2D Kinematics: Pre-Test Practice

1. Find the x-component of the following vector: 44m/s [68° below +x]
   - a. 14m/s
   - b. -14m/s
   - c. 16m/s
   - d. -16m/s
   - e. 21m/s
   - f. -21m/s
   - g. 29m/s
   - h. -29m/s
   - i. 41m/s
   - j. -41m/s
   - k. 44m/s
   - l. -44m/s

2. Find the y-component of the following vector: 44m/s [68° below +x]
   - a. 14m/s
   - b. -14m/s
   - c. 16m/s
   - d. -16m/s
   - e. 21m/s
   - f. -21m/s
   - g. 29m/s
   - h. -29m/s
   - i. 41m/s
   - j. -41m/s
   - k. 44m/s
   - l. -44m/s

3. Find the x-component of the following vector: 68m/s [19° N of W]
   - a. 34m/s
   - b. -34m/s
   - c. 49m/s
   - d. -49m/s
   - e. 64m/s
   - f. -64m/s
   - g. 22m/s
   - h. -22m/s
   - i. 53m/s
   - j. -53m/s
   - k. 11m/s
   - l. -11m/s

4. Find the y-component of the following vector: 68m/s [19° N of W]
   - a. 34m/s
   - b. -34m/s
   - c. 49m/s
   - d. -49m/s
   - e. 64m/s
   - f. -64m/s
   - g. 22m/s
   - h. -22m/s
   - i. 53m/s
   - j. -53m/s
   - k. 11m/s
   - l. -11m/s

B   4.0km   A

3.0km

C
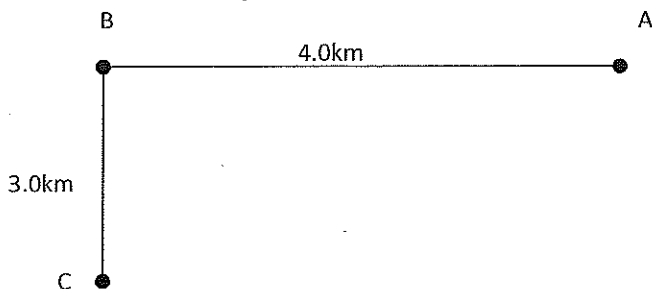
5. A car travels from A to B to C along the path shown above. The trip takes 7.0 minutes. What is the average speed for the trip?
   - a. 17m/s
   - b. 12m/s
   - c. 12m/s [37° below -x]
   - d. 12m/s [53° below –x]
   - e. 12m/s [37° above +x]
   - f. 12m/s [53° above +x]

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   - a. 17m/s
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   - e. 12m/s [37° above +x]
   - f. 12m/s [53° above +x]

7. A bird is flying 4.0m/s west and then turns to travel 3.0m/s south. Assuming constant acceleration, what is the bird's average velocity?
   - a. 5.0m/s [37° S of W]
   - b. 2.5m/s [37° S of W]
   - c. 5.0m/s [37° S of E]
   - d. 2.5m/s [37° S of E]
   - e. 5.0m/s [37° N of W]
   - f. 2.5m/s [37° N of W]

8. A bird is flying 4.0m/s west and then turns to travel 3.0m/s south. What is the bird's change in velocity?
   - a. 5.0m/s [37° S of W]
   - b. 2.5m/s [37° S of W]
   - c. 5.0m/s [37° S of E]
   - d. 2.5m/s [37° S of E]
   - e. 5.0m/s [37° N of W]
   - f. 2.5m/s [37° N of W]

9. A projectile is fired at 60.0m/s [30.0° above horizontal]. Which of the following is the best estimate for the time the projectile will take to reach its highest point?
   - a. 0.5s
   - b. 1s
   - c. 2s
   - d. 3s
   - e. 4s
   - f. 6s

10. A car accelerates from rest over 100m in 5.0s. What is the average speed?
   - a. 10m/s
   - b. 20m/s
   - c. 40m/s
   - d. 50m/s

11. A car accelerates from rest over 100m in 5.0s. What is the final speed?
   - a. 10m/s
   - b. 20m/s
   - c. 40m/s
   - d. 50m/s

12. If two velocity vectors with magnitudes 5.00 m/s and 7.00 m/s are added, which of the following magnitudes is **IMPOSSIBLE** for the resultant?

