GENERAL APTITUDE

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Ratio & Proportion

- **Ratio** : Ratio is a comparison of two numbers (quantities) by division.
- The ratio of a to b is written as
- **a : b = a/b = a ÷ b.**

* Ratio is defined only for two values of same units

  ratio between 20 kg & 50 kg is 2:5

Ratio & Proportion

- **Some Useful Results**
- **If a:b = c:d or a/b = c/d**

1. **a x d = b x c**
2. **b/a = d/c** (Invertendo)
3. **a/c = b/d** (Alternendo)
4. **a+b/b = c+d/d** (By Componendo)
5. **a-b/b = c-d/d** (By Dividendo)
6. **(a+b)/(a-b) = (c+d)/(c-d)** (By Componendo & Dividendo)

Ratio & Proportion

- **Proportion** : A proportion is an expression that states that two ratios are equal.

  i.e. **a : b = c : d** e.g **2 : 3 = 4 : 6** or **2 : 3 :: 4 : 6**

  a, b, c & d are called the 1st, 2nd, 3rd & 4th proportional.

  1st & 4th proportionals are called extreme terms &

  2nd & 3rd proportionals are called mean terms.

  Product of means = Product of extremes. **bc = ad**

- **Continued Proportion**

  Three quantities are said to be in continued proportion if

  a : b = b : c or a/b = b/c

  If a : b :: b : c then $b^2 = ac$ (b is the mean proportion of a & c)

  a : b = b : c = c : d or a/b = b/c = c/d

Ratio & Proportion

Q. If A : B = 2 : 3, B : C = 4 : 5 and C : D = 5 : 9 then A : D is equal to:

A. 11 : 17 B. 8 : 27 C. 5 : 9 D. 2 : 9

Soln:

$$\frac{A}{D} = \frac{A}{B} \times \frac{B}{C} \times \frac{C}{D}$$

$$\frac{A}{D} = \frac{2}{3} \times \frac{4}{5} \times \frac{5}{9}$$

$$\frac{A}{D} = \frac{8}{27}$$

Ans : B

Ratio & Proportion(Assignment)

Q. What is the value of A+B / A-B, if A/B = 7

A. 4/3 B. 2/3 C. 2/6 D. 7/8

Ans : A

A/B = 7/1

A+B/A-B = 7+1/7-1 = 8/6 =4/3

Ratio & Proportion

If X : Y = 3 : 4 and Y : Z = 8 : 9 then X : Z is

A. 3 : 4 B .5 : 4 C. 2 : 3 D. 8 : 9

Soln:

X : Y = 3 : 4

(Inverted N)

Y : Z = 8 : 9

= 3x8 : 8x4 : 4x9

= 24 : 32 : 36

= 6 : 8 : 9

Now, X : Z

6 : 9

2 : 3

Ans: C

$$\frac{X}{Z} = \frac{X}{Y} \times \frac{Y}{Z}$$

$$\frac{X}{Z} = \frac{3}{4} \times \frac{8}{9}$$

$$\frac{X}{Z} = \frac{2}{3}$$

Ratio & Proportion(Assignment)

If A : B = 2 : 3 and B : C = 4 : 5 then A : B : C is

A. 2 : 3 : 5 B .5 : 4 : 6 C. 8 : 12 : 15 D. 6 : 4 : 5

Ans : C

- $\frac{A}{B} = \frac{2}{3}$
- $\frac{B}{c} = \frac{4}{5}$

A : B : C

2 : 3

4 : 5

- A : B : C = 2 × 4 : 3 × 4 : 3 × 5
  = 8 : 12 : 15

Ratio & Proportion

Q. A sum of Rs. 1240 is distributed among A, B and C such that the ratio of amount received by A and B is 6 : 5 and that of B and C is 10 : 9 respectively. Find the share of C ?

A.Rs. 480 B.Rs. 360 C.Rs. 400 D.Rs. 630

- **Soln:**
- Given, A : B = 6 : 5 , B : C = 10 : 9
- A : B : C
- 6 : 5
  10 : 9

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60 : 50 : 45

12 : 10 : 9

A : B : C = 12 : 10 : 9

12x + 10x + 9x = 1240

x = 40

C's share = 9 × 40 = Rs. 360

Ans : B

Ratio & Proportion

If A : B = 2 : 3, B : C = 4 : 5 and C : D = 6 : 7. Find A:B:C:D

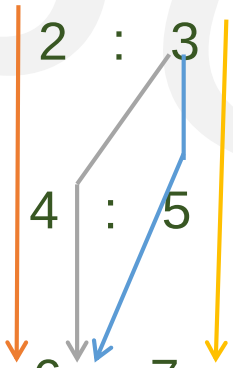
A. 2 : 3 : 4 : 5 B. 2 : 12 : 30 : 7 C. 16 : 24 : 30 : 35 D. 4 : 5 : 6 : 7

