**AP Calculus**

 **Acceleration Project**

**All projects can be presented as a posterboard, booklet, PowerPoint, or video (more creative ideas are not only tolerated but encouraged). Grading will be based on accuracy and appearance.**

To explore the relationship between position, velocity, and acceleration, you will need a stop watch, a measuring tape, some eggs, and an assortment of egg-friendly parachutes.

1. Find a safe spot some distance above the ground from which to drop your object (and an equally safe spot for your object to land).
2. Find the distance from which you will be dropping your egg, either using direct measurement or using trigonometry.
3. Drop the object and time how long it takes for the object to reach the ground.
4. Repeat several times (at least until you get consistent results) for each parachute and record the results below.

Parachute #1 Trial #1 \_\_\_\_\_ Trial #2 \_\_\_\_\_ Trial #3 \_\_\_\_\_ Trial #4 \_\_\_\_\_ Trial #5 \_\_\_\_\_

Parachute #2 Trial #1 \_\_\_\_\_ Trial #2 \_\_\_\_\_ Trial #3 \_\_\_\_\_ Trial #4 \_\_\_\_\_ Trial #5 \_\_\_\_\_

Parachute #3 Trial #1 \_\_\_\_\_ Trial #2 \_\_\_\_\_ Trial #3 \_\_\_\_\_ Trial #4 \_\_\_\_\_ Trial #5 \_\_\_\_\_

Etc.

 Answer the following.

1. What is your value of (the initial height)? \_\_\_\_\_
2. What is your value of (the initial velocity)? \_\_\_\_\_
3. What is your value of *s(t)* on the ground? \_\_\_\_\_
4. What would be a good value of *t* for each of your parachutes? How did you decide?
5. Using the general form, write an equation for *s*(*t*) for your time *t* for each parachute. Solve for *a* for each parachute. How much is each parachute helping? (If you’re not sure, try a test egg with no parachute to see.)
6. Find the displacement and average velocity of each parachute (using the same value of *t* from above for each parachute).
7. Which parachute was “best?” Explain why you think so in terms of velocity and acceleration (you can discuss time, also, if you choose).