

Name: _____ Date: _____

Kinematic Quest: Chasing Velocity for 12th Grade Pros

Can you predict a projectile's path? Identify the core principles governing displacement and constant acceleration in this senior physics challenge.

- 1. An oceanographer tracks a research vessel moving 40 km North, then 30 km West. What is the magnitude of the vessel's total displacement?**
 - A. 70 km
 - B. 50 km
 - C. 10 km
 - D. 35 km
- 2. If an object's velocity is zero at a specific instant, its acceleration must also be zero at that same instant.**
 - A. True
 - B. False
- 3. A maglev train maintains a constant velocity of 120 m/s for 30 seconds. The rate of _____ during this time interval is exactly zero.**
 - A. Displacement
 - B. Instantaneous Speed
 - C. Acceleration
 - D. Position
- 4. A geologist drops a sensor into a deep cavern. If the sensor falls freely from rest for 3 seconds, what is its approximate final velocity (ignoring air resistance)?**
 - A. 9.8 m/s
 - B. 14.7 m/s
 - C. 29.4 m/s
 - D. 44.1 m/s
- 5. In a displacement-vs-time graph, the _____ of the line represents the object's velocity.**
 - A. Slope
 - B. Area under the curve
 - C. X-intercept
 - D. Y-intercept
- 6. A vector quantity, such as displacement, requires both a magnitude and a specific direction.**
 - A. True
 - B. False

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7. An athlete sprints around a circular 400-meter track and returns to the exact starting blocks. What is the displacement of the athlete?

- A. 400 meters
- B. 200 meters
- C. 0 meters
- D. 100 meters

8. In the kinematic equation $v^2 = u^2 + 2as$, the variable 's' represents _____.

- A. Seconds
- B. Speed
- C. Displacement
- D. Slope

9. Average speed is always equal to the magnitude of average velocity.

- A. True
- B. False

10. A particle moves with an initial velocity of 5 m/s and experiences a constant acceleration of 2 m/s² for 4 seconds. What is its final velocity?

- A. 8 m/s
- B. 10 m/s
- C. 13 m/s
- D. 15 m/s