



## Mixture and Alligation Questions for CAT

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# Questions

## Instructions

For the following questions answer them individually

### Question 1

A milkman mixes 20 litres of water with 80 litres of milk. After selling one-fourth of this mixture, he adds water to replenish the quantity that he had sold. What is the current proportion of water to milk?

[CAT 2004]

A 2 : 3

B 1 : 2

C 1 : 3

D 3 : 4

**Answer:** A

[▶ Video Solution](#)

### Explanation:

After selling  $\frac{1}{4}$ th of the mixture, the remaining quantity of water is 15 liters and milk is 60 liters. So the milkman would add 25 liters of water to the mixture. The total amount of water now is 40 liters and milk is 60 liters. Therefore, the required ratio is 2:3.

### Question 2

Two liquids A and B are in the ratio 5 : 1 in container 1 and 1 : 3 in container 2. In what ratio should the contents of the two containers be mixed so as to obtain a mixture of A and B in the ratio 1 : 1?

A 2 : 3

B 4 : 3

C 3 : 2

D 3 : 4

**Answer:** D

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### Explanation:

Fraction of A in contained 1 =  $\frac{5}{6}$

Fraction of A in contained 2 =  $\frac{1}{4}$

Let the ratio of liquid required from containers 1 and 2 be  $x:1-x$

$$x\left(\frac{5}{6}\right) + (1-x)\left(\frac{1}{4}\right) = \frac{1}{2}$$

$$\frac{7x}{12} = \frac{1}{4}$$

$$\Rightarrow x = \frac{3}{7}$$

$\Rightarrow$  Ratio = 3:4

### Question 3

There are two containers: the first contains 500 ml of alcohol, while the second contains 500 ml of water. Three cups of alcohol from the first container is taken out and is mixed well in the second container. Then three cups of this mixture is taken out and is mixed in the first container. Let A denote the proportion of water in the first container and B denote the proportion of alcohol in the second container. Then,

- A**  $A > B$
- B**  $A < B$
- C**  $A = B$
- D** Cannot be determined

**Answer:** C

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**Explanation:**

Let the volume of the cup be  $V$ .

Hence, after removing three cups of alcohol from the first container,

Volume of alcohol in the first container is  $500 - 3V$

Volume of water in the second container is 500 and volume of alcohol in the second container is  $3V$ .

So, in each cup, the amount of water contained is  $\frac{500}{500+3V} * V$

Hence, after adding back 3 cups of the mixture, amount of water in the first container is  $0 + \frac{1500V}{500+3V}$

Amount of alcohol contained in the second container is  $3V - \frac{9V^2}{500+3V} = \frac{1500V}{500+3V}$

So, the required proportion of water in the first container and alcohol in the second container are equal.

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**Instructions**

DIRECTIONS for the following two questions: The following table presents the sweetness of different items relative to sucrose, whose sweetness is taken to be 1.00.

Lactose	0.16
Maltose	0.32
Glucose	0.74
Sucrose	1
Fructose	1.7
Saccharin	675

**Question 4**

What is the maximum amount of sucrose (to the nearest gram) that can be added to one-gram of saccharin such that the final mixture obtained is atleast 100 times as sweet as glucose?

- A** 7
- B** 8
- C** 9
- D** 100

**Answer:** B

[▶ Video Solution](#)

**Explanation:**

For the mixture to be 100 times as sweet as glucose, its sweetness relative to the mixture should be at least 74.

1 gm of saccharin = 675

Let the number of grams of sucrose to be added be  $N$ . Thus, the total weight of the mixture =  $N + 1$ .

So,  $(675 + N) / (N+1) = 74$

$$\Rightarrow 675 + N = 74N + 74$$

$$\Rightarrow 601 = 73N \Rightarrow N = 8.23$$

When  $N=9$ , sweetness will be  $S = (675+9)/10 = 684/10 = 68.4$

When  $N=8$ , sweetness will be  $S = (675+8)/9 = 683/9 = 75.8$

So, option b) is the correct answer.

