half-empty again, it was filled with B type petrol. What is the percentage of A type petrol at present in the tank?

(a) 33.5%   (b) 37.5%

(c) 40%   (d) 50%

36. How many kilograms of tea powder costing `31 per kg be mixed with thirty six kilograms of tea powder costing `43 per kg, such that the

mixture when sold at `44 per kg gives profit of 10%?

(a) 12kg   (b) 14kg

(c) 16kg   (d) 8kg

37. A mixture of Nitric acid and Sulfuric acid is taken in the ratio of 1:2 and another mixture of the same is taken in the ratio 2:3. How many parts of the two mixtures must be taken to attain a new mixture consisting of Nitric acid and Sulfuric acid in the ratio of 3:5?

(a) 3:5   (b) 5:3

(c) 2:3   (d) 3:2

38. In two alloys, the ratio of iron and copper is 4:3 and 6:1, respectively. If 14 kg of the first alloy and 42kg of the second alloy is mixed together to from a new alloy, then what will be the ratio of iron to copper in the new alloy?

(a) 11:3   (b) 11:8

(c) 8:1   (d) None of these

39. In a mixture of 45 litres, the ratio of milk and water is 4:1. How much water must be added to make the mixture ratio 3:2?

(a) 72 litres   (b) 24 litres

(c) 15 litres   (d) 1.5 litres

40. Zinc and copper are melted together in the ratio 9:11. What is the weight of melted mixture, if 28.8 kg of zinc has been consumed in it?
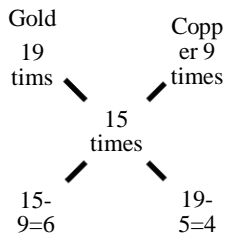
(a) 58kg   (b) 60kg

(c) 64kg   (d) 70kg

ANSWER KEY			
1	(a)	21	(b)
2	(b)	22	(b)
3	(c)	23	(b)
4	(a)	24	(c)
5	(a)	25	(d)
6	(c)	26	(b)
7	(c)	27	(b)
8	(c)	28	(d)
9	(b)	29	(a)
10	(b)	30	(d)
11	(b)	31	(c)
12	(d)	32	(c)
13	(a)	33	(c)
14	(d)	34	(c)
15	(d)	35	(b)
16	(a)	36	(a)
17	(c)	37	(a)
18	(b)	38	(a)
19	(c)	39	(c)
20	(c)	40	(c)

HINTS & EXPLANATIONS

1. (b) By the rule of allegation, we have

∴ Required ratio $= \frac{6}{4} = 3:2$

2. (c) Quantity of alcohol in 6 litres of 20% solution

$= \frac{20}{100} \times 6l = 1.2l$

Quantity of alcohol in 4 litres of 60 % solution

$= \frac{60}{100} \times 4l = 2.4l$

% alcoholic strength of the mixture
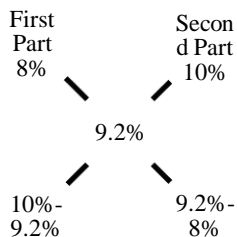
$= \frac{total\ alc.}{total\ sol.} \times 100$

$= \frac{1.2+2.4}{10} \times 100 = 36\%$

By direct formula:

% alcoholic strength of the mixture

$= \frac{6 \times 20 + 4 \times 60}{6+4} = 36$

3. (a) Here, the % value of first part and second part from `1000 should be taken into consideration.