Soln:

A : B = 2 : 3

B : C = 4 : 5

C : D = 6 : 7



A	:	B	:	C	:	D
= ABC	:	BBC	:	BCC	:	BCD
= 2X4X6	:	3X4X6	:	3X5X6	:	3X5X7
= 48	:	72	:	90	:	105
= 16	:	24	:	30	:	35

Ans: C

Ratio & Proportion

Dividing a given number in the given Ratio :

Let A be the given number. Let the given ratio be a:b:c

This means A is divided into three parts such that

First Part = A x a/(a+b+c)

Second Part = A x b/(a+b+c)

Third Part = A x c/(a+b+c)

And First Part + Second Part + Third Part = A

Any Part = Total Amount x (Its related ratio term / Sum of Ratio Terms)

Ratio & Proportion

Q. Find B's share in Rs 6,300 if A:B = 2:3, B:C = 4:5, C:D = 3:7

A.Rs 1080 B. Rs 1800 C. Rs 810 D. Rs 1200

Soln:

A/B	B/C	C/D
2/3	4/5	3/7

A : B = 2 : 3

B : C = 4 : 5

C : D = 3 : 7

A : B : C : D

8 : 12 : 15 : 35

So B's share = 6300 x 12/70 = 1080

Ans : A

Ratio & Proportion

Q. A bag contains total 1200 coins of 25 ps, 50 ps and 1 Re coins. If the number of coins are in the ratio 6:5:4 find the total amount in the bag.

A. Rs 200 B. Rs 120 C. Rs 320 D. Rs 640

Soln:

25 ps	**50 ps**	**1 Re**
6	5	4

$6x + 5x + 4x = 1200$

$15x = 1200 \rightarrow x = 80$

6x = 480 coins x ¼ =Rs 120

5x = 400 coins x ½ =Rs 200

4x = 320 coins x 1 =Rs 320

Total =Rs 640

Ans : D

Ratio & Proportion

Q. Divide Rs. 18200 amongst 3 persons such that A gets 5/9th of what B & C together get & B gets 6/7th of what A & C together get. What does C get?

A. Rs. 6500 B. Rs. 3300 C. Rs. 8400 D. Rs. 1400

Soln:

A : (B+C)

5 : 9

A+B+C = 5x+9x =14x

14x = 18200 → x =1300 → A = 5x = 6500

B : (C+A)

6 : 7

A+B+C = 6y + 7y =13y

13y =18200 → y = 1400 → B = 6y = 8400

C= 18200-8400-6500 = 3300

Ans : B

Ratio & Proportion(Assignment)

Q. If A:B =2:3, B:C= 4:5 and C:D =6:7 Find A:D is equal to:

A. 16 : 35 B. 8 : 25 C. 4 : 15 D. 2 : 10

Ans : A

Ratio & Proportion(Assignment)

Q. The difference between two positive numbers is 10 and the ratio between them is 5 : 3. Find the product of the two numbers.

A.375 B.175 C.275 D.125 E.250

Ans : A

Ratio & Proportion(Assignment)

Q. Two numbers are in ratio 4 : 5 and their LCM is 180. The smaller number is

A.9 B.15 C.36 D.45

Ans : C

Ratio & Proportion(Assignment)

Q. A bag contains total of Rs 2400 in the form of 25 ps, 50 ps and 1 Re coins. If the total amounts of each type of coins are in the ratio 3:4:5 find the total no of coins in the bag.

A. 2000coins B. 4000 coins C. 5500 coins D. 5000 coins

Ans : D

Ratio & Proportion(Assignment)

Q. The average income of all employees is Rs. 20000. The average salary of male employees is Rs. 22000. The average salary of female employees is Rs. 15000. What is the ratio of male employees to female employees?

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

Ans: C

Ratio & Proportion(Assignment)

Q. The sum of 3 numbers is 98. If ratio between first and second numbers be 2 : 3 and between second and third be 5 : 8, then the second number is?

A. 30 B. 40 C. 50 D. 60

Ans: A

Ratio & Proportion(Assignment)

Two numbers are in ratio 7 : 11. If 7 is added to each of the numbers, the ratio becomes 2 : 3. The smaller number is?

