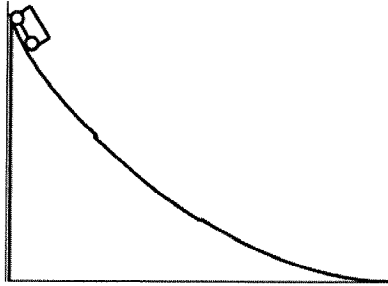


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- #1. A small cart is placed on a ramp that is curved as shown. When released from rest, which of the following best represent what happens to the magnitude of the cart's velocity and acceleration as it moves with negligible friction down the ramp?



- A) Increasing velocity and increasing acceleration
B) Decreasing velocity and increasing acceleration
C) Increasing velocity and decreasing acceleration
D) Increasing velocity and constant acceleration
- #2. A ball initially at rest is dropped from a height, y , above the floor, and it hits the floor after 1.5 s. From what height should the ball be dropped so that it takes 3.0 s to strike the floor?
- A) $0.7y$
B) $1.4y$
C) $2y$
D) $4y$
- #3. A truck traveled north for 400 m at 5 m/s and then it traveled east for 300 m at 4.3 m/s. The magnitude of the average velocity of the truck was most nearly
- A) 1.2 m/s
B) 3.3 m/s
C) 4.6 m/s
D) 6.6 m/s

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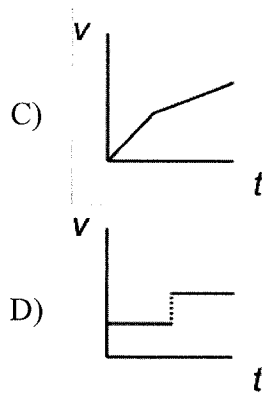
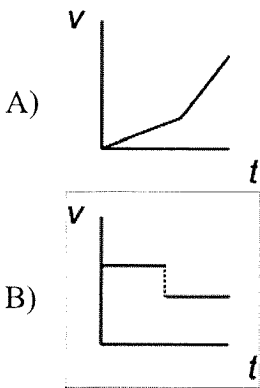
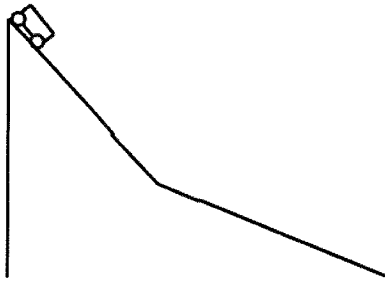
*4. The table shown represents the position of a laboratory cart at various instants in time as recorded by a motion detector. Which of the following best represents the velocity of the cart at time $t = 0.5$ s?

Time (s)	Position (cm)
0	10
0.5	14
1.0	18
1.5	22
2.0	26

- A) 4 cm/s
- B) 7 cm/s
- C) 8 cm/s
- D) 28 cm/s

*5.

A low friction cart is placed at the top of a ramp as shown. Upon release from rest, which of the following graphs best represents the velocity of the cart as a function of time?



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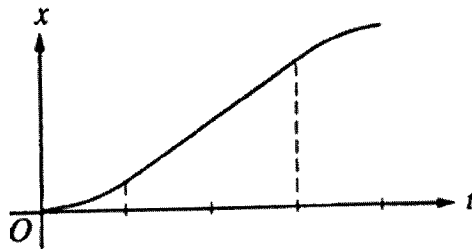
#6

A water balloon is launched from ground level toward a building. As the water balloon flies through the air, it strikes the second floor of the building after passing the peak of its trajectory. Disregarding any effects of air resistance and using the launch point as the origin and up as the positive (+) direction, which of the following shows the correct signs regarding the balloon's vertical position, vertical velocity, and vertical acceleration the instant before it strikes the building?

	<u>Vertical Position</u>	<u>Vertical Velocity</u>	<u>Vertical Acceleration</u>
A)	-	-	-
B)	-	-	+
C)	+	-	-
D)	+	+	+

#7.

The graph provided shows the position, x , as a function of time, t , for a motorcycle moving in a straight line. Which of the following statements is the best description of the motion of the motorcycle?



- A) Slowing down, moving at a constant speed, then speeding up
- B) Speeding up, moving at a constant speed, then slowing down
- C) Moving with an increasing speed the entire time
- D) Climbing a steep hill and then reaching the top

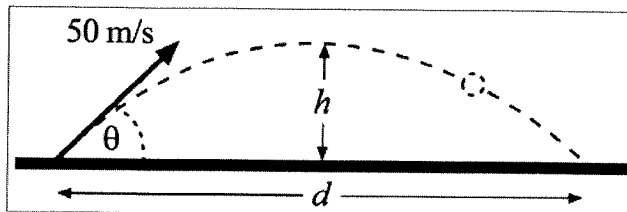
#8.