#### Question 5

Approximately how many times sweeter than sucrose is a mixture consisting of glucose, sucrose and fructose in the ratio of 1: 2: 3?

A 1.3

B 1

C 0.6

D 2.3

**Answer: A**

[Video Solution](#)

#### Explanation:

The relative sweetness of the mixture is  $(1 \times 0.74 + 2 \times 1 + 3 \times 1.7) / (1+2+3) = 7.84/6 = 1.30$

Option a) is the correct answer.

#### Instructions

For the following questions answer them individually

#### Question 6

Bottle 1 contains a mixture of milk and water in 7: 2 ratio and Bottle 2 contains a mixture of milk and water in 9: 4 ratio. In what ratio of volumes should the liquids in Bottle 1 and Bottle 2 be combined to obtain a mixture of milk and water in 3:1 ratio?

A 27:14

B 27:13

C 27:16

D 27:18

**Answer: B**

[Video Solution](#)

#### Explanation:

The ratio of milk and water in Bottle 1 is 7:2 and the ratio of milk and water in Bottle 2 is 9:4

Therefore, the proportion of milk in Bottle 1 is  $\frac{7}{9}$  and the proportion of milk in Bottle 2 is  $\frac{9}{13}$

Let the ratio in which they should be mixed be equal to  $X:1$ .

Hence, the total volume of milk is  $\frac{7X}{9} + \frac{9}{13}$

The total volume of water is  $\frac{2X}{9} + \frac{4}{13}$

They are in the ratio 3:1

Hence,  $\frac{7X}{9} + \frac{9}{13} = 3 * \left( \frac{2X}{9} + \frac{4}{13} \right)$

Therefore,  $91X + 81 = 78X + 108$

Therefore  $X = \frac{27}{13}$

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### Question 7

Consider three mixtures — the first having water and liquid A in the ratio 1:2, the second having water and liquid B in the ratio 1:3, and the third having water and liquid C in the ratio 1:4. These three mixtures of A, B, and C, respectively, are further mixed in the proportion 4: 3: 2. Then the resulting mixture has

- A The same amount of water and liquid B
- B The same amount of liquids B and C
- C More water than liquid B
- D More water than liquid A

**Answer:** C

[▶ Video Solution](#)

#### Explanation:

The proportion of water in the first mixture is  $\frac{1}{3}$

The proportion of Liquid A in the first mixture is  $\frac{2}{3}$

The proportion of water in the second mixture is  $\frac{1}{4}$

The proportion of Liquid B in the second mixture is  $\frac{3}{4}$

The proportion of water in the third mixture is  $\frac{1}{5}$

The proportion of Liquid C in the third mixture is  $\frac{4}{5}$

As they are mixed in the ratio 4:3:2, the final amount of water is  $4 \times \frac{1}{3} + 3 \times \frac{1}{4} + 2 \times \frac{1}{5} = \frac{149}{60}$

The final amount of Liquid A in the mixture is  $4 \times \frac{2}{3} = \frac{8}{3}$

The final amount of Liquid B in the mixture is  $3 \times \frac{3}{4} = \frac{9}{4}$

The final amount of Liquid C in the mixture is  $2 \times \frac{4}{5} = \frac{8}{5}$

Hence, the ratio of Water : A : B : C in the final mixture is  $\frac{149}{60} : \frac{8}{3} : \frac{9}{4} : \frac{8}{5} = 149 : 160 : 135 : 96$

From the given choices, only option C is correct.

### Question 8

Two types of tea, A and B, are mixed and then sold at Rs. 40 per kg. The profit is 10% if A and B are mixed in the ratio 3 : 2, and 5% if this ratio is 2 : 3. The cost prices, per kg, of A and B are in the ratio

- A 17 : 25
- B 18 : 25
- C 19 : 24
- D 21 : 25

**Answer:** C

[▶ Video Solution](#)

#### Explanation:

The selling price of the mixture is Rs.40/kg.

Let a be the price of 1 kg of tea A in the mixture and b be the price per kg of tea B.

