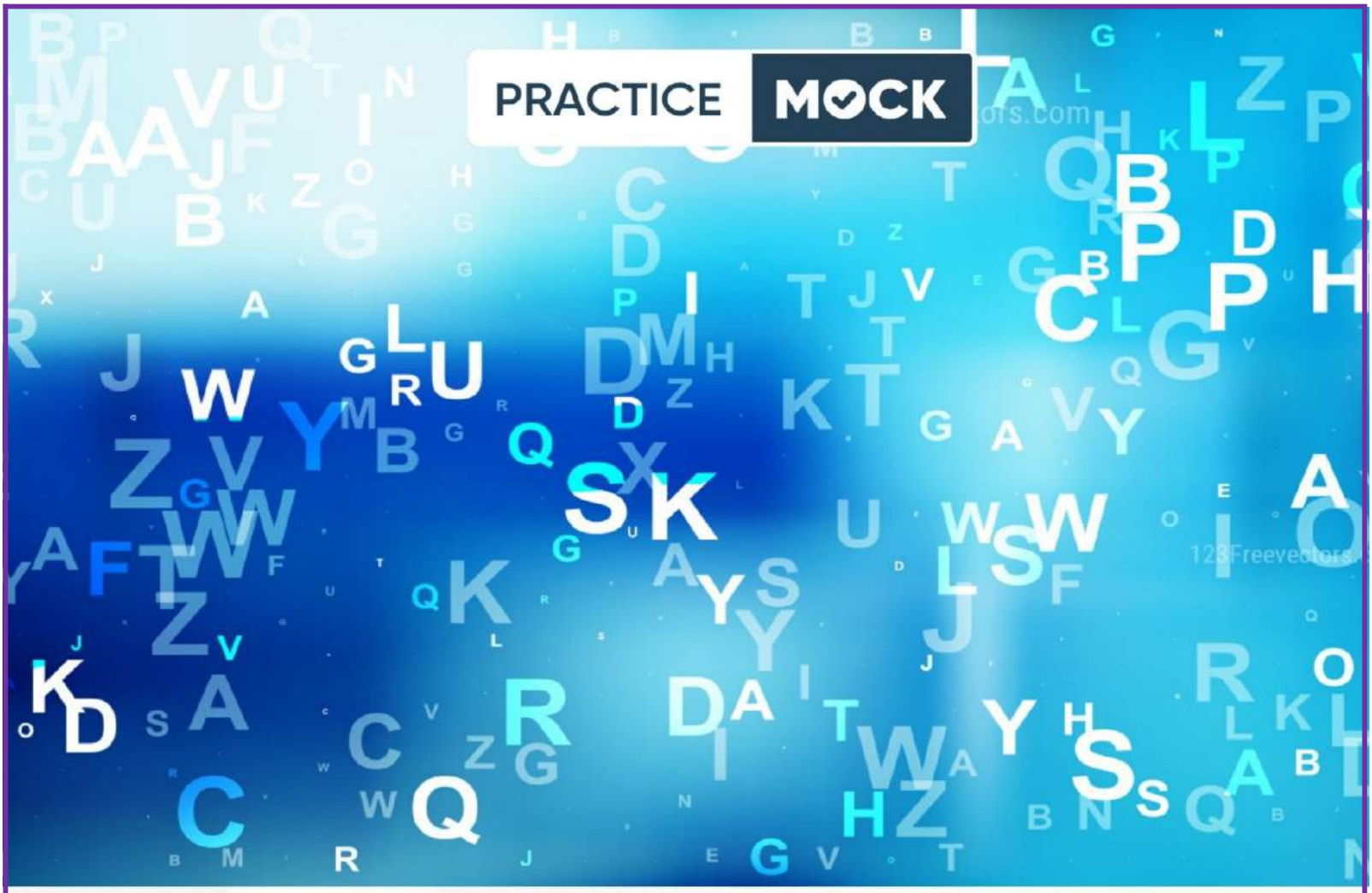

RRB Clerk Prelims & SBI Clerk Mains

Mixture & Alligations

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Mixture & Alligations Rules

The rules of mixture and alligations basically help the candidates to find out proportion between the two commodities given. These are two different terms and need to be understood differently.

Mixture

Mixing of two or more groups of different types is known as mixture.

Alligations

It basically deals with the quantity you want to mix in two or more items so that the final quantity can be calculated. Alligations deal with the quantity.

In the case of this topic of Quant the formula needs to be correct. The questions are at times tricky, but remembering and using the correct formula will surely help you find the correct answer. For a better understanding of this concept, mentioned below are the rules.

