AP Physics: Unit 1

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1 Scalars and Vectors

Scalars and vectors are two fundamental types of quantities in physics and mathematics. Scalars only have magnitude (or size), while vectors have both magnitude and direction. In this section, we'll explore examples of scalars and vectors, including distance, displacement, speed, and velocity.

Examples

1.1 Distance (Scalar)

If you walk 5 kilometers, the distance traveled is a scalar quantity because it only has magnitude (5 km) and no direction. The total path taken doesn't matter; only the magnitude of the motion is considered.

1.2 Displacement (Vector)

If you walk 5 kilometers north, the displacement is a vector quantity. It has both magnitude (5 km) and direction (north). Displacement is concerned with the change in position, taking into account the initial and final points.

1.3 Speed (Scalar)

If a car is moving at a speed of 60 miles per hour, the speed is a scalar quantity. It only indicates how fast the car is moving, without specifying the direction.

1.4 Velocity (Vector)

If a car is moving at 60 miles per hour eastward, the velocity is a vector quantity. Velocity has both magnitude (60 mph) and direction (east). It describes the rate of change of displacement with respect to time.