

Name: _____ Total Points: _____
(Last) (First)

Physics 201

Exam 1

Write also your name in the
appropriate box of the scantron

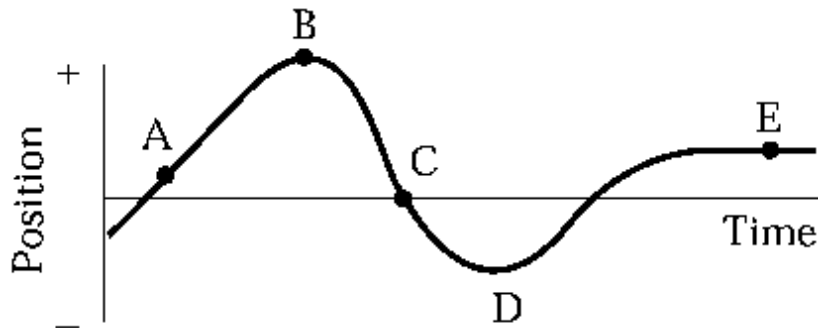
Multiple choice questions [70 points]

Answer all of the following questions. Read each question carefully. **Fill the correct bubble on your scantron sheet.** Each question has exactly one correct answer. All questions are worth the same amount of points.

1. A car starts from point A, goes 50 km in a straight line to point B, immediately turns around, and returns to A. The time for this round trip is 2 hours. The magnitude of the average velocity of the car for this round trip is:
 - A. 0 km/h
 - B. 50 km/h
 - C. 100 km/h
 - D. 200 km/h
 - E. Cannot be calculated without knowing the acceleration
2. Still referring to the situation described in the previous question, what is the average speed of the car?
 - A. 0 km/h
 - B. 50 km/h
 - C. 100 km/h
 - D. 200 km/h
 - E. Cannot be calculated without knowing the acceleration
3. A ball rolls up a slope. At the end of 3 seconds its velocity is 20 cm/s; at the end of 8 seconds its velocity is 0 cm/s. What is the magnitude of the average acceleration (in cm/s^2) from the instant 3s to the instant 8s?
 - A. 2.5
 - B. 4.0
 - C. 5.0
 - D. 6.0
 - E. 6.67

4. As a rocket is accelerating vertically upward at 9.8 m/s^2 near Earth's surface, it releases a projectile. Immediately after release the acceleration (in m/s^2) of the projectile is:
- A. **9.8 down**
 - B. **0**
 - C. **9.8 up**
 - D. **19.6 up**
 - E. None of the above

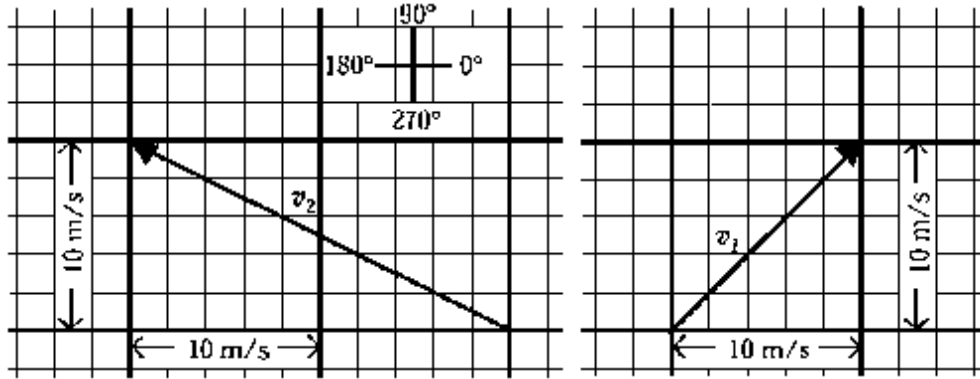
5.



An object moves along the horizontal axis as shown on the diagram. At which point or points is its acceleration zero?

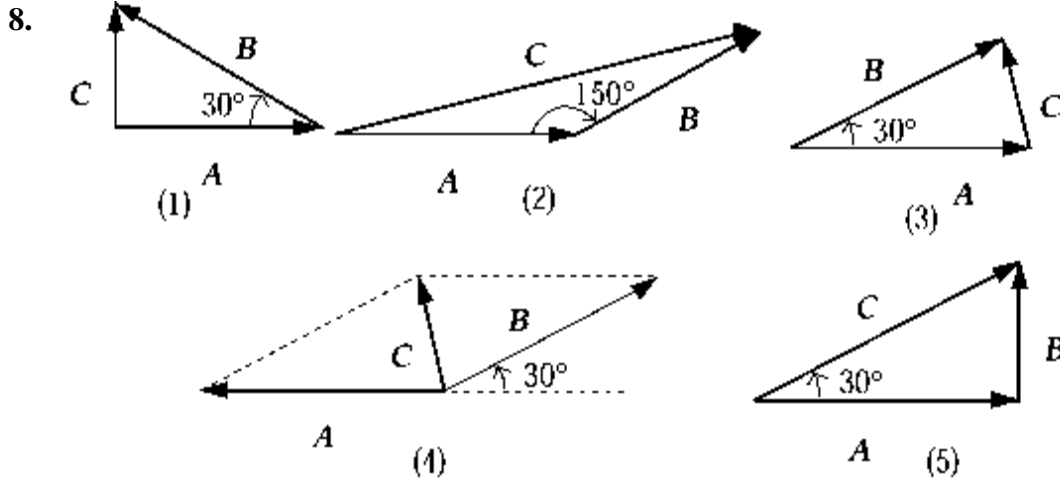
- A. C only
 - B. E only
 - C. B and D
 - D. A and E
 - E. B, D and E
6. A particle initially moving at 4.0 m/s along the x axis is uniformly accelerated at 3.0 m/s^2 along the y axis for 2.0 s . The final speed of the particle is
- A. **4.0 m/s**
 - B. **6.3 m/s**
 - C. **7.2 m/s**
 - D. **8.4 m/s**
 - E. None of these is correct.