Rule 1: If the gradients are mixed in a ratio

$$\frac{\text{Quantity of cheaper}}{\text{Quantity of dearer}} = \frac{\text{CP of dearer - Mean price}}{\text{Mean price - CP of cheaper}}$$

Rule 2: Two bowls filled with water and milk. In container A the ratio of water and milk is a:b and in second container B the ration is c:d. If both of these are emptied into the third container, then the ratio of the two will be as follows:

$$\left[\frac{a+c}{(a+b)+(c+d)}\right] : \left[\frac{b+d}{(a+b)+(c+d)}\right]$$

RRB Clerk Prelims Mixture & Alligation Practice Questions

1. A vessel contains 540 litres mixture of honey, milk and water in the ratio of 3:4:5 respectively. 15 litres of honey and 20 litres of milk is added to this mixture. Find the new ratio of honey, milk and water in the vessel.
a. 7:2:8
b. 2:3:5
c. 6:8:9
d. 4:5:3
e. 7:8:9

Answer: c)

Solution:
Quantity of honey in vessel initially = [3/ (3 + 4 + 5)] × 540 = 135 litres
Quantity of milk in vessel initially = [4/ (3 + 4 + 5)] × 540 = 180 litres
Quantity of water in vessel initially = [5/ (3 + 4 + 5)] × 540 = 225 litres
Therefore, required ratio = (135 + 15): (180 + 20): 225 = 150: 200: 225 = 6: 8: 9
Hence, option c.

2. A vessel contains 480 litres of mixture of milk and water in the ratio of 5:3, respectively. If some water is added to this mixture such that the quantity of water and milk become same in the resultant mixture, then find the quantity of water added.
a. 140 litres
b. 144 litres
c. 120 litres
d. 150 litres
e. 172 litres

Answer: c)

Solution:
Quantity of milk in mixture initially = (5/8) × 480 = 300
Quantity of water in mixture initially = (3/8) × 480 = 180
Let, quantity of water added be 'x' litres.

According to question,
300 = 180 + x
x = 120 litres
Hence, option c.

3. A vessel contains 240 litres mixture of milk and water in the ratio of 5:3. How much water should be added to this vessel so that ratio of milk and water changes to 1:1?
a. 72 litres
b. 40 litres
c. 60 litres
d. 54 litres
e. 45 litres

Answer: c)

Solution:
Amount of milk in vessel = (5/8) × 240 = 150 litres
Amount of water in vessel = (3/8) × 240 = 90 litres
Let, required amount of water be x litres
According to question,
150: (90 + x) = 1: 1
150 = 90 + x
x = 150 – 90
x = 60 litres
Hence, option c.

4. 75 litres of mixture of milk and water contains x% of milk. If the quantity of milk is 15 litres more than the quantity of water in the mixture, then find the value of 'x'.
a. 20%
b. 50%
c. 75%
d. 40%
e. 60%

Answer: e)

Solution:
Quantity of milk in the mixture = x% of 75 litres
Quantity of water in the mixture = (100 – x)% of 75 litres

According to question,
x% of 75 – (100 – x)% of 75 = 15
{x – (100 – x)}% of 75 = 15
{x – (100 – x)} = 20
2x = 120
x = 60
So, the value of 'x' = 60%

Hence, option e.

5. In an 800 gm mixture of khichdi, the ratio of rice and daal is in the ratio 5:3, respectively. What amount of daal should be added to make the ratio 5:4?
a. 100 gm
b. 120 gm
c. 80 gm
d. 75 gm
e. 125 gm

Answer: a)

Solution:
Amount of rice initially in the khichdi = 5/8 × 800 = 500 gm
Let us consider, 'x' gm of daal is added to the mixture to make the ratio of rice and khichdi as 5:4.
So, 500 = 5/9 × (800 + x)
=> 4500 = 4000 + 5x
=> 500 = 5x
x = 100
Therefore, 100 gm of daal must be added to the khichdi.
Hence, option a.

SBI Clerk Mains Mixture & Alligation Practice Questions

1. Rohan purchases 160 litres of milk at Rs. 5 per litre, and mixes 80 litres of water (free of cost) in it. He sells some amount of mixture at Rs. 5 per litre in which quantity of water is 30 litres, and again he mixes 'x' litres of water in it. If he sells the remaining mixture at Rs. 4 per litre, and profit earned by him is Rs. 330, then find the value of 'x'.
a. 30
b. 15
c. 20
d. 40
e. 35

Answer: c)

Solution:
Total cost price of milk = 160 × 5 = Rs. 800
Ratio of milk to water initially = 160:80 = 2:1
So, amount of mixture sold = 30/1 × 3 = 90 litres

Total amount sold = '240 + x' litres
So, 90 × 5 + (150 + x) × 4 – 800 = 330
450 + 600 + 4x – 800 = 330
4x = 80, x = 20
Hence, option c.