A body moving in the positive x direction passes the origin at time $t = 0$. Between $t = 0$ and $t = 1$ s, the body has a constant speed of 24 m/s. At $t = 1$ s, the body is given a constant acceleration of 6 m/s^2 in the negative x direction. The position x of the body at $t = 11$ s is

- A) -99 m
- B) -36 m
- C) 36 m
- D) 99 m

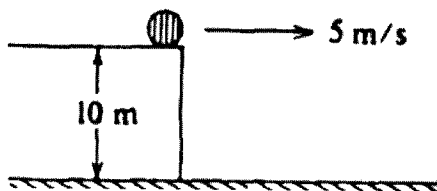
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- *9. A ball is shot into the air with a positive initial velocity as shown. Consider air resistance as negligible. Which of the following launch angles will cause the ball to remain in the air the longest time?



- A) 35°
- B) 45°
- C) 55°
- D) 65°

- *10. An object slides off a roof 10 m above the ground with an initial horizontal speed of 5 m/s as shown. If air resistance is negligible, what is the velocity of the object the instant before impact with the ground?



- A) 5 m/s vertically and 5 m/s horizontally
- B) 5 m/s vertically and 19 m/s horizontally
- C) 14 m/s vertically and 19 m/s horizontally
- D) 14 m/s vertically and 5 m/s horizontally

- *11. The position of an object is given by the equation

$$x = 3.0t^2 + 1.5t + 4.5$$

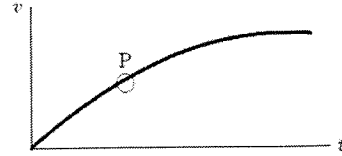
where x is in meters and t is in seconds. What is the instantaneous acceleration of the object at $t = 3.0$ s?

- A) 3.0 m/s²
- B) 6.0 m/s²
- C) 9.0 m/s²
- D) 19.5 m/s²

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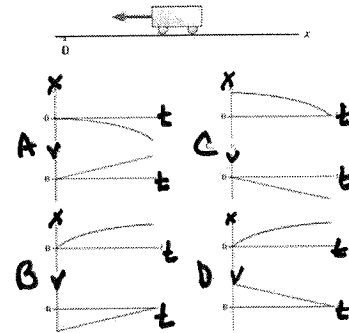
* 12. The diagram shows a velocity-time graph for a car moving in a straight line. At point P the car must be:

- (A) moving with zero acceleration
- (B) climbing a hill
- (C) accelerating
- (D) stationary
- (E) traveling backwards



* 13. A cart accelerates toward the origin as indicated on the diagram. What would the position vs. time and velocity vs. time graphs look like?

- (A) A
- (B) B
- (C) C
- (D) D



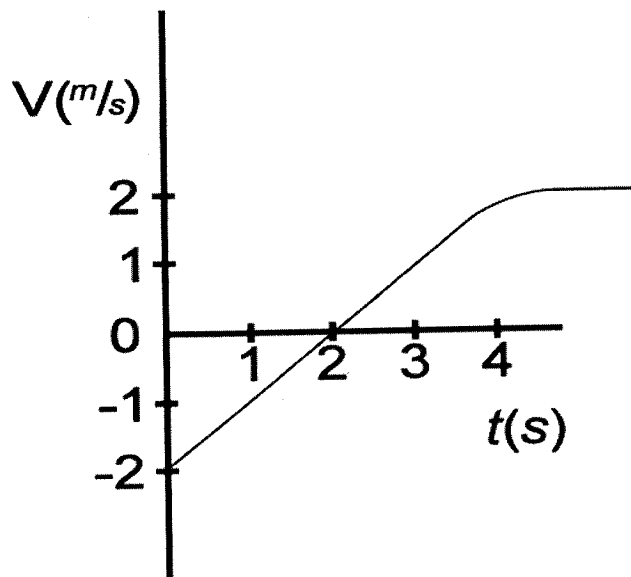
Directions: For each of the questions or incomplete statements below, *two* of the suggested answers will be correct. For each of these questions, you must select both correct choices to earn credit. No partial credit will be earned if only one correct choice is selected. Select the two that are best in each case and then enter both of the appropriate letters in the corresponding space on the answer sheet.

* 14. A teacher has challenged a student to hit a target with a dart gun. The dart is launched from ground level and the target is placed one meter above the ground. For the first attempt, the student launches the dart at an angle of 45° but the dart goes too far. Which of the following options could the student pick to produce a more accurate second shot? Select two answers.

- A) Increase the launch angle
- B) Decrease the launch angle
- C) Increase the launch height
- D) Decrease the target height

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#15 The velocity vs. time graph for an elevator is shown. For the time interval 0 s to 4 s, which of the following best describes the motion of the elevator? Select two answers.



- A) The elevator moves upward with decreasing velocity.
- B) The elevator moves downward with increasing velocity.
- C) The elevator returns to its starting position.
- D) The elevator moves with constant acceleration.