

Physics 1301, Exam 1 Review

The following is a list of things you should *definitely* know for the exam, however, the list *is not* exhaustive. You are responsible for all the material covered in the assigned readings, lectures, and homework assignments.

- Know the difference between speed, velocity, and acceleration.
- Know how to find the components of a vector.
- Know how to add and subtract vectors.
- Know how to find the magnitude and direction of a vector, given its components.
- Solve basic problems concerning motion with constant acceleration in one and two dimensions.
- Determine the total force acting on an object.
- Apply Newton's laws of motion to determine the acceleration of an object.

Exam 1 Multiple Choice Problems

Sample

Dr. Andersen

On the scantron sheet provided, *write* and *bubble in* your name. In the *identification number* field, write and bubble in the 7 digits from your student id number from your black cougar 1 card, or from your fee bill (do not try to fill the first two characters, which are letters.) Each of the following multiple choice questions is worth seven points. Mark the correct answer on the scantron sheet provided.

1. An objects weight:
 - (a) is a measure of how resistant the object is to being accelerated.
 - (b) determines the acceleration of gravity that the object will experience.
 - (c) is equivalent to the object's mass.
 - (d) is defined to be the force of gravity acting on the object.
 - (e) is an intrinsic property of that object.

2. If you were going to divide 40 m by 1.236 s , your answer should be stated to how many significant digits?
 - (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
 - (e) 5

3. What is the speed of an object whose velocity vector is $-(71.0 \text{ m/s})\hat{x} + (49.3 \text{ m/s})\hat{y}$?
 - (a) 49.3 m/s .
 - (b) 120.3 m/s .
 - (c) 71.0 m/s .
 - (d) 7470 m/s .
 - (e) 86.4 m/s .

4. A monkey sitting in a tree on a branch that is 15.0 meters above the ground throws a banana directly upward with a speed of 12.0 m/s. With what speed will the banana strike the ground?
 - (a) 21.5 m/s .
 - (b) 17.2 m/s .
 - (c) 12.3 m/s .
 - (d) 20.9 m/s .
 - (e) 12.0 m/s .

5. An airplane flies for a distance of 150. miles at an angle of 20.0° west of north. What is its westward displacement from its original position?
 - (a) 51.3 miles.
 - (b) 141. miles.
 - (c) 150. miles.
 - (d) 54.6 miles.
 - (e) 106. miles.

6. What angle does the vector $-3.61\hat{x} - 4.27\hat{y}$ make with the $+x$ axis, measured counter-clockwise?
 - (a) 49.8° .
 - (b) 76.8° .
 - (c) 130.2° .
 - (d) 229.6° .
 - (e) 256.8° .

7. A car traveling at 30.0 m/s slams on its brakes and skids to a stop in a time of 4.50 s . What is the average acceleration of the car during the skid?
- (a) 9.81 m/s^2 .
 - (b) 6.67 m/s^2 .
 - (c) $135.\text{ m/s}^2$.
 - (d) 3.14 m/s^2 .
 - (e) 0.150 m/s^2 .
8. A projectile is fired upward at an angle of 42° above the horizontal, at a speed of 100 m/s . When the projectile reaches its highest point:
- (a) its speed will be zero.
 - (b) the horizontal component of its velocity will be zero.
 - (c) the vertical component of its velocity will be zero.
 - (d) its acceleration will be zero.
 - (e) its y position will be zero.
9. An object has a weight of 350 . Newtons. Its mass is:
- (a) 35.7 kg .
 - (b) 3430 kg .
 - (c) $350.\text{ kg}$.
 - (d) 35.7 N .
 - (e) 3430 N .
10. A man and an elephant engage in a tug of war. Newton's third law requires that the elephant experience an equal and opposite force to that it exerts on the man. This means that:
- (a) neither the elephant or the man will move, because the forces acting on them balance.
 - (b) the elephant will be able to move the man if the forces between its feet and the ground exceed those between the man's feet and the ground.
 - (c) the total force acting on the combination of man plus elephant must be zero.
 - (d) neither the man or the elephant will be able to accelerate.
 - (e) Newton's third law was incorrectly applied in this case because it pertains only to the normal forces experienced by objects.

Exam 1 Worked Problems

Sample

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Both problems are worth 15 points, and will be graded in a manner similar to the assigned homework problems in the book; up to 6 points possible for the description of your solution method, up to 6 points for your algebra and other work (*available only if you receive the full 6 points for the description*), and three points for the correct answer (*available only if you receive the full 6 points for your work*), including units.

1.) A projectile is fired from the top of a 20.0 meter tall building, at a speed of 50 m/s with an angle of 40° above the horizontal. At what horizontal distance from the building will the projectile strike the ground?

2.) Vector \mathbf{A} has a length 2.3 *miles* and makes an angle below the $+x$ -axis of 25° , and vector \mathbf{B} has a length 4.1 *miles* and makes an angle of 75° *above* the $+x$ -axis. What is the magnitude of vector $\mathbf{C} = \mathbf{A} + \mathbf{B}$?