

General Physics
Physics 101
Test #1 – Spring 2011
Friday 2/11/11
Prof. Bob Ekey

Name (print): _____

I hereby declare upon my word of honor that
I have neither given nor received unauthorized
help on this work.

Signature: _____

Part I. Multiple Choice (3 pts each)

Instructions:

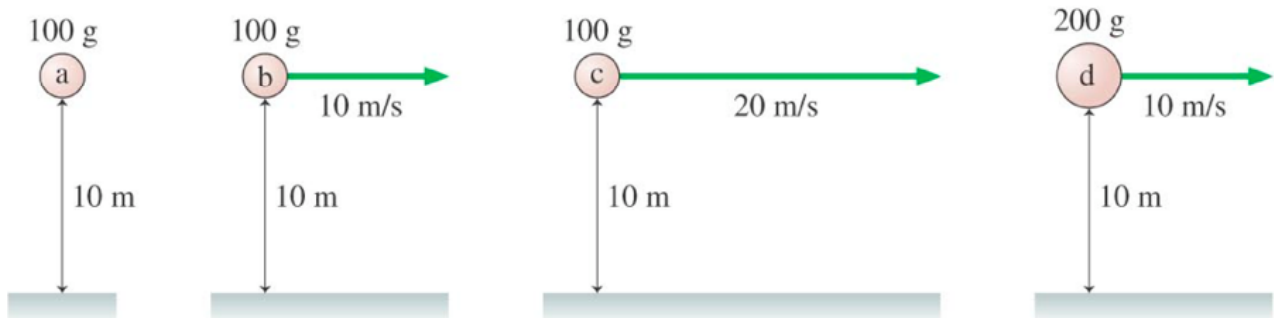
Please clearly circle one and only one answer for each of the following.
Show all of your work. Partial credit may be given if you include your work.

Questions:

1. A clown car traveling at 10.0 km/hr on a straight level road undergoes an acceleration of 1.00 m/s^2 for 10.0 seconds. How far do the clowns travel in 10.0 s?

- (a) 22.2 m
- (b) 50.0 m
- (c) 77.8 m
- (d) 150 m

2. For the projectiles shown, which is false. Ignore Air Resistance.



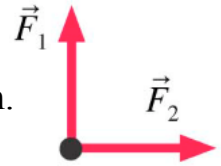
- (a) Projectile b and d travel the same horizontal distance.
- (b) Projectile c travels the largest horizontal distance.
- (c) Projectile d has a faster fall time than projectiles a-c.
- (d) All projectiles fall from the same height.

3. The volume of a cylinder is given as 3.34 m^3 .

Express this volume in cubic inches.

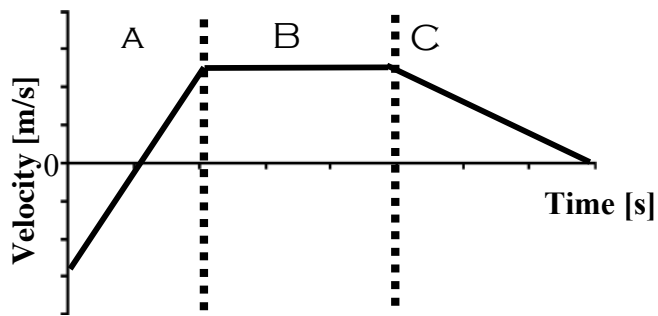
- (a) 203740 in^3
- (b) $2.04 \times 10^5 \text{ in}^3$
- (c) $5.48 \times 10^{-5} \text{ in}^3$
- (d) 131 in^3

4. Three forces are acting on the same point and the system is in equilibrium (Total/Net force is zero). If F_1 and F_2 are equal to 4.0 N each. What is the magnitude and direction of the 3rd balancing force?



