

PHYS 115 Midterm Exam #1 – Alternative Version

Description

This set of 1 statement of commitment to academic integrity and 8 questions is the first midterm exam for PHYS 115 Fall 2020 at the University of Saskatchewan.

30% of the exam mark is based on the answers for all 8 questions submitted through WebAssign. All 8 questions are weighted equally.

70% of the exam mark is based on the solutions for the 4 problems (questions 6 through 9) that are submitted through Canvas. All 4 solutions are weighted equally.

Instructions

Answers for all questions need to be submitted in WebAssign. For each of questions 6 through 9, in addition to submitting your answers in WebAssign, write the complete solution, **including a diagram**, using the problem-solving method discussed in class. **Keep extra decimal places throughout your calculations, and then round-off your final answer to three significant figures**. Submit your answer to each question in WebAssign.

When you have finished the entire exam, scan your written work for questions 6 through 9 and submit a single multi-page PDF file using the link in the Canvas site for your section.

Your WebAssign submission is due no later than 90 minutes after the questions become available and your Canvas submission is due no later than 120 minutes after the questions become available. LATE SUBMISSIONS WILL NOT BE ACCEPTED.

1. - UofS-P115-P117-Honour [4820285]

On my honour, I pledge that I will not give or receive aid during this assessment. I understand that I am expected to complete this assessment with no communication with other persons and no resource material other than the PHYS 115/117 Formulae sheet. I recognize that it is my responsibility to uphold academic integrity and I agree to follow the rules of this assessment and the guidelines laid forth in the policies of the University of Saskatchewan. Furthermore, I fully understand that disciplinary action may be taken against me if I am discovered to have communicated with another person or to have used an internet resource.

 Yes, I understand and agree.

2. - MT1-A-1 [4816538]

You decide that you want to walk a distance equal to the circumference of the Earth. Which one of the following is the best estimate of the order of magnitude of the number of steps required? (The length of a step for an average person is about 0.6 m and the radius of the Earth is 6.38×10^6 m.)

- 10^5 steps 10^8 steps 10^{11} steps 10^{15} steps 10^{20} steps

3. - MT1-A-7 [4820251]

In a particularly odd situation, the acceleration of an object that is moving in one-dimension along the x -axis has an acceleration that depends on its position x and is given by the equation $a = Cx^2$. What must be the dimensions of the quantity C ?

- $L T^2$
 $L^{-2} T^{-2}$
 $L^{-1} T^{-2}$
 $L^{-1} T^2$
 $L T^{-2}$

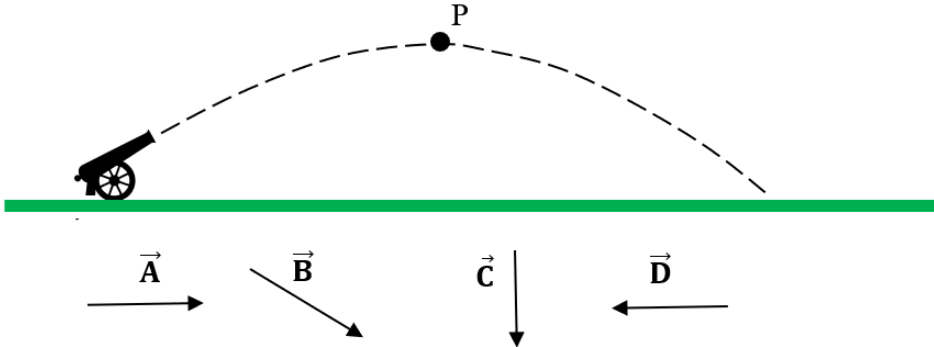
4. - MT1-A-4 [4816599]

A ball is kicked straight up in the air. Air resistance effects can be neglected. Which one of the following statements is correct regarding the ball's speed after it is no longer in contact with the kicker's foot?

- The ball's speed increases linearly as the ball approaches maximum height.
 The ball's speed increases rapidly at first, and then more and more slowly as the ball approaches maximum height.
 The ball's speed decreases linearly to zero as the ball approaches maximum height.
 The ball's speed increases slowly at first, and then more and more rapidly as the ball approaches maximum height.
 The ball's speed is constant throughout its motion.

