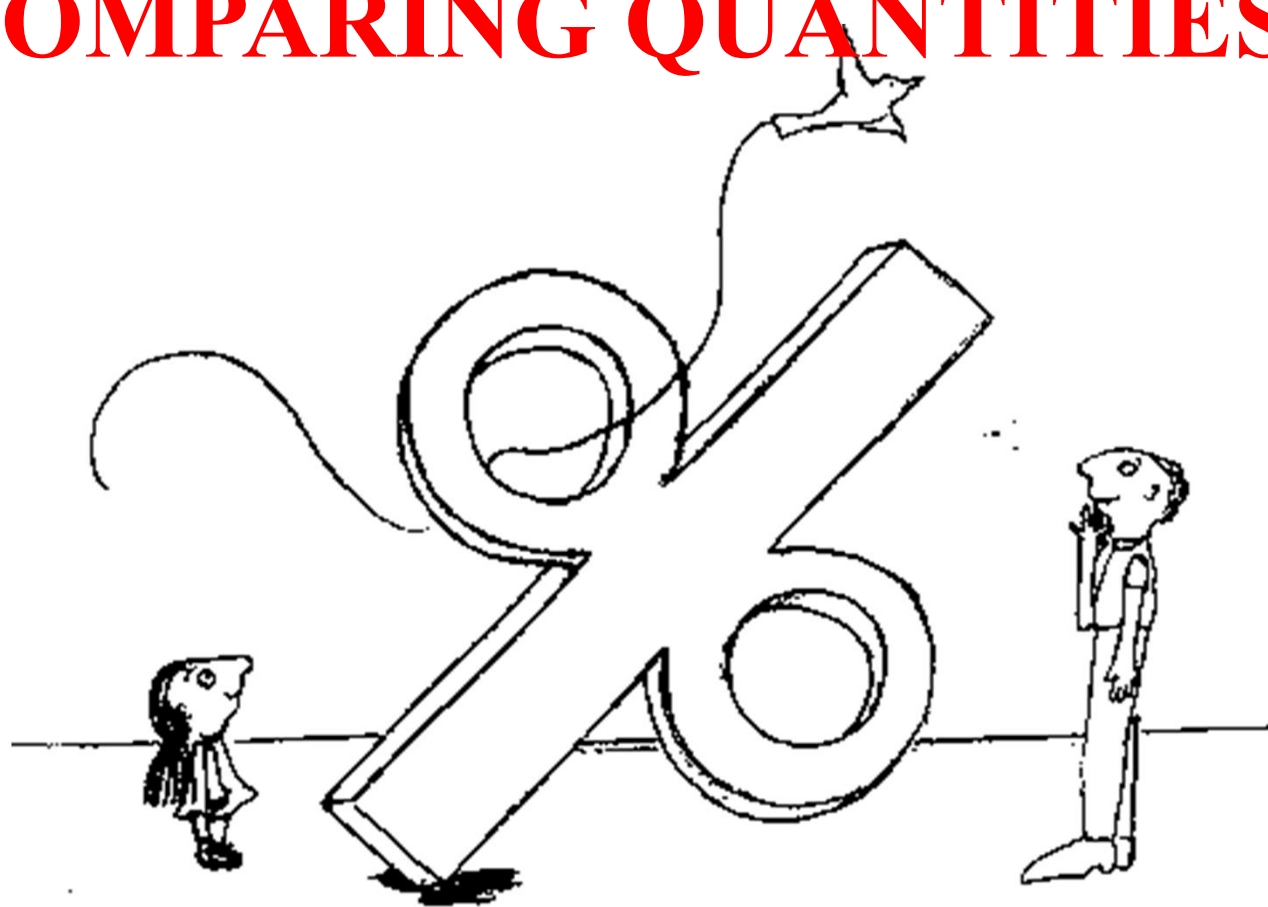


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COMPARING QUANTITIES



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Percentages

A percentage is a fraction converted to a decimal, and then multiplied by 100 and add percent sign (%).

For example, $7\% = \frac{7}{100}$

Example 1

Change each of the following into percentage.

(a) 0.83 (b) $\frac{12}{25}$

Solution :

(a) $0.83 = 0.83 \times 100\% = \underline{\underline{83\%}}$

(b) $\frac{12}{25} = \frac{12}{25} = .48 \times 100\% = \underline{\underline{48\%}}$

Percentage Change

When an original value is changed to a new value, the percentage change of the value can be measured in the following way.

