

Name: _____

DISC: _____

Score: ____ / 20

Instructions:

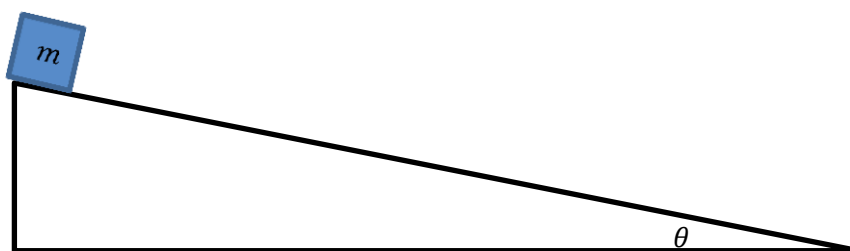
- Do your own work.
- Answer the questions below in the space provided.
- Make sure you show all your work and any equations that you use.
- Please place a box around your answers.
- Remember to give the correct units with all numerical answers

Q1	Q2	Q3	Q4
10	10	5	5

1. A block of mass m slides down a *frictionless* plane 2 m long. The angle between the ramp and the floor is $\theta = 25^\circ$.

- 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:

- Does the acceleration depend on the mass, m ?
- What is the x-component of the block's acceleration, a_x ?

Mass
Dependence: a_x : a_y :

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

- c. The block starts at rest at the top of the ramp ($\vec{v}_0 = 0\text{ m/s}$):

- Write down the equation you would use to find the speed at the bottom of the ramp:

Equation Selection
(2 pts):

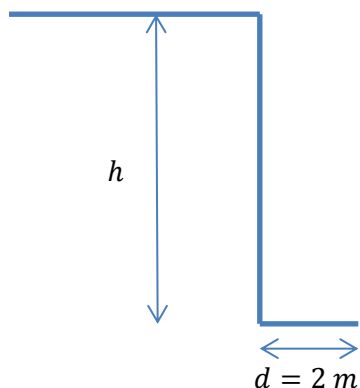
- Find the speed of the block at the bottom of the ramp.

Speed (3 pts):

2. You throw a ball horizontally from off of a cliff. The ball has an initial velocity of 3 m/s and travels $d = 2 \text{ m}$. 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. $x(t) = x_0 + v_{0x}t + \frac{1}{2}a_x t^2$
- ii. $v_x^2 = v_{0x}^2 + 2a_x \Delta x$
- iii. $v_y^2 = v_{0y}^2 + 2a_y \Delta y$
- 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):