



First Exam

Part 1:***(1 point each)***

For the following questions, please circle the correct answer to the nearest number.

1. A runner runs around a track consisting of two parallel lines **96 m** long connected at the ends by two semicircles with a radius of **49 m**. She completes one lap in **100** seconds. What is her average velocity?

- A) 2.5 m/s B) 5.0 m/s C) 10 m/s D) 0 m/s E) 3.0 m/s

2. Which one of the following quantities is a **vector quantity**?

- A) the age of the earth B) the mass of a football
C) the earth's pull on your body D) the temperature of an iron bar
E) the number of people attending a baseball game

3. An object is thrown upwards with a speed of **16 m/s**. How long does it take it to reach a height of **7.0 m** on the way up?

- A) 0.52 s B) 1.2 s C) 2.4 s D) 3.1 s E) 4.2 s

4. Town **A** lies **20 km north** of town **B**. Town **C** lies **13 km west** of town **A**. A small plane flies directly from town **B** to town **C**. What is the **displacement** of the plane?

- A) 33 km, 33° north of west B) 19 km, 33° north of west
C) 24 km, 57° north of west D) 31 km, 57° north of west
E) 6.6 km, 40° north of west

5. A car travels in a straight line covering a total distance of **90.0 miles** in **60.0 minutes**. Which one of the following statements concerning **this situation** is necessarily **true**?

- A) The velocity of the car is **constant**.
B) The acceleration of the car must be **non-zero**.
C) The first **45 miles** must have been covered in **30.0 minutes**.
D) The speed of the car must be **90.0 miles per hour** throughout the entire trip.
E) The average velocity of the car is **90.0 miles per hour** in the direction of motion.

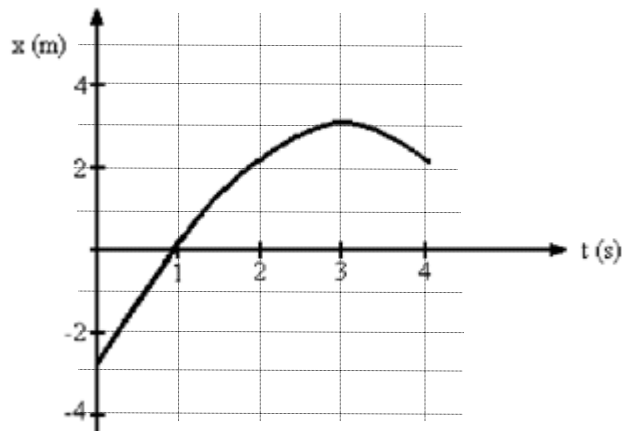
6. During the first **18 minutes** of a **1.0-hour** trip, a car has an average speed of **11 m/s**. What must the average speed of the car be during the last **42 minutes** of the trip be if the car is to have an average speed of **21 m/s** for the entire trip?

- A) 21 m/s B) 22 m/s C) 25 m/s D) 27 m/s E) 29 m/s

7. For which one of the following situations will the **path length** equal the magnitude of the **displacement**?

- A) A jogger is running around a circular path.
B) A ball is rolling down an inclined plane.
C) A train travels 5 miles east; and then, it stops and travels 2 miles west.
D) A ball rises and falls after being thrown straight up from the earth's surface.
E) A ball on the end of a string is moving in a vertical circle.

8. The figure below represents the position of a particle as it travels along the **x-axis**. What is the magnitude of the average velocity of the particle between **t = 1 s** and **t = 4 s**?



- A) 0.50 m/s B) 0.67 m/s C) 1.0 m/s D) 1.3 m/s E) 1.5 m/s

9. When the outdoor emergency warning siren at Prince Sultan University was tested, the sound from the siren took **7.0 s** to reach her house located **2.38 km** from the school. What is the speed of sound in air?

- A) 240 m/s B) 340 m/s C) 440 m/s D) 540 m/s E) 640 m/s

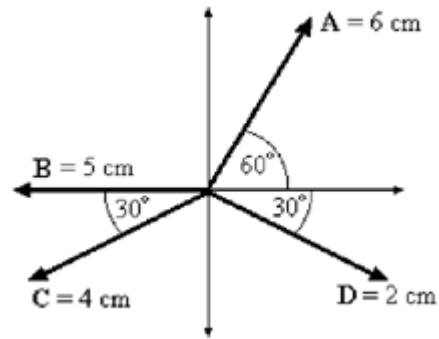
10. The velocity of a particle as a function of time is given by $v(t) = (2.3 \text{ m/s}) + (4.1 \text{ m/s}^2)t - (6.2 \text{ m/s}^3)t^2$. What is the average acceleration of the particle between **t = 1.0 s** and **t = 2.0 s**?

- A) -14.1 m/s^2 B) -14.5 m/s^2 C) 14.5 m/s^2 D) 14.1 m/s^2
E) 12 m/s^2

Part 2:**(3 points each)**

Please read each question carefully and show your work in the space provided. Your answer should include with the appropriate units.

- 1.. Refer to the figure below. Find the net resultant vector



Answer_____

2. A ball is thrown vertically up at time $t=0.0$ from a point on a roof **70 m** above the ground. The ball rises and then strikes the ground. The initial velocity of the ball is **31.9 m/s**. Consider all quantities as positive in the upward direction. Find the time when the ball strikes the ground.

Answer_____