

PHYS 141
In Class Assignment #3

Name:

Box #:

1. Write down one thing you learned about motion with acceleration. (2pts)
 2. Write down a question you have about motion with acceleration. (2pts)
 3. Write down the 5 equations of motion for an object moving with constant acceleration. (5pts)
 4. Write down the 5 equations of motion for an object in freefall (5pts)
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2. For the following problems, write down which of the equations you would use from question 3 or 4 to solve the problem. **Do not solve the problem.** Just write down the appropriate equation given the data that you have and the 1 unknown you are solving for.
 - a) A child slides down a hill on a toboggan with an acceleration of 1.5 m/s^2 . If she starts at rest, how far has she traveled in 1.0 s ? (3pts)
 - b) A meteorite strikes a car, leaving a dent 22 cm deep in the trunk. If the meteorite struck the car with a speed of 550 m/s and is brought to rest while traveling a distance equal to the depth of the dent, what was the magnitude of its deceleration, assuming it to be constant? (3pts)

c) When you see a traffic light turn red you apply the brakes until you come to a stop. If your initial speed was 12 m/s, and you were heading due west, what was your average velocity during braking? (3pts)

d) A rocket blasts off and moves straight upward from the launch pad with constant acceleration. After 3.0 s the rocket is at a height of 80 m. What is the magnitude of the rocket's acceleration? (3pts)

4. A person steps off the end of a 3.00 m diving board and drops into the water below. How long does it take for the person to reach the water? (solve by following the steps below)

a) Write out the known quantities: (3pts) Initial speed = _____ Initial position = _____

Final position = _____

b) What is the unknown quantity? (1pt)

c) Which equation would you use? (2pts)

d) Solve the equation for the unknown quantity. (3pts)

e) Plug in the values from part a) to find the time. (3pts)

6. The world's highest fountain of water in Arizona rises to a height of 170 m. What is the initial speed of the water?

a) Write out the known quantities: (2pts) Final speed = _____ Final Height = _____

b) What is the unknown quantity? (1pt)

c) Which equation should you use? (2pts)

d) Solve the equation for the unknown. (3pts)

e) Plug in the numbers to solve the problem (3pts)

7. In a baseball game, you hit the ball essentially at ground level and send it toward the wall with a speed of 13 m/s at an angle of 24° above the horizontal. How long does it take for the ball to reach the wall if it is 4.2 m away? How high is the ball when it hits the wall?

a) Find the x and y components of initial velocity. $v_{x0} = v_0 \cos \theta =$ _____ m/s (3pts)

$v_{y0} = v_0 \sin \theta =$ _____ m/s (3pts)

b) What equation is used for the horizontal motion? (2pts)

c) Solve the equation from part b for the time. $t =$ _____ s (4pts)

d) Now that you know the time, which equation should you use to determine the height? (2pts)

e) Find the height, $y =$ _____ m (4pts)