Mixture and Alligation (LOD 02)

1. How much chicory at Rs. 24 a kg should be added to 15 kg of tea at Rs. 60 a kg as to make the mixture worth Rs. 39 a kg ?

a) 21 kg b) 20 kg

c) 27 kg d) 18 kg

2. 640 ml of a mixture contains milk and water in ratio 6:2. How much of the water is to be added to get a new mixture containing half milk and half water ?

a) 310 ml b) 320 ml

c) 330 ml d) 340 ml

3. A shopkeeper buys 26 liter of milk @ Rs. 16 per liter. He also buys from another source an inferior quality of milk @ Rs. 10 per liter. How much quantity of the later should he buy to mix it with the former so that he can sell the mixture @ Rs. 14 per liter without making any loss?

a) 13 liter b) 12 liter

c) 14 liter d) 16 liter

4. Two vessels A and B contain mixture of milk and water in the ratio 4 : 1 and 9 : 11 respectively. They are mixed in the ratio of 3 : 2. Find the ratio of milk and water in the resulting mixture.

a) 34 : 16 b) 33 : 17

c) 16 : 34 d) 17 : 33

5. 6 liters of milk and water mixture has 75% milk in it. How much milk should be added to the mixture to make it 90% pure?

a) 8 liters b) 9 liters

c) 10 liters d) 12 liters

6. In what ratio must water be added to spirit to gain 25% by selling it at cost price?

a) 1 : 4 b) 4 : 1

c) 3 : 4 d) 4 : 3

7. A shopkeeper has 50 kgs of rice. He sells a part of it at 20% profit and the rest at 40% profit. If he gains 25% on the whole, find the quantity of each part.

a) 12.5 kgs and 37.5 kgs

b) 37.5 kgs and 12.5 kgs

c) 23.5 kgs and 21.5 kgs

d) 21.5 kgs and 23.5 kgs

8. The average monthly salary of employees, consisting of officers and workers, of an organisation is Rs. 3000. The average salary of an officer is Rs. 10,000 while that of a worker is Rs. 2000 per month. If there are total 400 employees in the organisation, find the number of officers and workers separately.

a) 300 , 100 b) 50 , 350

c) 250 , 150 d) 310 , 90

9. If 4 kg of an alloy made of 1/4th iron and rest is mixed with 6 kg of another alloy made of 2/3rd iron and rest tin, find the ratio of iron to tin in the resultant mixture.

a) 1 : 1 b) 2 : 1

c) 1 : 2 d) 3 : 2

10. In a courtyard there are many chickens and goats. If heads are counted, it comes to 100 but when legs are counted, it comes to 320. Find the number of chickens and goats in the courtyard.

a) 20 , 50 b) 30 , 70

c) 40 , 60 d) 50 , 50

11. A container is full of milk. One-third of milk is taken out of it and replaced by same quantity of water. Then again one-third of the mixture is taken out of it and replaced by the same quantity of water. The process is repeated 4 times. If 16 litres of milk is left in the container at the end of 4th operation, find the capacity of the container.

a) 76 litres b) 81 litres

c) 82 litres d) 85 litres

12. The cost of type - I rice is Rs. 15 per kg and type - II is Rs. 20 per kg. If both type - I and type - II are mixed in the ratio of 2 : 3, then find the price per kg of the mixed variety.

a) 19.50 b) 19

c) 18.50 d) 18

13. In what ratio of water be mixed with milk to gain 16 2/3 % on selling the mixture at cost price?

a) 4 : 3 b) 2 : 3

c) 6 : 1 d) 1 : 6

14. 729 ml. of a mixture contains milk and water in the ratio 7 : 2. How much more water is to be added to get a new mixture containing milk and water in ratio 7 : 3 ?

a) 600 ml b) 710 ml

c) 520 ml e) None of these

15. In a mixture of 60 liters, the ratio of milk and water is 2 : 1. If the ratio of the milk and water is to be 1 : 2, then the amount of water to be further added is —

a) 20 litres b) 30 litres

c) 40 litres d) 60 litres

16. A merchant has 50 kg. of sugar part of which he sells at 8 % profit and the rest at 18 % profit. He gains 14 % on the whole. The quantity sold at 18 % profit is —

a) 20 kg b) 30 kg

c) 15 kg d) 35 kg

17. In what proportion must wheat at Rs. 1·60 per kg be mixed with wheat at Rs. 1·45 per kg. So that the mixture be worth Rs. 1·54 per kg?

