

## Mixture and Alligation – 02



- (C) 24 litre (D) 36 litre
- Q9** Three types of wheat flour costing Rs. 60, 50 and 40/kg respectively are mixed in certain ratio to get the flour worth Rs. 48/kg. In what proportion were they mixed?  
 (A) 2 : 3 : 3  
 (B) 3 : 2 : 5  
 (C) 1 : 3 : 5  
 (D) 4 : 3 : 2
- Q10** Two tank contains petrol in equal quantity but worth Rs 80/litre and Rs 100/litre. Equal amount from both is taken and put into the other one respectively. Coincidentally the price/litre of each tank become equal. If quantity of petrol in each tank was 70 litre, then find the price/litre (in Rs.) of each tank finally.  
 (A) 300/7 (B) 500/11  
 (C) 80 (D) 90
- Q11** A sugar syrup containing 25% water was replaced with sugar solution A containing  $x\%$  of water. Replacement was done such that only  $1/5^{\text{th}}$  part of syrup was taken out and refilled with solution A. Now sugar syrup contained 26% of water. Find  $x$   
 (A) 27 (B) 28  
 (C) 30 (D) 35
- Q12** There is a 60 litre solution of milk and water with concentration of milk as 80% initially, 10 litres of the solution is replaced with 10 litres of pure milk, then again 10 litres of new solution is replaced with 10 litres of water. What is the concentration (in percentage) of milk in the solution now?  
 (A)  $63\frac{4}{9}$  (B)  $71\frac{5}{9}$   
 (C)  $69\frac{4}{9}$  (D)  $79\frac{4}{9}$
- Q13** Bottle A contains a mixture of milk and water in 18 : 2 ratio and Bottle B contains a mixture of water and milk in 6:10 ratio. In what ratio of volumes should the liquids in Bottle A and Bottle B be combined to obtain a mixture of milk and water in 3 : 1 ratio  
 (A) 5 : 6 (B) 6 : 5  
 (C) 2 : 3 (D) 3:2
- Q14** From a container filled with milk, 8 litres of milk is drawn and replaced with water. Next, from the same container, 8 litres of the mixture is once again drawn and replaced with water. If the volumes of milk and water in the container are now in the ratio of 16:9, then the capacity of the container in litres is  
 (A) 40 (B) 60  
 (C) 25 (D) 30
- Q15** Raman mixed two type of maize worth Rs. 22/kg and Rs 25/kg in the ratio  $m : n$ . He notice that if he mixes it in  $n : m$ , the price /kg of mixture reduce by 50 paise. Find  $(m + n)$   
 (A) 8 units (B) 12 units  
 (C) 15 units (D) 17 units
- Q16** An alloy A contains metal a and b in the ratio 3 : 11 respectively and alloy B contains metal b, c and d in the ratio 2 : 4 : 5 respectively. If alloy b is equal in quantity in both the alloy, then find the percentage of alloy d in mixture of alloy A and alloy B.  
 (A) 36.9% (B) 38%  
 (C) 42% (D) 45%
- Q17** A shopkeeper mixes four variants of same products costing Rs 34/kg, Rs 35/kg, Rs 40/kg and Rs 25/kg. He sell the mixture at Rs 45/kg at 25% profit. What is the proportion in which different variants were mixed respectively and net profit/loss (in Rs.) if he sold all the 15 kg of mixture?  
 (A) 4 : 4 : 6 : 1 and Rs. 134  
 (B) 5 : 3 : 6 : 1 and Rs. 135  
 (C) 5 : 3 : 6 : 1 and Rs. 155  
 (D) 4 : 4 : 6 : 1 and Rs. 141
- Q18** A bottle contains  $x$  litres of maaza. 5 litres of it was replaced with fanta twice. After the two



times replacement, only 2.5 litres of maaza left.  
What is the value of  $x$  ?



**Q19** Mixture of 3 liquids A, B and C is contained in a container in the ratio  $3 : 4 : 5$ . From this 60 litres of mixture, 20 litre is taken out and replaced with liquid A. Find the new ratio of A, B and C respectively.

- (A)  $9 : 4 : 5$
  - (B)  $7 : 3 : 5$
  - (C)  $8 : 4 : 5$
  - (D)  $10 : 3 : 5$

**Q20** A glass contains 70ml water. 15ml of it is replaced with lemon juice till the time water falls in the range of 32 – 39%. How many times this process should be repeated?