- (a) 8.0 N to the North East
 - (b) 8.0 N to the South West
 - (c) 5.7 N to the North East
 - (d) 5.7 N to the South West
5. A sailor climbs to the top of the mast, 15 m above the deck to look for land while his ship moves steadily forward through calm waters at 4.0 m/s. Unfortunately, he drops his spyglass to the deck below. Where does the spyglass land with respect to the deck below?
- (a) At the bottom of the mast.
 - (b) Ahead of the mast.
 - (c) Behind the mast.
 - (d) Need more information.
6. A sailboat initially at rest experiences an acceleration given by $\vec{a} = (1.0\hat{i} + 0.0\hat{j})\text{m/s}^2$. After 10 seconds, what is the displacement of the sailboat in the y-direction?
- (a) 0.0 m
 - (b) 50 m
 - (c) 5.0 m
 - (d) 1.0×10^2 m
7. A person travels a distance of 3.0 km in 1.0 hour. What of the following could not be true about this motion?
- (a) The total displacement of the person could be zero.
 - (b) The average speed of the person is 3.0 km/hr.
 - (c) The average velocity of the person could be less than 3.0 km/hr.
 - (d) The average velocity of the person could be greater than 3.0 km/hr

8. For the following velocity vs. time graph, what is true.

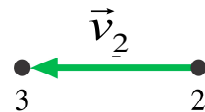


- (a) The cart has a negative decreasing then positive increasing velocity in A.
- (b) The cart is not moving in B.
- (c) The cart has a negative decreasing velocity in C.
- (d) The acceleration in A changes direction.

9. Samuel J. drops a box of snakes from a plane that is traveling horizontally at 115.0 m/s at a height of 1050 m above the ground. With what magnitude of velocity does the box hits the ground?

- (a) 1.8×10^2 m/s
- (b) 143.4 m/s
- (c) 183.9 m/s
- (d) 2.585×10^2 m/s

10. The figure shown shows two dots of a motion diagram and vector \vec{v}_2 . Which of the following is a correct vector \vec{v}_1 , if the acceleration vector points to the right?



- (a) \vec{v}_1 pointing right
- (b) \vec{v}_1 pointing left
- (c) \vec{v}_1 pointing left
- (d) \vec{v}_1 pointing right

11. You throw a ball straight-up from the ground to a second story window. As the ball reaches the window, its velocity is zero. If you throw the ball with half of the initial velocity, the time it takes to reach the window is...

- (a) the same.
- (b) twice as long.
- (c) four times as long.
- (d) The ball never makes it to the second story window.

12. You are in your car on a large flat open space. Your car is at rest and you slam your foot on the gas. After 10 seconds of traveling in a straight-line from east to west, you and your car have a speed of 50 m/s. What is the magnitude and direction of you and your car's average acceleration? Draw a picture if necessary.

- (a) 25 m/s^2 to the west
- (b) 5.0 m/s^2 to the west
- (c) 5.0 m/s^2 to the east
- (d) $\sqrt{5} \text{ m/s}^2$ to the east

Part II. Short answer problems (12 pts each)

Instructions:

Solve three of the following four problems. If you try to solve all four problems, please clearly indicate which problems you wish to have graded. If you do not indicate this, I will assume you want me to grade problems one, two and three.

Please show all of your work, including equations without numbers.

Please provide units with all answers.

Partial credit may be given if you include your work.

Question 1.

Grade this problem? Yes or No (circle one)

It's a snowball fight. You have barricaded yourself at the front door of your house, and your friends are 6.00 m away, you lob a snowball towards your friends and it lands 2.00 seconds later. Assume the initial and final altitudes are equal.

(a) Calculate the initial horizontal velocity of the snowball.

(b) At what time during the motion of the snowball is the y-component of the velocity zero? A numeric answer and words explaining what is happening are required.

(c) Using the knowledge demonstrated in (b) determine the initial vertical velocity of the snowball.

(d) Calculate the launch angle of the snowball.

Question 2. **Grade this problem? Yes or No (circle one)**

For the following position versus time graph do the following,

(a) Sketch the velocity versus time.

