Quantitative Aptitude

Mixture and Alligation
Level-1

Q1 195 liters of mixture contain the milk and water in the ratio of 7:6, respectively. x liters of water added in the mixture such that the ratio of water to milk becomes 8:7, respectively. Find the value of x.
(A) 45   (B) 22
(C) 30   (D) 56
(E) None of these

Q2 480 liters of a mixture contain milk and water, only, in the ratio of 5:x, respectively. If 20 liters water is added into it, then the ratio of quantity of milk to that of water in the resultant mixture will become 3:2. Find the value of 'x'.
(A) 5   (B) 7
(C) 1   (D) 6
(E) 3

Q3 132 litres of a mixture (milk + honey) contains milk and honey in the ratio 7:4, respectively. If a certain quantity of the mixture is replaced with 54 litres of honey, then the ratio of quantity of milk to that of honey in the final mixture becomes 2:5. Find the quantity of the mixture that has been replaced.
(A) 88 litres   (B) 230 litres
(C) 120 litres   (D) 98 litres
(E) 100 litres

Q4 In mixture of 90 litres, the ratio of milk to water is 3 : 2. The amount of water to be further added to the mixture so as to make the ratio of the milk to water 2 : 3 will be?
(A) 68 litres
(B) 60 litres
(C) 50 litres
(D) 45 litres
(E) 70 litres

Q5 600 litres of mixture contains 40% water in it and the rest is lime juice. The amount of juice that must be added so that the resulting mixture contains 90% juice is?
(A) 1800 litres   (B) 1400 litres
(C) 1240 litres   (D) 1360 litres
(E) None of these

Q6 In a mixture, the ratio of the alcohol and water is 6:11. When 68 litres mixture is replaced by water, the ratio of alcohol and water becomes 30:89. What is the initial quantity of alcohol?
(A) 80 litres   (B) 40litres
(C) 88 litres   (D) 90 litres
(E) None of these

Q7 Container A contains 153 kg mixture of zinc and copper in the ratio 4:5. How much copper should be added into container A so as to make the resultant mixture 80% copper?
(A) 245 kg   (B) 256 kg
(C) 272 kg   (D) 280 kg
(E) None of these

Q8 A mixture contains rosewater and glycerin in the ratio 5 : 3. If 32 liters of mixture is replaced with glycerin, the ratio of rosewater and glycerin becomes 13 : 11. Find the quantity of rosewater in the original mixture.
(A) 150 liters   (B) 90 liters
(C) 30 liters   (D) 130 liters
(E) 70 litres

Q9 A mixture contains honey and syrup in the ratio 7 : 3 respectively. 40 liters of the mixture is replaced by syrup. Now the ratio of honey and syrup became 21 : 29. Find the quantity of honey in the initial mixture.
(A) 42 liters   (B) 30 liters

(C) 70 liters   (D) 18 liters

(E) 50 litres

Q10 A lady bought 90 liters mixture of milk and water in which the ratio of milk and water is 2:3. How much water be evaporated so that the percentage of water becomes 25%?

(A) 42 liters   (B) 45 liters

(C) 60 liters   (D) 50 liters

(E) None of these

Q11 500 gram mixture of turmeric and chili powder contains 44% of chili powder. If x gram of turmeric powder is added into the mixture, so that the quantity of turmeric powder in the resultant mixture becomes 60%, find the value of x?

(A) 50   (B) 60

(C) 40   (D) 100

(E) 90

Q12 A vessel contains 112 litres of mixture of juice and water in the ratio of 3:4. If 42 litres of mixture is taken out from that vessel and then 30 litres of water added to it, what will be the percentage of juice in the final mixture?

(A) 20%   (B) 35%

(C) 30%   (D) 25%

(E) 40%

Q13 How many kilograms of corn-flour of Rs.108 per kg should be mixed with 15 kg of corn-flour of Rs.90 per kg, such that there may be gain of 30% by selling the mixture at Rs.121 per kg.

(A) 4 kg   (B) 3 kg

(C) 12 kg   (D) 24 kg

(E) 16 kg

Q14 A very big beaker in the chemistry lab contains a mixture of two acids X and Y in the ratio 5 : 3. When 16 litres of mixture are drawn off and the beaker is filled with Y with the same amount, the ratio of X and Y becomes 5 : 7. How many litres of acid X was contained by the beaker initially?

(A) 150 litres   (B) 200 litres

(C) 50 litres   (D) 100 litres

(E) 300 litres

Q15 A 10 litre mixture of spirit and water contains spirit and water in the ratio 4 : 1 and 5 litres of the mixture is removed and replaced with pure spirit. This process is done one more time. What is the ratio of spirit to water now?

(A) 9:1   (B) 9:19

(C) 1:9   (D) 19:9

(E) 19:7

Q16 A 40 litre mixture of soda and water contains soda and water in the ratio 3 : 2. 20 litres of the mixture is removed and replaced with pure soda. This process is done one more time. What is the ratio of soda to water now?

(A) 9:1   (B) 1:9

(C) 3:2   (D) 2:3

(E) 5:2

Q17 A mixture contains 48 litres of water and some amount of alcohol. If 12 litres of the mixture is replaced with 12 litres of alcohol, the resulting mixture contains 40% alcohol. What was the initial amount of alcohol in the mixture?

(A) 6 litres   (B) 12 litres

(C) 3 litres   (D) 15 litres

(E) 10 litres

Q18 A vessel contains 102 liters of mixture of honey and water mixed in the ratio 12 : 5 respectively. 'y' liters of the mixture is taken out from the vessel and replaced with 4 liters of water so the ratio of honey to water in the vessel becomes 2 : 1 respectively. Find the value of 'y'.

(A) 64 liters   (B) 4 liters

(C) 24 liters   (D) 44 liters

(E) 34 liters

Q19 200 liters of a mixture contains 15% water and the rest is Alcohol. The amount of alcohol that must be added so that the resulting mixture contains 87.5% alcohol is?

(A) 10   (B) 40

(C) 20   (D) 30

(E) None of these

Q20 336 liters of mixture of alcohol and water are in the ratio 4:3 and 84 liters of mixture is taken out and x liters of alcohol is added into the mixture.

If the ratio of alcohol and water in the final mixture is 5:3, then find the value of x.