$\frac{\text{Quantity lent at 8\%}}{\text{Quantity lent at 10\%}} = \frac{10-9.2}{9.2-8} = \frac{0.8}{1.2} = \frac{2}{3}$

∴ Quantity of money lent at 8%

$= \frac{2}{2+3} \times 1000 = ` 600$

4. (a) New % sugar in (3+1) litre solution

$= \frac{0.04 \times 3}{(3+1)} = 0.03 = 3\%$

5. (c) C.P. of 1 litre of milk $= ` \left(20 \times \frac{2}{3}\right. = ` \frac{40}{3}$
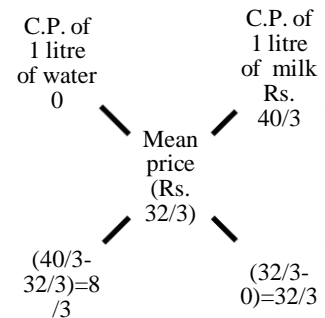
∴ Ration of water and milk $= \frac{8}{3} : \frac{32}{3} = 8:32 = 1:4$.

∴ Quantity of water to be added to 60 litres of milk

$= \left.\frac{1}{4} \times 60\right)$ litres = 15 litres.

6. (c) Here, cost price of mixture $= 40 \times \frac{100}{100+25} = 32$ pais

$\therefore \frac{q_1}{q_2} = \frac{32-24}{42-32} = \frac{8}{10} = \frac{4}{5}$

And hence $q_1 = \frac{4}{5} \times 25 = 20$kg

7. (c) C.P of mixture $= \frac{80 \times 15 + 20 \times 20}{80+20} = `16$

$\therefore S.P. = \frac{(100+25)}{100} \times 16 = `20$

8. (c) Let the quantity of two varieties of tea be 5×kg and 4×kg, respectively.

Now, SP= 23×9x = 207x

and CP = 20×5x+25×4x = 200x

Profit% $= \frac{7x}{200x} \times 100 = 3.5\%$

9. (a) Amounts of water in two jars are equal; the jar with the greater capacity is $\frac{1}{4}$ full, and the Jar with lesser capacity is $\frac{1}{3}$ full.

∴ When the water in smaller jar is poured into the larger Jar, the addition of an equal amount of water will double the amount in the larger jar, which will then be $2 \times \frac{1}{4} = \frac{1}{2}$ full.

10. (b)

C.P. of 1 l of pure milk Rs 3.60   C.P. of 1 l of water 0

Rs. 3

3-0   3.60-3
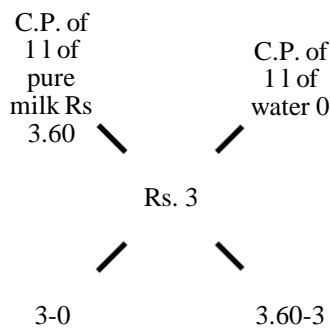
$$\frac{\text{Quantity of pure milk}}{\text{Quantity of water}} = \frac{3-0}{3.6-3}$$
$$= \frac{3}{0.6} = \frac{5}{1}$$

Since in every 5 litre of milk, he adds 1 litre of water.

∴In every 25 litres of milk, he adds 5 litres of litre.

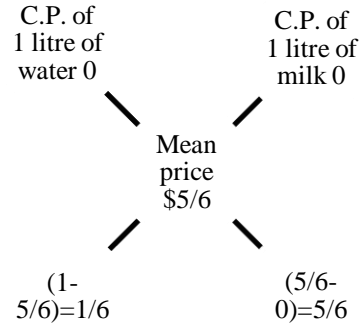11. (b) Let C.P. of milk be ` 1 per litre.

Then, S.P. of 1 litre of mixture =`1.

Gain = 20%

∴ C.P. of 1 litre of mixture $=`\left(\frac{100}{120} \times 1\right) = \square\frac{5}{6}$.

By the rule of allegation, we have:

C.P. of 1 litre of water 0   C.P. of 1 litre of milk 0

Mean price $5/6

(1-5/6)=1/6   (5/6-0)=5/6

∴Ratio of water and milk $=\frac{1}{6} : \frac{5}{6} = 1{:}5$.

12. (d) C.P. of mixture $=\frac{100}{100+10} \times 11 = `10$

Let the cost of second liquid be `x.

Then, cost of first liquid be ` (x+2).

