# MIXTURE AND ALLIGATION

Students, the prerequisite for this chapter is that you must grasp the concept of percentage and ratio as provided by us in previous chapters. If you have not studied them, first study those chapters to get better understanding of this chapter This chapter is not only useful in mixture questions but the same concept can also be applied in profit and loss, CI and SI, Average, Time and Distance etc.

Qus1. The average weight of boys and girls is 25. The average weight of only boys is 30 and that of only girls is 15. If the no of boys is 24, find the no. of girls.
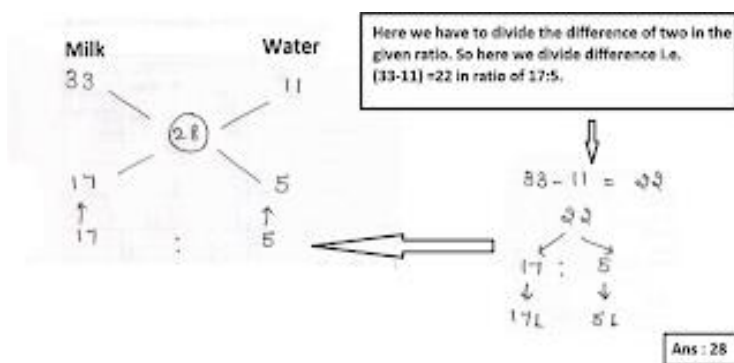(A) 15
(B) 20
(C) 12
(D) 24
Sol:-
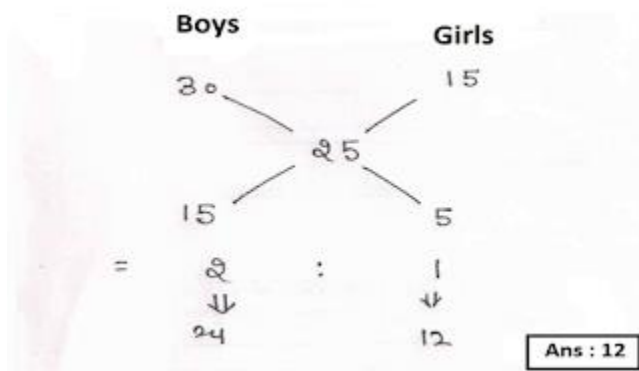
Qus.2. 17 liters of milk are mixed with 5 litre of water. If the price of water is 11per litre and that of milk is 33 per litre, find the average price.
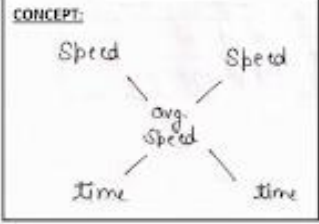(A) 30
(B) 32
(C) 26
(D) 28
Sol:-

Qus.3 Khusbu travels at the speed of 25km/h for certain time. After this she travels at the speed of 40 km/h for 22 min. If the average speed of her journey is 31km/h find the time for which she travelled with the speed of 25km/h

(A) 30min
(B) 33 min
(C) 24 min
(D) 28 min
Sol:-

Qus.4. Some amount of money was lent at 10% per annum and some at 20%per annum simple interest. Thus in 4 years, the total of interest earned from both the amount was rs 3400.If the total sum lent was 6000, find the amount lent at 20%.
(A) 3500
(B) 2500
(C) 2800
(D) 3000
Sol:-

Qus5. A sum of 41 was divided among 34 boys and 16 girls. The amount that each boy received was 90p then find the amount received by each girl.
(A) 65P
(B) 60P
(C) 62P
(D) 64P
Sol:-

Qus.6 Dharmender purchased a horse and a cow for Rs 150000. Then after some time he sold both of them. He sold the horse at a profit of 25% and the cow at a profit of 20%. But in the whole transaction he earned a total of Rs 33000 as profit. Find the cost price of horse.
(A) 90000
(B) 50000
(C) 60000
(D) 45000
Sol:-

Qus.7 Vishal purchased 12 pencils and 4 pens at Rs240. He sold the pencils at of its cost price and the pens at of its cost price. If in the whole transaction he earned a profit of 2%, find the cost price of each pencil.
(A) 18
(B) 14
(C) 12
(D) 10
Sol:-

Qus.8 35 liters of mixture of milk and water is sold Rs 60 per litre. The price of milk is 70 per litre and that of water is 20 per liter. Find the amount of milk in the mixture if the mixture is sold at a profit of 20%.
(A) 21L
(B) 35L
(C) 14L
(D) 26L
Sol:-

20% Profit = 1/5
1=profit
5= CP
so SP=5+1=6

6R= 60
Hence 5R=50

5R = 35L
3R = 21L
2R = 14 L

Since we are applying alligation on CP, we must take CP in middle.So we take 50.