It has been given that the profit is 10% if the 2 varieties are mixed in the ratio 3:2

Let the cost price of the mixture be x.

It has been given that  $1.1x = 40$

$$x = 40/1.1$$

$$\text{Price per kg of the mixture in ratio } 3:2 = \frac{3a+2b}{5} = 1.1$$

$$3.3a + 2.2b = 200 \text{ -----(1)}$$

The profit is 5% if the 2 varieties are mixed in the ratio 2:3.

$$\text{Price per kg of the mixture in ratio } 2:3 = \frac{2a+3b}{5} = 1.05$$

$$2.1a + 3.15b = 200 \text{ -----(2)}$$

Equating (1) and (2), we get,

$$3.3a + 2.2b = 2.1a + 3.15b$$

$$1.2a = 0.95b$$

$$\frac{a}{b} = \frac{0.95}{1.2}$$

$$\frac{a}{b} = \frac{19}{24}$$

Therefore, option C is the right answer.

#### Question 9

A wholesaler bought walnuts and peanuts, the price of walnut per kg being thrice that of peanut per kg. He then sold 8 kg of peanuts at a profit of 10% and 16 kg of walnuts at a profit of 20% to a shopkeeper. However, the shopkeeper lost 5 kg of walnuts and 3 kg of peanuts in transit. He then mixed the remaining nuts and sold the mixture at Rs. 166 per kg, thus making an overall profit of 25%. At what price, in Rs. per kg, did the wholesaler buy the walnuts?

A 96

B 98

C 86

D 84

**Answer:** A

[Video Solution](#)

#### Explanation:

Let the price of peanuts be Rs.  $100x$  per kg

Then, the price of walnuts = Rs.  $300x$  per kg

Cost price of peanuts for the shopkeeper = Rs.  $110x$  per kg

Cost price of walnuts for the shopkeeper = Rs.  $360x$  per kg

Total cost incurred to the shopkeeper while buying = Rs.  $(8 * 110x + 16 * 360x) = \text{Rs. } 6640x$

Since, 5kg walnut and 3kg peanuts are lost in transit, the shopkeeper will be remained with  $(16-5)+(8-3)=16$ kgs of nuts

Total selling price that the shopkeeper got = Rs.  $(166 * 16) = \text{Rs. } 2656$

Profit = 25%

So, cost price = Rs. 2124.80

Therefore,  $6640x = 2124.80$

On solving, we get  $x = 0.32$

Therefore, price of walnuts = Rs.  $(300 * 0.32) = \text{Rs. } 96$  per kg.

Hence, option A is the correct answer

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#### Question 10

A trader sells 10 litres of a mixture of paints A and B, where the amount of B in the mixture does not exceed that of A. The cost of paint A per litre is Rs. 8 more than that of paint B. If the trader sells the entire mixture for Rs. 264 and makes a profit of 10%, then the highest possible cost of paint B, in Rs. per litre, is

- A 16
- B 26
- C 20
- D 22

**Answer:** C

[▶ Video Solution](#)

**Explanation:**

Let the price of paint B be  $x$ .  
Price of paint A =  $x+8$

We know that the amount of paint B in the mixture does not exceed the amount of paint A. Therefore, paint B can at the maximum compose 50% of the mixture.

The seller sells 10 litres of paint at Rs.264 earning a profit of 10%.  
 $\Rightarrow$  The cost price of 10 litres of the paint mixture = Rs. 240

Therefore, the cost of 1 litre of the mixture = Rs.24

We have to find the highest possible cost of paint B.

When we increase the cost of paint B, the cost of paint A will increase too. If the cost price of the mixture is closer to the cost of paint B, then the amount of paint B present in the mixture should be greater than the amount of paint A present in the mixture. The highest possible cost of paint B will be obtained when the volumes of paint A and paint B in the mixture are equal.

$$\begin{aligned}\Rightarrow (x+x+8)/2 &= 24 \\ 2x &= 40 \\ x &= \text{Rs. } 20\end{aligned}$$

Therefore, option C is the right answer.

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