Physics 211, Fall 2008

Quiz 1, Form: A

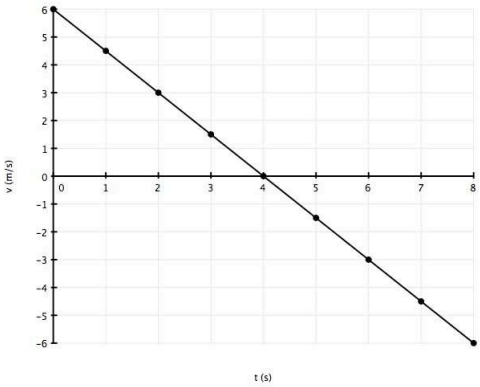
Name: _____

Date: _____

Use $g = 9.8$ m/s^2 for the magnitude of the acceleration of an object in free-fall.

Section 1. Multiple Choice

1. If you toss a ball vertically on the Moon and measure its velocity as a function of time, you might get a graph similar to the one shown below.



What is the acceleration of the ball?

(a) -9.8 m/s^2
(b) -0.75 m/s^2
(c) -1.5 m/s^2
(d) -1.3 m/s^2
(e) -12 m/s^2

2. 1 m = 3.28 ft. A basketball has a volume of 2.00 ft^3. What is its volume in m^3?

(a) 70.8 m^3
(b) 6.58 m^3
(c) 0.187 m^3
(d) 0.612 m^3
(e) 0.0569 m^3

3. A soccer ball, kicked from one player to another player, is displaced $\Delta x = -6$ m and $\Delta y = 8$ m. What distance did the ball travel, assuming it traveled along a straight line between the players?

(a) 7 m
(b) 14 m
(c) 2
(d) 12 m
(e) 10 m

4. Swimmer Jason Lezak helped the Americans win the gold medal in the 4x100 meter freestyle relay at the 2008 Bejing Olympics by swimming the final 100-m in a time of 46.06 s. What was Lezak's average speed, assuming he swims with uniform motion?

(a) 0.461 m/s
(b) 0.921 m/s
(c) 1.09 m/s
(d) 2.17 m/s
(e) None of the above.

5. A car is traveling in the -x direction, when the driver hits the brakes. As she is slowing down, her acceleration is

(a) positive.
(b) negative.
(c) zero.

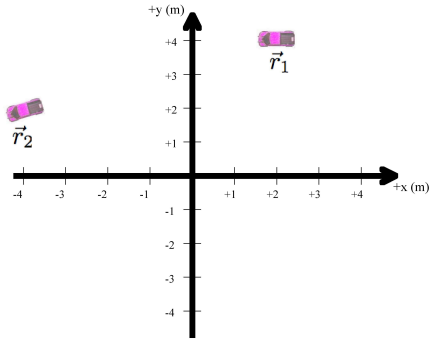
6. A tennis player tosses a ball into the air and lets it fall back to the court. The court is defined to be y=0. The ball leaves her hand at y=1 m, reaches its peak at y=3 m, and falls back to the court. Between the instant it leaves her hand and the instant it lands on the court, the ball's **displacement** is

   (a) –1 m
   (b) 1 m
   (c) –3 m
   (d) 5 m
   (e) –5 m

7. For the tennis ball in the previous question, the **distance the ball travels** between the instant it leaves the player's hand and the instant it hits the court is

   (a) –1 m
   (b) 1 m
   (c) –3 m
   (d) 5 m
   (e) –5 m

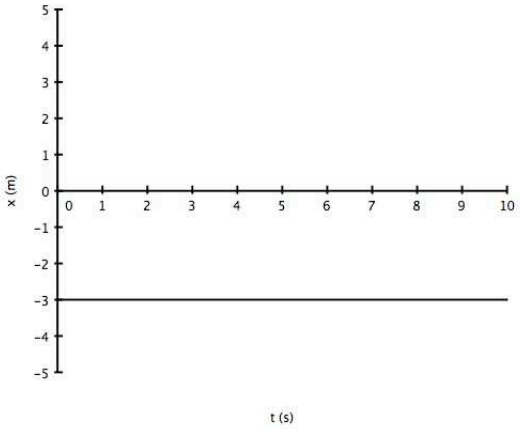
8. A toy car travels from its initial position to its final position as shown below.



   What is the displacement vector of the car?

   (a) $< 2, 4 >$ m
   (b) $< -4, 2 >$ m
   (c) $< -6, -2 >$ m
   (d) $< 6, 2 >$ m
   (e) 6.3 m

9. In the lab, you graphed the position as a function of time for your lab partner as he or she walked back and forth in front of the detector. Suppose that in one particular trial, you obtain the following graph.



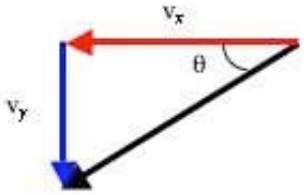
   Your lab partner was

   (a) speeding up while walking in the $+x$ direction.
   (b) slowing down while walking in the $-x$ direction.
   (c) walking with a constant (non-zero) velocity in the $+x$ direction.
   (d) walking with a constant (non-zero) velocity in the $-x$ direction.
   (e) standing at rest.