Ans: 21 L

Qus9. Two mixture of water and wine contain water and wine in the ratio of 7:3 and 1:4. In what ratio should these two mixtures should be mixed so as to obtain 40 liters of mixture is which the ratio of water and wine 3:2.
(A) 3:2
(B) 5:2
(C) 3:1
(D) 4:1
Sol:-

Here we can take the ratio of either wine or water. The answer would be same in both cases.Here we have taken water.

Ans : 4:1

Qus10. 21kg of alloy contains copper and tin in the ratio of 4:3. Some amount of copper is extracted so that the ratio becomes 10:9. Find the amount of copper extracted.
(A) 4kg
(B) 7kg
(C) 3kg
(D) 2kg
Sol:-

Here we have not extracted zinc so zinc should be same. So to make zinc equal, we have multiplied by 3 and 1.

Here zinc is equal in both cases

12R +9R = 21R = 21Kg
So 1R = 1 Kg
12-10 = 2R = 2Kg.

So amount of cu extracted = 2kg

Qus 11. In a mixture, the ratio of milk and water is 4:1. 75 liters of water is added to the mixture so that the ratio of milk and water becomes 2:3.Find the initial amount of milk in the mixture.

(A) 62L
(B) 60L
(C) 65L
(D) 75L
Sol:-

Qus12. There are three vessels of equal capacity. The ratio of milk and water in these 3 vessels is 7:3, 7:5 & 11:4. Then the content of all these vessels are poured into a large vessel. Find the amount of milk and water in the resultant mixture.
(A) 121:95
(B) 112:59
(C) 121:59
(D) 25:12
Sol:-

Qus13. There are two vessels containing wine and water in the ratio of 3:2 and 4:3. Mixture from both the vessels is taken out in the ratio of 2:3 and poured in a third large vessel. Find the amount of wine in the large vessel if the total amount of mixture in the large vessel is 350litres
(A) 175L
(B) 204L
(C) 200L
(D) 196L
Sol:-

Qus.14. The ratio of oil and petrol in a container is 3:2. Then 10 litres of mixture is taken out and replaced by

petrol so that after it the ratio of oil and petrol becomes 2:3. Find the initial amount of oil in the mixture.
(A) 9L
(B) 18L
(C) 20L
(D) 36L
Sol:-

Qus.15 Two vessels contain a mixture of milk and water. In the first vessel the ratio of milk to water is 8:3 and in the second vessel the ratio is 5:1. A 70 litres of cask is filled from these vessels so as the ratio of milk and water in the new cask is 4:1. Find the amount of mixture that was taken out from the first vessel.
(A) 14L
(B) 22L
(C) 20L
(D) 48L
Sol:-

Qus.16 In a container the ratio of wine and soda is 4:1. 10 liters of mixture is drawn from it and replaced by 20 liters of soda. The final ratio of wine and soda becomes 2:3. Find the initial amount of soda in the mixture.
(A) 24L
(B) 20L
(C) 6L

(D) 10L

Sol:-

Qus17. A bartender stole beer from a bottle that contained 50% of spirit and he replaced what he had stolen with beer having 20% spirit. The bottle then contained only 25% spirit. How much of the bottle did he steal.

(A) 6/11

(B) 5/11

(C) 6/5

(D) 5/6

Sol:-

Qus.18 In a mixture of milk and water, the percentage of water is 26%. After replacing the mixture with 7 litres of pure milk, the percentage of milk in the mixture becomes 76%. Find the quantity of mixture.

(A) 84L

(B) 90L

(C) 91L

(D) 7L

Sol:-

Qus19. A vessel is full of 80 litres of milk. 8 litres of milk is taken out and replaced by water. Again 8 litres

of mixture is taken out and replaced by water, find the amount of milk in the final mixture so formed.
(A) 6.48
(B) 64.8
(C) 68
(D) 66.48
Sol:-

Final Quantity = Initial quantity $\left(1 - \dfrac{x}{C}\right)^{n}$

C = Capacity of vessel
x = Quantity taken out at one time
n = No. of times process repeated.

so   Final Quantity = $80 \left(1 - \dfrac{8}{80}\right)^{2}$

$= 80 \times \dfrac{9}{10} \times \dfrac{9}{10}$

$= 64.8$ L.

