What Are Vectors in Physics?

Worksheet

A vector in physics is a quantity defined by both magnitude and direction, such as velocity or force. The magnitude of a vector with components (vx, vy) is found using |V| = (vx + vy).

$$\vec{R} = \vec{A} + \vec{B}$$

Questions

1. Which of these is a vector quantity?

A) Mass
B) Temperature
C) Force
D) Energy

2. A vector has vx = 6, vy = 8. What is its magnitude?

A) 14
B) 10
C) 48
D) 2

3. What distinguishes a vector from a scalar?

A) Vectors have units, scalars don't
B) Vectors have direction, scalars don't
C) Scalars are always bigger
D) Vectors can't be negative

4. Two equal-magnitude forces act in exactly opposite directions. What is the resultant?

A) Double the magnitude
B) Zero
C) Same as one force
D) Cannot be determined

5. A vector has components vx = 3 and vy = 4. Find its magnitude.

6. A displacement vector has vx = 6 m and vy = 8 m. Find the magnitude and direction (angle from x-axis).

7. Two forces act on an object: 5 N east and 12 N north. Find the resultant force.

8. Define: What is a vector?

9. Define: What is a scalar?

10. Define: How do you find a vector's magnitude from components?

Answer Key

1. C) Force - Force has both magnitude and direction, making it a vector.
2. B) 10 - |V| = (6+8) = 100 = 10.
3. B) Vectors have direction, scalars don't - Direction is the key property that separates vectors from scalars.
4. B) Zero - Opposite vectors of equal magnitude cancel out, giving a resultant of zero.
5. |V| = (vx + vy) |V| = (3 + 4) = (9+16) = 25 |V| = 5
6. |V| = (6 + 8) = (36+64) = 100 = 10 m = tan(vy/vx) = tan(8/6) 53.1
7. F = (5 + 12) = (25+144) = 169 F = 13 N
8. A quantity with both magnitude and direction, e.g. velocity or force.
9. A quantity with magnitude only, e.g. mass or temperature.
10. |V| = (vx + vy) using the Pythagorean theorem.