a) 2 : 3 b) 3 : 2

c) 3 : 4 d) 4 : 3

18. The ratio of milk and water in 66 kg of adulterated milk is 5 : 1. Water is added to it to make the ratio 5 : 3. The quantity of water added is —

a) 22 kg b) 24·750 kg

c) 16·500 kg d) 20 kg

19. Two vessels A and B contains milk and water mixed in the ratio 5 : 3 and 2 : 3. When these mixtures are mixed to form a new mixture containing half milk and half water, they must be taken in the ratio —

a) 2 : 5 b) 3 : 5

c) 4 : 5 d) 7 : 3

20. In what proportion should water and wine at Rs. 22·50 a liter be mixed to reduce the price to Rs. 18 a liter ?

a) 1 : 4 b) 4 : 1

c) 2 : 3 d) 3 : 2

21. A person bought 60 quintals of rice of two different sorts for Rs. 4642·50. The better sort costs Rs. 80 per quintal and the worse Rs. 75·50 per quintal. How many quintals were there of each sort ?

a) 25 quintals, 35 quintals

b) 20 quintals, 40 quintals

c) 32 quintals, 28 quintals

d) None of these

22. A petrol pump owner mixed leaded and unleaded petrol in such a way that the mixture contains 10 % unleaded petrol. What quantity of leaded petrol should be added to 1 liter mixtures, so that the percentage of unleaded petrol becomes 5 % ?

a) 1000 ml b) 900 ml

c) 1900 ml d) 1800 ml

23. In a mixture of 60 liters, the ratio of milk and water is 2 : 1. If the ratio of the milk and water is to be 1 : 2, then the amount of water to be further added is

a) 20 litres b) 30 litres

c) 40 litres d) 60 litres

24. 4 vessels of equal sizes contains mixture of spirit and water. The concentration of spirit in 4 vessels are 60 %, 70 %, 75 % and 80 % respectively. If all the 4 mixtures are mixed, find in the resultant mixture the ratio of spirit to water —

a) 57 : 13 b) 23 : 57

c) 57 : 23 d) None of these

Mixture Alligation (LOD 02 Answers)

1. Correct Option: A

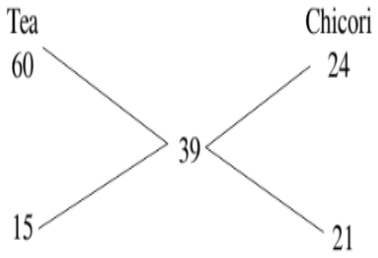
Given that :- C1 = Rs. 60 , C2 = Rs. 24 and Mean cost Price (M) = Rs. 39

By alligation method :

∴ Ratio of tea and chicori = 5 : 7

∴ Added chicori = 15 / 5 * 7

= 21 kg



2. Correct Option: B

Let us assume the ratio product is Q.

According to question,

Quantity of Milk in mixture = 6Q ml

Quantity of Water in mixture = 2Q ml

Quantity of Milk in mixture + Quantity of Water in mixture = 640

6Q + 2Q = 640

8Q = 640

Q = 640/8

Q = 80

Quantity of Milk in mixture = 6Q ml = 6 x 80 = 480 ml

Quantity of Water in mixture = 2Q ml = 2 x 80

= 160 ml

To find the new mixture containing half milk and half water,

Quantity of water to be added for making the mixture of equal quantity of milk and water = 480 - 160 = 320

3. Correct Option: A

Quantity of milk @ Rs.10 per liter / Quantity of milk @ Rs. 16 per liter = 1 / 2

So, quantity of milk @ Rs. 10 per liter = 26 / 2

= 13 liter.

4. Correct Option: B

Fraction is	Milk	Water
A:	4 / 5	1 / 5
B:	9 / 20	11 / 20

(3A + 2B) = A and B: ((12 / 5) + (9 / 10)) ((3 / 5) + (11 / 10))

(33 / 10) (17 / 10)

So, Ratio of milk: water in the resulting mixture = 33: 17.

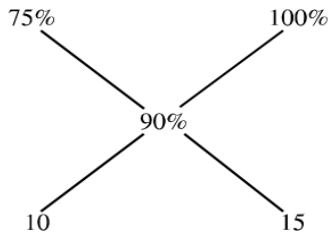
5. Correct Option: B

The given solution has 75% milk.

Milk to be added has 100% milk.

Milk should be added to the given mixture in the ratio 15 : 10 or 3 : 2

∴ Quantity of milk to be added = (3 / 2) × 6 = 9 liters.



6. Correct Option: A

Let cost price of spirit be Re. 1 per liter.

Then SP of mixture = Re. 1 per liter

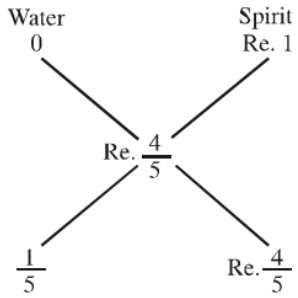
Gain = 25%

So, CP of mixture = 1 × (100 / 125) = Re. 4 / 5

We assume that CP of water is zero.

