

Name : _____

EXAM 1
PHYSICS 2A – Spring 2016

**MAKE SURE TO SHOW ALL WORK IN COMPLETE DETAIL. NO CREDIT WILL
BE GIVEN IF NO WORK IS SHOWN. EXPRESS ALL ANSWERS IN SI UNITS.**

1. Briefly answer the following short-answer questions: (1 pts each)

- a) What is the associative law of vectors?

- b) How do you find the acceleration graphically?

- c) Is the magnitude of the average velocity equal to the average speed?

- d) Is the magnitude of the velocity equal to the speed?

- e) What is the unit of length in the English system of Units?

- f) For what condition can we apply the kinematic equations?

- g) What is a reference frame?

- h) What is an object in free-fall?

- i) List one factor that influences the value of gravity.

- j) What does acceleration measure?

- k) What is a unit-vector?

2. A plane, diving with constant speed at an angle of 53° with the vertical, releases a package at an altitude of 730 m. The package strikes the ground 5.0 s after released. (10 pts)
- a) Calculate the speed of the plane.
 - b) Calculate the horizontal distance traveled by the projectile.
 - c) Calculate the speed of the projectile when it strikes the ground.

3. An air balloon is moving upward at a constant speed of 3 m/s. Suddenly a passenger realizes that she left her camera on the ground. A friend picks it up and throws it upward at 15 m/s at the instant the passenger is 4 m above the ground. (10 pts)
- a) Calculate the position of the passenger when she catches the camera.
 - b) Calculate the velocity of the camera when passenger catches it.
 - c) If the passenger misses catching camera on the way up, calculate the maximum height reached by the camera.

4. A jet is flying at 500 mi/hr at 30° west of north. 30.0 s later it is heading due south at 650 mi/hr. (5 pts)
- Calculate \mathbf{a}_{ave} in unit-vector notation. Express answer in SI units.
 - Calculate the magnitude and direction of \mathbf{a}_{ave} .

5. A particle is in uniform circular motion about the origin of an xy coordinate system, moving clockwise with a period of 10.0 s. At one instant, its position vector (measured from the origin) is $\vec{r} = -(4.00m)\hat{i} + (3.00m)\hat{j}$. At that instant calculate: (10 pts)
- The speed of the particle.
 - The velocity vector in unit-vector notation.
 - The acceleration vector in unit-vector notation.