∴ $10 = \frac{(x+2) \times 3 + 2x}{5}$

⇒ 5x + 6=50 ⇒x = ` 8.8

∴ cost of first liquid = ` (8.8+2) = ` 10.80

13. (a) Out of 10 litre of solution, there is 1 litres of nitric acid and 9 litres of water.
Let x litres of water be added to the solution so that the diluted solution is of 4% strength.
∴4% of (10+x) = 1⇒ x=15

14. (d) This question can be solved in so many different ways. But the method of allegation method is the simplest of all the methods. We will apply the allegation on price of milk, water and mixture.

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Milk 3.5   Water 0

Mean 2

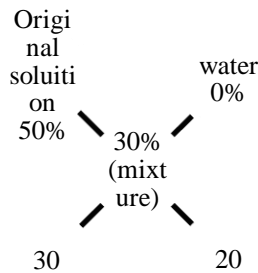2   1.5

</div>
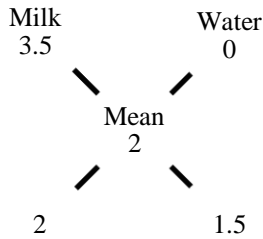
$\therefore$ ratio of milk and water should be 2:15 = 4:3

$\therefore$ added water $= \dfrac{40}{4} \times 3 = 30$ litres

15. (d) The given solution has 50% alcohol. Water which is to be added has 0% alcohol concentration.
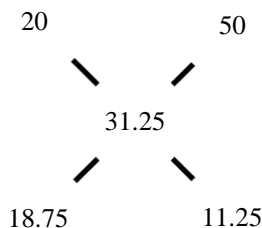
Alcohol concentration:

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Original soluition 50%   water 0%

30% (mixture)

30   20

</div>

$\therefore$ Water should be added in the ratio 2:3

$\therefore$ Quantity of water to be added $= \dfrac{2}{3} \times 9 = 6$ ml

16. (a) Go through options

$30 \times 50 + 50 \times 20 = 2500$ paise

Alternatively: Since the average price of a coin

$= \dfrac{2500}{80} = 31.25$ paise

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20   50

31.25

18.75   11.25

</div>

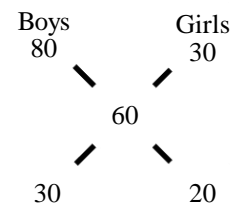So the ratio of no. of 20 paise coins to the no. of 50 paise coins

= 18.75 : 11.25

= 75 : 45 = 5:3

Therefore, the no. of coins of the denominations of 50 paise is 30.

17. (c) here, allegation is applicable for 'money per boy or girl".
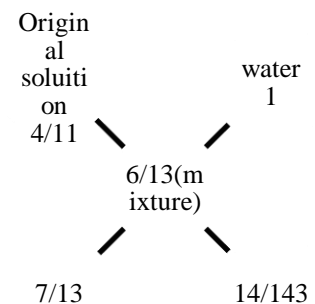
Mean value of money per student $= \dfrac{3900}{65} = 60$P

<div align="center">

Boys 80   Girls 30

60

30   20

</div>

$\therefore$ Boys : Girls = 3:2

$\therefore$ Number of boys $= \dfrac{65}{3+2} \times 3 = 39$

and number of girls = 65-39 = 26

18. (b) By the rule of allegation, water concentration,

<div align="center">

Original soluition 4/11   water 1

6/13(mixture)

7/13   14/143

</div>

$\therefore$water must be added to the mixture in the ratio $\dfrac{14}{143} : \dfrac{7}{13}$ i.e. 2:11

Short cut Method:

Quantity of water added $= \dfrac{55(7 \times 6 - 7 \times 4)}{7(7+4)}$

$= \dfrac{55 \times 14}{7 \times 11} = 10$ litres

Quantity of water to be added $= \frac{2}{11} \times 55 = 10$ litres

19. (c) Short cut method:
    Ratio of gold and copper in type C alloy $=$
    $\frac{7}{9} + \frac{7}{18} \; : \; \frac{2}{9} + \frac{11}{8} \;=\; \frac{21}{18} : \frac{15}{18} = 7:5$

