GENERAL APTITUDE

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Mixtures & Alligation

- **Alligation** : It is the rule which enables us to find the ratio in which two or more ingredients at given prices must be mixed to produce a mixture of a desired price.(mixing / linking)
- **Mean Price** : The cost price of a unit quantity of mixture is called the mean price.
- **Dearer** : The more expensive ingredient

- Note :

Always maintain the order in which problem is given else answer gets changed

Mixtures & Alligation

Type 1 oranges at Rs.60 per kg and Type 2 oranges at Rs.120 per kg and when mixed cost is Rs.75 per kg. Find the ratio in which Type 1 and Type 2 oranges are mixed.

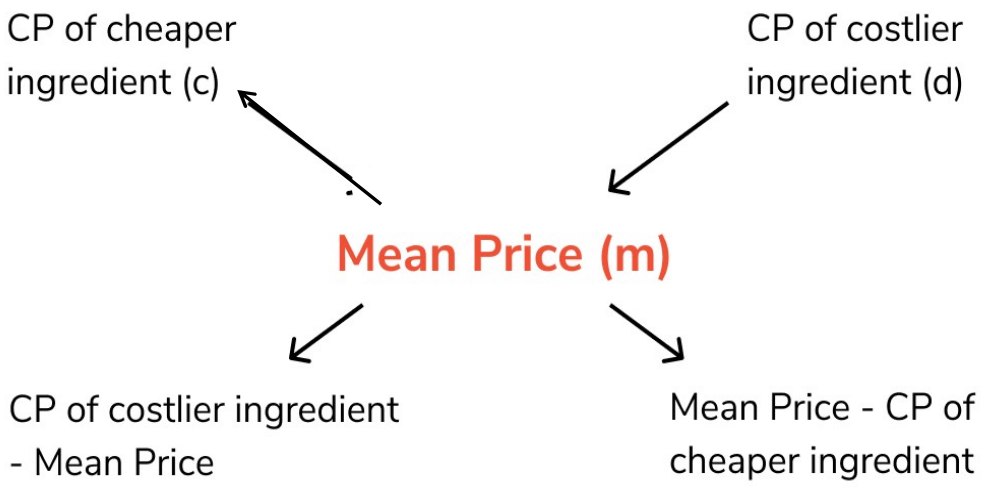
Soln:

Type 1 60 Type 2 120

75

x = d-m y =m-c

$$\frac{x}{y} = \frac{d-m}{m-c} = \frac{120-}{75-60} = \frac{45}{15} = \frac{3}{1} = 3:1$$



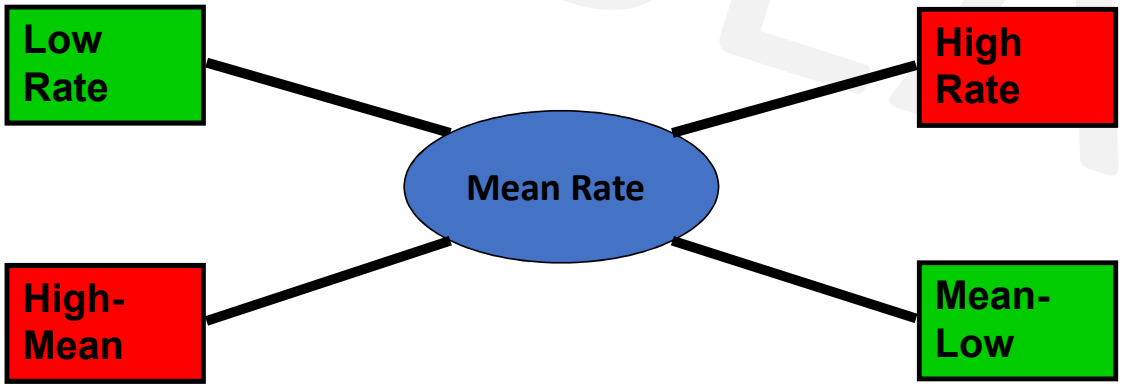
$$\frac{\text{Quantity of cheaper ingredient}}{\text{Quantity of costlier ingredient}} = \frac{d - m}{m - c}$$