A. 39 B. 49 C. 66 D. 77

Ans: B

Let the numbers be 7x and 11x.

$(7x+7)/(11x+7)=2/3$

$22x+14=21x+21$

$x=7$

Smaller number= 7x = 7 x 7 = 49

Ratio & Proportion(Assignment)

Q. What must be added to each of the numbers 7, 11 and 19, so that the resulting numbers may be in continued proportion?

A. -3 B. -4 C. 3 D. 4

Ans: A

Ratio & Proportion(Assignment)

Q. The incomes of A & B are in the ratio 3:2. Their respective expenditures are in the ratio 5:3. If each of them saves Rs. 2000, what is the income of B?

A. Rs 12,000 B. Rs 8,000 C. Rs 16,000 D. Rs 6,000

Ans : B

Ratio & Proportion(Assignment)

Q. When a particular number is subtracted from each of 7, 9, 11 and 15, the resulting numbers are in proportion. The number to be subtracted is -

A. 1 B. 2 C. 3 D. 5

Ans: C

Sol:

- Let the required number be x
- $\frac{7-x}{9-x} = \frac{11-x}{15-x}$
- (7 - x)(15 - x) = (11 - x)(9 - x)
- 105 - 22x + x2 = 99 - 20x + x2
- 2x = 6
- x = 3

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:

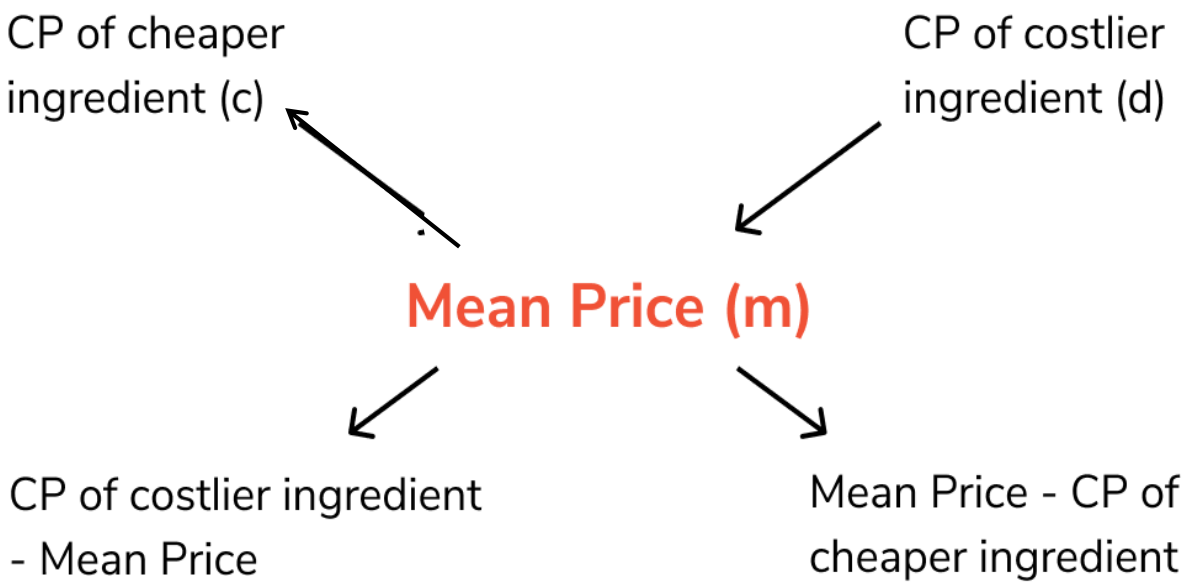
Type 1 60 — Type 2 120

75

x = d-m

y =m-c

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



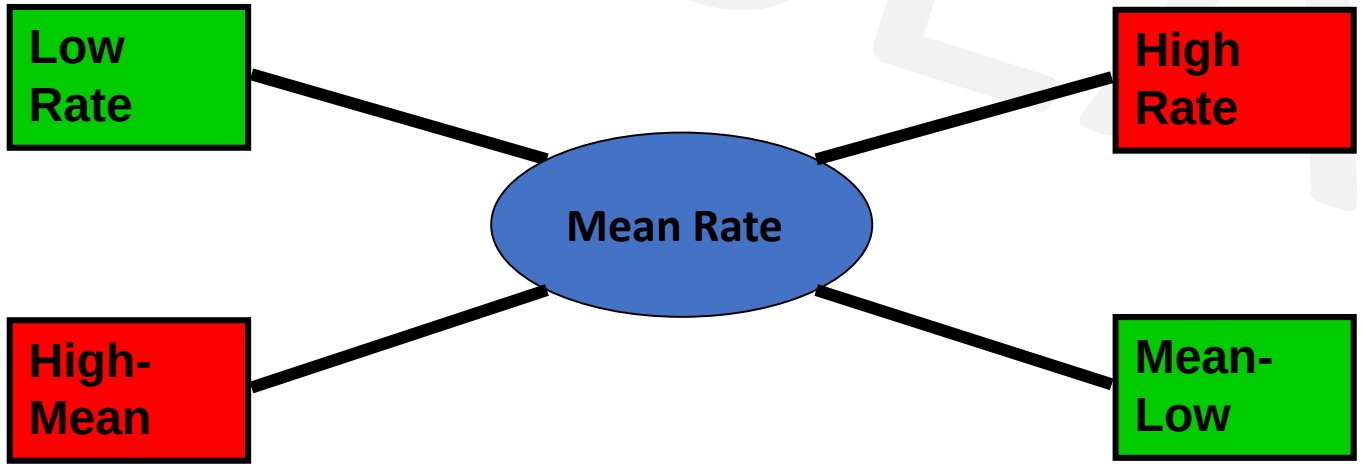
$$\frac{\text{Quantity of cheaper ingredient}}{\text{Quantity of costlier ingredient}} = \frac{d - m}{m - c}$$

Mixtures & Alligation

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

$$\frac{\textbf{Q}l}{\textbf{Q}h} = \frac{\textbf{CP}h - \textbf{CP}m}{\textbf{CP}m - \textbf{CP}l}$$

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

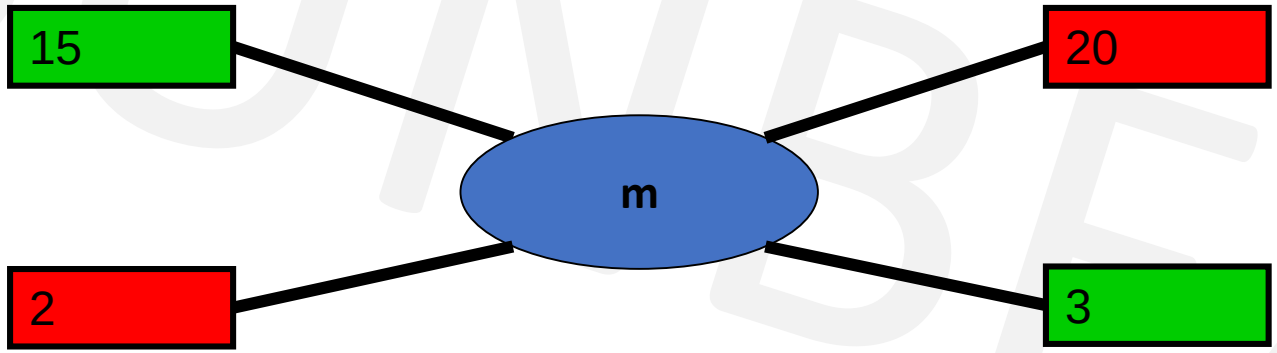


Mixtures & Alligation

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:



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

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

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

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:

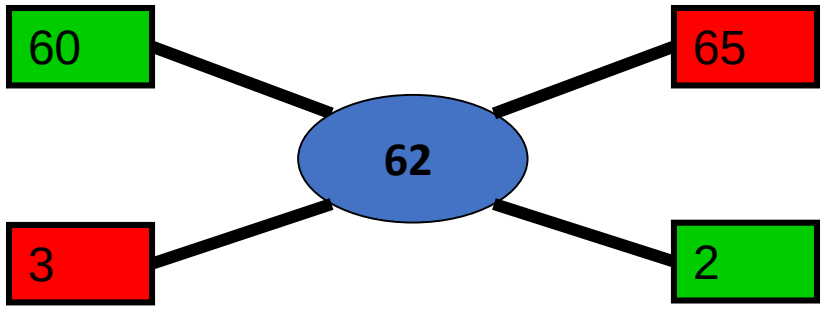
- Mean price is always CP
- Steps-
- 1. m=?
- 2. m = cost price(CP)
- 3. SP = given
- 4. find x/y=?