20. (c) Suppose the cane initially contains 7x and 5x litres of mixture A and B respectively.
    Quantity of A mixture left
    $= \left(7x - \frac{7}{12} \times 9\right)$ litres $= \left(7x - \frac{21}{4}\right)$ litres.
    Quantity of B in mixture left
    $= \left(5x - \frac{5}{12} \times 9\right)$ litres $= \left(5x - \frac{15}{4}\right)$ litres.
    $\therefore \dfrac{7x - \frac{21}{4}}{5x - \frac{15}{4} + 9} = \dfrac{7}{9} \Rightarrow \dfrac{28x - 21}{20x + 21} = \dfrac{7}{9}$
    $\Rightarrow 252x - 189 = 140x + 147$
    $\Rightarrow 112x = 336 \Rightarrow x = 3$
    So, the cane contained 21 litres of A.

21. (b) 18 carat gold $= \frac{3}{4}$ pure gold $= \frac{3}{4} \times 24 = 18$ carat gold 20 carat gold $= \frac{5}{6}$ pure gold $= \frac{5}{6} \times 24$ = 20 carat gold
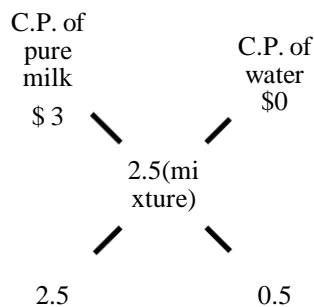   Required ratio $= 18:20 = 9:10$

22. (b) here, S.P. of mixture = C.P. of pure milk = ` 3 per litre
    Now, S.P. of mixture$= \frac{100+20}{100} \times$C.P. of mixture
    $\Rightarrow$ C.P. of mixture $= \frac{3 \times 100}{120} = $`2.5 per litre
    Also, C.P. of water $=$ ` 0
    By the rule of allegation:

    C.P. of pure milk $3   C.P. of water $0

    2.5(mixture)

    2.5   0.5

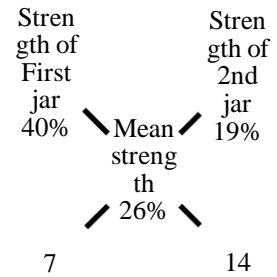23. $\therefore$ Ratio of pure milk and water in mixture $= \frac{2.5}{0.5} = 5:1$
    For five litres of water, quantity of pure milk $= 5 \times 5 = 25$ litres

23. (b) By the rule of allegation, we have:

    Strength of First jar 40%   Mean strength   Strength of 2nd jar 19%

    26%

    7   14

    So, ratio 1st and 2nd quantities = 7:14 = 1:2.
    $\therefore$ Required quantity replaced $= \frac{2}{3}$.

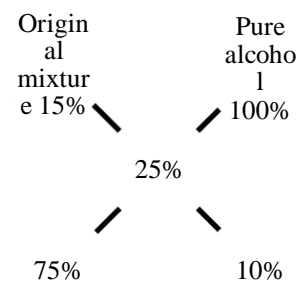24. (c) C.P. of mixture $= \frac{2.10 \times 15 + 0.98 \times 1}{15 + 1}$
    $=$`2.03 per kg
    Profit on 1 kg of mixture $= 0.22 \times 500$
    ($\because$ 1 quintals $= 100$ kg)
    $=$ `110

25. (d) By the rule of allegation, Alcohol concentration:

    Original mixture 15%   Pure alcohol 100%

    25%

    75%   10%

    $\therefore$ Alcohol must be added in the ratio of 10:75 or 2:15
    $\therefore$ Quantity of alcohol to be added in 10 litres
    $= \frac{2}{15} \times 10 = \frac{4}{3}$

