Names:_____

Catapult parabolic flight project

Overview: You will be firing your catapults and using the information you record to make an equation that models its flight path. You will then translate that equation to include the height of a desk and use your new equation to calculate where the projectile should land. We will then place a target under where you expect the projectile to land and points will be awarded based on how close you get to the center of the target. **YOU ARE NOT ALLOWED TO DO ANY TEST FIRES FROM A DESK.**

Directions:

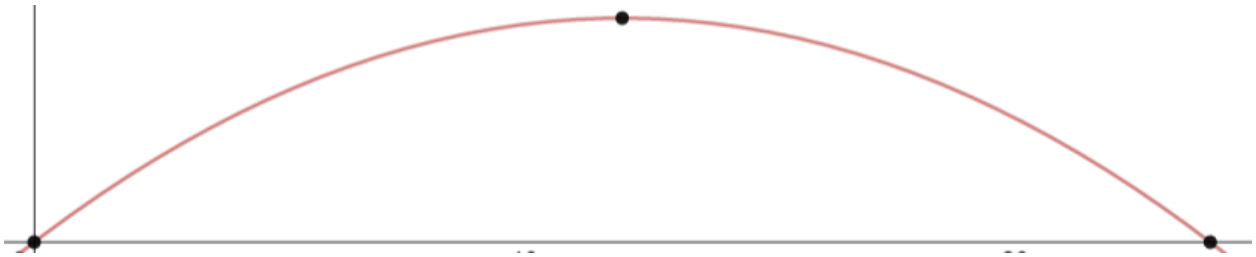
1) Place the catapult on the ground, and make sure that the person firing it is able to consistently fire the same distance every time.

Have one student fire the catapult while another student places a piece of tape exactly where it hits the ground. Mr. Sweeney will time how long your projectile is in the air. Record the distance that the projectile traveled and the time in the table below.

Trial #	Time(s)	Distance
1		
2		
3		

Average time: Average distance:

You will need to have 3 points that your parabola passes through to model a quadratic equation. Assume your projectile starts at (0,0).



2) Using the diagram above and your brains, fill in the table below. Remember that to find fall distance you can use the formula $d = \frac{1}{2}at^2$ and make sure to use the same units for gravity that you measured your distances in.

Gravity(a) in inches/second: 386
Gravity(a) in cm/s: 980

	Starting point	Landing point	Vertex
x distance	0		
y distance	0		

3) Once you fill in the chart above, place those three coordinate pairs into desmos and make a quadratic model (equation).

Equation:

4) Now you need to translate the equation by the height of a desk. Measure the height of the firing desk.

Desk height:

Now, what do you do to an equation to move the entire graph up by the desk height?

New equation with desk height:

5) To find where your projectile will land while being fired from the desk, set your new equation equal to zero and solve using any method (Show your work here)

6) Graph your new equation along with your original equation and make sure everything makes sense. Using the graph, double check that your parabola actually hits zero where you said it would in #5.

7) Get Mr. Sweeney and place the target where you expect your projectile to land. Record the top THREE scores below and ignore the worst result. Part of your grade will be based on these points.

Shot 1: _____ Shot 2:_____ Shot 3:_____