(A) 15   (B) 12

(C) 18   (D) 20

(E) None of these

Level-2

Q1 5 litres are taken out from a bottle full of beer and is then filled with water. This operation is performed two more times. The ratio of the quantity of beer now left in the bottle to that of the water is 8:19. How much beer the bottle hold originally?
(A) 15   (B) 18
(C) 20   (D) 22
(E) None of these

Q2 In a 54 liter mixture of spirit and water, the ratio of spirit to water is a :(a + 1). 30 li of water is added to this mixture to make the ratio of spirit to water 2 : 5. Find the value of a.
(A) 2   (B) 4
(C) 10   (D) 16
(E) None of these

Q3 Indian paints mix Red and Yellow in the ratio 4 : 5 in a tank. However, after mixing, the company finds that the resultant shade has less of Red and removes 9 litres of the mixture and adds equivalent quantity of Red. The shade thus obtained has red and yellow in the inverse ratio. How many litres of mixture was there initially in the tank?
(A) 5 litres   (B) 9 litres
(C) 4 litres   (D) 45 litres
(E) None of these

Q4 8 kg of metal contains 1/5th Tin and the rest is Aluminum. Another 10kg of metal contains 1/6th tin, and the rest is Aluminum. Find the ratio of tin to aluminium. Find the ratio of tin and aluminium in the mixture of these two metals.
(A) 5:8   (B) 8:5
(C) 221:49   (D) 49:221
(E) None of these

Q5 An alloy contains Titanium and Tungsten in the ratio 2 : 3 and another alloy contains Titanium and Tungsten in the ratio 7 : 4. If 2:3 amounts of both the alloys are melted together, then the ratio of Titanium and Tungsten the resulting alloy is.
(A) 147:126   (B) 149:125
(C) 143:126   (D) 149:126
(E) None of these

Q6 A vessel contains 232-liter mixture of zinc and sodium out of which 37.5% is sodium. 48 liters of mixture is taken out and 18-liter sodium & 14-liter zinc are added in the remaining mixture. Find the ratio between the quantity of sodium to zinc in the final mixture.
(A) 43: 29   (B) 43: 27
(C) 27: 43   (D) 41: 29
(E) 29: 43

Q7 A dishonest juice seller professes to sell his juice at cost price but he mixes it with water and thereby gains 25%. The percentage of water in the mixture is:
(A) 50%   (B) 10%
(C) 12.5%   (D) 25%
(E) 20%

Q8 A milk man has three container A, B and C, each container contains mixture of milk and water in the ratio 1:3, 4: 3 and 5: 2 respectively. He had taken out equal quantity of mixture from each container and mixed into a container D. What is the ratio of milk and water in the container D?
(A) 43: 41   (B) 35: 37
(C) 29: 33   (D) 31: 25
(E) None of these

Q9 28 kg of an alloy contains 65% copper and rest is zinc. Another 32kg of an alloy contains 40% copper and rest is zinc. If both alloys mix together then find the ratio of copper and zinc in the resultant mixture respectively?
(A) 7:11   (B) 21: 23

(C) 31:29   (D) 33:28

(E) 18:19

Q10 18 L are drawn from a flask full of water and it is then filled with orange juice, 18 L of mixture are drawn and the flask is again filled with juice. The quantity of water now left in the flask to that of the juice in it is 8:9. How much does the flask hold?

(A) 18.56 L   (B) 34.64 L

(C) 54L   (D) 72.19 L

(E) None of these

Q11 60 liters of Glycerine is mixed with 120 liters of water. X liter of total mixture is taken out and 30 liter Glycerine and 40 liter water are added in the mixture. The final mixture contains 70/120% Glycerine, find the quantity of the mixture that is taken out.

(A) 80   (B) 70

(C) 60   (D) 90

(E) 50

Q12 A vessel which contains 200 liters of ORS and water solution in the ratio of 3:22. From the vessel 80 liters of mixture is taken out and 9.6 liters of pure ORS solution and pure water, both are added to the mixture. What is the ratio of the quantity of water in the final mixture and the quantity of ORS solution?

(A) 1:10   (B) 2:5

(C) 5:2   (D) 5:24

(E) 24:5

Q13 Ramu bought two different kinds of cooking oil, one is mustard oil and another is peanut oil. There are two mixtures of these two oils. In the first mixture the ratio of the mustard and peanut oil is in the ratio of 3 : 4 and in the second mixture the ratio of the mustard and peanut oil is 5 : 6 . If he mixes these two mixtures and makes a third mixture of 72 liters in which the ratio of the mustard oil and peanut oil is 4 : 5. Find the quantity of the second mixture that

is needed to make 72 liters of the third type of mixture.

(A) 11 liters   (B) 22 liters

(C) 33 liters   (D) 44 liters

(E) None of these

Q14 1 unit of x% alcohol is mixed with 3 units of y% alcohol to give 60% alcohol. If x > y and x, y both are integers, then how many integer values can x take ?

(A) 11   (B) 12

(C) 13   (D) 14

(E) 15

Q15 A mixture P of alcohol and soda contains 75% of alcohol. After 24 liters of soda is added, the alcohol content gets reduced to 50%. If another mixture Q contains the quantity of alcohol equal to the total quantity of mixture P initially such that the ratio of alcohol to soda is 4: 3, then find the quantity of soda in mixture Q.

(A) 6 liters   (B) 12 liters

(C) 24 liters   (D) 36 liters

(E) 10 liters

Q16 **Directions: Study the following data carefully and answer the questions accordingly.**

A Juicewala has 2 types of mixture of juice with him. In 56 kg of first mixture ratio of juice to impurity is 6 : 2 and in 44 kg of second mixture the ratio of juice to impurity is 3 : 1. If he mixes these two mixture with 17 kg of pure juice in a large container, then find the ratio of juice to impurity in the large container.

(A) 92:25   (B) 3:1

(C) 5:3   (D) 10:3

(E) None of these

Q17 A vessel contains a mixture of alcohol and water in the ratio of 4 : 1. 60% of this mixture is taken out and then 4 litres of water is added to the vessel. Further 50% of the mixture is taken out and 6 litres of acid is added. If the initial quantity of the mixture is 200 litres, then find

the percentage of water in the resultant mixture.

(A) 20.83%   (B) 60.33%

(C) 40.63%   (D) 63.40%

(E) 25%

Q18 Two jars X and Y of equal volume contain Wine and Cranberry juice in the ratio 3 : 2 and 2 : 1 to their brim respectively. Four litres of the solution from jar X and six litres of the solution from jar Y are poured into a big empty jar Z. If the solution in Z occupied 50% of the capacity of Z, what proportion of the volume of jar Z should be the volume of cranberry juice that shall be added so that the ratio of wine and cranberry juice in jar Z becomes equal?

(A) 7:50   (B) 50:7

(C) 14:5   (D) 5:14

(E) 2:3

Q19 A mixture of milk and water comprises 60% milk. First, 30% of the mixture is replaced with water and then the volume of the resultant mixture is increased by 30% by adding only milk. What is approx. percentage of milk in the final mixture?

(A) 53.38%   (B) 58%

(C) 43.38%   (D) 48%

(E) 50%

Q20 A tank contains 1000 liters of water. 100 liters of water is taken out of it and replaced by the same quantity of syrup. This process is repeated one more time. After that 200 liters of the solution is replaced by the same quantity of juice. Find the proportion of syrup, water, and juice in the final mixture respectively ?

(A) 19 : 25 : 81   (B) 81 : 19 : 25

(C) 25 : 81 :19   (D) 19 : 81 : 25

(E) 91 : 81 : 25

Level-3

Q1 A person bought a 6-liter bottle of Rum. On the first night, he drank 120ml of its contents and replaced it with water. From the second night onwards, he drank 40 ml more than the previous night and replaced it with water. He continued it till the bottle got empty. What is the total quantity of water used in replacing?