Using allegation rule on cost price,

Water should be mixed to spirit in the ratio (1 / 5) : (4 / 5) or 1 : 4

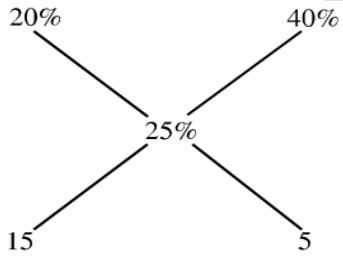


7. Correct Option: B

According to figure we find that the ratio will be 3 : 1.

Quantity sold at 20% profit = 3 / (3 + 1) × 50 = 37.5 kgs.

Quantity sold at 40% profit = (50 – 37.5) = 12.5 kgs.



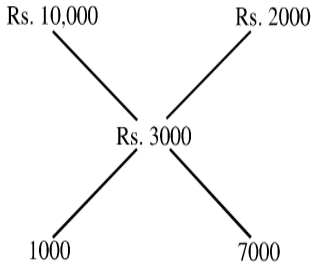
8. Correct Option: B

As per figure we can calculate the ration as below

Number of officers / Number of workers = 1000 / 7000 = 1 / 7

No. of officers = 1 / (1 + 7) × 400 = 50

No. of workers = 400 – 50 = 350



9. Correct Option: A

Total quantity of iron = 4 (1 / 4) + 6 (2 / 3) = 1 + 4 = 5 kg.

Total quantity of tin = (4 + 6) – 5 = 5 kg.

In the resultant mixture, iron : tin = 5 : 5 or 1 : 1

10. Correct Option: C

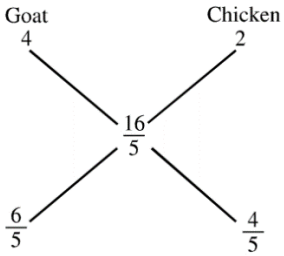
Average no. of legs per head = (320 / 100)

= (16 / 5)

or, 3 : 2

No. of goats = (3 / 3 + 2) × 100 = 60

No. of chickens = 100 – 60 = 40.



11. Correct Option: B

Let capacity of the container be P liter; then

$P(1 - 1/3)^4 = 16$

$\Rightarrow P(2/3)^4 = 16$

$\Rightarrow P(16/81) = 16$ liters

$\therefore P = 81$ liters

12. Correct Option: D

Let the price per kg of mixed variety be Rs. P;

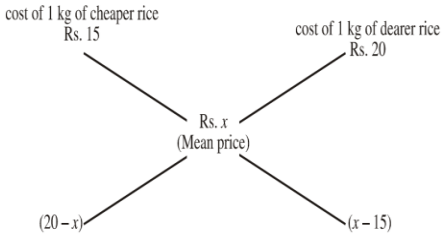
then By the rule of alligation,

Now, (20 - P) / (P - 15) = (2 / 3)

⇒ 60 – 3P = 2P – 30

⇒ 5P = 90

∴ P = Rs. 18



13. Correct Option: D

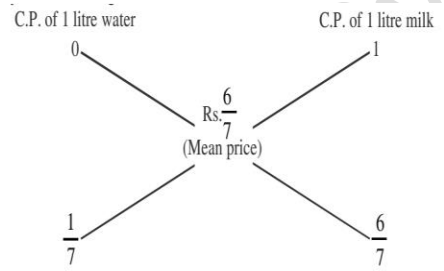
Let C.P. of 1 liter milk be Re. 1, Gain = 16 2/3 % = 50/3 %

and S.P. of 1 liter mixture = Re. 1

then C.P. of 1 liter mixture = (1 x (100 x 3) / 350) = Re. (6 / 7)

By the rule of alligation,

Hence, required ratio = (1/ 7) : (6 / 7) = 1 : 6



14. Correct Option: D

Given :- Quantity of mixture = 729 ml and Ratio of milk and water = 7 : 2

$$\text{Quantity of Milk} = \left(729 \times \frac{7}{9}\right) = 567 \text{ ml}$$

Quantity of Water = (729 – 567) = 162 ml

According to question ,

$$\text{Now,} \frac{567}{162 + y} = \frac{7}{3}$$

⇒ 567 x 3 = 7 (162 + y) ⇒ 1701 = 1134 + 7y ⇒ 7y = 567

⇒ y = 81 ml .

15. Correct Option: D

Here , Ratio of milk and water in mixture of 60 litre = 2 : 1

∴ Quantity of milk = 2y = 40 litre

Quantity of water = y = 20 litre

If ratio of milk and water is to be 1 : 2, then in 40 litres of milk, water should be 80 litre

∴ Quantity of water to be added = 60 litre.