Mixtures & Alligation

Quantity of Lower = (C.P. of Higher) – (Mean Price)
Quantity of Higher (Mean Price) – (C.P. of Lower)

$$\frac{Ql}{Qh} = \frac{CPh - CPm}{CPm - CPl}$$

(**Qty** Low) : (**Qty** High) = (**CP**h-**CP**m) : (**CP**m-**CP**l)



Mixtures & Alligation

Q. In what ratio must a grocer mix two varieties of pulses costing Rs. 15 and Rs. 20 per kg respectively so as to get a mixture worth Rs. 16.50 per kg ?

A. 3 : 7

B. 5 : 7

C. 7 : 3

D. 7 : 5

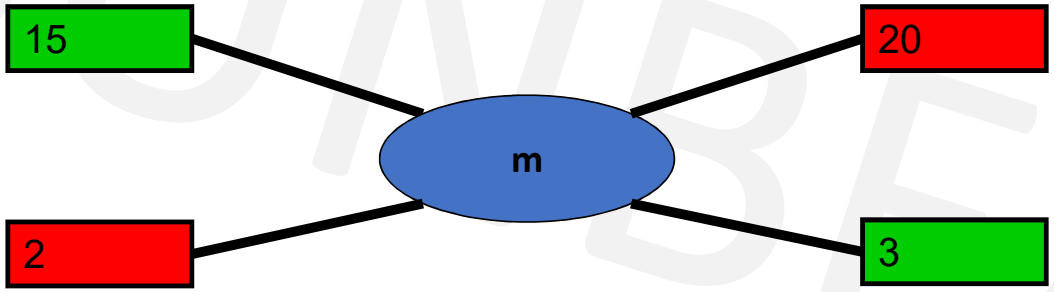
Ans: C

Mixtures & Alligation

Q. CP of rice A is Rs. 15/kg and CP of rice B is Rs.20/kg. If both A and B are mixed in the ratio 2:3. Then find the price per kg of the mixed rice.

A. Rs. 28 B. Rs. 17 C. Rs. 18 D. Rs. 48

Soln:



$\frac{x}{y} = \frac{d-m}{m-c}$

$\frac{2}{3} = \frac{20-m}{m-15}$

$m = \frac{90}{5}$ = Rs.18

Ans: C

Mixtures & Alligation

Q. In what ratio must a grocer mix two varieties of dal worth Rs. 60/kg & Rs. 65/kg, so that selling the mixture at 68.20/kg, he may gain 10%.

Soln:

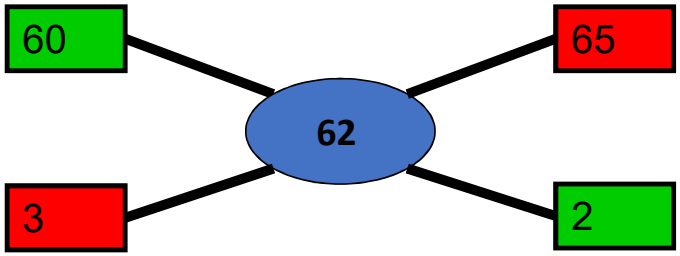
- Mean price is always CP
- Steps-
- 1. m=?
- 2. m = cost price(CP)
- 3. SP = given
- 4. find x/y=?

Mixtures & Alligation

In what ratio must a grocer mix two varieties of dal worth Rs. 60/kg & Rs. 65/kg, so that selling the mixture at 68.20/kg, he may gain 10%.

