Physics 1145 Test Preparation Homework 1

$x = x_i + v_{ix}\Delta t + \frac{1}{2}\, a_x(\Delta t)^2$ $v_x = v_{ix} + a_x\Delta t$ $v_x{}^2 = v_{ix}{}^2 + 2\, a_x(x - x_i)$

$y = y_i + v_{iy}\Delta t + \frac{1}{2}\, a_y(\Delta t)^2$ $v_y = v_{iy} + a_y\Delta t$ $v_y{}^2 = v_{iy}{}^2 + 2\, a_y(y - y_i)$

Free fall acceleration: g= 9.8m/s^2 Centripetal acceleration: $a_c = \frac{v^2}{R}$ $v = \frac{2\pi R}{T}$

First page of your test will contain 4-6 conceptual questions each worth 5 points. Similar to quizzes and conceptual questions.

Worked problems:

1. In order to determine the depth of a well, you drop a stone down the well. You find that it takes 2.50 seconds until you hear a splash after dropping the stone.

a) Draw a diagram, complete with all information necessary to solve the problem.

b) How deep is the well?

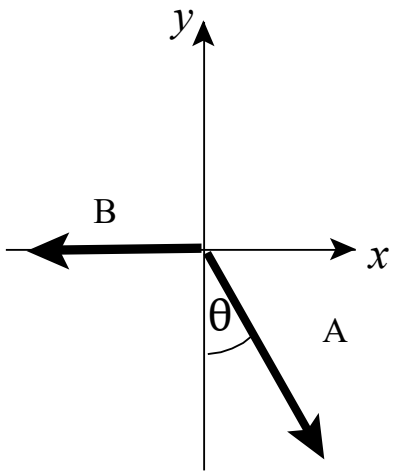
c) What is the speed of the stone just before it hits the water?

2. In the figure, the magnitude of the vectors are A=4 and B=3. The angle θ equals 30°.

a) Calculate the vector components A_x, A_y, B_x, B_y.

b) The vector $\vec{C} = \vec{A} + \vec{B}$. Sketch vector $\vec{C}$ in the diagram and calculate its components, magnitude, and direction.

c) The vector $\vec{D} = \vec{B} - \vec{A}$. Sketch vector $\vec{D}$ in the diagram and calculate its components, magnitude, and direction.



3. An athlete throws a ball with an initial velocity of 14.0 m/s at 60.0° above the horizontal.

a) Draw a diagram, complete with all information necessary to solve the problem.

b) How long does it take for the ball to reach the maximum height of its trajectory?

c) What is the speed of the ball at the top of the trajectory?

c) How high is the top of the trajectory above launch height?

4. On a carousel, a child sits 4.0m from the center. The carousel makes one revolution in 5 seconds.

a) Calculate the speed of the child.

b) Calculate the centripetal acceleration of the child.

c) If the child were sitting closer to the center, would the velocity be smaller, larger, or the same?