16. Correct Option: B

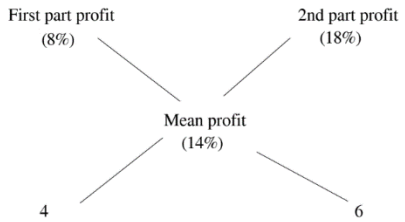
Here , C1 = 8% , C2 = 18% and Mean Profit (M) = 14%

Ratio of 1st and 2nd part = 4 : 6 = 2 : 3

Quantity sold at 18% = 50 × 3/ 2

= 30 kg

Using the method of alligation



17. Correct Option: B

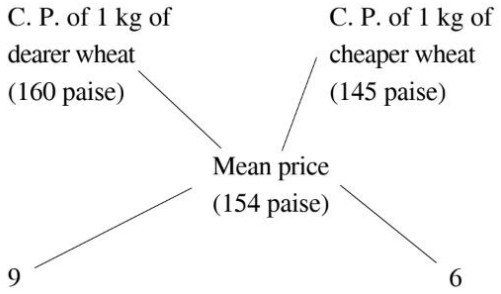
Using the Alligation method ,

Here , C1 = 160 paise , C2 = 145 paise and Mean cost Price (M) = 154 paise

Required ratio = (M - C2) : (C1 - M)

∴ (Dearer wheat) : (Cheaper wheat) = 9 : 6

Hence , (Dearer wheat) : (Cheaper wheat) = 3 : 2



18. Correct Option: A

Here , Ratio of of milk and water in 66 kg of adulterated milk = 5 : 1

In first mixture :

Milk

= 66 × 5 / 6

= 55 kg

and water = 11 kg

In second mixture :

Ratio = 5 : 3

If milk is 55 kg then water

= 3 / 5 * 55

New quantity of water = 33 kg

∴ Water to be added = 33 - 11 = 22 kg.

19. Correct Option: C

As per the given question , we can say that

$$\text{Milk in A} = \frac{5}{8}\text{of whole, Milk in B} = \frac{2}{5}\text{of whole,}$$

$$\text{Milk in mixture of A and B} = \frac{1}{2}$$

∵ By alligation rule ,

$$\text{(Mix. in A) : (Mix. in B)} = \frac{1}{10} : \frac{1}{8}$$

$$\text{(Mix. in A) : (Mix. in B)} = 4 : 5$$

20. Correct Option: A

Here ,Mean cost price Z = Rs.18

According to question , we have

$$\text{Required proportion} = \frac{C_2 - Z}{Z - C_1}$$

$$\text{Required proportion} = \frac{20{\cdot}50 - 18}{18 - 0}$$

[Water worths Rs. 0 a litre]

$$\text{Required proportion} = \frac{4{\cdot}50}{18} = 1 : 4.$$

21. Correct Option: A

According to question ,

$$\text{Per quintal cost of two different sorts of rice} = \frac{4642{\cdot}50}{60}$$

Per quintal cost of two different sorts of rice = Rs. 77·375 per quintal

$$\text{Proportion} = \frac{70{\cdot}50 - 77{\cdot}375}{77{\cdot}375 - 80}$$

$$\text{Required Proportion} = \frac{1{\cdot}875}{2{\cdot}625} = 5 : 7$$

$$\text{The quantity of better sort} = \frac{60}{12} \times 5 = 25 \text{ quintals}$$

And the quantity of worse sort $= \frac{60}{12} \times 7 = 35$ quintals.

22. Correct Option: A

Here we have to find the quantity of leaded petrol.

Hence, we have to make certain changes in the given data.

% of leaded petrol in the mixture = 100 – 10 = 90%

After addition of leaded petrol (that has to be calculated) percentage of leaded petrol becomes (100 – 5) = 95%

Now, applying the given theorem,

we have the required answer = (95 – 90 / 100 – 95) * 1000 ml

= 1000 ml

Hence , required answer is 1000 ml .

23. Correct Option: D

Here , mixture of 60 litres, the ratio of milk and water is 2 : 1.

$$\text{Required answer} = 60\left(\frac{\frac{200}{3}-\frac{100}{3}}{100-\frac{200}{3}}\right) = 60 \text{ litres.}$$

Hence , The amount of water to be further added is 60 ml .

24. Correct Option: C

Given : - The concentration of spirit in 4 vessels are 60%, 70%, 75% and 80% respectively.

Ratio of spirit to water in the different vessels

$$\Rightarrow \frac{60}{40} = 3:2, \frac{75}{25} = 3:1,$$

$$\frac{70}{30} = 7:3, \frac{80}{20} = 4:1$$

Now, applying the given rule,

$$\text{we have the required ratio} = \left(\frac{3}{5}+\frac{7}{10}+\frac{3}{4}+\frac{4}{5}\right):\left(\frac{2}{5}+\frac{3}{10}+\frac{1}{4}+\frac{1}{5}\right)$$

$$\text{Required ratio} = \frac{12+14+15+16}{20}:\frac{6+6+5+4}{20}$$

Required ratio = 57 : 23.