26. (b) C.P. of mixture $= \frac{100 \times 60}{(100 + 25)} = $`48

Let x kg be mixed. Then,

$$48 = \frac{40 \times x + 55 \times 16}{16 + x}$$

$\Rightarrow 8x = 16 [55-48] \Rightarrow x = 14kg$

27. (b) $\because$ 10 litres are withdrawn $= \frac{10}{50} = \frac{1}{5}$ of the whole

Quantity of milk after 2nd operation

$$= 50 \left(1 - \frac{1}{5}\right)^2$$
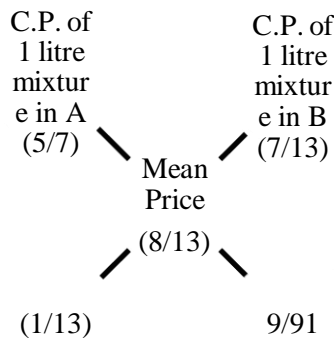
$$= \frac{16}{25} \times 50 = 32 \text{ litres}$$

28. (d) Let the C.P. of spirit be `1 per litre.

Sprite in 1 litre mix of A = $\frac{5}{7}$ litre; C.P. of a litre mix in A = ` $\frac{5}{7}$

Spirit in 1 litre mix, of B = $\frac{7}{13}$ litre; C.P. of 1 litre mix, in B = ` $\frac{5}{13}$.

Spirit in 1 litre mix, of C = $\frac{8}{13}$ litre; Mean price = ` $\frac{8}{13}$.

By the rule of allegation, we have:

```
   C.P. of              C.P. of
   1 litre              1 litre
   mixtur               mixtur
   e in A               e in B
   (5/7)                (7/13)
        \    Mean      /
          Price
          (8/13)
        /            \
   (1/13)             9/91
```

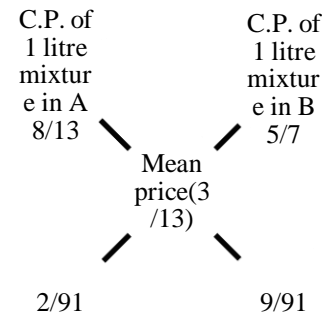$\therefore$Required ratio = $\frac{1}{13} : \frac{9}{13}$ = 7:9.

29. (a) Let cost of 1 litre milk be `1.

Milk in 1 litre mix in B = $\frac{8}{13}$ litre, C.P. of a litre mix in B = ` $\frac{5}{7}$.

Milk in 1 litre of final mix $= \left(\frac{900}{13} \times \frac{1}{100} \times 1\right) = \frac{9}{13}$ litre;
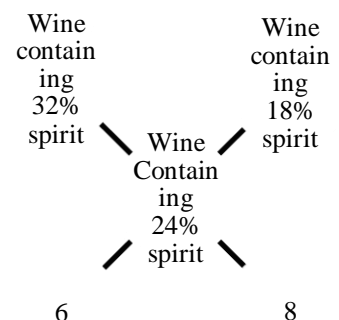
mean price = ` $\frac{9}{13}$

By the rule of allegation, we have:

```
   C.P. of              C.P. of
   1 litre              1 litre
   mixtur               mixtur
   e in A               e in B
   8/13                 5/7
        \    Mean      /
          price(3
          /13)
        /            \
   2/91               9/91
```

$\therefore$Required ratio = $\frac{2}{91} : \frac{1}{13}$ = 2:7.

