IGCSE Physics Worksheet

Topic: Distance and Displacement

Reading Passage:

Distance is the total length of the path travelled by an object. It is a scalar quantity because it has magnitude only and does not depend on direction. Displacement is the shortest straight-line distance from the starting point to the final point, including direction. It is a vector quantity because it has both magnitude and direction. When motion occurs in two perpendicular directions, displacement can be found using the Pythagorean theorem.

Questions:

Section A:

1. 1. Define distance.
2. 2. Define displacement.
3. 3. Explain why distance is a scalar quantity.
4. 4. Explain why displacement is a vector quantity.
5. 5. A student walks 12 m forward and 7 m backward. (a) State the distance travelled. (b) State the displacement.

Section B:

6. 6. A dog runs 5 m east, then 5 m west. (a) Calculate the total distance travelled. (b) Calculate the displacement. (c) Explain why the displacement is different from the distance.
7. 7. A cyclist travels 9 km north and then 12 km east. (a) State the total distance travelled. (b) Calculate the displacement. (c) Give the direction of the displacement.

Section C:

8. 8. Describe a real-life situation where distance and displacement give very different information. Explain why both quantities may be useful.

Answer Key:

Section A:

1. Distance is the total length of the path travelled by an object.

2. Displacement is the shortest straight-line distance from the starting point to the final point, including direction.

3. Distance is scalar because it has magnitude only and does not involve direction.

4. Displacement is vector because it includes both magnitude and direction.

5(a) Distance = 19 m.

5(b) Displacement = 5 m forward.

Section B:

6(a) Distance = 10 m.

6(b) Displacement = 0 m.

6(c) Distance measures total movement; displacement measures how far the dog is from the starting point.

7(a) Distance = 21 km.

7(b) Displacement = 15 km.

7(c) Direction = northeast.

Section C:

8. Example: A taxi may travel 8 km in total (distance), but the passenger may end only 2 km from the starting point (displacement). Distance is useful for fuel or fare; displacement is useful for navigation.