Subject: Physics

Class: SS1

Week: 2

Topic: Position, Distance, and Displacement

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1. Concept of Position, Distance, and Time

Position

- The **position** of an object tells **where the object is located** at a particular moment.
- It is described relative to a **reference point** (also called origin).
- For example, if you are sitting 3 meters away from the front door of a classroom, your position is 3 meters from that door. The door is the reference point.

Key point: Position is usually described in terms of **distance and direction** from a fixed point.

Distance

- **Distance** is the **total length of the path** covered by a moving object.
- It does **not consider direction**.
- It is a **scalar quantity**, meaning it only has **magnitude** (size) and **no direction**.

Example:
A boy walks 4 meters forward and then walks another 3 meters forward. The total distance he walked is:

4 m + 3 m = **7 meters**

Even if he walks in a curved or zig-zag path, the distance is the **sum of all the steps taken**, regardless of the direction.

Time

- **Time** is the **duration** taken to carry out an activity or motion.
- It helps us know **how long** something took to happen.

- Time is usually measured using a **stopwatch or clock**.
- The standard unit of time is the **second (s)**.

Example: If a car takes 10 seconds to travel from one house to another, the time taken for that motion is 10 seconds.

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2. Concept of Displacement

- **Displacement** is the **shortest straight-line distance** between the **starting point and the final point** of an object, **in a specific direction**.
- It is a **vector quantity** because it has both **magnitude** and **direction**.

Example 1:
A girl walks 5 meters east, then walks 3 meters back west.

- Total distance = 5 m + 3 m = 8 m
- Displacement = 5 m - 3 m = **2 meters east**

Example 2:
If a person walks in a full circle and ends at the starting point, the distance may be 20 meters, but the **displacement is 0**, because there is **no change in position**.

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3. Measurement of Distance and Displacement

- Both **distance** and **displacement** are measured in **metres (m)**, which is the SI unit.
- They are measured using different tools depending on the situation.

Common Tools:

Tool	**Use**
Ruler or Meter Rule	Used for measuring small distances (e.g., the length of a book).
Measuring Tape	Used for medium distances (e.g., measuring a room or field).
Odometer	Found in cars to measure how far the car has traveled.

Tool	Use
GPS Devices	Used in navigation systems to measure straight-line distance (displacement).
Stopwatch	Used to measure **time** taken to move from one position to another.

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4. Distinction Between Distance and Displacement

Feature	Distance	Displacement
Definition	Total length of the path traveled	Shortest distance from starting to final position
Type	Scalar quantity (no direction)	Vector quantity (has direction)
Direction	Not considered	Direction is very important
Value	Always positive	Can be positive, negative, or zero
Example 1	Walking 10 m in a circle = 10 m distance	Displacement = 0 (since you end at the starting point)
Example 2	A man walks 6 m east and 4 m west = 10 m	Displacement = 2 m east (6 - 4 = 2 m in the net direction)