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



x/y = 3/2= 3:2

Ans: A

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 :

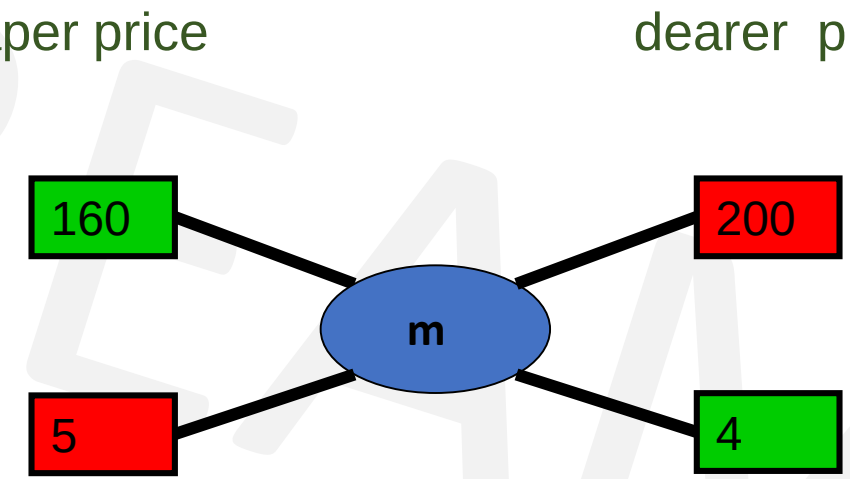
$\frac{x}{y} = \frac{d-m}{m-c}$

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

5m -800 = 800 -4m

9m = 1600

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



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

Ans: A

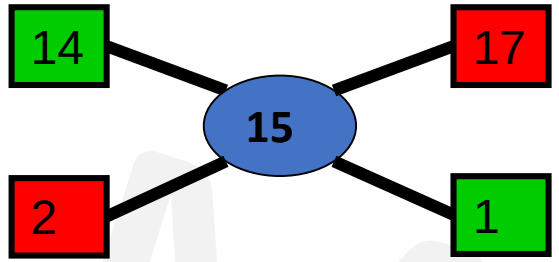
To make calculations easier, convert all denominator into common one

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

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

B
$\frac{17}{24}$

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



2:1

forget denominators,

By rule of Alligation,

Mixtures & Alligation

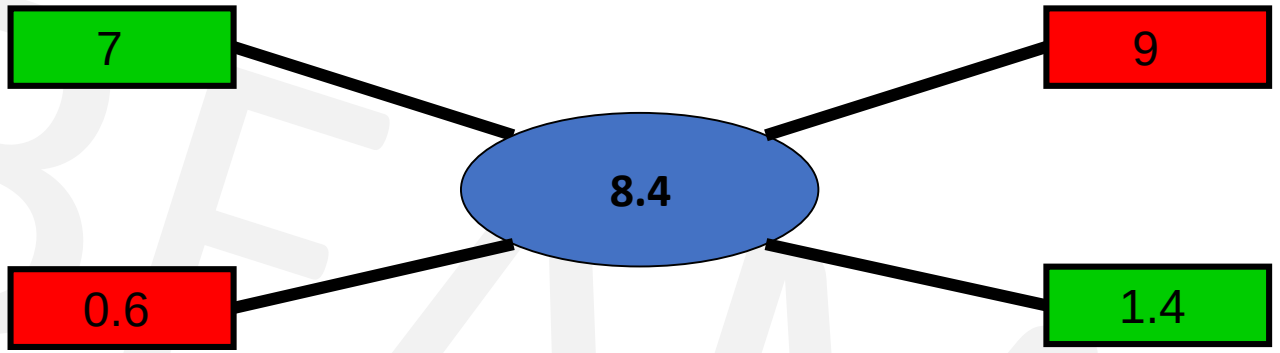
Q. How many kg of sugar costing Rs. 9 per kg must be mixed with 27kg of sugar costing Rs. 7 per kg, so that there maybe a gain of 10% by selling the mix at 9.24 per kg ?

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

- **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 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.

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

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

$= 40(0.729)$

$=29.16$

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.

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.

Ans : A

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. 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

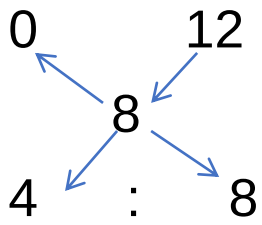
Mixtures & Alligation(Assignment)

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

Percentage

- Percentage is a fraction whose denominator is 100(per 100)

Fraction x100	% ÷100	Fraction	%
3/4	75%	5/4	125%
4/5	80%	3/2	150%
2/3	66.66 %	1/16	6.25%
5/6	83.33 %		
6/5	120%		

