

Kinematics Formative Quiz

Time: 30 min. 6 questions.

Instructions

Answer all six questions in the space provided or on separate paper. Show your work for the numeric question, including formulas, substitutions and units. Read each question carefully before choosing or writing your response.

Questions

1. Which of the following is a vector quantity?

- A) Speed
- B) Distance
- C) Time
- D) Velocity

[\(Outcome\)](#)

2. Define displacement, velocity and acceleration in your own words, and state the SI unit for each quantity.

[\(Outcome\)](#)

3. True or false: On a velocity-time graph, the slope of the line at any point represents the acceleration of the object at that instant.

[\(Outcome\)](#)

4. A car starts from rest and accelerates uniformly at 2.5 m/s^2 for 6.0 s. Calculate the displacement of the car during this time.

[\(Outcome\)](#)

5. A canoeist paddles at 1.5 m/s [east] relative to the water. The river flows at 0.80 m/s [north] relative to the shore. Which expression correctly gives the canoeist's velocity relative to the shore?

- A) The vector sum of 1.5 m/s [east] and 0.80 m/s [north]
- B) The vector difference of 1.5 m/s [east] and 0.80 m/s [north]
- C) 1.5 m/s [east] only, since the river current does not affect the canoe
- D) 0.80 m/s [north] only, since paddling speed is irrelevant to shore-relative motion

[\(Outcome\)](#)

6. A ball is thrown horizontally off a cliff. Explain how you would use vector components to determine the ball's horizontal and vertical motion separately, and describe how each component behaves during the flight.

[\(Outcome\)](#)

Curriculum coverage

Question	Outcome alias
1	Outcome
2	Outcome

3	Outcome
4	Outcome
5	Outcome
6	Outcome

Answer key

1. D) Velocity. Velocity has both magnitude and direction, which makes it a vector quantity, while speed, distance and time are scalar quantities ([Outcome](#)).
2. Displacement is the change in position of an object, measured in metres (m); velocity is the rate of change of displacement, measured in metres per second (m/s); acceleration is the rate of change of velocity, measured in metres per second squared (m/s²) ([Outcome](#)).
3. True. Acceleration is defined as the slope of a velocity-time graph, since slope represents the rate of change of velocity over time ([Outcome](#)).
4. 45 m. Using $d = v_0t + \frac{1}{2}at^2$ with $v_0 = 0 \text{ m/s}$, $a = 2.5 \text{ m/s}^2$ and $t = 6.0 \text{ s}$: $d = 0 + 0.5 \times 2.5 \times 6.0^2 = 45 \text{ m}$ ([Outcome](#)).
5. A) The vector sum of 1.5 m/s [east] and 0.80 m/s [north]. The canoeist's velocity relative to the shore equals the vector sum of the paddling velocity relative to the water and the water's velocity relative to the shore ([Outcome](#)).
6. The horizontal and vertical motions are analyzed as independent components. The horizontal component has no acceleration acting on it (ignoring air resistance), so horizontal velocity stays constant throughout the flight. The vertical component accelerates uniformly downward due to gravity, so vertical velocity increases with time while horizontal displacement and vertical displacement are calculated separately using their own kinematics equations ([Outcome](#)).