

AVERAGES, PERCENTAGES, PROFIT AND LOSS Pre-Class Notes

An average is the sum of a group of numbers or quantities divided by the number of numbers or quantities. Averages are helpful when summarizing or generalizing a condition resulting from different conditions.

Average calculations involve the following steps:

- Step 1: Add the individual numbers or quantities.
 Step 2: Count the number of numbers or quantities.
 Step 3: Divide the sum in Step 1 by the number in Step 2.

$$\text{Average} = \frac{\text{Sum of all Observations}}{\text{Total number of observation}}$$

Eg- Find the average temperature if the following values were recorded: 600°F, 596°F, 597°F, 603°F
Solution:

- Step 1: $600 + 596 + 597 + 603 = 2396$
 Step 2: The number of items is 4.
 Step 3: $2396/4 = 599^\circ\text{F}$

Weighted Average:-

Suppose in the same club, there are 2 citizen aged 40 years, 3 aged 45 years, 4 aged 50 years & 5 aged 55 years, then their average i.e. $\frac{\{(2 \times 40) + (3 \times 45) + (4 \times 50) + (5 \times 55)\}}{(2+3+4+5)}$ is weighted average

Percentages:-

A percentage is a way of expressing a number as a fraction of 100. For example, 45% is equal to 45/100, or 0.45.

Percentages are used to express how large/small one quantity is, relative to another quantity.

The first quantity usually represents a part of, or a change in, the second quantity

Example, an increase of \$ 0.15 on a price of \$ 2.50 is an increase by a fraction of $0.15/2.50 = 0.06$. Expressed as a percentage, this is therefore a 6% increase

Successive percentage change:

If a number is changed (increased/ decreased) by a % & in the second step, this is changed number is again changed (increased/decreased) by b%, then

$$\text{Net percentage change} = a + b + \frac{a \times b}{100}$$

If a & b shows decreased then put a (-ve) sign before a & b, otherwise (+ve) sign.

Eg- If a price of an item is increased by 20% & then a discount of 10% is given on the increased price, what will be the effect on sale?

$$\text{Using above formula, \% changed} = 20 - 10 - \frac{20 \times 10}{100} = 8\%$$

Cost Price:

The price, at which an article is purchased, is called its cost price, abbreviated as C.P.

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Selling Price:

The price, at which an article is sold, is called its selling price, abbreviated as S.P.

Profit or Gain:

If S.P. is greater than C.P., the seller is said to have a profit or gain.

Loss:

If S.P. is less than C.P., the seller is said to have incurred a loss.

IMPORTANT FORMULAE

1. Gain = (S.P.) - (C.P.)
2. Loss = (C.P.) - (S.P.)
3. Loss or gain is always reckoned on C.P.
4. Gain Percentage: (Gain %)

$$\text{Gain \%} = \left(\frac{\text{Gain} \times 100}{\text{C.P.}} \right)$$

5. Loss Percentage: (Loss %)

$$\text{Loss \%} = \left(\frac{\text{Loss} \times 100}{\text{C.P.}} \right)$$

6. Selling Price: (S.P.)

$$\text{SP} = \left[\frac{(100 + \text{Gain \%})}{100} \times \text{C.P.} \right]$$

7. Selling Price: (S.P.)

$$\text{SP} = \left[\frac{(100 - \text{Loss \%})}{100} \times \text{C.P.} \right]$$

8. Cost Price: (C.P.)

$$\text{C.P.} = \left[\frac{100}{(100 + \text{Gain \%})} \times \text{S.P.} \right]$$

9. Cost Price: (C.P.)

$$\text{C.P.} = \left[\frac{100}{(100 - \text{Loss \%})} \times \text{S.P.} \right]$$

10. Discount is Usually expressed as a certain % of the Marked Price(M.P)

$$11. \text{Discount} = \text{M.P} - \text{S.P}$$

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12. Rate of discount = Discount % = $\frac{\text{Discount}}{\text{M.P}} \times 100$

13. S.P = M.P $\times \left(\frac{100 - \text{Discount \%}}{100} \right)$

14. M.P = $\frac{100 \times \text{S.P}}{100 - \text{Discount \%}}$

15. If an article is sold at a gain of say 35%, then S.P. = 135% of C.P.

16. If an article is sold at a loss of say, 35% then S.P. = 65% of C.P.

17. When a person sells two similar items, one at a gain of say x%, and the other at a loss of x%, then the seller always incurs a loss given by:

$$(P^2 / 100) \%$$

18 If a trader professes to sell his goods at cost price, but uses false weights, then

$$\text{Gain \%} = \frac{\text{Error}}{\text{True value} - \text{Error}} \times 100$$