Name: _____ DISC: _____ Score: _____ / 20

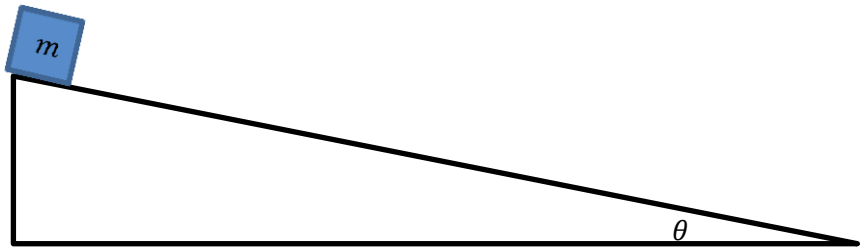
Instructions:

- Do your own work.
- Answer the questions below in the space provided.
- Make sure you show all your work and any equations that you use.
- Please place a box around your answers.
- Remember to give the correct units with all numerical answers

Q1	Q2	Q3	Q4
10	10	5	5

1. A block of mass m slides down a *frictionless* plane $6\ m$ long. The angle between the ramp and the floor is $\theta = 10^o$.
   a. Select a coordinate system and complete the free-body diagram. *Include your coordinate system on the diagram*.

Diagram (2pts):



   b. Let's consider the acceleration of the block:
      i. Does the acceleration depend on the mass, m?
      ii. What is the x-component of the block's acceleration, a_x?

Mass Dependence:
a_x:
a_y:

      iii. What is the y-component of the block's acceleration, a_y?

   c. The block starts at rest at the top of the ramp ($\vec{v}_0 = 0\ m/s$):
      i. Write down the equation you would use to find the speed at the bottom of the ramp:

Equation Selection (2 pts):

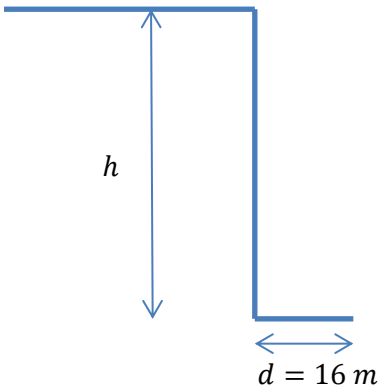
      ii. Find the speed of the block at the bottom of the ramp.

Speed (3 pts):

2. You throw a ball horizontally from off of a cliff. The ball has an initial velocity of $5\ m/s$ and travels $d = 16\ m$. Let the x-direction be horizontal and the y-direction be vertical.

a. Draw a picture of the path you expect the ball to take to the ground. *Include the coordinate system*.

Picture:



b. Now let's work on the motion of the ball.

Acceleration:
Direction:
v_x
v_y:

i. What is the acceleration of the ball?
ii. What is the direction of the acceleration?
iii. What is the x-component of the ball's initial velocity (v_{0x})?
iv. What is the y-component of the ball's initial velocity (v_{0y})?

c. Now we want to find the distance h. Select the equations you could use to calculate h (select all correct equations).

Choice (2 pts):

i. $v_x^2 = v_{0x}^2 + 2\,a_x\,\Delta x$
ii. $x(t) = x_0 + v_{0x}t + \frac{1}{2}a_x t^2$
iii. $v_y^2 = v_{0y}^2 + 2\,a_y\,\Delta y$
iv. $y(t) = y_0 + v_{0y}t + \frac{1}{2}a_y t^2$

d. Use your chosen equations to solve for h (the height of the cliff).

Solution (3 pts):