Name _____

Physics   **Test 3: Motion in One Dimension**   page 1

Multiple Choice

Read each question and choose the best answer by putting the corresponding letter in the blank to the left.

_____ 1. Which of the following is a scalar quantity?

    A. displacement
    B. velocity
    C. force
    D. speed

_____ 2. The slope of a position-time graph gives

    A. displacement.
    B. distance.
    C. speed.
    D. acceleration.

_____ 3. The speedometer on your car measures

    A. average speed.
    B. average velocity.
    C. instantaneous speed.
    D. instantaneous velocity.

_____ 4. Which change results in zero acceleration?

    A. a change in only the direction of motion
    B. a change in only the magnitude of velocity
    C. a change in both the magnitude and direction of velocity
    D. a change in only time

_____ 5. Which is a possible unit for acceleration?

    A. ft^2/s^2
    B. m^2/s
    C. m/s
    D. ft/s^2

_____ 6. The area underneath a velocity-time graph within a given time interval gives

    A. displacement.
    B. distance.
    C. speed.
    D. acceleration.

_____ 7. The equations of motion apply only if

    A. the motion is in a straight line.
    B. acceleration is nonzero.
    C. velocity is constant.
    D. acceleration is constant.

_____ 8. A ball is dropped from a 80.0 m building. What is the ball's velocity after 3.00 s?

    A.   –29.4 m/s

    B.   96.0 m/s

    C.   96 m/s

    D.   29 m/s

_____ 9. How far will a rock fall in 10. s, starting from rest?

    A.   490 m

    B.   491 m

    C.   980 m

    D.   981 m

_____ 10. Assuming no air resistance, which scenario is *not* an example of free fall?

    A.   You watch a rope that is holding a piano 1 m above the ground as the rope suddenly breaks.

    B.   You drop your camera as you stand at a lookout over the Grand Canyon.

    C.   You throw a penny down out of a window of the Empire State Building.

    D.   You fall out of an airplane to go skydiving.

Short Answer 1

After reading each sentence, write a response in the blank provided.

11. The study of motion is called _____.

12. The study of the causes of motion is called _____.

13. The direction-sensitive change in position between two distinct points is called the _____.

14. A quantity that has only magnitude associated with it is called a/an_____ quantity.

15. For a situation where the displacement is the same as the change in position, the slope of a line tangent to the position-time curve gives the _____.

16. If an object travels in a straight line, the magnitude of the displacement will be equal to the _____.

17. If an object's position or its velocity is constant, then _____is zero.

18. The slope of a velocity-time graph gives the _____.

19. The equation of motion that is in a quadratic form is the _____equation of motion.

20. One common example of uniformly accelerated motion is _____.

Short Answer 2

Study the following position-time graph of the straight-line motion of a train and answer the questions below.
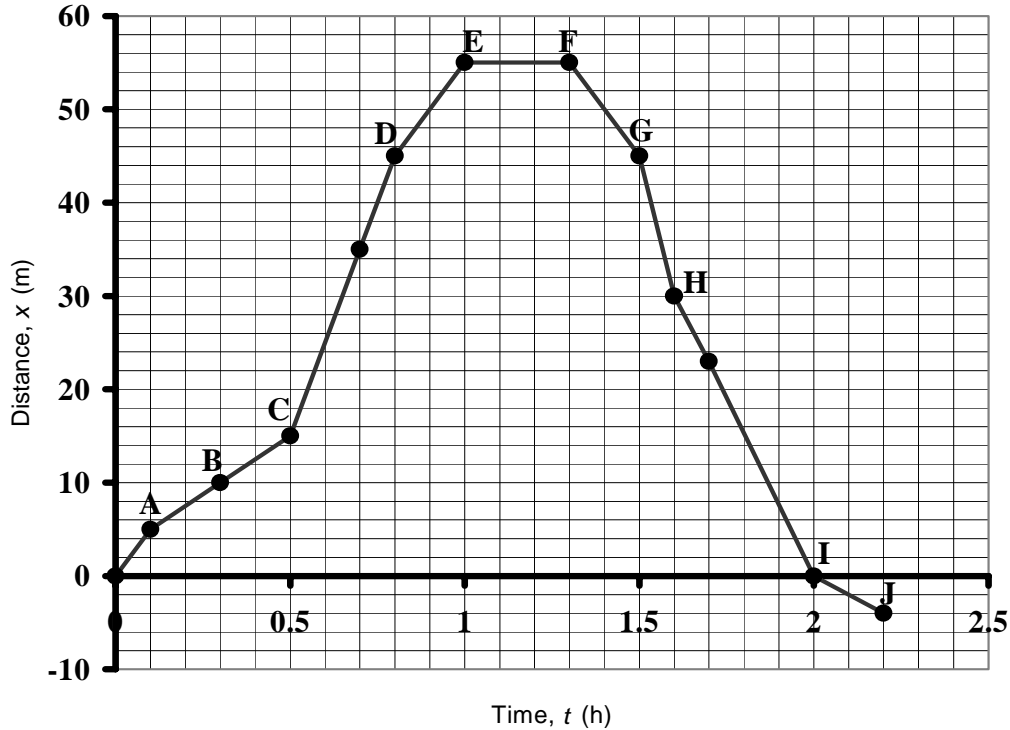
21.   What is the train's displacement? _____

