Name _____ Period _____ Date _____
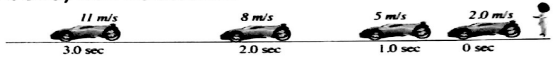
Quiz: Linear Motion {Concepts}

1. A car starts from rest 340 m in front of an observer. It moves toward from the observer and slows at a uniform rate of 8.0 m/s².

a. $x = -4t^2 + 340$ ____ Write an equation for the car's position, x, as a function of time (t).

b. $v = -8t$ ____ Write an equation for the car's velocity(v) as a function of time (t).

c. 0 ____ Estimate the value of the jerk for this motion.

d. __B__ Which statement best describes the car's distance from the observer as it approaches the observer?
A. It increases at a decreasing rate   B. It decreases at an increasing rate   C. It decreases at a constant rate   D. It remains constant   E. It is zero at all times.

2. The instantaneous velocity of a car is recorded every second. The motion is away from the observer.

a. $3 m/s²$ ____ Estimate the car's acceleration from the picture.

11 m/s   8 m/s   5 m/s   2.0 m/s
3.0 sec   2.0 sec   1.0 sec   0 sec

b. __B__ Which value(s) are most likely to be zero, based on this diagram?
A. The acceleration   B. The jerk   C. The average velocity   D. The average speed   E. None of these

3. The location of a guinea pig is marked as it walks over a grid. Assume it walks with a constant speed at all times during its trip.

a. __A__ Which statement is most correct about its motion?
A. Its average speed is larger than the magnitude of its average velocity.
B. The magnitude of its average velocity is larger than its average speed.
C. The average speed and the magnitude of its average velocity are equal.
D. No comparison may be made between its speed and velocity.
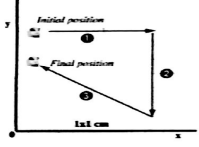
b. __B__ Which statement is most correct about the guinea pig's instantaneous acceleration from part ❶ to part ❷?
A. It is zero at all times   B. It has a non-zero value   C. no inference can be made about its acceleration.

4. __D__ Which equation of motion applies only to situations with constant acceleration?
A. $v_{avg} = \Delta x / \Delta t$ B. $a = dv/dt$ C. $\Delta v = v - v_0$ D. $x = \frac{1}{2}at^2 + v_0t + x_0$ E. All require constant acceleration

5. __D__ A bicyclist moves away from an observer with a constant negative acceleration. Her distance from the observer is a maximum when...
A. Her position equals her instantaneous velocity   B. Her instantaneous acceleration is zero.   C. The magnitude of her instantaneous velocity is the same as her acceleration.   d. Her instantaneous velocity is zero   E. Her acceleration equals her position

6. A fast moving cart reaches the bottom of a curved ramp at position (A). It continues up the ramp. Positions are marked at arbitrary times. Assume friction is negligible.

a. __A__ Which location shows the cart with the largest magnitude of instantaneous velocity? Choose E if all locations are equal.

b. __D__ Which position shows the cart with the largest magnitude of instantaneous acceleration? Choose E if all locations are equal.
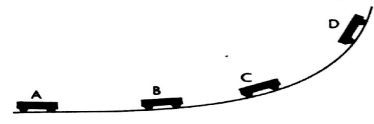
7. The velocity of a rocket is given by: $v = 1200 - 3t^4$

a. $-12t^3$ ____ Write the expression for the rocket's instantaneous acceleration. $\frac{dv}{dt} = -12t^3$ $\frac{da}{dt} = -36t^2$

b. __E__ Which statement best describes the rocket's instantaneous velocity for the first few moments?
A. It decreases at a constant rate   B. It increases at a constant rate.   C. It increases at an increasing rate   D. It increases at a decreasing rate   E. It decreases at an increasing rate.

8. ??? __C__