Chapter 2: Kinematics

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Scalar quantities are quantities that have only magnitude, while Vector quantities are quantities have both magnitude and direction.

- **Distance and displacement**
  Distance is the total length covered by an object regardless of direction of motion. It is a scalar quantity with the SI Unit of metre(m).

  Displacement is the distance measured in a straight line in a specified direction. It is a vector quantity with the SI Unit of metre(m).

- **Speed and Velocity**
  Speed is the distance moved per unit time. It is a scalar quantity, with the SI Unit metre per second (m/s). It can be calculated using distance/time taken.

  Instantaneous speed is the speed of an object at any instant (any one point in time). The average speed of an object is the total distance travelled divided by the total time taken. If an object travels the same speed in each unit of time, it has constant speed.

  Velocity is the rate of change of displacement. It is a vector quantity, with the SI Unit metre per second (m/s). It can be calculated using displacement/time taken. It is the distance moved by the object per unit time in a specified direction.

  It is speed with a direction.

- **Acceleration**
  Acceleration is the rate of change of velocity, and is measured in meters per second squared. It is calculated by (change of velocity)/(time taken).

  Zero Acceleration (acceleration = 0) is when the velocity of the object is constant throughout. Accelerating is when the velocity of the object is increasing. Decelerating is when the velocity of the object is decreasing.

- The speed of an object is the distance moved by the object per unit time.
- Speed can also be defined as the rate of change of distance.
- It is a scalar quantity.

$$\text{speed} = \frac{\text{distance travelled}}{\text{time taken}}$$

SI unit: m/s