Fraction	%	Fraction	%	Fraction	%
1/1	100%	1/6	16.66 %	1/11	9.09 %
1/2	50%	1/7	14.28 %	1/12	8.33 %
1/3	33.33 %	1/8	12.5 %	1/13	7.69 %
1/4	25%	1/9	11.11 %	1/14	7.14 %
1/5	20%	1/10	10%	1/15	6.66 %

Percentage

Q. x is 83.33% of y. So y is ____% of x

Solution:

$x = 83.33y$

$x = \frac{5}{6} y$

So, $y = \frac{6}{5} x$

y = 120% (from chart)

Fraction x100	% 100	Fraction	%
3/4	75%	5/4	125%
4/5	80%	3/2	150%
2/3	66.66 %	1/16	6.25%
5/6	83.33 %		
6/5	120%		

Percentage

Q. x is 80% of y. So y is ____% of x

Solution:

$x = 80y$

$x = \frac{4}{5} y$

So, $y = \frac{5}{4} x$

y = 125%

Percentage

Q. A number x is increased by 20% then the number is decreased by 20%. Find the net % change.

- **Soln** :
- If a number is increased / decreased by x% then there is always a loss of $-(x/10)^2$
- Net % Change = $-(20/10)^2$ = -(400/100) = - 4% (loss)
- **OR**
- Let the number be 100
- 100 ↑ by 20% =120
- So 20% ↓ of 120 = 96

- 100 120 96

-4% = net change

Percentage

Q. A number x is increased by 50% then the number is increased by 20% and again by 10%. Find the net % change

Soln:

- Let the number be 100
- 100↑ by 50% =150
- Again, 150↑ by 20% =30, So 150 + 30 = 180
- 10%↑of 180 = 18, So, 180 + 18 = 198

- 100 150 180 198

98% = net change

Percentage

- **Two Step change of Percentage**

  In first step if number is changed by a% and the result is again changed by b% the net percentage change of original number is given by

  Net % Change in Number = a + b + ab/100 (+ve or –ve)

Percentage

Q. If a number is increased by 12 % & then decreased by 18% then the net % change in number is

Soln:

Net % Change in Number = a + b + ab/100 (+ve or –ve)

% Change = 12 – 18 + (12 x -18)/100

= -6 – 2.16

= - 8.16%

Percentage

- **Percentage Change & effect on Product**

  If A x B = Product

  If A is changed by a% & also B is changed by b% then

  Net % Change in Product = $a + b + ab/100$ (+ve or –ve)

Percentage

Q. Find % Change of area of rectangle if length increases by 30% & breadth decreases by 12%

Soln :

Net % Change in Product = a + b + ab/100 (+ve or –ve)

% Change of Area = +30 – 12 + (30 x -12)/100

= 18 – 3.6 = + 14.4%

Percentage

Q. If the radius of a circle is decreased by 50%, find the percentage decrease in its area.

- A. 55% B. 65% C. 75% D. 85%
- **Soln**:
- Area of a circle = πr^2 where r is the radius
  => Area is directly proportional to r^2
- Assume the old radius is = r1=100
- $A_1 = \pi \times 100^2 = 10000\pi$

  Assume the new radius is = r2=50

  $A_2 = \pi \times 50^2 = 2500\pi$

  Decrease in area = $10000\pi - 2500\pi = 7500\pi$

  Percentage decrease in area = $\frac{difference}{old}$ x100 = $\frac{7500\pi}{10000\pi}$ x 100 = 75%
- **Ans : C**

Percentage

- Expenditure = Price x Consumption
- $P \propto \frac{1}{\text{Consumption}}$
- So, for expenditure to remain constant, when one quantity increases the other quantity should decrease proportionally.
- Eg: If the price of a commodity is decreased by 20% and its consumption is increased by 20%, what will be the increase or decrease in expenditure on the commodity?
- Soln:

Net % Change = a + b + ab/100 (+ve or –ve)

% Change = -20 + 20 + (-20 x 20)/100

= 0 -4 = -4%

OR

100 === 20%↓(Decrease in Price) ===> 80 === 20%↑(Increase in Consumption) ===> 96.

