Questions 1 through 4 refer to the following:

A toy projectile is fired from the ground vertically upward with an initial velocity of 29 meters per second. The projectile arrives at its maximum altitude in 3.0 seconds. [*Neglect air resistance*.]

1) As the projectile rises and then falls back to the ground, its acceleration

A) decreases, then increases
B) remains the same
C) increases, then decreases
D) increase, only

2) What is the displacement of the projectile from the time it left the ground until it returned to the ground?

A) 0. m
B) 88 m
C) 9.8 m
D) 44 m

3) The *greatest* height the projectile reaches is approximately

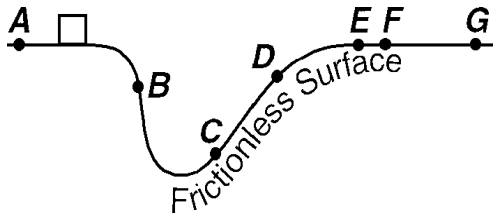
A) 23 m
B) 44 m
C) 87 m
D) 260 m

4) What is the velocity of the projectile when it hits the ground?

A) −29 m/s
B) 0. m/s
C) −9.8 m/s
D) +29 m/s

Questions 5 through 7 refer to the following:

The diagram represents a block sliding along a frictionless surface between points *A* and *G*.



5) Which expression represents the magnitude of the block's acceleration as it moves from point *C* to point *D*?

A) $\frac{\Delta v}{\Delta t}$
B) $\frac{2\Delta s}{\Delta t}$
C) $\frac{m}{F}$
D) $m\Delta v$

6) As the block moves from point *A* to point *B*, the speed of the block will be

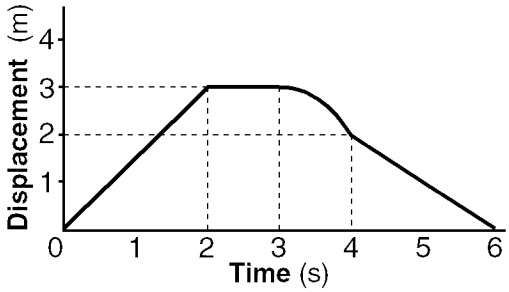
A) increasing
B) decreasing
C) zero
D) constant, but not zero

7) Which formula represents the velocity of the block as it moves along the horizontal surface from point *E* to point *F*?

A) $(v_f)^2 = 2a\Delta s$
B) $\bar{v} = \frac{\Delta s}{\Delta t}$
C) $\Delta v = \frac{1}{2}a(\Delta t)^2$
D) $\bar{v} = \frac{\Delta v}{2}$

Questions 8 through 12 refer to the following:

The graph below represents the displacement of an object as a function of time.



8) What is the velocity of the object at $t = 1$ second?

A) 2.0 m/s B) 1.5 m/s C) 1.0 m/s D) 3.0 m/s

9) What is the average velocity of the object from $t = 0$ to $t = 3$ seconds?

A) 3.0 m/s B) 0 m/s C) 1.0 m/s D) 2.0 m/s

10) During which time interval is the object accelerating?

A) 3-4 s B) 0-2 s C) 4-6 s D) 2-3 s

11) How far is the object from the starting point at the end of 3 seconds?

A) 9.0 m B) 0 m C) 3.0 m D) 2.0 m

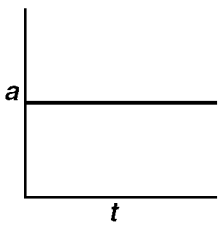
12) During which time interval is the object at rest?

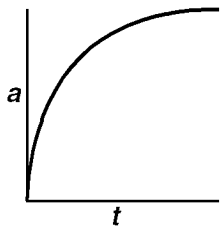
A) 3-4 s B) 2-3 s C) 4-6 s D) 0-2 s

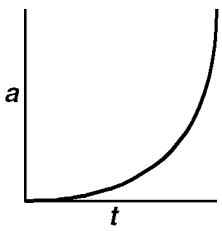
Questions 13 through 15 refer to the following:

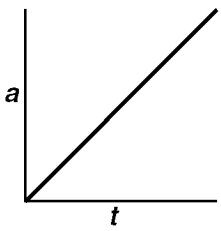
A 10.-kilogram object, starting from rest, slides down a frictionless incline with a constant acceleration of 2.0 m/sec^2 for 4.0 seconds.

13) Which graph *best* represents the relationship between acceleration (a) and time (t) for the object?

A) 

B) 

C) 

D) 

14) What is the velocity of the object at the end of the 4.0 seconds?

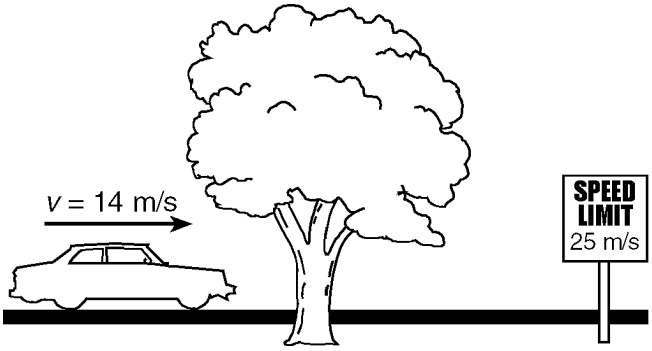
A) 8.0 m/sec B) 4.0 m/sec C) 16 m/sec D) 2.0 m/sec

15) During the 4.0 seconds, the object moves a total distance of

A) 16 m B) 32 m C) 8.0 m D) 4.0 m

Questions 16 and 17 refer to the following:

A car is traveling at a constant speed of 14 meters per second along a straight highway. A tree and a speed limit sign are beside the highway. As it passes the tree, the car starts to accelerate. The car is accelerated uniformly at 2.0 meters per second^2 until it reaches the speed limit sign, 5.0 seconds later.



16) When the car reaches the sign, the car's speed is

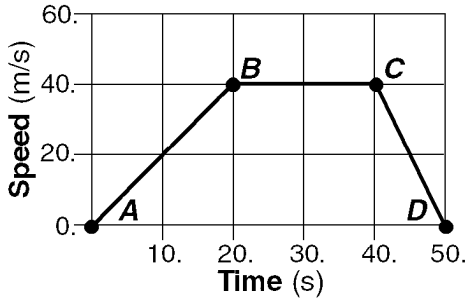
C) greater than the speed limit A) equal to the speed limit

B) less than the speed limit

17) What is the distance between the tree and the sign?

A) 25 m B) 10. m C) 95 m D) 70. m

18) The speed-time graph below, which represents the linear motion of a cart.



(a) Determine the magnitude of the acceleration of the cart during interval *AB*. [*Show all calculations, including the equation and substitution with units*.]

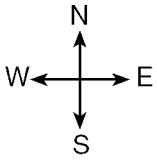
(b) Calculate the distance traveled by the cart during interval *BC*. [*Show all calculations, including the equation and substitution with units*.]

(c) What is the average speed of the cart during interval *CD*?

19) A newspaper carrier on her delivery route travels 200. meters due north and then turns and walks 300. meters due east.

(a) Draw a vector diagram following the directions below.

(1) Using a ruler and protractor and starting at point *P*, construct the sequence of two displacement vectors for the newspaper carrier's route. [*Use a scale of 1.0 cm = 50. m.*] [*Label the vectors.*]



(2) Construct and label the vector that represents the carrier's resultant displacement from point *P*.

(b) What is the magnitude of the carrier's resultant displacement?

(c) What is the angle (in degrees) between north and the carrier's resultant displacement?