**Q21** A chemist mixes two liquids 1 and 2. One litre of liquid 1 weighs 1 kg and one litre of liquid 2 weighs 800 gm. If half litre of the mixture weighs 430 gm, then the percentage of liquid 1 in the mixture, in terms of volume, is



**Q22** Two identical bottles of 1000 ml each, Bottle A contains alcohol of 20% concentration and bottle B contains alcohol of concentration 35%. 25% of solution from bottle A is mixed with 50% of solution from bottle B in Jar C, Remaining Solution is mixed together and kept in Jar D. How much water (in ml, correct up to 2 decimal places) should be added and to which Jar so that concentration of both the Jars becomes same?

- (A) 115.38, Jar C      (B) 117.47, Jar D  
(C) 117.47, Jar C      (D) 115.38, Jar D

**Q23** 456ml of mixture contains milk and water in the ratio of 12 : 7, respectively. If 'a' ml of mixture is taken out and 285ml of mixture (milk + water)

containing  $156(1/4)\%$  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'.



**Q24** Three liquids A, B and C of equal density in a mixture are in the ratio of  $5 : 3 : 2$ . Initially 50% of the mixture is taken out and replaced by liquid A, again 60% of the mixture is replaced by liquid B and at last 2 times the present quantity of liquid C is added to the mixture. What is the percentage of liquid C in present solution?

- (A) 12%
  - (B) 11.11%
  - (C) 14.42%
  - (D) 15.56%

**Q25** Out of total quantity of pure milk present in a jar, 10% is replaced with same quantity of water. This process is repeated 2 more times. Find the quantity of milk present initially in the jar if the difference between quantities of milk and water at the end of the process is 36.64 litres.

- (A) 125 litres
  - (B) 60 litres
  - (C) 110 litres
  - (D) 80 litres

**Q26** A jar contains 120 litres of pure acid. Using a mug, 20% of the acid is replaced with water. Find the minimum number of times, does this procedure have to followed so that the quantity of acid in the jar falls below 60 litres.



**Q27** A vessel contains 80 litres of pure alcohol. A jar is used to withdraw the alcohol and replace it with the same quantity of water. When the same process is repeated 2 more times, the



quantity of alcohol in the jar is 40.96 litres. Find the capacity of the jar.

- (A) 32 litres
- (B) 16 litres
- (C) 24 litres
- (D) 12 litres

**Q28** A mixture contains ' $2P$ ' litres milk and 40 litres water. When ' $P - 30$ ' litres of the mixture is replaced with the same quantity of water, the ratio of quantity of milk to that of water in the resultant mixture becomes  $3 : 2$ . Find the value of ' $P$ ' given that  $P > 50$ .

- (A) 70
- (B) 120
- (C) 80
- (D) 60

**Q29** A milkman has two containers A and B of same capacity. Container A contains pure milk, and container B contains the mixture of milk and water, fully filled. The milkman replaces 8 litres of pure milk from container A with water. He attempts this process thrice such that the ratio of the milk and water in the final mixture becomes  $512:217$  in the container A. If the ratio of milk to water in container B is  $5 : 4$ , then find the quantity of water in container B.

- (A) 54 litres
- (B) 36 litres
- (C) 45 litres
- (D) 32 litres

**Q30** Two chemical solutions, X and Y, are combined in the ratio  $2:1$  by volume. The volume of the mixture is then tripled by adding solution X so that chemical Z is 80% of the final mixture. If solution X contains 78% of Chemical Z, what is the percentage of Chemical Z in solution Y?

- (A) 98%
- (B) 96%
- (C) 94%
- (D) 92%



# Answer Key

Q1 (B)  
Q2 (D)  
Q3 (B)  
Q4 (B)  
Q5 (C)  
Q6 (B)  
Q7 (A)  
Q8 (C)  
Q9 (B)  
Q10 (D)  
Q11 (C)  
Q12 (C)  
Q13 (A)  
Q14 (A)  
Q15 (B)

Q16 (A)  
Q17 (B)  
Q18 (B)  
Q19 (A)  
Q20 (C)  
Q21 (A)  
Q22 (A)  
Q23 (B)  
Q24 (B)  
Q25 (D)  
Q26 (D)  
Q27 (B)  
Q28 (C)  
Q29 (D)  
Q30 (B)