(A) 60000 ml   (B) 59600 ml
(C) 225788 ml   (D) 446880 ml
(E) 256000 ml

Q2 A mixture A of alcohol and water contains 66.66% of alcohol. After 24 litres mixture A is replaced with water, the alcohol content gets reduced to 50%. If another mixture B contains the quantity of alcohol equal to the total quantity of alcohol of mixture A initially such that the ratio of alcohol to water is 4: 3, then find the quantity of water in mixture B.

(A) 16 litres   (B) 32 litres
(C) 8 litres   (D) 24 litres
(E) 10 litres

Q3 A milkman orders his servant to mix water in 56 litres of pure milk. With that pure milk the servant first mixes 40 litres of milk and water solution in which the concentration of milk was 60% and then takes out 24 litres from it. Again, he mixes 8 litres of water. What is the concentration of milk in the final mixture?

(A) 16 L   (B) 24 L
(C) 80 L   (D) 56 L
(E) 60 L

Q4 48 gm Rice is mixed in a container, which contains 120 gm pulse. 42 gm mixture from the container is taken out and some quanlity of Rice and pulse are added in the ratio of 2: 1 in the container. If the resulting mixture ratio of pulse and Rice is 11: 6, then what quantity of Rice was added?

(A) 22   (B) 21

(C) 18   (D) 24
(E) None of these

Q5 30 kg of gypsum is mixed with 75 kg of plaster of paris in a container to form a mixture. Then, (p + 5) kg of mixture in container is replaced with 12.5 kg of gypsum and 15 kg of plaster of paris such that the mixture in container now contains $33(\frac{1}{3})$% of gypsum. Find the value of 'p'

(A) 27   (B) 30
(C) 25   (D) 23
(E) None of these

Q6 456 ml of mixture contains milk and water in the ratio of 12:7, respectively. If 'a' ml of mixture is taken out and 285 ml of mixture (milk + water) containing $156\frac{1}{4}$% more water than milk in it, is mixed with the remaining mixture then ratio of milk to water in the resultant mixture becomes 7:12. Find the value of 'a'.

(A) 361   (B) 300
(C) 121   (D) 432
(E) 400

Q7 20 liters of a 25% alcohol solution is mixed with 'y' liters of a 50% alcohol solution and a resultant solution of 40% alcohol is obtained. Then, '2y' liters of the resultant solution is mixed with 150 liters of a 60% alcohol solution, resulting in a solution of 50% alcohol. What is the percentage difference between 'y' and 20?

(A) 10%   (B) 25%
(C) 100%   (D) 50%
(E) None of these

Q8 In a 400 ml mixture of milk and water, milk is _____ % more than that of water. When 160 ml of mixture is removed and replaced with 54 ml water and 36 ml milk, then the ratio of milk and water in the mixture becomes _____ respectively.

I. 50%, 6:5

II. 66.66%, 31:16

III. 200%, 36:19

(A) I only

(B) II only

(C) I and III only

(D) II and III only

(E) None of these

Q9 Mixture A contains milk and water in the ratio of 5:4 respectively while mixture B contains milk and water in the ratio of 7:9 respectively. If mixture A is mixed with mixture B then total quantity of resultant mixture becomes ____ ml while quantity of water in mixture B is ____ ml more than that in mixture A. Ratio of quantities of milk in mixture A to B is ___ respectively.

The values given in which of the following options will fill the blanks in the same order in which is it given to make the statement true:

I.) 590, 60, 15:14

II.) 756, 99, 20:21

III.) 1080, 100, 10:9

IV.) 1608, 252, 9:7

(A) only I and II

(B) Only I and III

(C) Only I, II and III

(D) Only I, II, III and IV

(E) Only II and III

Q10 **Direction: Study the following data carefully and answer the questions:**

Two mixtures A and B contain different quantities of milk and water. Ratio of mixture A to mixture B is 6:5. In mixture A, quantity of milk is 'x'% and rest is water. In mixture B, quantity of milk is 'y'% and rest is water. When both the mixtures are mixed together, quantity of milk in the final mixture becomes $63\left(\frac{7}{11}\right)$ %.

Note: x + y = $126\left(\frac{2}{3}\right)$

Which of following is/are true?

P: Quantity of water is equal in both the mixtures.

Q: If cost of mixture A is Rs.32 per L, then cost of pure milk will be Rs. 40 per L.

R: Ratio of milk in mixture A to that of milk in mixture B is 4: 3.

(A) Only P and Q

(B) All P, Q and R

(C) Only Q

(D) Only P and R

(E) None of these

Answer Key

Level–1

Q1	(C)		Q11	(A)
Q2	(E)		Q12	(C)
Q3	(A)		Q13	(B)
Q4	(D)		Q14	(E)
Q5	(A)		Q15	(D)
Q6	(B)		Q16	(A)
Q7	(C)		Q17	(B)
Q8	(A)		Q18	(E)
Q9	(C)		Q19	(B)
Q10	(A)		Q20	(A)

Level-2

Q1	(A)		Q11	(C)
Q2	(B)		Q12	(E)
Q3	(D)		Q13	(D)
Q4	(D)		Q14	(C)
Q5	(D)		Q15	(D)
Q6	(E)		Q16	(A)
Q7	(E)		Q17	(A)
Q8	(A)		Q18	(A)
Q9	(C)		Q19	(A)
Q10	(B)		Q20	(D)

Level-3

Q1	(D)		Q6	(A)
Q2	(D)		Q7	(D)
Q3	(E)		Q8	(C)
Q4	(C)		Q9	(C)
Q5	(B)		Q10	(D)

Hints & Solutions

Level–1

Q1 Text Solution:

Quantity of milk in the initial mixture

$$= 195 \times \left[\frac{7}{6+7}\right] = 105 \; liters$$

Quantity of water in the initial mixture

$$195 - 105 = 90 \; liters$$

According to the questions,

$$\frac{90+x}{105} = \frac{8}{7}$$

630 + 7x = 840

x = 30 liters

Option '30 liter' is the correct answer.

Q2 Text Solution:

Total quantity of resultant mixture = 480 + 20 = 500

Quantity of milk in resultant mixture = (3/5) × 500 = 300 litres

Quantity of water in resultant mixture = 500 − 300 = 200 litres

Since, quantity of milk remains constant. So, quantity of milk in initial mixture = 300 litres

And, quantity of water in the initial mixture = 480 − 300 = 180 litres

O, ratio of quantity of milk and water in the initial mixture = 300:180 = 5:3

So, x = 3

Hence, option e.

Q3 Text Solution:

Quantity of milk in 132 litres of mixture = $\frac{7}{11}$ × 132 = 84 litres

Quantity of water in 132 litres of mixture = $\frac{4}{11}$ × 132 = 48 litres

Let the quantity of Milk and Honey taken out be '7x' litres and '4x' litres, respectively.