A. 3:2 B. 2:3 C. 3:4 D. 4:3

- SP of 1 kg of mixture = Rs. 68.20
- Gain =10%
- In case of profit, SP = $\frac{\text{C.P. x (100 +\%gain)}}{100}$
- CP of 1kg of mixture = Rs ($\frac{100}{100+10}$ x 68.2)
- $= \frac{682}{11}$
- Mean price =Rs. 62
- By the rule of alligation, we have :
- C.P. of 1kg dal of 1st kind C.P. of 1kg dal of 2nd kind



Ans: A x/y = 3/2= 3:2

Mixtures & Alligation

Q. A person blends two varieties of tea, one cost Rs. 160/kg and other cost Rs. 200/kg in the ratio 5 : 4. He sells the blended variety at Rs.192/kg. Find the profit %.

A. 6% B. 8% C. 7% D. 9%

Soln :

$\frac{x}{y} = \frac{d-m}{m-c}$

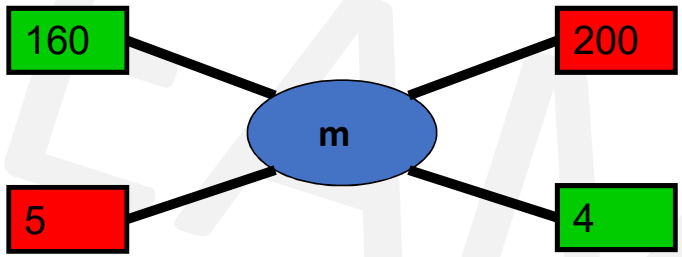
$\frac{5}{4} = \frac{200-m}{m-160}$

5m -800 = 800 -4m

9m = 1600

m = $\frac{1600}{9}$

cheaper price dearer price



SP=Rs.192(given) , CP =mean price

Profit% = $\frac{SP-CP}{CP}$ x 100

= $\frac{192 - \frac{1600}{9}}{\frac{1600}{9}}$ = $\frac{1728 - 1600}{1600}$ = $\frac{128}{16}$ = 8% **Ans: B**

Mixtures & Alligation

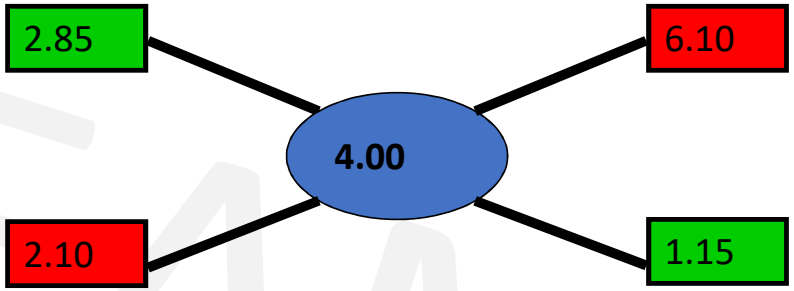
Q. What quantity of sugar costing Rs 6.10 per kg must be mixed with 126 kg of sugar priced at Rs 2.85 per kg so that 20% may be gained by selling mix at Rs 4.80/kg ?

A. 65 kg B. 69 kg C. 66 kg D. 64 kg

Soln :

$$SP = \frac{C.P. \times (100 + \%gain)}{100}$$

- CP (Mean) = 4.8 x 100/120 = 4.0



- Qty of Low : Qty of High = 210/115 = 42/23
- 126 / Qh = 42/23
- Ql = 126 x 23/42 = 69
- **Ans B**

Mixtures & Alligation

Q. Acid and water are mixed in a vessel A in the ratio of 5:2 and in the vessel B in the ratio of 8:5. In what ratio mixtures from two vessels should be mixed to get a new mixture in which the acid and water will be in the ratio of 9:4?

A. 7:2 B. 2:7 C. 7:4 D. 2:3

Soln: For these type of questions consider 1 ingredient out of the two ingredients and represent as fraction of one.