What knowledge/definition are you using to make this sketch?

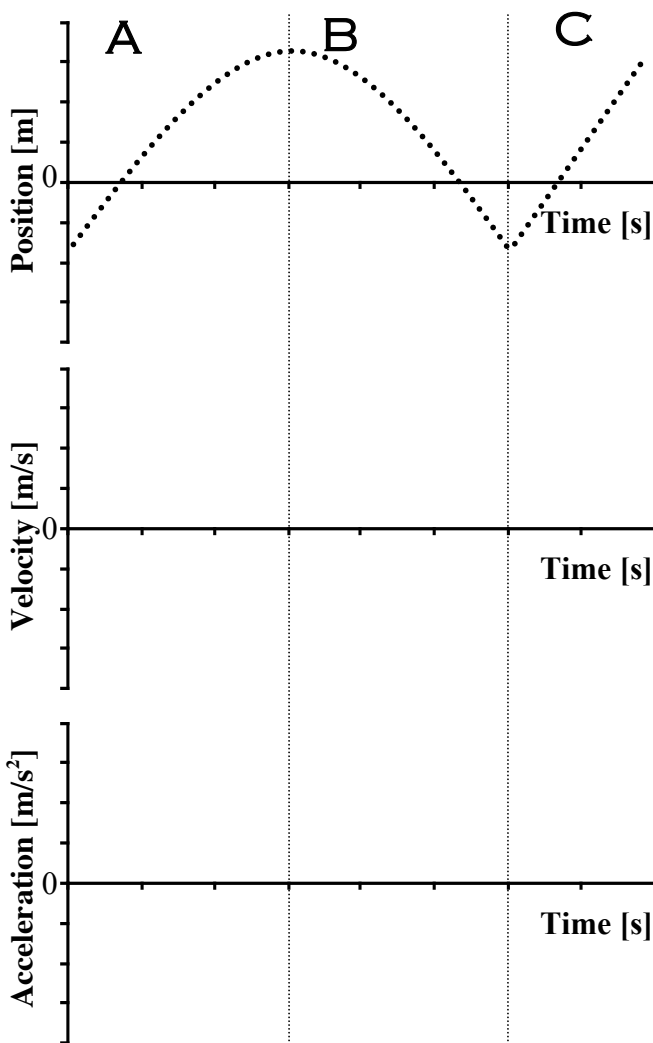
(b) Sketch the acceleration versus time.

What knowledge/definition are you using to make this sketch?

Note: You do not need to provide any numbers in your answers.

Note: On the velocity vs. time graph all lines should be straight - sloped or horizontal

Note: Your sketches and description will be graded independently.



(c) In each section (A-C) describe the motion.
(x, v and a)

Question 3. **Grade this problem? Yes or No (circle one)**

A ball rolls along a smooth horizontal floor at 10 m/s then starts up a 20° ramp.

(a) Draw a motion diagram for this situation including the velocity and acceleration vectors and labeled starting and final locations & velocities.

(b) What is the acceleration of the ball as the ball rolls up the ramp?
Explicitly state the direction of the acceleration.

(c) How high does the ball roll up the ramp before rolling back down?

(d) What is the velocity of the ball 3.5 seconds after it starts up the ramp?

Question 4.

Grade this problem? Yes or No (circle one)

Standing on top of a 4.0 m “tall” tower (a.k.a. top bunk), you throw (not drop) a 1.0 kg physics text book straight down with an initial velocity of -10 m/s.

(a) What is the velocity (magnitude and direction) of the book immediately before it strikes the ground?

(b) Immediately before the book hits the ground, is the acceleration on the book greater than, less than or the same as the acceleration due to gravity.
Explain/Justify your answer.

(c) How long did it take the book to reach the ground?

(d) Sketch a position vs time plot that could represent the motion of the book.
Please explain the shape & meaning of the graph.