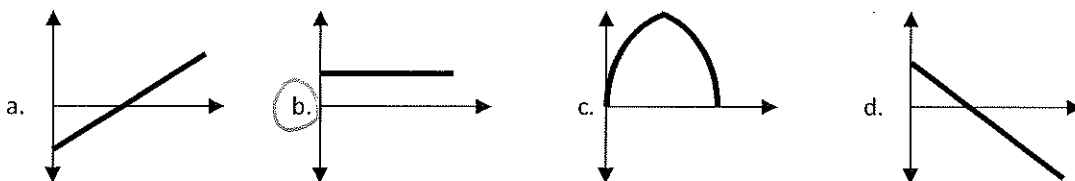   a. 12.5 m/s   b. 12.0 m/s   c. 7.00 m/s   d. 5.00 m/s   e. 3.0 m/s

13. Which of the following is a possible graph of **horizontal velocity vs. time** for a projectile thrown upward from the ground?

a.   b.   c.   d.
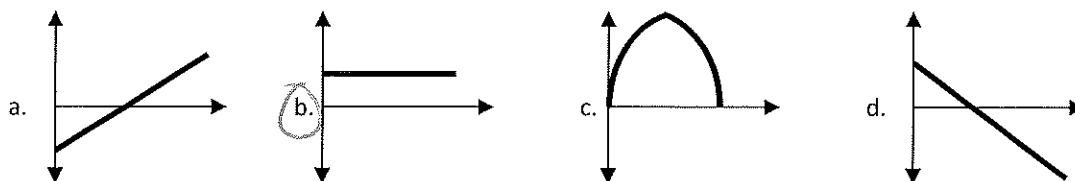
14. Which of the following is a possible graph of **vertical velocity vs. time** for a projectile thrown upward from the ground?

a.   b.   c.   d.
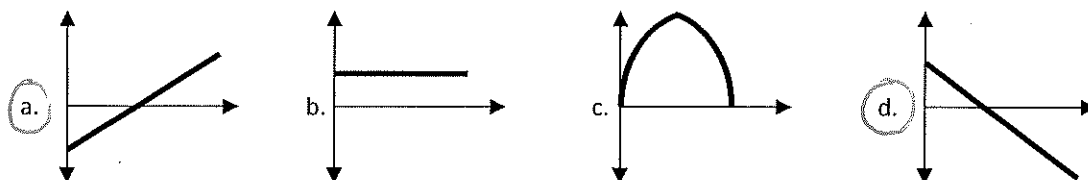
15. Which of the following is a possible graph of **vertical acceleration vs. time** for a projectile thrown upward from the ground?

a.   b.   c.   d.

16. Which of the following is a possible graph of **vertical position vs. time** for a projectile thrown upward from the ground?

a.   b.   c.   d.
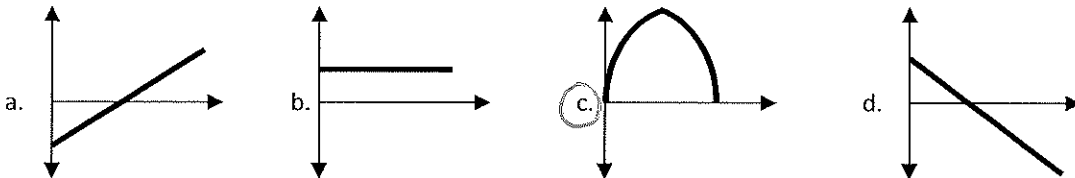
17. The slope of a velocity vs. time graph tells which of the following?

   a. average velocity   b. change in velocity   c. displacement   d. acceleration

18. A Styrofoam cup filled with soy sauce and powdered sugar free falls from rest. It takes the cup a time T to fall a distance D. How long would it take a second cup to fall a distance 2D?

   a. 2T
   b. ½ T
   c. 4T
   d. need to know the masses of the objects to answer
   e. $\sqrt{2}$ T

19. A projectile is launched over level ground at an angle of 30.0°. The projectile takes 2.00s to reach its maximum height. What was its initial speed?

   a. 9.80m/s
   b. 19.6m/s
   c. 27.6m/s
   d. 39.2m/s
   e. 42.1m/s

20. A projectile is fired at 23.5m/s at an angle of 10.0° above horizontal. The projectile strikes a wall that is 7.50m away horizontally. How high up the wall does it hit?