PERCENTAGE =

$$\frac{\textit{DIFFERENCE OF NEW VALUE AND ORIGINAL VALUE}}{\textit{ORIGINAL VALUE}} \times 100$$

Percentage Change

Example 2

Peter's weight decreases from 60 kg to 48 kg. Find the percentage change of his weight.

Solution :

$$\begin{aligned}\text{Percentage change} &= \frac{48 - 60}{60} \times 100\% \\ &= -20\%\end{aligned}$$

$\therefore$ Percentage decrease of weight is 20%.

Tips for Students

If the answer is positive, it means a percentage increase.
If the answer is negative, it means a percentage decrease.

Profit and Loss

The profit and loss in trading refers to the difference between the cost price and the selling price.

$$(1) \text{ Percentage change} = \frac{\text{New price} - \text{Original price}}{\text{Original price}} \times 100\%$$

The selling price can be found if the cost price and the percentage change are given.

$$(2) \text{ Selling price} = \text{Cost price} (1 + \text{Profit percentage}) \text{ or} \\ \text{Cost price}(1 - \text{Loss percentage})$$

Profit and Loss

Example

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David bought a car for \$90 000 three years ago. He sells the car for \$54 000 this year. What is the percentage change of his car's price?

Solution :

$$\begin{aligned}\text{Percentage change} &= \frac{54\,000 - 90\,000}{90\,000} \times 100\% \\ &= -40\%\end{aligned}$$

$\therefore$ Loss percentage of car's price is 40%.

Tips for Students

When the percentage change is positive, it means there is a profit.

When the percentage change is negative, it means there is a loss.

Discount

Discount is a price deduction from a marked price in purchasing.

$$(1) \text{ Percentage change} = \frac{\text{Marked price} - \text{Selling price}}{\text{Marked price}} \times 100\%$$

$$(2) \text{ Selling price} = \text{Marked price} (1 - \text{Discount percentage})$$

Example 5

The marked price of a washing machine is \$4500. If the selling price is \$3000, find the discount percentage.

Solution :

$$\text{The discount rate} = \frac{4500 - 3000}{4500} \times 100\% = \underline{\underline{33\frac{1}{3}\%}}$$

Simple Interest

- ◆ **Simple interest** means that only the principal invested earns interest
- ◆ **Principal** means the original amount invested or borrowed
- ◆ **Rate** refers to the interest rate being paid as a percent usually per year (per annum)
- ◆ The **amount of the investment** refers to the total of the principal and the interest being paid

Simple Interest

Let P be the principal, I be the interest, A be the amount, $r\%$ be the interest rate per period and t be the number of periods.

(a) Simple Interest

$$SI = \frac{P \times T \times R}{100}$$

- ◆ $I = Prt$ where I is the interest earned, P is the principal invested, r is the interest rate being earned (usually per annum), and t is the length of time that the principal earns interest (usually in years)
- ◆ $A = P + I$ where A is the total amount of the investment which is the sum of the original principal and the interest earned
- ◆ upon combining $A = P(1 + rt) = P + Prt$

Compound Interest

- **Compound Interest** means that you earn interest on the original investment plus any previously accrued interest i.e. you interest on your principal and also on your interest
- **Compounding period** refers to the interval of time that interest is accrued prior to being added into the principal i.e. your interest is added into your principal at the end of the compounding period
- ex. if you invest Rs 4000 at 10% pa compounded annually, it means that interest earned is calculated every year and added into the principal at the end of every year.

Compound Interest

- Compounding Periods:
- **Semi-annual** => interest determined and added every 6 months, twice a year
- **Quarterly** => interest determined and added every 3 months, 4 times a year
- **Monthly** => interest determined and added every month, 12 times a year
- **Daily** => interest determined and added every day, 365 times a year

Compound Interest

Let P be the principal, I be the interest, A be the amount, $r\%$ be the interest rate per period and t be the number of periods.

(b) Compound Interest

- the compound interest formula is: $A = P(1 + i)^n$
- A = total amount of investment
- P = the principle investment
- i = interest rate per conversion period
- n = number of conversion periods