According to question:

$$\frac{84-7x}{48-4x+54} = \frac{2}{5}$$

Or, 420 − 35x = 96 − 8x + 108

Or, 35x − 8x = 420 − 204

Or, 27x = 216

Or, x = 8

Quantity of mixture that has been replaced = 7x + 4x = 11x = 11 × 8 = 88 litres

Q4 Text Solution:

In 90 litres of the mixture,

Milk = (3/5) × 90 = 54 litres

Water = (90 – 54) = 36 litres

Let x litres of water be added

Then, 54/(x + 36) = 2/3

⇒ 2x = 90

⇒ x = 45 litres

Q5 Text Solution:

Quantity of juice in initial mixture =

$$(100 - 40)\% \; of \; 600 = \frac{60}{100} \times 600 = 360 \text{ litres}$$

Let "x" litres of juice has to be added then,

According to given conditions, $\frac{360+x}{600+x} = \frac{90}{100}$

Hence, X = 1800 litres

Q6 Text Solution:

Alcohol in 68 liters = $\frac{6}{17} \times 68 = 24$

Water in 68 litres = $\frac{11}{17} \times 68 = 44$

Let the initial quantity of alcohol and water be 6k and 11k respectively.

$$\frac{6k-24}{11k-44+68} = \frac{30}{90}$$

$$\frac{6k-24}{11k-24} = \frac{1}{3}$$

18k−72=11k−24

7k=48

k=6.8

The initial quantity of alcohol = 6k = $6 \times 6.8 = 40.8 \approx 40$ liters.

Q7 Text Solution:

Zinc in the 153 kg mixture = $\frac{4}{9} \times 153 = 68$

Copper in the 153 kg mixture = $\frac{5}{9} \times 153 = 85$

Let x kg copper be added.

$$\frac{(68+x)}{(153+x)} \times 100 = 80$$

$$\frac{(68+x)}{(153+x)} = \frac{4}{5}$$

$$340 + 5x = 612 + 4x$$

$$x = 272$$

Q8 Text Solution:

Let, initial quantity of rosewater = 5x

And, initial quantity of glycerin = 3x

Then, 32 liters of mixture was taken out

So, Quantity of rosewater in 32 liters mixture = $\frac{5x}{5x+3x} \times 32$

= 20 liters

And, quantity of glycerin in 32 liters mixture = $\frac{3x}{5x+3x} \times 32$

= 12 liters

So, Quantity of rosewater left = 5x – 20

And, Quantity of glycerin left = 3x – 12

Again, 32 liters of glycerin is added in the mixture,

So, Quantity of glycerin = 3x – 12 + 32 = 3x + 20

Now, according to the question.

=> $\frac{5x-20}{3x+20} = \frac{13}{11}$

=> 11(5x – 20) = 13(3x + 20)

=> 55x – 220 = 39x + 260

=> 16x = 480

=> x = 30

So, initial quantity of glycerin = 3x = 3(30) = 90 liters

quantity of rosewater in the original mixture=5x=5(30)=150 litre

Q9 Text Solution:

Let, initial quantity of honey = 7x

And, initial quantity of syrup = 3x

Now, 40 liters of mixture was taken out,

So, quantity of honey in 4 liters mixtures = $\frac{7x}{7x+3x} \times 40$

= $\frac{7}{10} \times 40$ = 28 liters

And, quantity of syrup in 40 liters mixture= $\frac{3x}{3x+7x} \times 40$

= $\frac{3}{10} \times 40$ = 12 liters

So, quantity of honey left = 7x – 28

And, quantity of syrup left = 3x – 12

Then, 40 liters of syrup is added in mixture,

So, quantity of syrup = 3x – 12 + 40 = 3x + 28

Now, According to question,

=> $\frac{7x-28}{3x+28} = \frac{21}{29}$

=> 29(7x – 28) = 21(3x + 28)

=> 203x – 812 = 63x + 588

=> 140x = 1400

=> x = 10

Hence, initial quantity of honey = 7x = 7(10) = 70 liters

Q10 Text Solution:

Milk in 90 liters mixture = $90 \times \frac{2}{5} = 36$

Water in 90 liters mixture = $90 \times \frac{3}{5} = 54$

Let x liters of water be evaporated.

$\frac{54-x}{90-x} \times 100 = 25$

$\frac{54-x}{90-x} \times 4 = 1$

$216 - 4x = 90 - x$

$3x = 126$

$x = 42$

Q11 Text Solution:

Quantity of chili powder =$0.44 \times 500 = 220\,g$

Quantity of turmeric powder $= 500 - 220 = 280\,g$

As per question;

Ratio of turmeric : chili powder $= 6:4$

$[280 + x] : 220 = 6 : 4$

$560 + 2x = 660$

$2x = 100$

$x = 50\,g$

∴ The answer is 50 g.

Q12 Text Solution:

Amount of juice in vessel initially = $\frac{3}{3+4} \times 112 = 48\,L$

And, amount of water in vessel initially = $\frac{4}{3+4} \times 112 = 64\,L$

Amount of juice in 42 litres mixture = $\frac{3}{3+4} \times 42 = $ 18L

And, amount of water in 42 litres mixture = 42 – 18 = 24L

So, final amount of juice = 48 – 18 = 30L

And, final amount of water = 64–24 + 30 = 70L

Hence, required% = $\frac{30}{30+70} \times 100 = 30\%$

Q13 Text Solution:

Given, selling price of final mixture = Rs. 121

And, Profit% = 30

As, Profit% = $\frac{sp-cp}{cp} \times 100$

$30 = \frac{121-cp}{cp} \times 100$

$\frac{30}{100} = \frac{121}{cp} - 1$

$0.3 + 1 = \frac{121}{cp}$

$CP = \frac{121}{1.3}$

CP = Rs. 93

Now, using the concept of alligations

Flour type	1	2
Cost	108	90
Required Cost		93
Required-Ratio	(93-90)	(108 – 93)

= 3: 15 = 1: 5

But, it's given the quantity of 2 type of flour is 15kg

So, 5 =15 kg

1 =3 kg

Hence, required quantity of flour costing Rs.108 = 1 units = 1 ×3

= 3 kg

Q14 Text Solution:

Let, initial quantity of acid X = 5a

And, initial quantity of acid Y = 3a

When, 16 litres of mixture is drawn

Then, quantity of acid X remaining = 5a – $\frac{5a}{5a+3a}$ × 16

= 5a – 10

And, quantity of acid Y remaining = 3a – $\frac{3a}{5a+3a}$ × 16

= 3a – 6

Now, 16 litres of acid Y is added

Then, quantity of mixture Y = 3a – 6 + 16

= 3a + 10

Now, according to question,

=> $\frac{5a-10}{3a+10} = \frac{5}{7}$

=> 7(5a – 10) = 5(3a + 10)

=> 35a – 70 = 15a + 50

=> 20a = 120

=> a = 60

So, initial quantity of acid X = 5a = 5(60) = 300 litres

Q15 Text Solution:

Given, Quantity of spirit in initial mixture = = 8 litres

Quantity of water in initial mixture = = 2 litres

Then, 5 litres of mixture is removed

So, Quantity of spirit left = 8 – 4 = 4 litres

And, quantity of water left = 2 – 1 = 1 litres

Then, 4 litres of spirit is added,

So, quantity of spirit = 4 + 5 = 9 litres

So, ratio of spirit and water = 9 : 1

Again, 5 litres of mixture is removed

So, quantity of spirit left = 9 – 4.5 = 4.5 litres

And, quantity of water left = 1 – 0.5 = 0.5 litres

Again 5 litres of spirit is added,

So, quantity of spirit = 4.5 + 5 = 9.5 litres

Thus, ratio of spirit to water = 9.5 : 0.5 = 19:1

Q16 Text Solution:

As, quantity of mixture = 40 L

So, quantity of soda = 24L

And, quantity of water = 40 – 24 = 16L

Now, 20 L of mixture is drawn out, 12L of soda & 8L of water is drawn out. And same quantity is left

Then, 20L of soda is added, so mixture will have (12+20) 32L soda & 8L water

Again, 20L of mixture is drawn out, 16L of soda & 4 L of water will be drawn out, and same amount would be left.