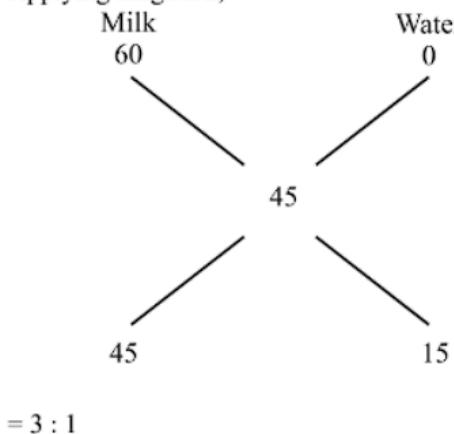


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# Hints & Solutions

**Q1 Text Solution:**

Applying alligation,



$$\text{Required quantity of water} = 18/3$$

$$= 6 \text{ litres.}$$

**Q2 Text Solution:**

We know that,

Quantity of pure ghee left after 3 replacement

$$\begin{aligned}
 &= \text{initial quantity of Pure ghee} \times \\
 &\left(1 - \frac{\text{amount replaced each time}}{\text{initial quantity of pure ghee}}\right)^3 \\
 &= 20 \times (1 - 6/20)^3 \\
 &= 6.86 \text{ litre}
 \end{aligned}$$

Ans. d

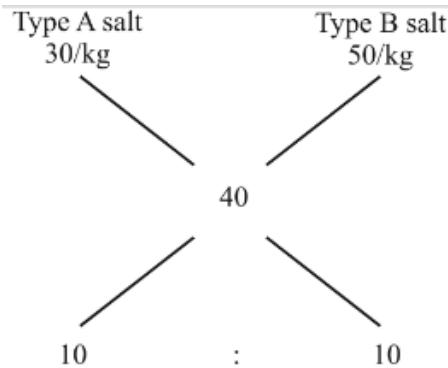
**Q3 Text Solution:**

$$\text{SP of mixture} = \text{Rs. } 48/\text{kg}$$

$$\text{So, CP of mixture} = \text{Rs. } (48 \times \frac{5}{6})/\text{kg}$$

$$= \text{Rs. } 40/\text{kg}$$

Now, applying alligations



$$= 1 : 1$$

So, salt worth Rs. 30/kg should also be 5 kg.

Ans. b

**Q4 Text Solution:**

Let the capacity of each container be  $60x$   
(LCM of  $7 + 5$  and  $1 + 9$ )

Suppose A and B are mixed in the ratio  $a : b$ .

Then, according to the question,

$$\begin{aligned}
 &\frac{(\frac{7}{12} \times 60x)a + (\frac{1}{10} \times 60x)b}{(\frac{5}{12} \times 60x)a + (\frac{9}{10} \times 60x)b} = \frac{39}{61} \\
 &\frac{35a + 6b}{25a + 54b} = \frac{39}{61} \\
 &\Rightarrow 2135a + 366b = 975a + 2106b \\
 &\Rightarrow 1160a = 1740b \\
 &\Rightarrow \frac{a}{b} = \frac{3}{2}
 \end{aligned}$$

So, container A and B are mixed in the ratio  
3 : 2 Ans. b

**Q5 Text Solution:**

$\frac{3}{8}$  th part of substance S is spirit and  $\frac{5}{8}$  th part is alcohol.

$\frac{7}{11}$  th part of spirit is a and  $\frac{4}{11}$  th part is b.

Whereas  $\frac{2}{3}$  rd part of alcohol is b and  $\frac{1}{3}$  rd part is c.

B part in substance S

$$= \left( \frac{4}{11} \times \frac{3}{8} \right) + \left( \frac{2}{3} \times \frac{5}{8} \right)$$



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$$\begin{aligned}
 &= \frac{3}{22} + \frac{5}{12} \\
 &= \frac{18 + 55}{132} \\
 &= \frac{73}{132}
 \end{aligned}$$

Now, in 1056 units of S, b amount  
 $= (\frac{73}{132} \times 1056) = 584$  units

Total quantity

$$\begin{aligned}
 &= \frac{584 \times 5}{2} \text{ units} \\
 &= 1460 \text{ units}
 \end{aligned}$$

Required quantity of water =  $1460 - 1056 = 404$   
 litres

Ans. c

#### Q6 Text Solution:

Let quantity of liquid in sprite, fanta and maaza be 40ml, 50ml and 30ml respectively.