7.



The instantaneous velocity of a particle at t_1 is represented by v_1 , and at t_2 by v_2 . Each heavy graph division is 10 m/s on each side. Let $t_1 = 1$ s and $t_2 = 7$ s. Then the average acceleration of the particle between time t_1 and t_2 is

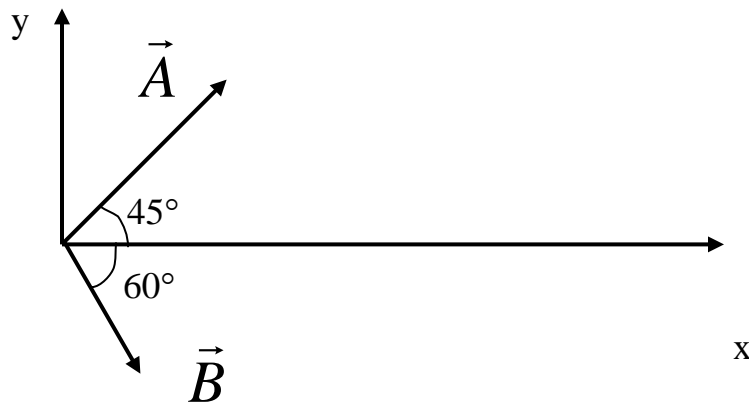
- A. 18.2 m/s² at 0°
- B. 15.0 m/s² at 180°
- C. 6.06 m/s² at 98°
- D. 5.00 m/s² at 180°
- E. 3.03 m/s² at 98°



The angle between vectors A and B is 30° , and their sum is C . Which vector diagram correctly describes the vectors A , B , and C ?

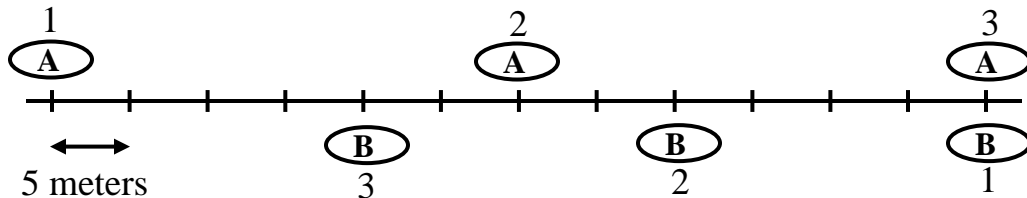
- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

9. In the diagram, \vec{A} has magnitude 12 m and \vec{B} has magnitude 8 m. The x component of $\vec{A} - \vec{B}$ is about



- A. 1.56 m
- B. 4.0 m
- C. 4.5 m
- D. 14.4 m
- E. 20 m

10. Two objects, A and B, move with constant speed relative to a straight line. The strobe diagram shows the positions of the objects at instant 1-3, separated by one-second time intervals. (Note that each tick mark on the diagram represents 5 meters.)



At instant 2 what is the direction of the instantaneous velocity of object A in the frame of reference of object B?

- A. to the left
 - B. to the right
 - C. Undefined: the velocity is zero
11. Still referring to the problem of the previous question, at instant 2, what is the magnitude of the instantaneous velocity of object A in the frame of reference of object B?
- A. 0 m/s
 - B. 10 m/s
 - C. 20 m/s
 - D. 30 m/s
 - E. 50 m/s

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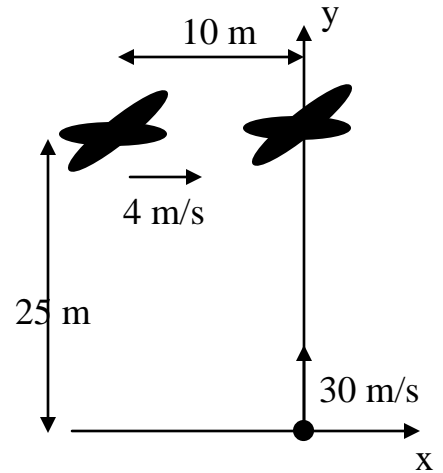
12. A girl on a merry-go-round moves horizontally in a circle at constant speed. She travels one fourth of a revolution, a distance of 25m along the circumference of the circle, in 5.0s. The magnitude of her acceleration is

- A.** 0.31 m/s^2
- B.** 1.3 m/s^2
- C.** 1.6 m/s^2
- D.** 3.9 m/s^2
- E.** 6.3 m/s^2

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PROBLEM [40 points]

A boy hurls a stone with a sling shot at a flying line of Canada geese. The stone is thrown at 30m/s vertically upward exactly when the first of the line of geese is overhead ($t=0$). The geese fly 4m/s, 10 m apart at an altitude of 25m (counted from the position of the stone at $t=0$). Take $g=10 \text{ m/s}^2$



- 1). [10 pts] If the boy misses the geese, when does the stone reach its maximum height?
- 2). [15 pts] When does the stone cross the path of the geese (make sure that you count all possible crossings)?
- 3). [15 pts] Does the stone hit a goose; if so which one (first goose is #1)?