A
a:w
5:2

B
a:w
8:5

C
a:w
9:4

We consider acid here, so fraction of acid,

A
$\frac{5}{5+2} = \frac{5}{7}$

B
$\frac{8}{8+5} = \frac{8}{13}$

C
$\frac{9}{9+4} = \frac{9}{13}$

To make calculations easier, convert all denominator into common one

So, find LCM(7,13,13) = 91

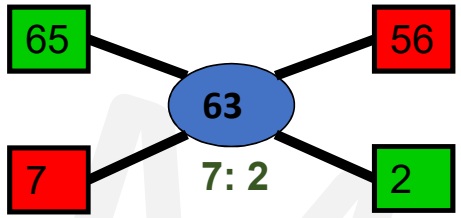
A
$\frac{5}{7} \times \frac{13}{13} = \frac{65}{91}$

B
$\frac{8}{13} \times \frac{7}{7} = \frac{56}{91}$

C
$\frac{9}{13} \times \frac{7}{7} = \frac{63}{91}$

forget denominators,

By rule of Alligation,



Ans: A

Mixtures & Alligation

- **Final concentration = Initial $(1-\frac{R}{Initial})^n$**
- where,
- Final concentration is the amount of concentration remaining after the process
- n is the number of times the process is done and
- R is the replaced quantity.
- Initial is the initial concentration

Mixtures & Alligation

Q. A container contains 60 litres of milk. From this container 6 litres of milk was taken out and replaced by water. This process was repeated further two times. How much milk is now contained by the container?

A. 38.52 litres B. 43.74 litres C. 42.68 litres D. 39.85 litres

Ans: B

- The volume of milk remaining after the three processes is,
- $V=N(1-\frac{R}{N})^n$ where,

N is the original amount of milk,
n is the number of processes and
R is the replaced quantity.

$= 60(1-\frac{6}{60})^3$

$= 60(1-\frac{1}{10})^3$

$= 60(0.729)$

$= 43.74$ litres

Mixtures & Alligation(Assignment)

Q. A container contains 100 L of milk. From this container 10 L of milk was taken out and replaced by water. This process was further repeated three times. How much milk does the container have now?

A. 72.9 litres B. 65.61 litres C. 34.39 litres D. 81 litres

Ans: B

Final concentration = Initial concentration (1−Replaced/Initial)n

Mixtures & Alligation(Assignment)

Q. The ratio of milk to water in 80 litres of a mixture is 7 : 3. The water (in litres) to be added to it to make the ratio 2 : 1 is ?

A. 4 litres B. 5 litres C. 6 litres D. 8 litres

Soln:

Mixture = 80 litres

Milk : Water

7 : 3 = 7+3 = 10(total parts of mixture)

Quantity of Milk = $\frac{7}{10}$ x 80 = 56 litres

Quantity of Water = $\frac{3}{10}$ x 80 = 24 litres

Let quantity of water added be 'x' litres

$\frac{56}{24+x} = \frac{2}{1}$ 56 = 48 + 2x

x = 4 litres of water is to be added.

Ans : A

OR

Let, Milk = 7x and Water = 3x

7x + 3x = 80 litres
10x = 80
x = 8litres

Milk = 7x = 7x8 = 56 litres
Water = 3x =3x 8 = 24 litres

$\frac{56}{24+x} = \frac{2}{1}$ 56 = 48 + 2x

x = 4 litres of water is to be added.

Mixtures & Alligation(Assignment)

