Catapult Project

Your job is to design and build a catapult that will launch different sized marshmallows to their maximum height from the materials provided. You may use materials brought in or provided. You must use at least 3 of the materials to create your catapult.

After building your catapult, you will launch a mini marshmallow, a standard marshmallow, and a giant marshmallow using your catapult. You will launch each marshmallow 3 different times and record your results in the charts below. One person in your group must time the launch in seconds with a stop watch. Time will start when the catapult is released, and will stop when the marshmallow hits the ground. You will record the time on the charts in the worksheet in their appropriate spaces.

After collecting time data, you will average the three trials for each marshmallow to find the average time your launch took to reach the ground. You will use the data collected to find the initial velocity and maximum height of each marshmallow. Answer the questions in the packet below.

Projectile Motion: $s(t) = -16t^2 + v_0t + s_0$

$s(t)$ = the height of the object over time, v_0 = initial velocity, t = time, s_0 =initial height

Answer all questions on a separate sheet of paper

Pre-experiment questions:

a) What effect do you think the weight of each marshmallow will have on the maximum height the coin will reach?

b) What materials do you think will give the marshmallow the greatest height and why?

c) What shape do you think your launch will form?

d) What was the initial height of your catapult? (in feet)

1. Fill in the following chart based on your launches.

Mini Marshmallow	
Trial	Time (seconds)
1	
2	
3	

Standard Marshmallow	
Trial	Time (seconds)
1	
2	
3	

Giant Marshmallow	
Trial	Time (seconds)
1	
2	
3	

2. Calculate the average time in seconds each marshmallow took to hit the ground.

3. Use the information gathered in problem number 2 to calculate the initial velocity of each marshmallow. *Don't forget to measure the initial height of your catapult (pre-question d).

4. Create a projectile motion equation for each marshmallow.

5. Graph the equation of each marshmallow. Draw the equation of each marshmallow below. You should have a total of three different graphs. Be sure to label key points (x-intercepts and maximum point) and use appropriate labels (title, axis, etc.) on your graph.

6. Use the information gathered to calculate the maximum height of each marshmallow.

7. Which size marshmallow had the greatest initial velocity? Why do you think this marshmallow has the greatest initial velocity?

8. Which size marshmallow had the greatest maximum height? Why do you think this marshmallow has the maximum height?