

MIDTERM EXAM-1 – v1

PHYS 201 (Spring 2015), 02/16/15

Name:

Lab-Sect. no.:

Signature:

In taking this exam you confirm to adhere to the Aggie Honor Code:
“An Aggie does not lie, cheat, steal or tolerate those who do.”

Duration: 50 minutes

Show all your work for full/partial credit!

Include the correct units in your final answers for full credit!

Unless otherwise stated, quote your results in SI units!

1.) *Multiple Choice*

(18 pts.)

For each statement below, circle the correct answer (TRUE or FALSE, no reasoning required).

- (a) In projectile motion, the acceleration at the highest point of the motion is equal to \vec{g} .
TRUE FALSE
- (b) The magnitude of the sum of two vectors, $\vec{C} = \vec{A} + \vec{B}$, cannot be larger than the sum of the magnitudes of \vec{A} and \vec{B} .
TRUE FALSE
- (c) In uniform circular motion, the centripetal acceleration is directed radially outward.
TRUE FALSE
- (d) If you are sitting in your car and accelerate, there is a force on you that pushes you back into the seat.
TRUE FALSE
- (e) If an elevator is moving downward at constant velocity, your apparent weight in the elevator is smaller than your true weight.
TRUE FALSE
- (f) When a car starts from rest at constant acceleration, its distance covered after 10 seconds is 2 times as large as the distance covered after the initial 5 seconds.
TRUE FALSE

No.	Points
1	
2	
3	
4	
5	
Sum	

2.) *Projectile Motion*

(10+4+6 pts.)

A student hits a tennis ball toward a practice wall which is 12 m away (horizontally). The ball is launched one meter above the horizontal ground at an angle of 35° above the horizontal. The ball strikes the wall 4 m above the ground.

- (a) Calculate the initial speed of the tennis ball.
- (b) How long is the ball in the air (between launch and impact)?
- (c) Find the x and y components of the ball's velocity just before it hits the wall.

3.) *Relative Velocity*

(20 pts.)

A river (230 m wide) is flowing due south with a current of 5 mph. A ferry, which has a still water speed of 12 mph, needs to cross the river due east. (1 m/s=2.25 mph)

- (a) At what angle relative to due east should the captain aim his ferry?
- (b) How long does it take the ferry to cross the river?

4.) *Normal Force in Elevator*

(4+8+8 pts.)

An elevator cabin has a scales implemented into its floor. A person steps into the elevator and reads off his weight of 800 N . Then the elevator starts to move at a constant acceleration, and the scales is showing a reading of 720 N .

- (a) Draw a free-body diagram of the person.
- (b) How large is the initial acceleration of the elevator, and what is its direction (up or down)?
- (c) Now the elevator is decelerating at $a=+2\text{ m/s}$. What is the scales reading?

5.) *Tension Force in Atwood's Machine*

(8+10+4 pts.)

Two weights ($m_1=5\text{ kg}$, $m_2=4\text{ kg}$) are attached to an ideal rope which passes over an ideal pulley (massless, no friction).

- (a) Draw the free-body diagram of each box.
- (b) Find the acceleration of each of the boxes.
- (c) Find the tension force in the rope.