Now, total amount of water in the final mixture

$$\begin{aligned}
 &= \left( \frac{1}{9} \times 40 \right) + \left( \frac{1}{10} \times 50 \right) + \left( \frac{2}{9} \times 30 \right) \\
 &= \frac{145}{9}
 \end{aligned}$$

Required percentage

$$\begin{aligned}
 &= \left( \frac{\frac{145}{9}}{40 + 50 + 30} \times 100 \right) \% \\
 &\approx 13.4\%
 \end{aligned}$$

Ans. b

#### Q7 Text Solution:

Suppose each jar contains 55 litre of mixture  
 (LCM of 2 + 3 and 5 + 6)

Final amount of water in jar A =  $33 \left(1 - \frac{6}{33}\right)^2$

$$= \left( 33 \times \frac{81}{121} \right)$$

and final amount of water in jar

$$\begin{aligned}
 B &= 30 \left(1 - \frac{6}{30}\right)^2 \\
 &= \left( 30 \times \frac{16}{25} \right)
 \end{aligned}$$

Total amount of water in final mixture.

$$\begin{aligned}
 &= \frac{2673}{121} + \frac{96}{5} \\
 &= \frac{24981}{605}
 \end{aligned}$$

Therefore, the part of final mixture which is water

$$\begin{aligned}
 &= \frac{\frac{24981}{605}}{(55 \times 2)} \\
 &\approx 0.37 \text{ litre}
 \end{aligned}$$

Ans. a

#### Q8 Text Solution:

Total honey = 672 litres

Part of b which consists of d =  $\frac{1}{4}$   
 Part of A which consists of b =  $\frac{3}{7}$

Part of original mixture consisting of A =  $\frac{1}{3}$

Therefore, d amount in 672 litre of mixture

$$\begin{aligned}
 &= \left( \frac{1}{4} \times \frac{3}{7} \times \frac{1}{3} \times 672 \right) \\
 &= 24 \text{ litres}
 \end{aligned}$$

Ans. c

#### Q9 Text Solution:

Since, there's ratio given in each option, checking the option would be a better approach.

Option-a : They are mixed in the ratio 2 : 3 : 3

$$\begin{aligned}
 \text{So, } & \frac{(60 \times 2) + (50 \times 3) + (40 \times 3)}{(2 + 3 + 3)} \\
 &= 48.75 \neq 48
 \end{aligned}$$



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This option is not correct.

Option-b: They are mixed in the ratio 3 : 2 : 5

$$\text{So, } \frac{(60 \times 3) + (50 \times 2) + (40 \times 5)}{(3+2+5)}$$

$$= 48$$

This fits the mentioned criteria of question.

Ans. b

#### **Q10 Text Solution:**

Suppose  $x$  litre of petrol was taken out. Then, according to the question,

$$\begin{aligned} \frac{80(70-x) + 100x}{70} &= \frac{100(70-x) + 80x}{70} \\ \Rightarrow 5600 - 80x + 100x &= 7000 - 100x \\ &\quad + 80x \\ \Rightarrow 20x + 20x &= 1400 \\ \Rightarrow x &= \frac{1400}{40} = 35 \end{aligned}$$

Therefore, price per litre of petrol

$$\begin{aligned} &= \frac{80(70-35) + (100 \times 35)}{70} \\ &= \frac{2800 + 3500}{70} = \text{Rs. } \frac{6300}{70} / \text{litre} \end{aligned}$$

Ans. Rs. 90

Option (d)

#### **Q11 Text Solution:**

Suppose sugar syrup contained 100ml of solution, So, water content = 25ml and sugar content = 75ml Now,  $\frac{1}{5}$  th part is replaced with  $x\%$  water solution

$$\begin{aligned} \text{So, } 25 - \left(\frac{1}{5} \times 25\right) + \left(\frac{x}{100} \times 20\right) \\ &= 26\% \text{ of } 100 \\ \Rightarrow 20 + \frac{x}{5} &= 26 \\ \Rightarrow x &= 30 \end{aligned}$$