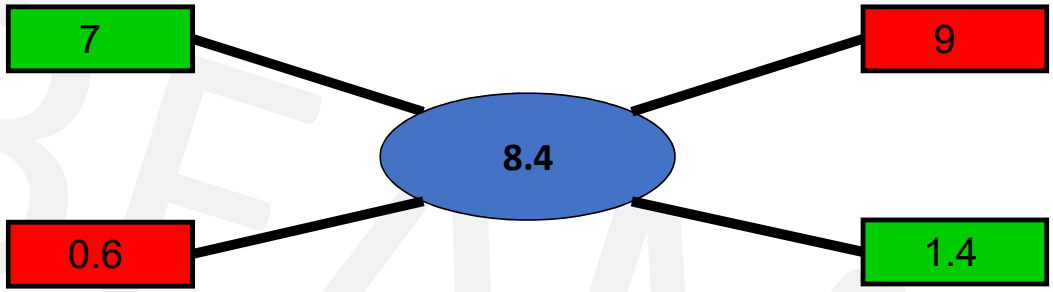
Q. How many kg of sugar costing Rs. 9 per kg must be mixed with 27kg of sugar costing Rs. 7 per kg, so that there maybe a gain of 10% by selling the mix at 9.24 per kg ?

A. 62kg B. 63kg C. 53kg D. 59kg

Soln:

$$SP = \frac{C.P. \times (100 + \%gain)}{100}$$

CP (Mean) = 9.24 x 100/110 = 8.4



- Qty of Low : Qty of High = 0.6/1.4 = 6/14 = 3/7
- 27 / Q_H = 3/7
- Q_H = 27 x 7/3 = 63 kg

Ans: B

Mixtures & Alligation(Assignment)

Q. The cost of two varieties of tea is ₹300 and ₹375 respectively. If both the varieties of tea are mixed together in the ratio 3 : 2, then what should be the price of mixed variety of tea per kg?

A. Rs. 340 B. Rs.330 C. Rs. 350 D. Rs. 360

Ans: B

Mixtures & Alligation(Assignment)

Q. What quantity of sugar costing Rs 21.20 per kg must be mixed with 144 kg of sugar priced at Rs 26.20 per kg so that 10% may be gained by selling mix at Rs 25.30/kg ?

A. 256 kg B. 265 kg C. 244 kg D. 144 kg

Ans: A

Mixtures & Alligation(Assignment)

Q. What ratio must a grocer mix tea at Rs. 60/ kg and Rs. 65/kg, so that by selling the mixture at Rs. 69.30/kg, he may gain 10%

A. 2:3 B. 4:3 C. 3:2 D. 2:1

Ans: A

Mixtures & Alligation(Assignment)

Q. Find the ratio in which the contains of 2 jars A & B containing spirit & water in the ratio 1:3 & 3:2 respectively must be mixed so that resulting mixture contains 45% spirit?

A. 2:3 B. 3:5 C. 3:2 D. 3:4

Ans D

Mixtures & Alligation(Assignment)

Q. Two solutions have milk : water ratio of 2:3 and 4:5. In what ratio must they be mixed such that the resultant solution has milk : water ratio of 3:4?

A. 8:3 B. 3:8 C. 5:9 D. 9:5

Ans : C

Mixtures & Alligation(Assignment)

Q. In what ratio rice at Rs. 9.30/kg be mixed with rice at Rs. 10.80/kg. So that the mixture be worth Rs. 10/kg.

A. 6:5 B. 8:7 C. 3:7 D. 6:1

Ans : B

Mixtures & Alligation(Assignment)

Q. The ratio, in which tea costing Rs. 192 per kg is to be mixed with tea costing Rs. 150 per kg so that the mixed tea when sold for Rs. 194.40 per kg, gives a profit of 20%.

A. 2 : 5 B. 3 : 5 C. 5 : 3 D. 5 : 2

Ans : A

Mixtures & Alligation(Assignment)

Q. In what ratio must a mixture of 30% alcohol strength be mixed with that of 50% alcohol strength so as to get a mixture of 45% alcohol strength?

A. 1 : 2 B. 1 : 3 C. 2 : 1 D. 3 : 1

Ans : B

Mixtures & Alligation(Assignment)

Q. A mixture of 70 litres of alcohol and water contains 10% of water. How much water must be added to the above mixture to make the water 12.5% of the resulting mixture?

