

Phys 201 – First Midterm Test
February 12, 2020
50 minutes

Professor: Dr. Edward J. Brash

Rules and Regulations:

1. Calculators, with memory cleared, are permitted.
2. You may bring as many pencils, pens, and erasers with you as you like.
3. You may bring 1 (one) 8.5" x 11" piece of paper with formulas (both sides), brief explanations, and diagrams. You may NOT have any solved problems from the homework on the formula sheet.
4. No other material is permitted.
5. You must complete questions 1 and 2, and then you have a CHOICE of completing either of questions 3 or 4. Indicate below which of the final two questions you have completed.
6. Thus, a fully completed exam consists of 3 questions where you should present full solutions. The full solution questions are worth 10 points each (30 points total).
7. You should complete your solutions to the full solution questions on the exam paper itself.
8. Your solutions to the full solution problems should, in general, contain a combination of diagrams, equations, and English word sentences explaining your strategy and thought process.
9. In any problems involving gravity, use $g=9.80\text{m/s}^2$, if necessary.

STUDENT NAME: _____

STUDENT ID NUMBER: _____

SIGNATURE: _____

QUESTIONS COMPLETED: 1, 2, and _____

1. A person walks first at a **constant speed** of 5.20 m/s along a straight line from point A to point B and then back along the line from B to A at a **constant speed** of 3.50 m/s.

(a) Draw a diagram of this situation and indicate the coordinate system that you will use to solve the problem.

(b) What is her average speed over the entire trip? Explain your answer!

(c) What is her average velocity over the entire trip? Explain your answer!

Hint: It is NOT necessary to know the distance between points A and B to solve this problem.

2. A car accelerates at a rate of 4.50m/s^2 , from rest, to a final velocity of 35.0m/s . At this exact moment in time, the driver notices a police car at the side of the road, and IMMEDIATELY decelerates at a constant (but different!) rate to a velocity of 20.0m/s . The TOTAL distance traveled by the care from start to finish is 160m .

- a) What is the distance traveled by the car during the initial acceleration?
- b) How much distance is remaining (of the original 160m) for the “deceleration” phase?
- c) What is the acceleration of the car during the “deceleration” phase?

3. A student on the golf team is making an approach shot to an elevated green, from the fairway. The level of the green is 20m above the level of the fairway. A perfect shot should travel 150m horizontally. The student chooses a seven iron for the shot, which she knows will launch the golf ball at an elevation of 35 degrees.
- (a) Draw a diagram of this situation and indicate the coordinate system to be used.
 - (b) With what initial speed must the golf ball be launched in order to make the perfect shot?
 - (c) What is the total time of flight of the golf ball?

4. A small plane flies at 250 km/h in still air. The wind blows directly out of the north at 58 km/h.

The pilot wishes to fly directly to a city that is directly north-east of the airport from which he takes off.

Show that the angle (north of east) at which he should head is plane is given by the solution to the following equation:

$$\cos(\theta) = \sin(\theta) - 58/250$$

(Incidentally, the solution to this equation for this problem is 54.4 degrees).