Ans. c

#### **Q12 Text Solution:**

	Milk(in L)	Water(in L)	Total (in L)
<b>Initial</b>	48	12	60
After taking out 10 litre of solution	40	10	50
After adding 10 litre of milk	50	10	60
After taking out 10 litre of solution	$50 - \frac{50}{6}$	$10 - \frac{10}{6}$	50
After adding 10 Litre of water	$\frac{250}{6}$	$\frac{110}{6}$	60

$$\text{Concentration of Milk} = \frac{\frac{250}{6}}{60} \times 100 = \frac{250}{360} \times 100 = \frac{625}{9} = 69\frac{4}{9}$$

#### **Q13 Text Solution:**

$A = 18$  part MILK and 2 part WATER  
 $= \frac{18}{20}$  milk

$B = 10$  part MILK and 6 part WATER  
 $= \frac{10}{16}$  milk

we want the mixture to be  $= \frac{3}{4} = \frac{15}{20} = \frac{12}{16}$  milk

using mixtures and alligations formula

$$\begin{aligned} \frac{\frac{3}{4} - \frac{10}{16}}{\frac{18}{20} - \frac{3}{4}} \text{ will be } &= \frac{\text{the required amount of A}}{\text{the required amount of B}} \\ \frac{\frac{1}{8}}{\frac{3}{20}} &= \frac{20}{24} = \frac{5}{6} = \frac{\text{the required amount of A}}{\text{the required amount of B}} \end{aligned}$$

#### **Q14 Text Solution:**



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We can use the wine left formula here  
By wine left formula if a container with A liters of wine is successively replaced with let say B liters water for N times then

$$\frac{\text{wine left after } N \text{ th operation}}{\text{capacity of the container}} = \left[ \frac{(A-B)}{A} \right]^N$$

Here milk is getting replaced 2 times with 8 litres of water

After 2nd operation we have  $16x$  Liters of milk and  $9x$  liters of water

$$\frac{\text{milk left after 2nd operation}}{\text{capacity of the container (initial liters of wine)}} = \frac{16x}{(16+9)x}$$

$$= \left[ \frac{(A-8)}{A} \right]^2 = \frac{16x}{(16+9)x} = \frac{16}{25}$$

taking square root on both sides

$$\left[ \frac{(A-8)}{A} \right] = \frac{4}{5}$$

$$5A - 40 = 4A$$

$$A = 40L$$

#### Q15 Text Solution:

If two types are mixed in  $m : n$ , then price /kg

$$= \frac{22m + 25n}{m+n}$$

and if two types are mixed in  $n : m$ , then price /kg

$$= \frac{22n + 25m}{n+m}$$

$$\text{Given, } \frac{22m+25n}{m+n} - \frac{22n+25m}{n+m} = \frac{1}{2}$$

$$\Rightarrow 2(3n - 3m) = m + n$$

$$\Rightarrow 5n = 7m$$

$$\Rightarrow \frac{n}{m} = \frac{7}{5}$$

So,  $n + m = 12$  units

Ans. b

#### Q16 Text Solution:

Alloy A composition =  $(3 : 11) \rightarrow (a : b)$   
and alloy B composition  
 $= (2 : 4 : 5) \rightarrow (b : c : d)$

As b quantity is equal in both,  
So, make the b part same in both the ratio  
or,  $2 \times (3 : 11)$  and  $11 \times (2 : 4 : 5)$   
or  $6 : 22$  and  $22 : 44 : 55$   
Combining both, we get

$$\begin{aligned} & 6 : (22 + 22) : 44 : 55 \\ & = 6 : 44 : 44 : 55 \end{aligned}$$

Therefore, percentage of metals d in the final

$$\begin{aligned} \text{mixture} &= \frac{55}{(6+44+44+55)} \times 100 \\ &= \frac{55}{149} \times 100 \\ &\approx 36.9\% \end{aligned}$$

Ans. a

#### Q17 Text Solution:

SP at which mixture is sold = Rs. 45/kg Profit = 25%

So, CP of final mixture = Rs.  $\frac{45}{1.25}$ /kg = Rs. 36/kg

Now, best approach would be to go by option

(a) CP of mixture

$$\begin{aligned} &= \frac{(34 \times 4) + (35 \times 4) + (40 \times 6) + (25 \times 1)}{(4+4+6+1)} \\ &= \frac{541}{15} \approx 36.06 \neq 36 \end{aligned}$$

