Created by Paris, an 18-year-old final-year Physics and AI major committed to producing clear, accessible learning resources for homeschool students in Hong Kong

IGCSE Physics Worksheet

Topic: Scalars and Vectors

Reading Passage:

In physics, quantities are divided into two main types: scalars and vectors. Scalars have magnitude only. Examples include mass, temperature, time, speed, energy, and distance. Vectors have both magnitude and direction. Examples include velocity, displacement, acceleration, force, and momentum. Scalars can be added using normal arithmetic, while vectors require direction to be considered. Understanding the difference is essential for solving physics problems involving motion and forces.

Questions:

Section A:

1. Define a scalar quantity.

2. Define a vector quantity.

3. Give two examples of scalar quantities.

4. Give two examples of vector quantities.

5. Explain why velocity is considered a vector quantity.

Section B:

6. A student walks 8 m east and then 5 m west. (a) State the total distance travelled. (b) Calculate the displacement. (c) Explain why distance and displacement are different.

7. Two forces act on a box: 12 N right and 7 N right. (a) State whether force is scalar or vector. (b) Calculate the resultant force. (c) If the second force acted left instead, calculate the new resultant force.

8. A cyclist moves at 6 m/s north. (a) State the speed. (b) State the velocity. (c) Explain the difference.

Section C:

9. Describe a real-life situation where confusing a scalar with a vector could cause misunderstanding.

Answer Key:

Section A:

1. A scalar has magnitude only.

2. A vector has magnitude and direction.

3. Examples: mass, temperature.

4. Examples: velocity, force.

5. Velocity includes direction.

Section B:

6(a) Distance = 13 m.

6(b) Displacement = 3 m east.

6(c) Distance is total movement; displacement is straight-line change including direction.

7(a) Force is a vector.

7(b) Resultant = 19 N right.

7(c) Resultant = 5 N right.

8(a) Speed = 6 m/s.

8(b) Velocity = 6 m/s north.

8(c) Speed has magnitude only; velocity includes direction.

Section C:

9. Example: A driver knowing speed but not direction cannot navigate correctly; direction is essential for vectors.