A. 1 litre B. 1.5 litres C. 2 litres D. 2.5 litres

Ans: C

- Water=10% of 70 lit=7 lit,
- alcohol=90% of 70 lit=63 lit.
- Let, x lit water must be added.
  $\frac{(7+x)}{63} = \frac{12.5\%}{87.5\%}$
- 7 +x = 787.5/87.5
  7 + x = 9
- x=2 litres

Mixtures & Alligation(Assignment)

Q. In what ratio should two qualities of coffee powder having the rates of ₹47 per kg and ₹32 per kg be mixed in order to get a mixture that would have a rate of ₹37 per kg?

A. 1 : 2 B. 4 : 1 C. 1 : 3 D. 3 : 1 E. 1 : 4

Ans: A

Mixtures & Alligation(Assignment)

Q. How many kilograms of tea worth Rs. 3. 60 per kg. must be mixed with 8 kg. of tea worth Rs. 4.20 per kg. so that by selling the mixture at Rs. 4.40 per kg. There may be a of 10%.

A) 4 kg B) 3 kg. C) 6 kg. D) 8 kg.

Ans: A

Mixtures & Alligation(Assignment)

Q. The ratio of milk to water in 20 litres of a mixture is 3 :1. The Milk (in litres) to be added to the mixture so as to have milk and water in the ratio 4 : 1 is ?

A. 7 litres B. 4 litres C. 5 litres D. 6 litres

Ans: C

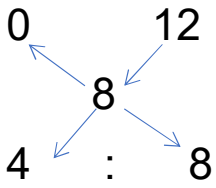
Mixtures & Alligation(Assignment)

Q. In what ratio must water be mixed with milk costing Rs. 12 per litre to obtain a mixture worth of Rs. 8 per litre?

A. 1 : 2 B. 2 : 1 C. 2 : 3 D. 3 : 2

Ans: A

By the rule of alligation :



Ratio of water to milk

= 4 : 8

= 1 : 2

Mixtures & Alligation(Assignment)

Q. Two jars A and B contain milk and water in the ratio 7:5 and 17:7 respectively. In what ratio mixtures from two vessels should be mixed to get a new mixture containing milk and water in the ratio 5:3?

A. 2:1 B. 1:2 C. 2:3 D. 3:4

Soln:

For these type of questions consider 1 ingredient out of the two ingredients and represent as fraction of one.

A
m:w
7:5

B
m:w
17:7

C
m:w
5:3

We consider milk here, so fraction of milk,

A
$\frac{7}{7+5} = \frac{7}{12}$

B
$\frac{17}{17+7} = \frac{17}{24}$

C
$\frac{5}{5+3} = \frac{5}{8}$

To make calculations easier, convert all denominator into common one

So, find LCM(12,24,8) = 24

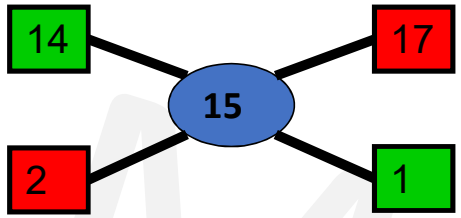
A
$\frac{7}{12} \times \frac{2}{2} = \frac{14}{24}$

B
$\frac{17}{24}$

C
$\frac{5}{8} \times \frac{3}{3} = \frac{15}{24}$

forget denominators,

By rule of Alligation,



2:1

Ans: A

Mixtures & Alligation(Assignment)

Q. Two vessels A and B contain spirit and water mixed in the ratio 5:2 and 7:6 respectively. Find the ratio in which these mixtures are mixed to obtain a new mixture in vessel C containing spirit and water in the ratio 8:5?

A. 4:3

B. 3:4

C. 5:6

D. 7:9

Ans: D

Mixtures & Alligation(Assignment)

Q. A container contains 40 litres of milk. From this container 4 litres of milk was taken out and replaced by water. This process was repeated further two times. How much milk is now contained by the container?