Now, we again add 20L soda, so mixture will have (16+20) 36L soda & 4L water

Hence, required ratio = 36:4 = 9:1

Q17 Text Solution:

Let the initial amount of alcohol in the mixture be x litres. Then, the total volume of the mixture is (x + 48) litres.

When 12 litres of the mixture is replaced with 12 litres of alcohol, the total volume of alcohol in

the mixture becomes (x + 12) litres, and the total volume of the mixture remains the same at (x + 48) litres.

According to the question, the resulting mixture contains 40% alcohol. This means that:

$\frac{x+12}{x+48} = 0.4$

Multiplying both sides by (x + 48), we get,

x + 12 = 0.4(x + 48)

Expanding the right-hand side and simplifying, we get:

x + 12 = 0.4x + 19.2

Subtracting 0.4x from both sides, we get:

0.6x + 12 = 19.2

Subtracting 12 from both sides, we get:

0.6x = 7.2

Dividing both sides by 0.6, we get:

x = 12

Therefore, the initial amount of alcohol in the mixture was 12 litres.

Q18 Text Solution:

Quantity of honey in initial mixture = $\frac{12}{12+5} \times 102$ = 72 liters

Quantity of water in initial mixture = $\frac{5}{12+5} \times 102$ = 30 liters

Then, y liters of mixture is taken out,

So, quantity of honey left = 72 – $\frac{12}{12+5} \times y$

= 72 – $\frac{12y}{17}$

And, quantity of water left = 30 – $\frac{5}{12+5} \times y$

= 30 – $\frac{5y}{17}$

Again, 4 liters of water is added,

So, quantity of water = 30 – $\frac{5y}{17}$ + 4

Now, According to question,

=> $\frac{72 - \frac{12y}{17}}{30 - \frac{5y}{17} + 4} = \frac{2}{1}$

=> 1(72 – $\frac{12y}{17}$) = 2 (30 – $\frac{5y}{17} + 4$)

=> 72 – $\frac{12y}{17}$ = 60 – $\frac{10y}{17}$ +8

=> 4 = $\frac{12y}{17} - \frac{10y}{17}$

=> 4 = $\frac{2y}{17}$

=> $\frac{4 \times 17}{2} = y$

=> y = 34 liters

Q19 Text Solution:

Total mixture = 200 liters

Quantity of water = 15% of 200 = $\frac{15}{100} \times 200 = 30\ liters$

Quantity of Alcohol = 200 – 30 = 170 liters

Quantity of Alcohol to be mixed = x liters

According to question, $\frac{170+x}{200+x} \times 100 = 87.5$

X = 40 liters

Q20 Text Solution:

Quantity of alcohol = $\frac{4}{7} \times 336 = 192$

Quantity of water = $\frac{3}{7} \times 336 = 144$

According to the question,

$\frac{192 - 42 \times \frac{4}{7} + x}{72 - 42 \times \frac{3}{7}} = \frac{23}{6}$

$\frac{168 + x}{54} = \frac{23}{6}$

x= 15

Level-2

Q1 Text Solution:

Let the quantity of beer initially be x l.

Then;

Quantity of beer left after 2 more operations

$= [x(1-\frac{5}{x})^3]$

$=> \frac{[\{x(1-\frac{5}{x})\}]}{x} = \frac{8}{27}$

$=> \frac{[x(1-\frac{5}{x})^3]}{x} = (\frac{2}{3})^3$

$=> 1-\frac{5}{x} = \frac{2}{3}$

$=> x = 15$

Q2 Text Solution:

Initial quantity of spirit $= \frac{a}{2a+1} \times 54$

And, Final quantity of spirit $= \frac{2}{7} \times 84 = 24$

Since, water is added. Hence, the quantity of spirit remains the same.

$\therefore \frac{a}{2a+1} \times 54$ = 24

9a = 8a + 4

a = 4

Q3 Text Solution:

Let, Initial quantity of red be 4x & yellow be 5x

So, total quantity = 4x + 5x = 9x

Quantity of red in 9 litres mixture = 4 litres

And, quantity of yellow in 9 litres mixture = 9 − 4 = 5 litres

So, total quantity of Red = 4x −4 + 9 = 4x +5

And, quantity of yellow = 5x − 5

According to question,

x = 5

Hence, required quantity = 9x = 9 × 5 = 45 litres

Q4 Text Solution:

$Tin\ in\ 8kg\ metal\ = \frac{1}{5} \times 8 = \frac{8}{5}$

$\&\ Aluminum\ in\ 8kg\ metal\ = (1-\frac{1}{5})$

$\times 8 = \frac{32}{5}$

$Tin\ in\ 10kg\ metal\ = \frac{1}{6} \times 10 = \frac{5}{3}$

$\&\ Aluminum\ in\ 10kg\ metal\ = (1-\frac{1}{6})$

$\times 10 = \frac{25}{3}$

$So,\ total\ Tin\ in\ the\ mixture\ = \frac{8}{5}+\frac{5}{3}$

$= \frac{49}{15}$

$\&\ total\ Aluminum\ in\ the\ mixture\ = \frac{32}{5}$

$+\frac{25}{3} = \frac{221}{15}$

$Hence,\ required\ ratio\ = \frac{49}{15} : \frac{221}{15}\ = 49$

$: 221$

Q5 Text Solution:

Amount of Titanium in 1st alloy = $\frac{2}{2+3} = \frac{2}{5}$

Amount of Tungsten in 1st alloy = $\frac{3}{2+3} = \frac{3}{5}$

Amount of Titanium in 2nd alloy = $\frac{7}{7+4} = \frac{7}{11}$

Amount of Tungsten in 2nd alloy = $\frac{4}{7+4} = \frac{4}{11}$

Let, 2 units of 1st alloy & 3 units of 2nd alloy is mixed

Amount of Titanium in 3rd alloy = $2\times \frac{2}{5} + 3 \times \frac{7}{11} = \frac{149}{55}$

Amount of Tungsten in 3rd alloy = $2 \times \frac{3}{5} + 3 \times \frac{4}{11} = \frac{126}{55}$

Hence, required ratio = $\frac{149}{55} : \frac{126}{55} = 149:126$

Q6 Text Solution:

Sodium remained after 48 lit mixture is taken out = (232 − 48) × $\frac{3}{8}$ = 69 liter

Zinc remained after 48 lit mixture is taken out = (232 − 48) × $\frac{5}{8}$ = 115 liter

Required Ratio = (69+18) : (115 + 14) = 29:43

Q7 Text Solution:

Let the cost price of the pure juice be Rs.10 for 10L

And selling price of 10L of mixture = 25% gain on 10 = 125% of 10 =

$\frac{125}{100} \times 10 = 12.5$

So, CP of 10L of mixture = $\frac{100}{125} \times 10 = 8$

Juice   Water

10   0

    8

8 – 0 = 8 10-8 = 2

So, Ratio of juice to water = 8:2 = 4:1

Hence, Required% = $\frac{1}{1+4} \times 100 = 20\%$

Q8 Text Solution:

The ratio of milk and water in the container D

$= \dfrac{\frac{1}{4}+\frac{4}{7}+\frac{5}{7}}{\frac{3}{4}+\frac{3}{7}+\frac{2}{7}} = \dfrac{\frac{7+16+20}{28}}{\frac{21+12+8}{28}} = \dfrac{43}{41}$

Q9 Text Solution:

Quantity of copper in 28kg alloy = 28 × 0.65 = 18.2

Quantity of zinc in 28kg alloy = 28 - 18.2 = 9.8

Quantity of copper in 32kg alloy = 32 × 0.40 = 12.8

Quantity of zinc in 32kg alloy = 32 - 12.8 = 19.2

Quantity of copper in the resultant mixture = 18.2 + 12.8 = 31

Quantity of zinc in the resultant mixture = 9.8 + 19.2 = 29

The ratio of copper and zinc in the resultant mixture = 31:29

Q10 Text Solution:

Let Quantity of water = 8

And, quantity of mixture = 8 + 9 = 17

Suppose a container contains x units of liquid from which y units are taken out and replaced by water.

After n operations, the quantity of pure liquid. = $x\left(1 - \frac{y}{x}\right)^n$

Putting all the values, 8 = $x\left(1 - \frac{18}{x}\right)^2$

So, x = 34.64 L

Q11 Text Solution:

Ratio of glycerine : water 1:2

When 3k l mixture is taken out,

Quantity of glycerin taken out= k

Quantity of water taken out= $2k$

Now;

Quantity of glycerine = $60 + 30 - k = 90 - k$

Quantity of water $= 120 + 40 - 2k = 160 - 2k$

As per question;

$\frac{(90-k)}{(160-2k)} = 7/12$

$=> 1080 - 12k = 1120 - 14k$

$=> 40 = 2k$

$=> k = 20\, l$

Therefore; total quantity of mixture taken out, X = 3k=60 lit

Q12 Text Solution:

Given, 80 liters of solution was taken out,

So, remaining solution = 200 − 80 = 120 liters

ORS in remaining solution = $\frac{3}{3+22} \times 120 = \frac{72}{5}$ liters

Water in remaining solution = $\frac{22}{3+22} \times 120 = \frac{528}{5}$ liters

Adding 9.6 liters of both water & ORS

So, new quantity of ORS = $\frac{72}{5} + 9.6 = 24$ liters

And, new quantity of Water = $\frac{528}{5} + 9.6 = \frac{576}{5}$ liters

Hence, required ratio = $\frac{576}{5} : 24 = 24 : 5$

Q13 Text Solution:

Mustard oil in mixture 1 = $\frac{3}{3+4} = \frac{3}{7}$

Mustard oil in mixture 2 = $\frac{5}{5+6} = \frac{5}{11}$

Mixture 1   Mixture 2

3/7   5/11

          4/9
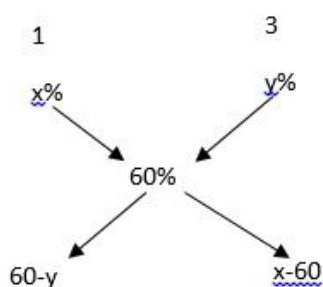
$\frac{5}{11} - \frac{4}{9} = \frac{1}{99}$ $\frac{4}{9} - \frac{3}{7} = \frac{1}{63}$

Ratio = 7:11

Required quantity of 2nd mixture = $\frac{11}{11+7} \times 72 = 44\, liter$

Q14 Text Solution:

To start with x > y => x > 60 > y.

(x − 60) = 3(60 − y).

60 − y is an integer => x − 60 has to be a multiple of 3.

x can take values {63, 66, 69 ..... 99}– A total of 13 values.

Q15 **Text Solution:**

In mixture P ,

Quantity of alcohol = 75% = $\frac{75}{100} = \frac{3}{4}$

And, quantity of soda = 1 - $\frac{3}{4} = \frac{1}{4}$

So, ratio of alcohol to soda = $\frac{3}{4} : \frac{1}{4}$ = 3 : 1

Let, quantity of alcohol in mixture P = 3a

And quantity of soda in mixture P = a

Now, 24 liters of soda is added in mixture P,

So, quantity of soda = a + 24

Again, according to question, quantity of alcohol becomes 50%, and soda also 50%, that is, 1:1

=> $\frac{3a}{a+24} = \frac{1}{1}$

=> 3a = a + 24

=> 2a = 24

=> a = 12

So, initial quantity of alcohol in mixture P = 3a = 3(12) =36 liters

And, initial quantity of soda in mixture P = a = 12 liters

Now, mixture Q contains the quantity of alcohol equal to the total quantity of mixture P initially.

So, quantity of alcohol in mixture Q = 3a + a = 4a = 4(12) = 48 liters

And ratio of alcohol and soda in mixture Q = 4:3

So, 4 = 48

=> 1= 12

That is, multiplication factor is 12

Hence, quantity of soda in mixture Q = 3 ×12 = 36 liters

Q16 **Text Solution:**

In 56 kg of first mixture, juice = $56 \times \frac{6}{8}$

= 42 kg and impurity = 56 − 42 = 14 kg

In 44 kg of second mixture, juice = $44 \times \frac{3}{4}$

= 33 kg and impurity = 44 − 33 = 11 kg

In large container quantity of pure juice = 42 + 33 + 17 = 92 kg

In large container quantity of impurity = 14 + 11 = 25 kg

Required ratio = 92 : 25

Therefore, the ratio of juice to impurity in the large container is 92:25.

Q17 **Text Solution:**

Total amount in the vessel = 200 litres

Quantity of alcohol = $\frac{4}{4+1} \times 200 = 160$

Quantity of Water =200-160=40

After, 60% of mixture taken out,

Quantity of alcohol left = $(100 − 60) \% \, of \, 160 = \frac{40}{100} \times 160 = 64 \, L$

Quantity of water left = $(100 − 60) \% \, of \, 40 = \frac{40}{100} \times 40 = 16 \, L$

Then, 4 litres of water is added,

So, quantity of water = 16 + 4 = 20

Again, 50% of the mixture was taken out

Quantity of alcohol left = $64 \text{ का } 100 − 50\% = \frac{50}{100} \times 64 = 32 \, L$

Quantity of water left = (100 − 50)% of 20 = $\frac{50}{100} \times 20 = 10 \, L$

Then, 6 litres of alcohol is added,

So, quantity of acid = 32 + 6 = 38 litres

Hence, required% = $\frac{10}{10+38} \times 100 = 20.83\%$

Q18 **Text Solution:**

Amount of Wine poured in Z = $4 \times \frac{3}{3+2} + 6 \times \frac{2}{2+1} = \frac{32}{5} litres$

Amount of juice poured in Z = $4 \times \frac{2}{2+3} + 6 \times \left(\frac{1}{2+1}\right) = \frac{18}{5} litres$