2. A mixture containing milk and water contains 96 litres of milk and remaining water. If 20 litres of mixture is taken out from the mixture and is replaced with 20 litres of water such that the quantity of milk is twice the quantity of water in the resultant mixture, find the quantity of water in the initial mixture.
a. 48 litres
b. 24 litres
c. 36 litres
d. 12 litres
e. 60 litres

Answer: b)

Solution:
Let the initial quantity of water in the mixture be 'x' litres.
According to question,
$96 - \{20 \times 96/(96 + x)\} = 2 \times [x - \{20x/(96 + x)\} + 20]$
$9216 + 96x - 1920 = 2 \times (96x + x^2 + 1920)$
$3648 + 48x = 96x + x^2 + 1920$
$x^2 + 48x - 1728 = 0$
$x^2 - 24x + 72x - 1728 = 0$
$x(x - 24) + 72(x - 24) = 0$
$(x - 24)(x + 72) = 0$
$x = 24, -72$, ($x = -72$ not possible)
So, the initial quantity of water in the mixture = 24 litres
Hence, option b.

3. A vessel contains mixture of milk and water mixed in the ratio 11:5 respectively. 112 litres mixture is taken out of the vessel and replaced with 21 litres milk so that the ratio of the milk to water in the vessel becomes 8:3 respectively. What would be the ratio of milk to water if instead of adding 21 litres milk, same quantity of water was added?
a. 3:2
b. 5:4
c. 2:3
d. 1:3
e. 5:6

Answer: a)
Solution:

Let the initial quantities of milk and water in the vessel are 11x litres and 5 litres respectively.
112 litres mixture contains 77 litres milk and 35 litres water.
So according to question: $(11x - 77 + 21)/(5x - 35) = 8/3$
$33x - 168 = 40x - 280$
$7x = 112$, $x = 16$
So the initial quantities of milk and water in the vessel are 176 litres and 80 litres respectively.

Ratio of the milk to water if 21 litre water was added = (176 – 77)/(80 – 35 + 21) = 99:66 = 3:2
Hence, option a.

4. 'x' liters of a 30% alcohol solution is mixed with 25 liters of 80% alcohol solution and resultant of 40% alcohol solution is formed. Now '2x' liters of y% alcohol solution is added to 200 liters of 40% alcohol solution which resulted in 60% alcohol solution. 'y' is what percentage more or less than 'x'?
a. 20%
b. 15%
c. 40%
d. 25%
e. 30%

Answer: a)

Solution:
According to question,
$x \times 0.3 + 25 \times 0.8 = 0.4 \times (x + 25)$
$0.3x + 20 = 0.4x + 10$
$0.1x = 10, x = 100$
Also, $200 \times y\% + 200 \times 0.4 = 0.6 \times (200 + 200)$
$2y + 80 = 240$
$2y = 160, y = 80$
Therefore, required percentage = $[(100 – 80)/100] \times 100 = 20\%$
Hence, option a.

5. A vessel contains mixture of milk and water mixed in the ratio 8:3, respectively. 66 litres of the mixture is taken out of the mixture and sold at the rate 20% higher than the rate of milk. Now,21 litre water is added to the remaining mixture and the ratio of the milk to water in the vessel becomes 3:2. Now, the whole mixture is sold at the rate 40% less than the rate of the milk. Find profit earned in this whole transaction, if the milk costs Rs. 20 per litre.

a. Rs. 512
b. Rs. 624
c. Rs. 648
d. Rs. 478
e. Rs. 548

Answer: b)

Solution:
Let the initial quantity of milk and water in the vessel be 8x litre and 3x litre, respectively
66 litre mixture contains 48 litre milk and 18 litre water.
So according to question: (8x – 48)/(3x – 18 + 21) = 3/2
16x – 96 = 9x + 9
7x = 105
x = 15
So, the initial quantities of milk and water in the vessel are 120 litre and 45 litre respectively.
So, the total cost price of the milk = 120 × 20 = Rs. 2,400
Selling price of 66 litre mixture = 66 × 20 × 1.20 = Rs. 1,584
Selling price of the remaining mixture = 0.60 × 20 × (120 + 45 – 66 + 21) = 12 × 120 = Rs. 1,440
So, the total selling price = 1584 + 1440 = Rs. 3,024
So, the profit earned = 3024 – 2400 = Rs. 624
Hence, option b.