5. - MT1-A-8 [4820254]

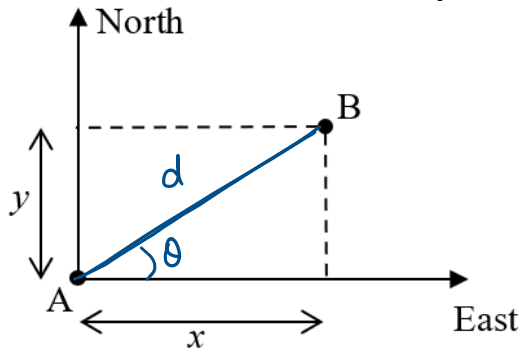
A cannonball is flying through the air in the parabolic path shown in the diagram. Air resistance can be neglected. The point P is the highest point in the path. Which one of the vectors below best represents the direction of the acceleration, if any, of the cannonball at point P?



- There is no acceleration of the cannonball at point P.
- Vector \vec{D}
- Vector \vec{A}
- Vector \vec{B}
- Vector \vec{C}

6. - MT1-B-6 [4820256]

City B is located $x = 167$ km East, and $y = 161$ km North of city A, as shown in the diagram.



(a) What is the distance between city A and city B? 232 km

(b) In what direction would a plane fly to get from city A to city B? (Give your answer in degrees as the counter-clockwise angle from the East direction.) 44°

7. - MT1-B-4 [4816610]

In a particular cycling road race along a perfectly straight road, there is a flat portion followed by a hill climb to the finish line. A cyclist starts from rest at the beginning of the flat portion and accelerates at 0.168 m/s^2 for 72.0 s . The cyclist then maintains constant velocity for an additional 1 hour and 15 minutes ($4.50 \times 10^3 \text{ s}$), which brings the cyclist to the start of the hill climb. The cyclist's velocity immediately drops to 7.15 m/s and the cyclist maintains this velocity for 1.53×10^3 seconds, reaching the top of the hill and the finish line.

(a) As part of your written submission, sketch the graph of the cyclist's velocity versus time for the entire race.

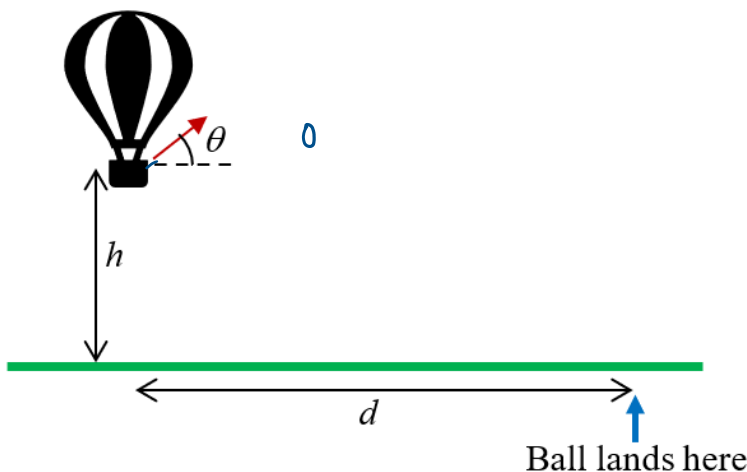
(b) Calculate the length of the entire race from start to finish. Express your answer in km.
68.4 km

8. - MT1-B-3 [4816587]

A race car must achieve an average speed of 255 km/h while travelling a total distance of $2,480 \text{ m}$ to qualify for a race. If a particular car travels the first half of the distance at an average speed of 221 km/h , what minimum average speed must it have while travelling the second half of the distance to qualify? 301 km/h

9. - MT1-B-7 [4820257]

A person in a balloon gondola is a vertical distance h above the horizontal ground. She throws a ball with an initial speed v_0 at an angle $\theta = 54.0^\circ$ to the horizontal as shown in the diagram. The ball lands a horizontal distance $d = 50.0 \text{ m}$ from the balloon's position. The time of flight of the ball is $t = 5.48 \text{ s}$. Air resistance can be neglected in the flight of the ball.



(a) Calculate the initial speed v_0 with which the ball was thrown. 15.5 m/s

(b) Calculate the height h from where the ball was thrown. 78.3 m