30. (d) Fineness $= \frac{6 \times 15 + 5 \times 14 + 4 \times \frac{25}{2}}{6+5+4} = \frac{210}{15} = 14$ carats

31. (c) By the rule of a allegation,

```
   Wine                 Wine
   contain              contain
   ing                  ing
   32%                  18%
   spirit \   Wine    / spirit
            Contain
            ing
            24%
          / spirit  \
   6                    8
```

$$\frac{\text{Quantity of 32\% spirit}}{\text{Quantity of 18\% spirit}} = \frac{6}{8} = \frac{3}{4}$$

Now, wine of 32% spirit = $\frac{3}{7}$ of the butt

$\therefore$ The rest part i.e. $1 - \frac{3}{7} = \frac{4}{7}$ of the butt has been stolen

32. (c) Ratio of milk in the containers are,

$$5 \times \frac{1}{6} : 4 \times \frac{3}{8} : 5 \times \frac{5}{12} = \frac{5}{6} : \frac{3}{2} : \frac{25}{12}$$

and the ratio of water in the containers are,

$$5 \times \frac{5}{6} : 4 \times \frac{5}{8} : 5 \times \frac{7}{12} = \frac{25}{6} : \frac{5}{2} : \frac{35}{12}$$

Ratio of mixture of milk and water in the containers

$$= \left(\frac{1}{6} \times 5 + \frac{3}{8} \times 4 + \frac{5}{12} \times 5\right) : \left(\frac{5}{6} \times 5 + \frac{5}{8} \times 4 + \frac{7}{12} \times 5\right)$$

$= 106 : 230 = 53 : 115$

33. (c) Let the third type of tea is priced at `x per kg. Also suppose that the three types of tea mixed together are m, m and 2m kg, respectively.

Now, $\frac{126m + 135m + 2mx}{m + m + 2m} = 153$

or $\frac{261 + 2x}{4} = 153$

or $261 + 2x = 612$

or $x = \frac{351}{2} = $ `175.5 per kg.

34. (c) Let a container contains x units of liquid and y units of liquid is taken out from it. If this operation is repeated n times, then the final quantity of the liquid in the

container is $x\left(1 - \frac{y}{x}\right)^n$

Therefore, from this equation, we have

$24 = 54\left(1 - \frac{y}{54}\right)^2$

(y = amount of acid initially drawn off)

or $\left(1 - \frac{y}{54}\right)^2 = \frac{24}{54} = \frac{4}{9}$

or $\left(1 - \frac{y}{54}\right) = \frac{2}{3}$ or $\frac{x}{54} = \frac{1}{3}$

or y = 18 litres

35. (b) Let the capacity of the car be 100 litres.

	Type A	Type B
At the start	100	-
When the tank was half	50	50
When the tank was half again	25 + 50 = 75	25
When the tank was half tank	12.5 + 50 = 62.5	37.5

$\therefore$ Percentage of A type petrol now is 37.5%

36. (a) C.P. of the mixture $= \frac{44 \times 100}{110} = $ `40 per kg

Using allegation rule, the required ratio

```
   31              43
=        40            = 1:3
   3               9
```

If 3 → 36 kg

Then 1 → ?

$= \frac{1 \times 36}{3} = 12$ kg

37. (a) By allegation rule

$CP_{cheaper}$ 1/3 CP_{dearor}

```
           3/8
   1/40            1/24
```

$\therefore$ The ratio in which the two are to be mixed is

$\frac{1}{40} : \frac{1}{24} = 3 : 5$

38. (a)

	Iron		Copper	
Alloy I	8	:	6	14kg
Alloy II	36	:	6	42kg
	44	:	12	56kg

39. (c) Quantity of milk $= 45 \times \frac{4}{5} = 36$ litres

Quantity of water $= 45 \times \frac{1}{5} = 9$ litres

Let x litres of water be added.

Then, $\frac{36}{9 + x} = \frac{3}{2}$

$\Rightarrow 72 = 27 + 3x$ or $3x = 45$

or x = 15 litres

40. (c) For 9 kg zinc, mixture melted = (9 + 11) kg.

For 28.8 kg zinc, mixture melted

$= \left(\frac{20}{9} \times 28.8\right)$ kg = 64 kg.