10. A kayak is drifting on a river. $x = 0$ is defined to be at the dock, and the river flows in the $-x$ direction with a speed of 0.75 m/s. The kayak is at $x = 10$ m when you start your stopwatch. What is the **position** of the kayak when the clock reads 40 s?

    (a) -40 m
    (b) 40 m
    (c) -20 m
    (d) 20 m
    (e) -30 m

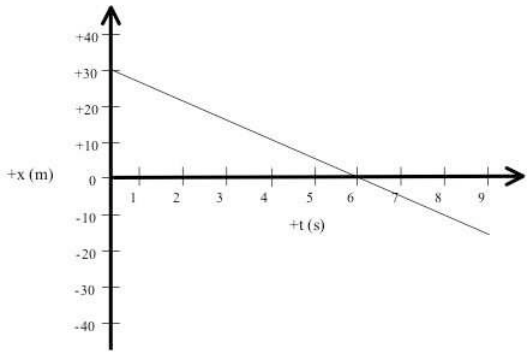
11. A baseball at a certain instant has the velocity shown below.



where $v_x = -30.0$ m/s and $v_y = -20.0$ m/s. What is the angle θ?

(a) 33.7 °
(b) 56.3 °
(c) 41.8 °
(d) 48.2 °
(e) 25.9 °

12. A runner's position vs. time graph is shown below.



The runner is

(a) running with a constant velocity in the $+x$ direction.
(b) running with a constant velocity in the $-x$ direction.
(c) speeding up while running in the $+x$ direction.
(d) slowing down while running in the $-x$ direction.
(e) slowing down while running in the $+x$ direction.

13. The average distance from Earth to Sun is 149,597,870,691 m. Write this number in scientific notation with four significant figures.

(a) 1.496×10^{-9} m
(b) 1.496×10^{-11} m
(c) 1.496×10^{9} m
(d) 1.496×10^{11} m
(e) 1.496×10^{12} m

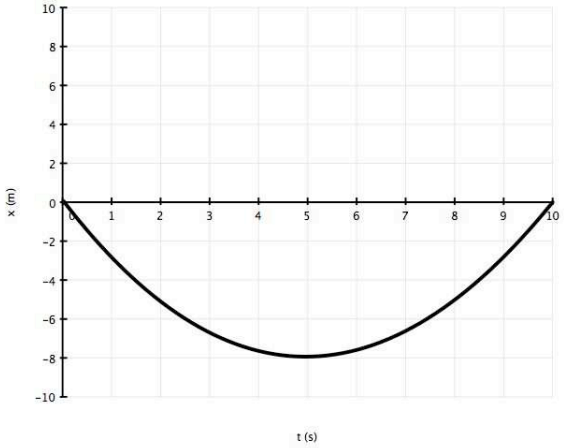
14. In Lab 1, you found that the free-fall time as a function of height for a ball released from rest is given by

$$t = 0.45\sqrt{h}$$

If you double the height at which you drop the ball, by what factor does the free-fall time change?

(a) 2
(b) 4
(c) $\sqrt{2}$
(d) $\frac{1}{\sqrt{2}}$
(e) $\frac{1}{2}$

15. The position vs. time graph for a certain ball rolling on a track is shown below.



At $t = 0$, the initial velocity of the ball is

(a) positive
(b) negative
(c) zero
(d) Velocity cannot be determined from the given graph.

16. You toss a ball vertically, with the +y axis defined to be upward. What is the ball's acceleration at its peak?

(a) zero
(b) -9.8 m/s^2
(c) None of the above.

Section 2. Problem Solving

For each question shown below, you must (1) identify the "class" of problem (like uniform motion, constant acceleration, free-fall, etc.); (2) sketch a picture of the situation described in the problem; (3) write given variables and unknowns; (4) use the appropriate equations; and (5) correctly solve for the unknown(s). Be sure to check your final answer and verify that it makes sense and has correct units.

Your final answer will NOT receive full credit if you do not do the steps above and if your final answer has missing or wrong units.

17. A swimmer has a constant velocity of 2.0 m/s in the $+x$ direction when he stops kicking and just glides. He comes to a stop, 5 s later. (a) How far does the swimmer glide, assuming that he slows down with a constant acceleration? (b) What is his acceleration?

18. A hiking trail goes 800 m in a direction 60 ° S of W (south of west). It then goes 1000 m in a direction 45 ° N of W where it ends at a waterfall. Taking the beginning of the trail as your origin, find the position of the waterfall and write it in vector notation (i.e. $< x, y >$).

Answer Key for Exam A

Section 1. Multiple Choice

1. (c)
2. (e)
3. (e)
4. (d)
5. (a)
6. (a)
7. (d)
8. (c)
9. (e)
10. (c)
11. (a)
12. (b)
13. (d)
14. (c)
15. (b)
16. (b)