(b)

$$\begin{aligned} & \frac{(34 \times 5) + (35 \times 3) + (40 \times 6) + (25 \times 1)}{(5+3+6+1)} \\ &= \frac{170 + 105 + 240 + 25}{15} \end{aligned}$$

CP of mixture = 36

This option satisfy the given CP of mixture So,

they were mixed in the ratio  $(5 : 3 : 6 : 1)$

So, SP of mixture = Rs.  $(15 \times 45)$



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Rs. 675

and actual CP of 15 kg

$$\begin{aligned} &= \text{Rs. } [(34 \times 5) + (35 \times 3) + (40 \times 6) \\ &\quad + (25 \times 1)] \\ &= \text{Rs. } (170 + 105 + 240 + 25) \\ &= \text{Rs. } 540 \end{aligned}$$

Therefore, profit = Rs.  $(675 - 540)$

$$= \text{Rs. } 135$$

Therefore, profit = Rs.  $(675 - 540)$

$$= 135$$

Ans. b

#### **Q18 Text Solution:**

Given, quantity of maaza =  $x$  litres Now, according to the question,

$$x \left(1 - \frac{5}{x}\right)^2 = 2.5$$

(using n-iterations formula)

$$\begin{aligned} &\Rightarrow x^2 + 25 - 10x = 2.5x \\ &\Rightarrow 2x^2 - 25x + 50 = 0 \\ &\text{or } x = \frac{25 \pm \sqrt{625 - 400}}{4} \\ &= \frac{25 \pm 15}{4} \end{aligned}$$

or  $x = 10$  or  $2.5$

But  $x$  can't be  $2.5$  litres, because  $5$  litres of maaza was withdrawn from the bottle.

So,  $x = 10$  litres

Ans. b

#### **Q19 Text Solution:**

Quantity of liquid A, B and C in the initial mixture.  $= \left(\frac{3}{12} \times 60\right) \ell, \left(\frac{4}{12} \times 60\right) \ell$  and  $\left(\frac{5}{12} \times 60\right) \ell$  (in that order)  
 $= 15\ell, 20\ell, \text{ and } 25\ell$

Now,  $20$  litres is taken out.

So, new quantity in that order

$$\begin{aligned} &= \left[15 - \left(\frac{3}{12} \times 20\right)\right] \ell, \\ &\left[20 - \left(\frac{4}{12} \times 20\right)\right] \ell \text{ and} \\ &\left[25 - \left(\frac{5}{12} \times 20\right)\right] \ell \end{aligned}$$

Quantity of A, B, C =  $10\ell, \left(20 - \frac{20}{3}\right) \ell$  and  $\left(25 - \frac{25}{3}\right) \ell$   
or  $10\ell, \frac{40}{3}\ell$  and  $\frac{50}{3}\ell$

Therefore, required ratio of A, B and C

$$\begin{aligned} &= (10 + 20) : \frac{40}{3} : \frac{50}{3} \\ &= 30 : \frac{40}{3} : \frac{50}{3} \\ &= 90 : 40 : 50 \\ &= 9 : 4 : 5 \end{aligned}$$

Ans. a

#### **Q20 Text Solution:**

Given, quantity of water =  $70\text{ml}$  Suppose the process is repeated  $n$  times

Then, quantity of water after  $n$ -iterations

$$= 70 \left(1 - \frac{15}{70}\right)^n$$

So, according to the question,

$$\begin{aligned} 32\% \text{ of } 70 &\leq 70 \left(1 - \frac{15}{70}\right)^n \leq 39\% \text{ of } 70 \\ \text{or } 22.4 &\leq 70 \left(1 - \frac{3}{14}\right)^n \leq 27.3 \\ \text{or } 22.4 &\leq 70 \left(\frac{11}{14}\right)^n \leq 27.3 \end{aligned}$$

At  $n = 4$ , the above inequality is valid.

Therefore, this process should be repeated 4 times.

Ans. c



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**Q21 Text Solution:**

For liquid 1,

$$1\text{L} = 1000\text{gm},$$

$$0.5 \text{ L} = 500\text{gm}$$

For liquid 2,

$$1\text{L} = 800 \text{ gm}$$

$$0.5 \text{ L} = 400 \text{ gm.}$$

Here Half litre of the mixture weight 430 grams.