Thus, there is a decrement of 4%

Percentage

Q. Two numbers are respectively 40% and 60% more than a third number. The ratio of the two numbers is:

A. 7:8 B. 3 : 5 C. 4 : 5 D. 6 : 7

Soln:-

- Let the third number be 100
- First number = 40% more than 100 = 100 + 40%of 100 = 100+40 = 140
- Second number = 60% more than 100 = 100 + 60%of 100 = 100 + 60 = 160
- Ratio = $\frac{\text{first number}}{\text{second number}} = \frac{140}{160} = \frac{7}{8} = 7 : 8$

Ans: A

Percentage using x

Q. Two numbers are respectively 40% and 60% more than a third number. The ratio of the two numbers is:

A. 7:8 B. 3 : 5 C. 4 : 5 D. 6 : 7

Soln:-

- Let the third number be x.
- First number = 40% more than x = x + 40%of x $= x + \frac{40}{100}x = \frac{100x+40x}{100} = \frac{140x}{100}$
- Second number = 60% more than x = x + 60%of x $= x + \frac{60}{100}x = \frac{100x+60x}{100} = \frac{160x}{100}$
- Ratio = $\frac{\text{first number}}{\text{second number}} = \frac{\frac{7x}{5}}{\frac{8x}{5}} = \frac{7}{8} = 7 : 8$

Ans: A

Percentage(Assignment)

Q. If the price of sugar increases by 25%, by what percent will a housewife have to reduce her consumption to leave total expenditure on sugar unchanged?

A. 25% B. 35% C. 20% D. 15%

Ans: C

Percentage(Assignment)

Q. 1.14 expressed as a per cent of 1.9 is:

A. 6% B. 10% C. 60% D. 90%

Ans: C

Percentage(Assignment)

Q. A number x is increased by 20% then the number is increased by 10% and again by 50%. Find the net % change.

A. 77% B. 75% C. 88% D. 98% E. 99%

Ans : D

Percentage(Assignment)

Q. If the altitude of a triangle increases by 5% and the base of the triangle increases by 7%, by what percent will the area of the triangle increase?

A. 12.25% B. 12.35% C. 6.00% D. 5.25%

Ans B

Percentage(Assignment)

Q. The length and breadth of a room are increased by 25% and 40% respectively. While the height is decreased by 20%.Find % change.

A. 16% B. 40% C. 60% D. 30%

Ans B

Percentage(Assignment)

Q. If the length of a rectangle is increased by 37.5% and its breadth is decreased by 20%, find the change in its area.

A. 15% increase B. 13% decrease C. 10% increase D. 10% decrease

Ans: C

Percentage(Assignment)

Q. The ratio 5 : 4 expressed as a percent equals :

A. 125% B. 80% C. 40% D. 12.5%

Ans: A

Required % = 5/4 × 100 = 125%

Percentage(Assignment)

Q. 12% of 5000 = ?

A. 600 B. 620 C. 680 D. 720

Ans: A

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. If selling price is doubled, the profit triples. Find the profit %.

A. $66\frac{2}{3}\%$ B. 100% C. $105\frac{1}{3}\%$ D. 120%

Soln:

Let, CP = C , SP=S

As they ask profit % , we know profit = SP – CP

As per given,

3(S-C) = 2S-C

3S -3C = 2S-C

S = 2C

But, Profit = S –C = 2C – C = C

$$\text{Profit \%} = \frac{\text{profit}}{\text{CP}} \times 100 = \frac{C}{C} \times 100 = 100\%$$

Ans : B

Profit & Loss

Q. A shopkeeper sells his goods at 20% profit and to make an extra profit he gives only 800 gm per kg. Find his profit %

A. 25% Pr B. 33.33% Pr C. 50% Pr D. 25% Ls

Soln

CP	SP	Profit
100	120	20
80	120	40

% Profit = 40/80 x 100

= 1/2 x 100

= 50%

Ans: C

Profit & Loss

Q. If the cost price of 6 pencils is equal to the selling price of 5 pencils, then the gain per cent is

A. 10% B. 20% C. 15% D. 25%

Soln:

Let the cost price of one pencil be Rs.1.
CP of 5 pencils =Rs. 5

CP of 6 pencils =Rs. 6

as, SP of 5 pencils = CP of 6 pencils

SP of 5 pencils = Rs.6
if, SP >CP so it's a profit
profit = SP − CP
= 6 − 5
= 1
Profit % = profit/cp x 100

