

Midterm Exam 01 (2016 Spring)

PHYS 203A: College Physics

Date: 2016 Feb 19

(Name)

(Signature)

Instructions

1. Seating direction: Please be seated on odd-numbered seats.
2. Total time = 50 minutes.
3. There are 8 questions in this exam.
4. Equation sheet is provided separately.
5. To be considered for partial credit you need to show your work in detail and organize it clearly.
6. A simple calculator (with trigonometric functions) is allowed.
7. Use of mobile phones is strictly prohibited. It should stay out of reach during the exam.

1. **(10 points.)** Consider the mathematical expression

$$x = vt + \frac{1}{2!}at^2 + \frac{1}{3!}bt^3 + \frac{1}{4!}ct^4, \quad (1)$$

where x is measured in units of distance and t is measured in units of time. Determine the dimension of the physical quantity c .

2. **(10 points.)** The x component of a displacement vector $\vec{\mathbf{r}}$ is -40.0 m , while its y component is -30.0 m .
- (a) Find the magnitude of $\vec{\mathbf{r}}$.
 - (b) Find the direction of $\vec{\mathbf{r}}$.

3. **(10 points.)** A golfer takes two strokes to putt a golf ball into a hole. On the first stroke, the ball moves 4.0 m at an angle 60° East of North. On the second, it moves 3.0 m at an angle 70° South of East. If the golfer had instead hit the ball directly into the hole on the first stroke, what would have been the magnitude and direction of the ball's displacement?

4. (**10 points.**) A small fish is dropped by a pelican that is rising steadily at 6.0 m/s when it is 50.0 m above the ground. How much time later does the fish hit the water?

5. **(10 points.)** A truck covers 44.0 m in 2.00 s while smoothly slowing down at the rate of 3.00 m/s^2 . Find its final velocity.

6. (10 points.) A speeder passes a parked police car at 30.0 m/s . The police car starts from rest, immediately after the speeder passes, with a uniform acceleration of 2.0 m/s^2 . How far does the speeder get before being overtaken by the police car?

7. **(10 points.)** A river is flowing with respect to ground with velocity 2.0 m/s . A boat can move, in still water, with a speed of 6.0 m/s . The banks of the river are separated by a distance of 200.0 m . The boat is moving, with respect to river, with velocity 6.0 m/s aimed right across the river. The boat gets drifted. How far down the river will the boat be drifted?

8. **(10 points.)** A batter hits a ball with an initial velocity 30.0 m/s at an angle 45° above the horizontal. The ball is 1.0 m above the ground at the time of hit. There is 10.0 m high fence, which is a horizontal distance 100.0 m away from the batter. Determine the vertical distance of the ball when it reaches the fence. Thus, analyze whether the ball clears the fence.