

Speed, Velocity & Acceleration (Secondary 1)

Passage

Students often think that “speed” and “velocity” mean the same thing, but in physics they are different ideas. Speed tells us how fast an object is moving, but it does not tell us the direction. For example, if a student runs 5 m/s, we only know the rate of movement.

Velocity, however, includes both speed and direction. If a cyclist moves at 5 m/s north, that is a velocity. Changing direction counts as changing velocity, even if the speed stays the same. This is why a car turning a corner is said to be changing its velocity.

Another important idea is acceleration. Many students think acceleration only means “speeding up”, but in physics it has a wider meaning. Acceleration is the rate of change of velocity. This means an object accelerates when it speeds up, slows down, or changes direction. A bus that slows from 20 m/s to 10 m/s is accelerating — but in a negative direction.

Understanding these three ideas helps us describe motion more accurately. When scientists study how objects move, they look not only at how fast something travels, but also how its direction and speed change over time.

Questions

Part A — Multiple Choice

1. Which statement best describes “speed”?
 - A. How fast an object moves, including direction
 - B. How fast an object moves, without direction
 - C. The rate of change of velocity
 - D. The distance travelled in a straight line only
2. Which situation shows a change in velocity?
 - A. A runner keeps moving at 4 m/s in a straight line
 - B. A cyclist moves at 5 m/s north
 - C. A car turns left while keeping the same speed
 - D. A ball stays still on the ground

3. Which of the following is an example of acceleration?

- A. A bus moving at constant speed
- B. A train slowing down as it reaches a station
- C. A car parked on the road
- D. A person walking at the same speed and direction

Part B — Short Questions

4. Explain why changing direction counts as acceleration.

5. A student runs at 6 m/s east. Is this speed or velocity? Explain your answer.

Part C — Data Interpretation

A car's velocity changes from 10 m/s to 4 m/s in 3 seconds.

6. Is the car accelerating or decelerating? Why?

7. Calculate the change in velocity.

Answer Key

Part A

1. B
2. C
3. B

Part B

4. Changing direction counts as acceleration because acceleration is the rate of change of velocity. Since velocity includes direction, any change in direction means the velocity has changed.
5. It is velocity, because the description includes both speed (6 m/s) and direction (east).

Part C

6. The car is decelerating, because its velocity decreases from 10 m/s to 4 m/s.
7. Change in velocity = 4 m/s – 10 m/s = –6 m/s.