A. 26.34 litres B. 27.36 litres C. 28 litres D. 29.16 litres

Ans: D

- The volume of milk remaining after the three processes is,
- $V=N(1-\frac{R}{N})^n$ where,

N is the original amount of milk,
n is the number of processes and
R is the replaced quantity.

$= 40(1-\frac{4}{40})^3$

$= 40(1-\frac{1}{10})^3$

$= 40(0.729)$

$=29.16$

Profit & Loss

- **Basics**

Profit (Gain) = (S.P – C.P)

Loss =(C.P – S.P)

% gain = (Gain / C.P) x 100

% loss = (Loss / C.P) x 100

- **Multipliers to find S.P**

In Case of Profit : S.P. = C.P. x **(100 +%gain)/100**

In Case of Loss : S.P. = C.P. x **(100 - %loss)/100**

i.e For sale at 25% profit S.P. = 125 % of C.P.

For sale at 25% loss S.P. = 75% of C.P.

Profit & Loss

Q. A man bought certain no of oranges at the rate of 5 for Rs 4 and sold them at the rate of 4 for Rs 5. Find his overall profit/loss percentage?

A. 25.5% Pr B. 36.5% Pr C. 56.2% Pr D. 64.5% Pr

Soln

Cost Price			Selling Price		
Oranges →		Rs	Oranges →		Rs
5	→	4	4	→	5
20	→	16	20	→	25

SP>CP, so profit

P% = (SP –CP)/CP x 100

= (25-16)/16 x 100

= 225/4 = 56.20%

Ans: C

Cost Price			Selling Price		
Oranges →		Rs	Oranges →		Rs
5	→	4	4	→	5
1	→	$\frac{4}{5}$	1	→	$\frac{5}{4}$

SP>CP, so profit

P% = (SP –CP)/CP x 100

$= \frac{(\frac{5}{4} - \frac{4}{5})}{\frac{4}{5}} \times 100 = \frac{(\frac{9}{20})}{\frac{4}{5}} \times 100$

= 225/4 = 56.20%

Profit & Loss

Q. A man bought banana at the rate of 8 for Rs 34 and sold them at the rate of 12 for Rs 57 How many banana should be sold to earn a net profit of Rs. 45?

A. 90 B. 100 C. 135 D. 150

Soln:-

- Cost Price
- banana→ Rs
  - 8 → 34
  - 1 → $\frac{34}{8} = \frac{17}{4}$

Selling Price

banana → Rs

12 → 57

1 → $\frac{57}{12} = \frac{19}{4}$

- SP>CP, so profit
- Profit = (SP –CP)
- $= \frac{19}{4} - \frac{17}{4} = \frac{1}{2}$

No. of banana to make a profit of Rs.45 $= \frac{\text{Profit total}}{\text{Pofit one}} = \frac{45}{1/2}$ = 90 banana

Ans: A

Profit & Loss

Q. When a article is sold for Rs.116,the profit percent is thrice as much as when it is sold for Rs. 92. The cost price of article is –

A. Rs. 68 B. Rs. 72 C. Rs. 78 D. Rs. 80

Soln:

- %P when SP is 116 = 3 x %P when SP is 92
- $\frac{116-CP}{CP}$ x 100 = 3 x $\frac{92-CP}{CP}$ x 100
- 116 – CP = 276 – 3CP
- 2CP =160
- CP =Rs. 80
- **Ans: D**

Profit & Loss

Q. By selling 90 ball pens for Rs.160, a person loses 20%. How many ball pens should be sold for Rs.96, so as to have a profit of 20% ?

A. 20 B. 30 C. 36 D. 26

Ans: C

Soln:

SP =Rs. 160 ,loss =20%

$CP = \frac{100}{100-20} \times 160 = Rs.200$

SP =Rs. 96 ,profit =20%

$CP = \frac{100}{100+2} \times 96 = Rs.80$

Rs.200 CP of = 90 ball pens

Rs. 80 CP of = ? $\frac{90 \times 80}{200}$ = 36 ball pens