     a. 65cm   b. 81cm   c. 1.2m   d. 1.3m   e. 1.8m

21. A car travels clockwise ¼ of the way around a circular track at constant speed. The car begins at the 6 o'clock position. What is the direction of the change in velocity?
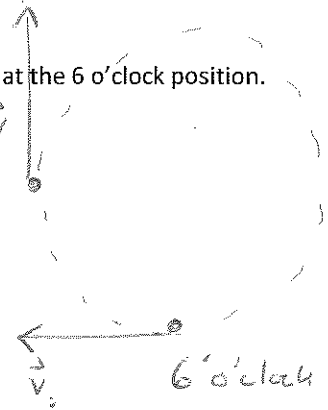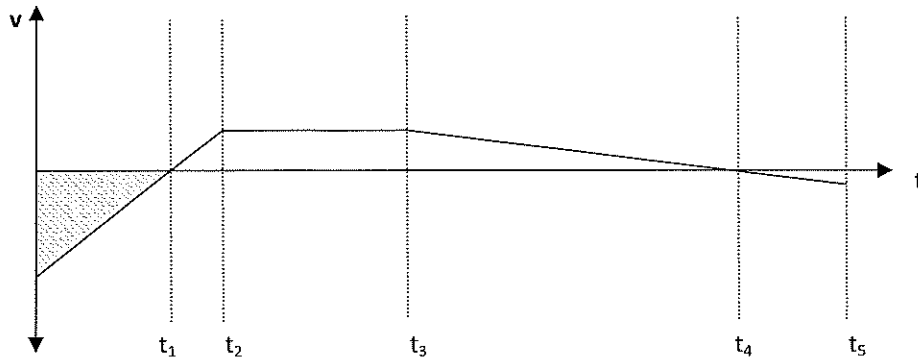
a.

b.

c.

d.

e.

Consider the following **v** vs. t graph and answer questions 22-26

22. At what time(s) will there be a vertex on the corresponding **d** vs t graph?
     a. t_1 only
     b. t_2 only
     c. t_3 only
     d. t_2 and t_3
     e. t_1 and t_4
23. When is the acceleration zero?
     a. from 0 to t_2
     b. At t_1 and t_4 only
     c. from t_1 to t_4
     d. from t_2 to t_3
     e. from t_3 to t_5
24. When is the velocity negative?
     a. from 0 to t_1
     b. from 0 to t_1 and t_4 to t_5
     c. from t_1 to t_4
     d. from t_2 to t_3
   e. from t_3 to t_5
25. When is the object speeding up?
     a. from 0 to t_1 and t_3 to t_4
     b. from 0 to t_2
     c. from t_1 to t_4
     d. from t_1 to t_2 and t_4 to t_5
     e. from t_1 to t_2 only
26. What doe the shaded region between t=0 and t=t_1 represent?
     a. average velocity from 0 to t_1.
     b. change in velocity from 0 to t_1.
     c. displacement from 0 to t_1.
     d. acceleration from 0 to t_1.
     e. none of the above

27. Which vector equation below correctly matches the vector diagram shown?
    a. D+K=R
    b. D+R=K
    c. K+R=D
    d. D+K+R=0
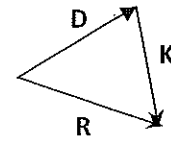
28. A buffalo runs off of a 9.0m high cliff at 8.00m/s. How far from the base of the cliff does it land?
    a. 4.0m
    b. 6.0m
    c. 9.0m
    d. 11.0m
    e. 17m
    f. 26m

29. Car A and Car B are 500.0m apart, facing one another. Car A has an initial velocity of 3.00m/s right. Car B has a constant velocity of 8.00m/s left. At t=0.000s Car A begins to accelerate at 2.00m/s² right. Assuming that Car A starts at the origin, at what position do the cars meet?

    360 m

30. A canon-ball is launched, on level ground, with a speed of 99.0 m/s. The launch angle is 64.5° above positive x.
    a. Find the horizontal distance travelled before landing. 777m
    b. The maximum height reached by the canon-ball. 407m

31. An object travels horizontally off of a 36m high cliff. The object lands 41m from the base of the cliff.
    a. Find the initial velocity. 15 m/s x̂
    b. Find the velocity at impact. 31 m/s [(60×10)° below horizontal]

32. A 2.6kg frozen chicken is launched with a velocity of 32m/s @ 71° above horizontal from the top of a 12m high building.

    a. Find the velocity of the chicken as it lands. 35 m/s [73° below +x]
    b. Find the range of the flight. 68 m

33. A car drives horizontally at 72.0km/h from a 9.0m tall cliff. How far from the base of the cliff does the car land?
    27 m

34. A potato is thrown, on level ground, with a speed of 29.0 m/s. The throw angle is 38.2° above positive x.
    a. Find the horizontal distance travelled before landing. 83.4 m
    b. The maximum height reached by the potato. 16.4 m

35. $\vec{v}_2 = 44$ m/s ; $t_B = 4.5$s

36. t = 7.7s ; $d_x = 54$ m