Name: _____ **Date:** _____

The Velocity Architect: Designing 7th Grade Motion Systems Quiz

Calculate how high-speed maglev trains and deep-sea probes maintain precision using vector displacement and non-linear acceleration analysis.

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1. A drone flies 80 meters North to deliver a package, then immediately flies 30 meters South. What is the drone's total displacement relative to its launch pad?

A. 110 meters North
B. 50 meters North
C. 50 meters South
D. 80 meters

2. An autonomous rover on Mars increases its velocity from 2 m/s to 14 m/s over a period of 4 seconds. The rover's constant acceleration is _____ m/s^2.

A. 12
B. 4
C. 3
D. 48

3. If a professional sprinter runs exactly one full lap around a circular 400-meter track, their total displacement is 0 meters.

A. True
B. False

4. Which of the following scenarios describes an object that is accelerating even though its speed remains constant?

A. A car parked on a steep hill
B. A subway train traveling 20 m/s on a straight track
C. A satellite orbiting Earth in a perfect circle at constant speed
D. A lift moving upward at a steady 2 m/s

5. A maglev train starts from rest and accelerates at 2 m/s^2. Using the formula $s = ut + \frac{1}{2}at^2$, the distance the train covers in the first 10 seconds is _____ meters.

A. 20
B. 100
C. 200
D. 50

6. On a Velocity vs. Time graph, what does a horizontal line (zero slope) located above the x-axis represent?

A. The object has stopped moving

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B. The object is moving at a constant velocity
C. The object is accelerating at a constant rate
D. The object is returning to its starting position

7. Negative acceleration always means that an object is slowing down.

A. True
B. False

8. A deep-sea research probe is dropped into the ocean. If we ignore water resistance and use gravity ($a = 9.8\ m/s^2$), its velocity after 3 seconds of free-fall would be ____ m/s.

A. 9.8
B. 19.6
C. 29.4
D. 32.2

9. A cheetah accelerates from 0 mph to 60 mph in a few seconds. If you were analyzing this using the kinematic equation $v^2 = u^2 + 2as$, which variable represents the distance the cheetah traveled during this burst?

A. v
B. u
C. a
D. s

10. The slope of a Position vs. Time graph represents the acceleration of the object.

A. True
B. False