MIXTURE AND ALLIGATION

Mixture and Alligation

- Mixing of two or more quantities
- Continuous replacement problems
- Introduction of Alligation
- Application of Alligation (Average, Percentage, Profit & loss)
- Data Sufficiency Questions

MIXTURE AND ALLIGATION

1. Zinc and copper are in the ratio of 5 : 3 in 200 gm of an alloy. How much grams of copper be added to make the ratio as 3 : 5?

A] 133 (1/3)

B] 1 / 200

C] 72

D] 66

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2. 200 litres of a mixture contains milk and water in the ratio 17 : 3. After the addition of some more milk to it, the ratio of milk to water in the resulting mixture becomes 7 : 1. The quantity of milk added to it was

A] 20 litres

B] 60 litres

C] 80 litres

D] 40 litres

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3. A and B are two alloys of gold and copper prepared by mixing metals in ratios 7 : 2 and 7 : 11 respectively. If equal quantities of the alloys are melted to form a third alloy C, the ratio of gold and copper in C will be ;

A] 7:5

B] 5:9

C] 9:5

D] 5:7

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4. The proportion of acid and water in three samples is 2 : 1, 3 : 2 and 5 : 3. A mixture containing equal quantities of all three samples is made. The ratio of water and acid in the mixture is :

A] 120:133

B] 227:133

C] 227:120

D] 133:227

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5. Two alloys contain tin and iron in the ratio of 1 : 2 and 2 : 3. If the two alloys are mixed in the proportion of 3 : 4 respectively (by weight), the ratio of tin and iron in the newly formed alloy is :

A] 10:21

B] 13:22

C] 14:25

D] 12:23

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6. A container contains two liquids A and B in the ratio 7 : 5. When 9 litres of mixture are drawn off and the container is filled with B, the ratio of A and B becomes 1:1. How many litres of liquid A was in the container initially ?

A] 26

B] 16 (1/2)

C] 36 (3/4)

D] 26 (3/4)

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7. A barrel contains a mixture of wine and water in the ratio 3 : 1. How much fraction of the mixture must be drawn off and substituted by water so that the ratio of wine and water in the resultant mixture in the barrel becomes 1 : 1 ?

A] 1/4 B] 1/3

C] 3/4 D] 2/3

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Continuous replacement:

Suppose a container contains x liters of liquid ‘A’ from which y liters are taken out and replaced by another liquid ‘B’. After n operations, the quantity of pure liquid ‘A’

$$= \left[x \left(1 - \frac{x}{y} \right)^{n} \right] \text{ liters}$$

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8. A container contains 60 kg of milk. From this container 6 kg of milk was taken out and replaced by water. This process was repeated further two times. The amount of milk left in the container is

A] 34.34 kg

B] 39.64 kg

C] 43.74 kg

D] 47.6 kg

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9. 8 liters are drawn from a cask full of wine and is then filled with water. This operation is performed two more times. The ratio of the quantity of wine and water is 8:19 now. How much wine did the cask hold originally?

A] 24 L

B] 32 L

C] 27 L

D] 40 L

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Alligation:

It is the rule that enables us to find the ratio in which two or more ingredients at the given price must be mixed to produce a mixture of desired price.

Mean Price:

The cost of a unit quantity of the mixture is called the mean price.

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Concept of Alligation:

Price and quantity of 1st type quality = P_1 & Q_1
Price and quantity of 2nd type quality = P_2 & Q_2
Price and quantity of new quality = P & $(Q_1 + Q_2)$

$$P_1 \times Q_1 + P_2 \times Q_2 = P \times (Q_1 + Q_2)$$

$$P_1Q_1 + P_2Q_2 = PQ_1 + PQ_2$$

$$P_1Q_1 - PQ_1 = PQ_2 - P_2Q_2$$

$$Q_1 (P_1 - P) = Q_2(P - P_2)$$

$$\frac{Q_1}{Q_2} = \frac{(P - P_2)}{(P_1 - P)}$$

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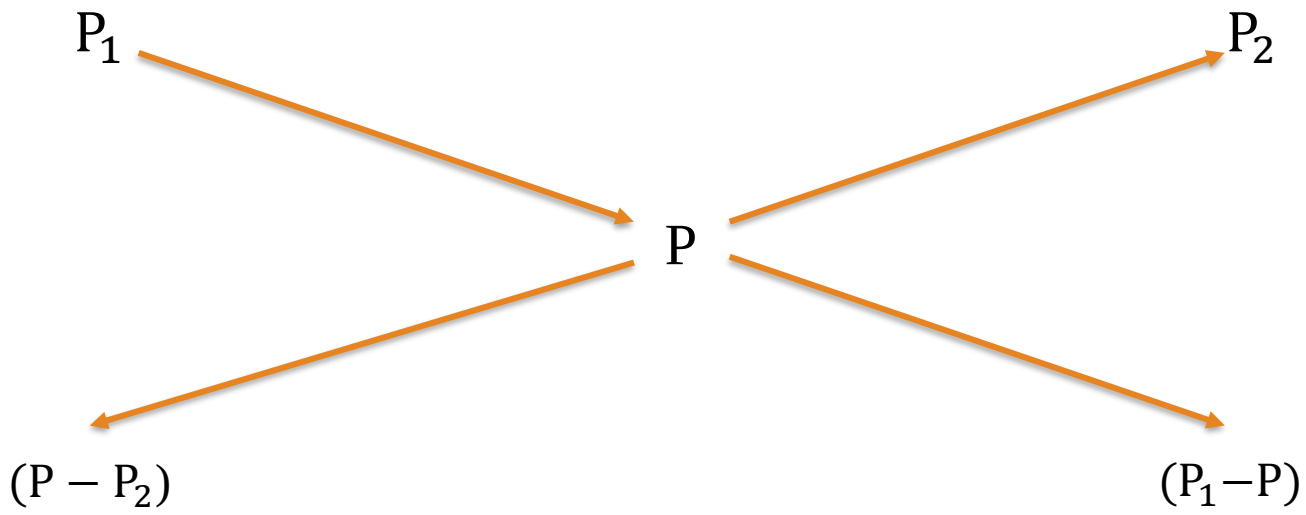
Rule of Alligation:



$$\frac{Q_1}{Q_2} = \frac{(P - P_2)}{(P_1 - P)}$$

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10. A salesman mixes two varieties of tea, whose costs are Rs. 30 and Rs. 60 per kg respectively. In what proportion the two varieties are to be mixed if the sale price be Rs. 44 per kg ?

A] 8:7

B] 5:9

C] 9:5

D] 5:7

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11. The ratio of the quantities of sugar, in which sugar costing Rs. 20 per kg. and Rs. 15 per kg. should be mixed so that there will be neither loss nor gain on selling the mixed sugar for Rs. 14.

A] 6:1

B] 1:6

C] 4:1

D] None Of These

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12. A salesman mixes two varieties of tea, whose costs are Rs. 60 and Rs. 45 per kg respectively. In what proportion the two varieties are to be mixed so as to make a profit of 25% if the sale price be Rs. 62.50 per kg ?

A] 2:3 B] 1:2

C] 1:3 D] 2:5

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13. How many kilogram of sugar costing Rs. 9 per kg must be mixed with 27 kg of sugar costing Rs. 7 per kg so that there may be a gain of 10% by selling the mixture at Rs. 9.24 per kg?

A] 36 kg
B] 42 kg
C] 54 kg
D] 63 kg

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14. The cost of Type 1 rice is Rs. 15 per kg and Type 2 rice is Rs. 20 per kg. If both Type 1 and Type 2 are mixed in the ratio of 2 : 3, then the price per kg of the mixed variety of rice is:

A] Rs. 18

B] Rs. 18.50

C] Rs. 19

D] Rs. 19.50

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15. Tea worth Rs. 126 per kg and Rs. 135 per kg are mixed with a third variety in the ratio 1:1:2. If the number of worth Rs. 153 per kg, then find the price of third variety per kg?

A] Rs. 170

B] Rs. 150

C] Rs. 180

D] Rs. 175.5

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16. A dishonest milkman professes to sell his milk at cost price but he mixes it with water and thereby gains 25%. The percentage of water in the mixture is?

A] 66%

B] 60%

C] 20%

D] 45%

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17. The ratio in which two sugar solutions of the concentrations 15% and 40% are to be mixed to get a solution of concentration 30% is

A] 2:3

B] 3:2

C] 8:9

D] 9:8

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18. Two vessels contain milk and water in the ratio 3 : 2 and 7 : 3. Find the ratio in which the contents of the two vessels have to be mixed to get a new mixture in which the ratio of milk and water is 2 : 1.

A] 2:1

B] 1:2

C] 4:1

D] 1:4

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19. Two vessels A and B contain milk and water mixed in the ratio 5:7 and 7:17 respectively. Find the ratio in which these mixture to obtain a new mixture in vessel C containing milk and water in the ratio 17:31?

A] 1:1

B] 2:1

C] 3:8

D] 4:7

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20. In a class, the average score of girls in an examination is 73 and that of boys is 71. The average score for the whole class is 71.8. Find the percentage of girls.

A] 50%

B] 40%

C] 55%

D] 60%

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21. The total population of a village is 5000. The number of males and females increases by 10% and 15% respectively and consequently the population of the village becomes 5600. What was the number of males in the village?

A] 3000

B] 3400

C] 3800

D] 2400

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22. A businessman lends Rs.1800 in two parts at simple interest. He lends one part at 10% p.a. and other at 15% p.a. At the end of the year, the average interest worked out to be 11 (1/3) % p.a. Find out the interest earned by the businessman from the part which was lent at 10% p.a.

A] Rs.1400
B] Rs.1320
C] Rs.1250
D] Rs.1300

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23. A merchant has 1000 kg of sugar, part of which he sells at 8% profit and the rest at 18% profit. He gains 14% on the whole. The quantity sold at 18% profit is:

A] 400 kg

B] 560 kg

C] 600 kg

D] 640 kg

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24. A man travelled a distance of 61 km in 9 hours. He travelled some distance on foot at a speed of 4 km/hr and the remainder on a bicycle at a speed of 9 km/hr. The distance travelled on foot is

A] 12 km

B] 16 km

C] 30 km

D] 24 km

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25. There are 2 types of animal in a zoo, 2 legged animals and 4 legged animals. Total number of legs are 16 and total number of heads are 6. How many 2 legged animals are present in the zoo?

A] 2
B] 3
C] 4
D] 5

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29. Two hydrochloric acid solutions, one of concentration 40% and one of concentration 25%, are mixed together to make a solution of 35% concentration. How much solution is made?

Statement I: 200 ml of 40% solution is used.
Statement II: 100 ml of 25% solution is used

A) Only I B) Only II C)Both I and II D) Either I or II

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30. What quantity of solution is obtained by diluting x liters of pure acid with water?

Statement I: The final solution contains 20% of acid.
Statement II: x = 20 ml

A) Only I B) Only II C)Both I and II D) Either I or II

Any Doubts???