Given, 10 litres is the 50% capacity of z

So total capacity of Z = 20 litres

To make the quantities of wine and juice same in the vessel Z, quantity of juice to be added = $\frac{32}{5} - \frac{18}{5} = \frac{14}{5}$ litres

Hence, required Ratio = $\frac{\frac{14}{5}}{20} = 7 : 50$

Q19 Text Solution:

Let total initial quantity of mixture = 100ml

So, quantity of milk = 60% 0f 100 = 60ml

And, quantity of water = 100 − 60 = 40ml

Now, 30% mixture is replaced by water,

So, quantity of milk = (100 − 30) % of 60 = $\frac{70}{100} \times 60$= 42ml

And, quantity of water = (100−30) % of 40 + 30% of 100

= $\frac{70}{100} \times 40 + \frac{30}{100} \times 100$= 58 ml

Again, 30% of volume is increased by milk,

So increased quantity of milk =$\frac{30}{100} \times 100 = 30$ ml

Thus, total quantity of milk = 42+30 = 72ml

And total quantity of water = 58ml

Hence, required% =$\frac{72}{72+58} \times 100 = 55.38\%$

Q20 Text Solution:

Given

A tank contains 1000 liters of water.

Calculation Initially Water = 1000 liters

100 liters of water is taken out of it and replaced by the same quantity of syrup

After 1st replacement

Quantity of water = 1000 − 100

And, quantity of syrup = 100

So, Water : Syrup = (1000−100) : (100)

= 900 : 100

= 9 : 1

After 2nd replacement

Quantity of water left,

Water = 900 − $\left(100 \times \frac{9}{9+1}\right)$

= 900 − $\left(100 \times \frac{9}{10}\right)$

= 900 − 90

= 810 liters

And, quantity of syrup left

Syrup = 100 − (100 × $\frac{1}{9+1}$) + 100

= 100 − 10 + 100

= 190 liters

This process is repeated again.

After 3rd replacement

Quantity of water left,

Water = 810 − (200 × $\frac{810}{1000}$)

= 810 − (162)

= 648 liters

And, quantity of syrup left,

Syrup = 190 − (200 × $\frac{190}{1000}$)

= 190 − 38

= 152 liters

Then again, 200 liters of the solution is replaced by the same quantity of juice, so.

Juice = 200 liters

∴ Required ratio = Syrup : Water : Juice

= 152 : 648 : 200

⇒19 : 81 : 25

Level-3

Q1 Text Solution:

On the first night, he drank 120ml and added 120 ml of water to replace it.

Second night onwards, he drank 40 ml more than the previous night. i.e., 120 + 40 = 160 ml

On third night, 160 + 40 = 200 ml

Capacity of bottle = 6L = 6000 ml

Capacity replaced is –

120 + 160 + 200 + 240 + ... + 5960 + 6000

In the above expression 6000 is removed because on the last night he emptied the bottle without replacement.

So, the expression is –

120 + 160 + 200 + 240 + 280 + ... 5960

This is a arithmetic progression, $T_n = a + (n - 1) d$

Here, $T_n = 5960$, a = 120 & d = 40

$5960 = 120 + (n - 1) 40$

n = 147

Total quantity is calculated by applying the sum formula,

$S_n = \{a + L\} \times \frac{n}{2}$

Here, a = 120 , L = 5960 & n = 147

$S_n = \{120 + 5960\} \times \frac{147}{2} = 446880$ ml

Q2 Text Solution:

Quantity of alcohol in mixture A = 66.66% $= \frac{66.66}{100} = \frac{2}{3}$

Quantity of water in mixture A = $1 - \frac{2}{3} = \frac{1}{3}$

Quantity of alcohol in 24 litres $= \frac{2}{3} \times 24 = 16$

Quantity of water in 24 litres $= \frac{1}{3} \times 24 = 8$

According to given condition,

$\frac{\frac{2}{3} - 16}{\frac{1}{3} - 8 + 24} = \frac{50}{100}$ (let $\frac{1}{3} = x$)

x = 16 , So Quantity of alcohol in mixture A = 2x = 32

Given that quantity of alcohol in mixture B is same as initial quantity of alcohol in mixture A = 32 litres

And, 4 =32

1=8

So, Quantity of water in mixture B = 3 × 8 = 24 litres

Q3 Text Solution:

Initial quantity of pure milk = 56 litres

Now, Concentration of milk in 40 L solution = 60% of 40 = 24L

And concentration of water in 40 L solution = 40 – 24 = 16 L

When 56L of milk & 40 L of solution is mixed,

Quantity of milk in solution =56+24=80 L

And, quantity of water = 16 L

So, ratio of Milk to water = 80:16 = 5:1

Again 24L of mixture was taken out.

So, amount of milk taken out $= \frac{5}{5+1} \times 24 = 20\,l$

And, amount of water taken out =24–20=4 L

New quantity of milk = 80 – 20 = 60L

And, new quantity of water = 16 – 4 = 12L

Again, 8 L of water is added, so quantity of water = 12+8 = 20

Hence, concentration of milk in final mixture = 60L

Q4 Text Solution:

Total quantity of mixture in container = (48 + 120) = 168 gm

Lets 2x gm and x gm of Rice and Pulse added in container

ATQ—

$\frac{120 - 42 \times \frac{5}{7} + x}{48 - 42 \times \frac{2}{7} + 2x} = \frac{11}{6}$

$\frac{90 + x}{36 + 2x} = \frac{11}{6}$

$22x - 6x = 540 - 396$

$16x = 144$

$x = 9\,gm$

Quantity of Rice added = 9 × 2 = 18 gm

Q5 Text Solution:

Ratio of initial quantity of gypsum to plaster of paris in container

= 30:75 = 2:5

Let the quantity of gypsum and plaster of paris withdrawn be 2x kg and 5x kg, respectively

Quantity of gypsum in the final mixture = 30 − 2x + 12.5

= (42.5 − 2x) L

Quantity of plaster of paris in the final mixture = (75 − 5x + 15)

= (90 − 5x) L

Since, $33\left(\frac{1}{3}\right)\%$ = $\frac{1}{3}$, therefore

Ratio of gypsum to plaster of paris in the final mixture

= $\left(\frac{1}{3}\right):\{1 − \left(\frac{1}{3}\right)\}$ = $\left(\frac{1}{3}\right):\left(\frac{2}{3}\right)$ = 1:2

According to the question,

$\left\{\frac{42.5 − 2x}{90 − 5x}\right\} = \frac{1}{2}$

Or, 85 − 4x = 90 − 5x

Or, x = 5

Therefore, p + 5 = 2x + 5x

Or, p + 5 = 10 + 25

Or, p = 30

Q6 Text Solution:

Quantity of milk in 456 ml of mixture = $456 × \frac{12}{19}$ = 288 ml

Quantity of water in 456 ml of mixture = 456 − 288 = 168 ml

Let quantity of milk and water taken out be '12x' ml and '7x', respectively.