= 1/5 x100

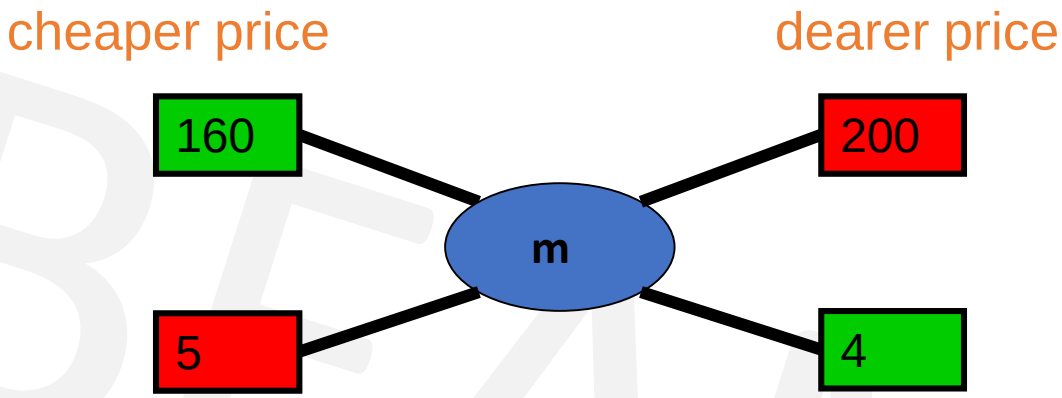
= 20%

Ans: B

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 %.

Soln :



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

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

5m -800 = 800 -4m

9m = 1600

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

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

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

$= \frac{192 - \frac{1600}{9}}{\frac{1600}{9}} = \frac{1728 - 1600}{1600} = \frac{128}{16} = 8\%$

Combination

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

A. 300 kg B. 700 kg C. 600 kg D. 400 kg

Ans : C

Profit & Loss(Assignment)

If gain is half of SP, the gain percentage is ____?

A. 50% B. 33.33% C. 25% D. 100%

Soln:

we know profit = SP – CP

As per given,

1/2SP = SP-CP

CP = SP – 1/2SP

SP = 2CP

But, Profit = SP –CP = 2CP– CP= CP

Profit % = $\frac{\text{profit}}{\text{CP}}$ x 100 = $\frac{\text{CP}}{\text{CP}}$ x 100 = 100%

Ans : D

Profit & Loss(Assignment)

Q. A bookseller sells 84 books at the cost of 72 books. Find his profit or loss%

A. 14.28% B. 28.24% C. 20.4% D. 12.86%

Ans : A

Profit & Loss(Assignment)

Q. By selling 100 pencils, a shopkeeper gains the selling price of 20 pencils. His gain per cent is

A) 25 B) 20 C) 15 D) 12

Ans: A

SP –CP =gain here gain = SP of 20 pencils

S.P. of 100 pencils − C.P. of 100 pencils = S.P. of 20 pencils
S.P. of 80 pencils = C.P. of 100 pencils

Let C.P. of 1 pencil = Rs. 1
S.P. of 80 pencils = Rs. 100

C.P. of 80 pencils = Rs. 80

Profit % = $\frac{100-80}{80} \times 100 = 25\%$

Profit & Loss(Assignment)

Q. A man bought a horse & carriage together for Rs 15600 & sold them together, the horse at 36% profit & the carriage at 15% loss. If selling price of both is equal. Find the cost of the carriage?

A.Rs.6000 B. Rs.7600 C. Rs.3600 D. Rs.9600

- **Soln**
- Let CP of horse be H & Carriage be C → H+C= 15600
- SP of both is equal
- So, comparing the CPs
- 136H/100 = 85C/100
- H = 5C/8
- 5C/8 + C = 15600
- 13C/8 = 15600
- C = 1200 x 8
- C = 9600

Ans: D

Profit & Loss(Assignment)

Q. A vendor bought 6 oranges for Re 10 and sold them at 4 for Re 6. Find his loss or gain percent.

A. 8% gain B. 10% gain C. 8% loss D. 10% loss

Ans: D

Profit & Loss(Assignment)

Q. A shopkeeper sells his goods at 10% loss but uses a weight of 750gms instead of 1kg. Find profit %

A. 20% Pr B. 14.28% Pr C. 30% Pr D. 25% Ls

Ans: A

Profit & Loss(Assignment)

Q. A fruit seller buys oranges at 4 for Rs. 3 and sells them at 3 for Rs. 4. Find its profit percent.

A. 43.75% Pr B. 77.7% Pr C. 75% Pr D. 65.7% Ls

Ans: B

Profit & Loss(Assignment)

Q. A man buys a cycle for Rs. 1400 and sells it at a loss of 15%. What is the selling price of the cycle?

A. Rs. 1090 B. Rs. 1160 C. Rs. 1190 D. Rs. 1202

Ans: C

Profit & Loss(Assignment)

Q. 100 oranges are bought at the rate of Rs. 350 and sold at the rate of Rs. 48 per dozen. The percentage of profit or loss is:

A. 14 2/7% gain B. 15% gain C. 14 2/7% loss D. 15 % loss

Ans: A


THANK
YOU!