Physics 6A Practice Midterm #1

1. You drive your car at a speed of 40 km/hr for 1 hour, then slow down to 30 km/hr for the next 20 km. How far did you drive, and what was your average speed?
   a) 60 km at 35 km/hr
   b) 60 km at 36 km/hr
   c) 65 km at 38 km/hr
   d) 70 km at 36 km/hr

2. A speeding car is traveling at 40 m/s down a straight road. The driver slams on the brakes, and the car comes to a complete stop in 5 seconds. Assuming constant acceleration, how far did the car travel while braking?
   a) 50 m
   b) 80 m
   c) 100 m
   d) 200 m

3. A rock is thrown upward from the top of a 300-meter high cliff. The initial speed is 10 m/s. If we ignore air resistance, how long does it take for the rock to hit the ground below?
   a) 7.8 s
   b) 8.9 s
   c) 9.8 s
   d) 12.2 s

4. Two rocks are thrown with the same initial speed from the top of a 300-meter high cliff. Rock A is thrown upward and Rock B is thrown downward. If we ignore air resistance, which of the following is true about the speeds of the rocks just before they hit the ground?
   a) Rock A is faster.
   b) Rock B is faster.
   c) Rock A and Rock B have equal speeds.
   d) There is not enough information to determine the answer.

5. The radius of Venus is about 6000 km. Assuming Venus is spherical, what is its approximate volume? (V = 4πR^3/3 for a sphere of radius R)
   a) 9.17 * 10^{10} km^3
   b) 9.05 * 10^{14} m^3
   c) 9.17 * 10^{18} m^3
   d) 9.05 * 10^{26} cm^3

6. An airplane is flying East at a speed of 300 km/hr. A gust of wind blows in a Northwest direction at 50 km/hr. Find the new speed and direction of the plane.
   a) 240 km/hr in a direction 17° North of East
   b) 240 km/hr in a direction 17° East of North
   c) 267 km/hr in a direction 8° North of East
   d) 350 km/hr in a direction 8° North of East

7. Bob has 2 pet rocks. Their names are Elvis and Pedro. Bob drops Pedro from a high bridge to the river below. When Pedro has fallen 4m, Bob drops Elvis. As the rocks continue their free-fall, what happens to their separation distance?
   a) The distance increases.
   b) The distance decreases.
   c) The distance stays the same.
   d) There is not enough information to determine the answer.
8. A ball is dropped from a train moving on a straight level track at a speed of 50 m/s. The ball is initially 5m above the ground. If air resistance can be ignored, how far does the ball travel horizontally before it hits the ground?
   a) 25.3 m  
   b) 37.2 m  
   c) 50.5 m  
   d) 62.0 m

9. A soccer ball is kicked at an angle of 30° above the horizontal on a level field. The ball lands 45m from where it was kicked. What was the initial speed of the ball?
   a) 9.8 m/s  
   b) 14.5 m/s  
   c) 22.6 m/s  
   d) 28.2 m/s

10. A golf ball is launched at an angle with an initial speed of 30 m/s, at an angle of 50° above the horizontal. The ball lands on a green that is 5m above where the ball was struck. How far has the ball traveled in the horizontal direction by the time it lands?
   a) 86.0m  
   b) 4.4m  
   c) 43.0m  
   d) 133.8m

11. A golf ball is launched at an angle with an initial speed of 30 m/s, at an angle of 50° above the horizontal. The ball lands on a green that is 5m above where the ball was struck. Find the velocity of the ball just before it lands.
   a) 28.4 m/s at a 47° angle above the horizontal  
   b) 28.4 m/s at a 47° angle below the horizontal  
   c) 30.0 m/s at a 50° angle above the horizontal  
   d) 40.1 m/s at a 50° angle below the horizontal

12. A jet plane comes in for a downward dive as shown in Figure 3.39. The bottom part of the path is a quarter circle having a radius of curvature of 350m. According to medical tests, pilots lose consciousness at an acceleration of 5.5g. At what speed will the pilot black out for this dive?
   a) 137 m/s  
   b) 44 m/s  
   c) 1,900 m/s  
   d) 18,700 m/s

13. Two children are on a merry-go-round which spins at a rate of 1 revolution every 5 seconds. Bobby is standing at a position that is 0.75m from the center, and Cindy is 1.50m from the center. Which statement is true about their linear speeds?
   a) Their speeds are equal  
   b) Bobby’s speed is twice Cindy’s speed.  
   c) Cindy’s speed is one-and-a-half times Bobby’s speed.  
   d) Cindy’s speed is twice Bobby’s speed.

Answers: 1)b  2)c  3)b  4)c  5)d  6)c  7)a  8)c  9)c  10)a  11)b  12)a  13)d