By using Alligation we get,

$$\frac{(500 - 430)}{(430 - 400)} = \frac{\text{Quantity of Liquid 1 mixed}}{\text{Quantity of Liquid 2 mixed}}$$

$$\frac{\text{Quantity of Liquid 1 mixed}}{\text{Quantity of Liquid 2 mixed}} = \frac{3}{7}$$

$$\% \text{ of liquid 1 in the mixture} = (3/10) \times 100 = 30\%$$

**Q22 Text Solution:**

Let capacity of each bottle be 1L

Then alcohol amount in bottle A is 200ml

Alcohol amount in bottle B is 350ml

Jar C has 250 ml solution of Bottle A and 500 ml solution of Bottle B

Total volume of solution in Jar C=750ml

$$\text{So amount of alcohol in Jar C} = 0.2 \times 250 + 0.35 \times 500 = 50 + 175 = 225 \text{ ml}$$

$$\text{Concentration of Alcohol} = \frac{225}{750} \times 100 = 30\%$$

Jar D has 750 ml solution of Bottle A and 500 ml solution of bottle B

Total volume in Jar D is 1250 ml

$$\text{Amount of alcohol in Jar D} = 0.2 \times 750 + 0.35 \times 500 = 150 + 175 = 325 \text{ ml}$$

$$\text{So concentration of Alcohol in this Jar} = \frac{325}{1250} \times 100 = 26\%$$

For Concentration of Jar C is high, thus we have to add water into it to dilute it to 26%

Let amount of water added be X ml

$$\text{So } \frac{26}{100} = \frac{225}{750+x}$$

$$26 \times 750 + 26x = 22500$$

$$\Rightarrow 26x = 22500 - 19500 = 3000$$

$$x = \frac{3000}{26} = 115.38 \text{ ml}$$

115.38 ml of water should be added to Jar C

**Q23 Text Solution:**

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

Let quantity of milk and water taken out be  $12x\text{ml}$  and  $7x$ , respectively.

$$156 \left( \frac{1}{4} \right) \% = \frac{25}{16}$$

Let quantity of milk in 285ml of mixture is ' b ' ml So, quantity of water in 285ml of mixture

$$= \left( 1 + \frac{25}{16} \right) \times b = \frac{41b}{16} \text{ml}$$

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

$$\text{Or, } b = 80$$

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

So, quantity of water in 285ml of mixture

$$= 285 - 80 = 205\text{ml}$$

$$\text{So, } \frac{(288-12x+80)}{(168-7x+205)} = \frac{7}{12}$$

$$\text{Or, } 4416 - 144x = 2611 - 49x$$

$$\text{Or, } 95x = 1805$$

$$\text{Or, } x = 19$$

$$\text{So, } a = 19x = 19 \times 19 = 361\text{ml}$$

Hence, option b is correct.

**Q24 Text Solution:**

Let the quantity of A, B and C be 500ml, 300ml and 200ml respectively.

After 1<sup>st</sup> replacement,

$$A = 250 + 500 = 750\text{ml} B = 150\text{ml}$$

$$C = 100\text{ml}$$

After 2<sup>nd</sup> replacement, A = 300ml

$$B = 60 + 600 = 660\text{ml}$$

$$C = 40\text{ml}$$

After 3<sup>rd</sup> replacement, A = 300ml

$$B = 660\text{ml}$$

$$C = 40 + 80 = 120\text{ml}$$

$$\% \text{ of C in solution} = \frac{120}{1080} \times 100 = 11.11\%$$

Hence, option b is correct.



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**Q25 Text Solution:**

Let initial quantity of milk in the jar be 'P' litres  
 Quantity of milk left in the jar at the end of the process  $= P \times \left\{1 - \left(\frac{1}{10}\right)\right\}^3 = \left(\frac{729P}{1000}\right)$  litres  
 Quantity of water in the jar finally  $= P - \left(\frac{729P}{1000}\right) = \left(\frac{271P}{1000}\right)$  litres

According to the question;

$$\left(\frac{729P}{1000}\right) - \left(\frac{271P}{1000}\right) = 36.64$$

$$\text{Or, } P = \frac{(36.64 \times 1000)}{458} = 80$$

Hence, option d is correct.

