

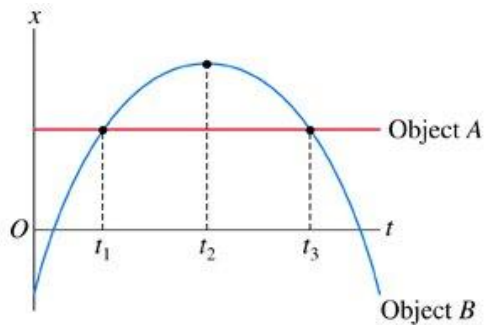
Name: _____

PHYSICS 2210 – EXAM 1

SUMMER 2010

Please write your answers to the multiple choice questions on the blanks in front of the numbers. Each multiple choice question is worth 2 points, questions 6 – 11 are worth 5 points each, and questions 12 and 13 are worth 10 points each. **Your work must be shown in order to receive credit for problems 6 - 13.** Be sure to include appropriate units on your answers!

- _____ 1. The accompanying figure shows the position versus time graphs of two objects, A and B. When do the two objects have the same velocity?



- a. times t_1 and t_3
- b. time t_2 only
- c. time t_3 only
- d. time t_1 only

- _____ 2. Two displacement vectors, \mathbf{G} and \mathbf{H} , have magnitudes $G = 9$ m and $H = 4$ m. Which of the following could NOT be the magnitude of the vector sum $\mathbf{G} + \mathbf{H}$?

- a. 1 m
- b. 9 m
- c. 5 m
- d. 13 m

- _____ 3. A golf ball is hit so that it leaves the ground at 60° above the horizontal and feels no air resistance as it travels. Which of the following statements about the subsequent motion of this ball while it is in the air is true?

- a. Its acceleration is zero at its highest point.
- b. Its speed is zero at its highest point.
- c. Its velocity is zero at its highest point.
- d. Its acceleration is always 9.8 m/s^2 downward.
- e. Its forward acceleration is 9.8 m/s^2 .

- _____ 4. Two identical stones are dropped from rest and feel no air resistance as they fall. Stone A is dropped from height h , and stone B is dropped from height $2h$. If stone A takes time t to reach the ground, stone B will take time:

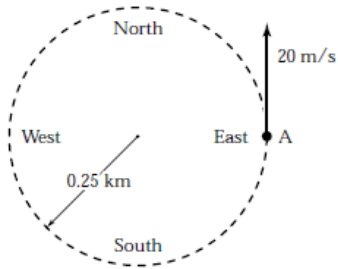
- a. $2t$
- b. $t/2$
- c. $4t$
- d. $t/\sqrt{2}$
- e. $\sqrt{2} t$

- _____ 5. A person runs from home to the store and back again, a total distance of 1.0 mile. The trip, including the stop at the store, takes 20 minutes. The person's average velocity is:

- a. 3 mi/hr
- b. 0 mi/hr
- c. 6 mi/hr

For the following problems, show your work and please circle your answers. Keep in mind partial credit is given for problems that are partially correct. In order to give partial credit, I need to know what equations you are using. Write down your equations and show your steps in solving the problems. Be sure to include appropriate units.

6. A car travels counterclockwise around a flat circle of radius 0.25 km at a constant speed of 20 m/s. When the car is at point A as shown in the figure, what is the car's centripetal acceleration? Please give both the magnitude and the direction. (Answer: 1.6 m/s^2 , West)



7. Consider two vectors: $\mathbf{A} = 1.0\mathbf{i} + 5.0\mathbf{j}$ and $\mathbf{B} = 4.0\mathbf{i} - 1.0\mathbf{j}$. What are the magnitude and direction of $2\mathbf{A} - 3\mathbf{B}$? (Answer: 16, 128°)

8. Copper has a density of 8.92 g/cm^3 . What is the density in kg/m^3 ? (Answer: 8920 kg/m^3)

9. The acceleration of a rocket ship obeys the equation $a(t) = (2.6\text{m/s}^3)t + 1.0\text{m/s}^2$. Find the speed of the ship at $t = 8.0 \text{ s}$ if it is at rest at $t = 0$. (Answer: 91 m/s)

10. A skier starts at rest at the top of a smooth, frictionless incline. After 7.5 seconds, the skier has traveled 65 meters down the incline. What is the angle of the incline? (Answer: 14°)

11. A racquetball strikes a wall with a speed of 30 m/s and rebounds with a speed of 26 m/s. The collision takes 20 ms (milliseconds). What is the average acceleration of the ball during the collision? (Answer: 2800 m/s^2)

12. A rock is thrown from the roof of a building, with an initial velocity of 10.0 m/s at an angle of 30.0° above the horizontal. The rock is observed to strike the ground 43.0 m from the base of the building. What is the height of the building? (Answer: 96.0 m)

13. An airplane undergoes the following displacements: First, it flies 66 km in a direction 30 east of north. Next, it flies 49 km due south. Finally, it flies 100 km 30 north of west. Determine how far the airplane ends up from its starting point and in what direction? (*Answer: 79 km, 133°*)