Ans : 64.8L

Qus.20 9 litres is drawn from a cask full of water and then filled with milk. 9 litres of mixture is again drawn and replaced with milk. The quantity of water left in the cask to that of the milk is 16:9. How much does the cask hold.
(A) 45L
(B) 40L
(C) 144L
(D) 81L
Sol:-

Initial Quantity of Milk = 16 + 9 = 25 R

So in two process   25 ⟶ 16
    In one process $\sqrt{25}$ ⟶ $\sqrt{16}$
                ⇒   5 ⟶ 4
                    1R = 9L
                    5R = 45L

Ans : 45L

Qus.21 From a container full of milk, 15 litres of milk was taken out and replaced by water. He again repeated the process for 2 more times. Thus in 3 attempts the ratio of milk to water becomes 343:169. Find the volume of container.
(A) 512L
(B) 120L
(C) 16L
(D) 214L
Sol:-

Initial Quantity of Milk = 343 + 169 = 512
Final Quantity of Milk = 343

So in 3 processes : 512 ⟶ 343

in 1 process : $3\sqrt{512}$ ⟶ $3\sqrt{343}$

8 ⟶ 7

1 = 15L

So 8 = 120L

Ans : 120L

Qus22. 2 vessels A & B of equal volume contain wine and soda in ratio of 3:2 and 2:1 respectively. 2 and 3 litres of solution is taken out from these vessles respectively and poured into a large vessel C. If this mixture occupied 40% of capacity of C, what proportion of volume of vessel C should be the volume of soda that shall be added so that the percentage of soda in vessel C becomes 50%.

(A) 144/160
(B) 14/144
(C) 14/125
(D) 12/127

Sol:-

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wine    Soda
3   :   2      x3 x2
2   :   1      x5 x3
=  18   :  12
   30   :  15
   48   :  27
=  16   :  9
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Capacity of vessel C x40% = 25
Capacity of vessel C = 125/2

To make 50% we need 7L of Water

So $\frac{7 \times 2}{125} = \frac{14}{125}$

Ans : 14/125

Qus23. A solution contains beer and soda in the ratio of 3:5. 20% of that solution is taken out and replaced by beer. How many times the process should be repeated to make the ratio of beer and soda 17:8?

(A) 2
(B) 3
(C) 4
(D) Can not be determined

Sol:-

Final Quantity = Initial quantity $\left(1 - \frac{x}{C}\right)^n$

C = Capacity of vessel
x = quantity taken out at one time
n = No. of times process repeated.

So Initial quantity of water = $\frac{5}{8}$

Final quantity of water = $\frac{8}{25}$

Quantity taken out at one time = 20% = $\frac{1}{5}$

So $\frac{8}{25} = \frac{5}{8}\left(1 - \frac{1}{5}\right)^n$ ⟹ $\frac{64}{125} = \left(\frac{4}{5}\right)^n$

n = 3

Ans : 3times

Qus. 24. In a kerosene bottle there is 32% oil. Some quantity of kerosene is taken out and of that quantity is replaced by kerosene that contains 18% oil so that the new mixture contains 28% oil. Find how much amount of kerosene is taken out.

(A) 2/7
(B) 3/4
(C) 4/9
(D) 6/11

Sol:-

Remaining   Replaced
  32%   18%

                28

    10   4

  = 5   :   2

Since only $\frac{1}{3}$ is replaced so
actual withdrawn =
    $2 \times 3 = 6L$
So
to be out = $\frac{6}{5+6}$ → $\frac{6}{11}$ Ans :6/11

Qus 25. An mixture contains milk and water in the ratio of 2:3 by volume. In 15 liters of such mixture, 10 litres of milk is added then find what volume of water has to be removed from the mixture so that the final mixture has milk & water in the ratio of 4 : 1.

(A) 5.3L
(B) 5L
(C) 4.5L
(D) 5.67L

Sol:-

        15
    2 :   3
    ↓   ↓
MILK 6L   9L ← Water

So A.T.Q :-

$\frac{Milk}{Water} = \frac{6L + 10L}{9L - x} = \frac{4}{1}$

$x = 5L.$

Let amount of water taken= x litre

Ans : 5L