# Comparing Quantities

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- Formula for percentage increase and decrease are:

$$\text{Percentage increase} = \frac{\text{Increase in the value}}{\text{Original value}} \times 100$$

$$\text{Percentage decrease} = \frac{\text{Decrease in the value}}{\text{Original value}} \times 100$$

**Example:** In the year 2007, the number of children in a locality was 1500. In the year 2008, the number of children in the locality rose to 2100. Find the percent increase in the number of children of the locality.

**Solution:** Increase in the number of children = 2100 – 1500 = 600

Percent increase $= \frac{600}{1500} \times 100 = 40\%$

Thus, the required percent increase in the number of children of the locality is 40%.

- The formulae to calculate profit and loss are:
  - Profit % $= \frac{\text{Profit}}{\text{C.P}} \times 100$
  - Loss % $= \frac{\text{Loss}}{\text{C.P.}} \times 100$

**Example:** A shopkeeper purchased 15 dozen cups for Rs 900. However, 9 cups cracked during transportation. The remaining cups were sold for Rs 9 each. Find the gain or loss percent.

**Solution:** Cost price of 15 dozen i.e., 180 cups = Rs 900

9 cups were cracked. Therefore, number of cups left = 180 – 9 = 171

These 171 cups were sold at Rs 9 each.

∴ S.P. of 171 cups = Rs 9 × 171 = Rs 1539

⇒ Profit = SP – CP = Rs (1539 – 900) = Rs 639

$$\text{Profit\%} = \frac{\text{Profit}}{\text{C.P.}} \times 100 = \frac{639}{900} \times 100 = 71\%$$

- Discount is the reduction given on the Marked Price (M.P) of an article.

**Discount = Marked Price – Sale price**

**Discount = Discount % of Marked Price**

- If the successive discount %, $d_1$%, $d_2$%, $d_3$% … are given, then

**S.P. =** $\text{M.P.} \times \left(\frac{100-d_1}{100}\right) \times \left(\frac{100-d_2}{100}\right) \times \left(\frac{100-d_3}{100}\right) \times \ldots.$

**Example:** For the stock sale at the end of a season, a garment shop offers 50% and then 40% on the garments. What is the marked price of a shirt if the shop offers a total discount of Rs 840 after giving two successive discounts?

**Solution:** Let the marked price of the shirt be Rs $x$.
In two successive discounts, $d_1$% = 50 and $d_2$% = 40.
We know that

$$\text{S.P.} = \left(\frac{100-d_1}{100}\right) \times \left(\frac{100-d_2}{100}\right) \times \text{M.P.}$$

$$= \left(\frac{100-50}{100}\right) \times \left(\frac{100-40}{100}\right) \times x$$

$$= \frac{50}{100} \times \frac{60}{100} \times x$$

$$= \frac{3x}{10}$$

We know that, discount = M.P. − S.P.

$$\Rightarrow 840 = x - \frac{3x}{10}$$

$$\Rightarrow \frac{7x}{10} = 840$$

$$\Rightarrow x = \frac{840 \times 10}{7} = 1200$$

Hence, the marked price of the shirt is Rs 1200.

- Interest is the extra money paid by institutions such as banks or post offices on money deposited with them.

  It is also paid by people when they borrow money from these institutions.

  $$\text{Simple Interest} = \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$$

  Amount = Principal + Interest

- The interest calculated on the amount of the previous year (or duration at which interest is compounded) is known as **compound interest**. Compound interest allows the principal to grow faster than simple interest.

- Amount (A) when interest is compounded annually is $A = P\left(1 + \frac{R}{100}\right)^n$ where, P = Principal, R = Rate of interest, *n* = Time period.

  For example, if Supriya invested Rs 75000 in a bank at the rate of 10% per annum for 2 years then the amount received by her can be calculated as follows:
  Here, P = Rs 75000, R = 10%, *n* = 2 years

  $$A = P\left(1 + \frac{R}{100}\right)^n$$
  $$= 75000\left(1 + \frac{10}{100}\right)^2$$
  $$= 75000 \times \frac{121}{100}$$

  = Rs 90750
  Thus, Supriya received Rs 90750 after 2 years.

- Amount when interest is compounded half yearly is given by, $A = P\left(1 + \frac{R}{200}\right)^{2n}$

  Where, $\frac{R}{2}$ = Half-yearly rate and 2*n* = Number of half years

- Amount when interest is compounded quarterly is given by, $A = P\left(1 + \frac{R}{400}\right)^{4n}$

  Where, $\frac{R}{4}$ = Quarterly rate and 4*n* = Number of quarters