Chapter – 13

Direct and Inverse Proportions

- **Variations:** If the values of two quantities depend on each other in such a way that a change in one causes corresponding change in the other, then the two quantities are said to be in variation.
- **Direct Variation or Direct Proportion:**

  Two quantities x and y are said to be in **direct proportion** if they increase (decrease) together in such a manner that the ratio of their corresponding values remains constant. That is if $\frac{x}{y} = k$ [k *is a positive number*], then x and y are said to vary directly. In such a case if y_1, y_2 are the values of y corresponding to the values x1, x of x respectively then $\frac{x_1}{y_1} = \frac{2}{y_2}$.
- If the number of articles purchased increases, the total cost also increases.
- More than money deposited in a bank, more is the interest earned.
- Quantities increasing or decreasing together need not always be in direct proportion, same in the case of inverse proportion.
- When two quantities x and y are in direct proportion (or vary directly), they are written as $x \propto y$. Symbol '$\propto$' stands for 'is proportion to'.
- **Inverse Proportion:** Two quantities x and y are said to be in **inverse proportion** if an increase in x causes a proportional decrease in y **(and vice-versa**) in such a manner that the product of their corresponding values remains constant. That is, if xy = k, then x and y are said to vary inversely. In this case if y_1, y_2 are the values of y corresponding to the values x_1, x_2 of x respectively then $x_1y_1 = x_2y_2$ or $\frac{x_1}{x_2} = \frac{x_2}{y_2}$
- When two quantities x and y are in inverse proportion (or vary inversely), they are written as $x \propto {}^{1}$. Example: If the number of workers increases, time taken to finish the job decreases. Or If the speed will increase the time required to cover a given distance will decrease.