22.   What is the train's distance covered? _____

23.   During what portion of travel does the train move the fastest in a forward direction?_____

24.   During what interval does the train move the fastest in a backward direction? _____

25.   At what point does the train pass its starting point going backwards? _____

26.   Over what interval does the train cover the largest distance? _____

27.   During what interval is the train stopped? _____

28.   Calculate the average velocity over the time interval from A to E._____

29.   Calculate the average velocity over the time interval from F to H. _____

30.   Calculate the instantaneous speed at point B._____

True/False

Read the following statements. Identify each as true or false by putting *T* or *F* in the blank to the left.

_____ 31.   To identify a position on a line, each position is compared to a reference point called the origin.

_____ 32.   The magnitude of displacement can be equal to distance.

_____ 33.   Displacement is the distance between an object's final and initial positions over a given time interval.

_____ 34.   The magnitude of a vector is always a positive quantity.

_____ 35.   Average speed and the magnitude of average velocity can be equal.

_____ 36.   A negative acceleration is always a decrease in speed.

Application Problems

Complete the problems below. Be sure to show your work, consider significant figures, and put your answer with the correct units in the blank provided.

37.   A bicyclist passing through a city accelerates after he passes the signpost marking the city limits at $x = 0$. His acceleration is constant at 5.0 m/s^2. At time $t = 0$, he is at $x = 6.0$ m and has a velocity $v = 4.0$ m/s.

_____a.   Find his position and velocity at $t = 2.0$ s.

_____ b.   How far is he from the signpost when his velocity is 6.0 m/s?

⊙ ___ 38. You are in Paris, 50. m up in the Eiffel Tower. If you throw a euro downward at a velocity of 1.0 m/s, how long would it take the euro to hit the ground?

____ 39. In the Olympics, a high diver jumps from a height of 40. m. How long will he fall before he enters the water?

40. A penny is dropped from the top of the Empire State Building. The following table summarizes its velocity as a function of time, assuming no air resistance.

Velocity (m/s)	Time (s)
0	0
9.8	1.0
19.6	2.0
29.4	3.0
39.2	4.0

a.   Construct a velocity-time graph for this information.
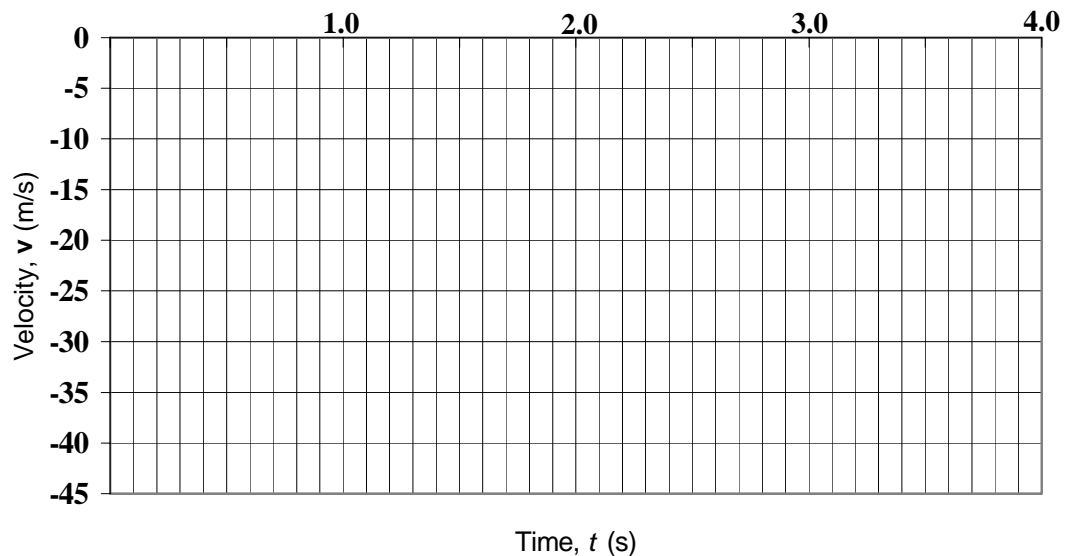
_____ b. What is the magnitude of its displacement from $t = 0$ s to $t = 4.0$ s?

_____c. What is the value of the slope of the velocity-time graph for any free-falling object?