**Q26 Text Solution:**

According to the question;

$$120 \times (0.8)^n \leq 60$$

Quantity of acid in the tank after:

$$\begin{aligned} 1\text{st replacement} &= 120 \times 0.80 = 96 \text{ litre} \\ 2\text{nd replacement} &= 96 \times 0.80 = 76.8 \text{ litres} \\ 3\text{rd replacement} &= 76.8 \times 0.80 = 61.44 \text{ litres} \end{aligned}$$

It is obvious that the quantity of acid will fall below 60 litres in the tank after one more replacement. Therefore, the procedure has to be followed a total of 4 times.

Hence, option d is correct.

**Q27 Text Solution:**

Let the capacity of Jar be 'x' litres

$$\text{So, } 80 \times \left\{1 - \left(\frac{x}{80}\right)\right\}^3 = 40.96$$

$$\text{Or, } \left\{1 - \left(\frac{x}{80}\right)\right\}^3 = 0.512$$

$$\text{Or, } 1 - \left(\frac{x}{80}\right) = 0.8$$

$$\text{Or, } 0.2 = \left(\frac{x}{80}\right)$$

$$\text{Or, } x = 16$$

Therefore, the capacity of the jar is 16 litres.

Hence, option b is correct

**Q28 Text Solution:**

Quantity of milk left in the solution after withdrawing from the mixture

$$2P - \left\{ (P - 30) \times \frac{2P}{2P + 40} \right\}$$

And ratio of quantity of milk to that of total mixture

$$= \frac{3}{5}$$

$$\text{So, } \frac{\left(2P - \left\{ (P - 30) \times \frac{2P}{2P + 40} \right\}\right)}{2P + 40} = \frac{3}{5}$$

$$\begin{aligned} \frac{2P \times (2P + 40) - \{(P - 30) \times 2P\}}{(2P + 40)^2} &= \frac{3}{5} \\ (4P^2 + 80P - \{2P^2 - 60P\}) \times 5 &= 3 \\ &\quad \times (4P^2 + 1600 + 160P) \end{aligned}$$

$$\begin{aligned} (2P^2 + 140P) \times 5 &= 12P^2 + 4800 + 480P \\ 10P^2 + 700P &= 12P^2 + 4800 + 480P \end{aligned}$$

$$\begin{aligned} 2P^2 - 220P + 4800 &= 0 \\ P^2 - 110P + 2400 &= 0 \end{aligned}$$

$$\text{or, } P^2 - 80P - 30P + 2400 = 0$$

$$\text{or, } P(P - 80) - 30(P - 80) = 0$$

$$\text{or, } (P - 30)(P - 80) = 0$$

$$\text{So, } P = 30 \text{ or } P = 80$$

$$\text{Since, } P > 50$$

$$\text{So, } P = 80$$

Hence, option c is correct.

**Q29 Text Solution:**

After replacement of 8 litres thrice,

The ratio of the milk to water in the container A becomes 512 : 217.

Let the quantity of milk and water in the final mixture be  $512y$  litres and  $217y$  litres, respectively. So, total quantity of pure milk initially  $= 512y + 217y = 729y$  litres

By replacement formula,

Where  $n$  is the number of attempts of replacement.

$512y = 729y \times \left(1 - \frac{8}{k}\right)^3$ , where  $k$  is the amount of pure milk in container A initially.

Pure milk in container A initially,



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$$\frac{512y}{729y} = \left(1 - \frac{8}{k}\right)^3$$

$$\left(\frac{8}{9}\right)^3 = \left(1 - \frac{8}{k}\right)^3 \frac{1}{9} = \frac{8}{k}$$

*k = 72 litres*

So the quantity of mixture in container B = 72 litres

So, required quantity of water in container B =

$$\frac{4}{9} \times 72 = 32 \text{ litres}$$

Hence, option d is correct.

### **Q30 Text Solution:**

Let Volume of X = 200; Volume of Y = 100;

Volume of X+Y = 300

Volume is tripled = (900) by adding X,

(According to question)

Therefore X = 800 and Y = 100

Chemical Z in new mixture = 80% of 900 = 720

Chemical Z in X = 78% of 800 = 624

Chemical Z in Y = 720 – 624 = 96

Percent of Chemical Z in Y =  $96 \times 100 / 100 =$

96%



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