$156\frac{1}{4}\%$ = $\frac{25}{16}$

Let quantity of milk in 285 ml of mixture is 'b' ml

So, quantity of water in 285 ml of mixture = $(1 + \frac{25}{16}) × b$ = $\frac{41b}{16}$ ml

So, b + $\frac{41b}{16}$ = 285

Or, b = 80

So, quantity of milk in 285 ml of mixture = 80 ml

So, quantity of water in 285 ml of mixture = 285 − 80 = 205 ml

So, $\frac{288 − 12x + 80}{168 − 7x + 205} = \frac{7}{12}$

Or, 4416 − 144x = 2611 − 49x

Or, 95x = 1805

Or, x = 19

So, a = 19x = 19 × 19 = 361 ml

Q7 Text Solution:

Let's first determine the amount of alcohol in the initial 25% alcohol solution. 25% alcohol means that there are 25 liters of alcohol in 100 liters of the solution. Therefore, in 20 liters of the solution, there are = 5 liters of alcohol.

Let's assume that there are 'x' liters of the 50% alcohol solution added to the 20 liters of 25% alcohol solution. Therefore, the total amount of alcohol in the mixture is 5 + 0.5x. The total volume of the mixture is (20 + x) liters.

According to the question, a 40% alcohol solution is obtained after mixing the two solutions. This means that:

= 0.4

Multiplying both sides by (20 + x), we get:

5 + 0.5x = 0.4(20 + x)

Simplifying, we get:

5 + 0.5x = 8 + 0.4x

Subtracting 0.4x from both sides, we get:

0.1x = 3

x = 30

Therefore, 'y' is 30 liters, and the percentage difference between 'y' and 20 is:

= $\frac{y−20}{20} × 100$ = $\frac{30−20}{20} × 100$ = 50%

Therefore, 'y' is 50% more than 20.

Q8 Text Solution:

I. 50%, 6:5

Ratio of milk and water in the initial mixture = 3:2

Amount of milk in initial mixture = $\frac{3}{5} × 400$ = 240 ml

Amount of water in initial mixture = $\frac{2}{5} × 400$ = 160 ml

Ratio of milk and water in new mixture = [240 − $\frac{3}{5} × 160$ + 36]:[160 − $\frac{2}{5} × 160$ + 54] = 180:150 = 6:5

This statement is true.

II. 66.66%, 31:16

Ratio of milk and water in the initial mixture = 5:3

Amount of milk in the initial mixture = $\frac{5}{8} × 400$ = 250 ml

Amount of water in initial mixture = $\frac{3}{8} \times 400$ = 150 ml

Ratio of milk and water in new mixture = $[250 - \frac{5}{8} \times 160 + 36] : [150 - \frac{3}{8} \times 160 + 54]$ = 186:144 = 31:24

This statement is not true

III. 200%, 36:19

Ratio of milk and water in the initial mixture = 3:1

Amount of milk in the initial mixture = $\frac{3}{4} \times 400$ = 300 ml

Amount of water in initial mixture = $\frac{1}{4} \times 400$ = 100 ml

Ratio of milk and water in new mixture = $[300 - \frac{3}{4} \times 160 + 36] : [100 - \frac{1}{4} \times 160 + 54]$ = 216:114 = 36:19

This statement is true.

So, Only I and III are true.

Q9 Text Solution:

For statement I:

Let quantity of milk and water in mixture A is 5x ml and 4x ml respectively.

Quantity of milk and water in mixture B is 7y ml and 9y ml respectively.

So, 9x + 16y = 590..........................(1)

And, 9y − 4x = 60........................(2)

Solving equation (1) and (2), we get

x = 30 and y = 20

So, desired ratio = 150:140 = 15:14

So, statement I is true.

For statement II:

Let quantity of milk and water in mixture A is 5x ml and 4x ml respectively.

Quantity of milk and water in mixture B is 7y ml and 9y ml respectively.

So, 9x + 16y = 756..........................(1)

And, 9y − 4x = 99........................(2)

Solving equation (1) and (2), we get

x = 36 and y = 27

So, desired ratio = 180:189 = 20:21

So, statement II is true.

For statement III:

Let quantity of milk and water in mixture A is 5x ml and 4x ml respectively.

Quantity of milk and water in mixture B is 7y ml and 9y ml respectively.

So, 9x + 16y = 1080..........................(1)

And, 9y − 4x = 100........................(2)

Solving equation (1) and (2), we get

x = 56 and y = 36

So, desired ratio = 280:252 = 10:9

So, statement III is true.

For statement IV:

Let quantity of milk and water in mixture A is 5x ml and 4x ml respectively.

Quantity of milk and water in mixture B is 7y ml and 9y ml respectively.

So, 9x + 16y = 1608..........................(1)

And, 9y − 4x = 252........................(2)

Solving equation (1) and (2), we get

x = 72 and y = 60

So, desired ratio = 360:420 = 6:7

So, statement IV is not true.

Hence, option c.

Q10 Text Solution:

Let total quantities of mixture A and mixture B are 6L and 5L respectively.

So, quantity of milk in mixture A = x% of 6L = $\left(\frac{6x}{100}\right)$ L

Quantity of water in mixture A = $\left[6 - \left(\frac{6x}{100}\right)\right]$ L

Quantity of milk in mixture B = y% of 5L = $\left(\frac{5y}{100}\right)$ L

And quantity of water in mixture B = $\left[5 - \left(\frac{5y}{100}\right)\right]$ L

Since, when both the mixtures are mixed together, quantity of milk in the final mixture becomes $63\left(\frac{7}{11}\right)$ %.

So,

$$\left(\frac{6x}{100}\right) + \left(\frac{5y}{100}\right) = (6 + 5) \times \left(\frac{700}{1100}\right)$$

$\frac{6x + 5y}{100}$ = 7

6x + 5y = 700 -----------(1)

Since,

x + y = $126\left(\frac{2}{3}\right)$

x + y = $\frac{380}{3}$ -----------(2)

So, by equation (2) × 6 − equation (1):

6x + 6y − 6x − 5y = 760 − 700

y = 60 and x = $66\left(\frac{2}{3}\right)$

So, ratio of milk to water in mixture A = $66\left(\frac{2}{3}\right)$:33 $\left(\frac{1}{3}\right)$ = 2:1

And ratio of milk to water in mixture B = 60:40 = 3:2

Let quantities of mixtures A and B are '6x' L and '5x' L respectively.

From P:

Quantity of water in mixture A = 6x × $\left(\frac{1}{3}\right)$ = '2x' L

Quantity of water in mixture B = 5x × $\left(\frac{2}{5}\right)$ = '2x' L

Since, quantity of water in mixture A = quantity of water in mixture B = '2x' L

So, P is true.

From Q:

Quantity of milk in mixture A = 6x × $\left(\frac{2}{3}\right)$ = '4x' L

If cost of mixture A = Rs.32 per L

Let cost of pure milk = Rs.'m' per L

So, $\frac{4x \times m}{6x}$ = 32

m = Rs.48 per L

So, Q is not true.

From R:

Quantity of milk in mixture A = 6x × $\left(\frac{2}{3}\right)$ = '4x' L

Quantity of milk in mixture B = 5x × $\left(\frac{3}{5}\right)$ = '3x' L

Required ratio = 4x: 3x = 4:3

So, R is true.

Hence, only P and R are true.