

Eggcellent Problems

Name:

Date:

Class:

Directions: Answer the following questions as if you were dropping a naked egg from approximately 30 ft. An egg has a mass of approximately 55g. (1 meter = 3.28 feet)
Show all of your work! Please disregard air resistance unless noted.

$t = \sqrt{\frac{2d}{g}}$	$d = \frac{1}{2}gt^2$	$v = gh$	$gPE = mgh$	$KE = \frac{1}{2}mv^2$	$p = mv$	$Ft = \Delta mv$
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1. Conversions (use factor analysis):

What is the **(a) distance** your egg will drop in meters?

(b) Mass of your egg in kg?

2. How much gravitational potential energy does the egg have at

a) 30 ft?

b) $\frac{1}{2}$ way down?

3. How many **seconds** will it take your egg to hit the ground from a height of 30 ft.?

4. What is its **velocity** **a) half-way down?** **b) Right before it hits the ground?**

5. What is the egg's **momentum** right before it hits the ground?

6. How much kinetic energy does the egg possess (hint, you do not need to calculate these)
 - a. At 30 ft?
 - b. $\frac{1}{2}$ way down
 - c. Right before it hits the ground?
7. Assuming that the time of impact is 0.01 second, then what **force** does the egg experience when it hits the ground?
8. Describe two ways that could you **decrease the force** that the egg experiences as it hits the ground. Explain why they will work.

Graphing

9. On your graph paper, please draw a **to-scale sketch** of the building, you and the egg as it falls. Calculate where the egg would be at **0.25 second intervals** and draw an egg at each interval. Make sure to **include your scale**.
10. On the other side of the graph paper, make a graph of **time (s) vs. distance (m)** for the egg as it drops. Use 0.25 s intervals. What have you just graphed? Give your graph an appropriate title.
11. From your graph, **estimate** (do not calculate) the following:
 - a. how far the egg will fall in 0.6 seconds
 - b. how long will it take to fall 8.4 meters
 - c. the velocity (m/s) of the egg when it has fallen 7.7 meters
 - d. the velocity (m/s) at 1.3 seconds.**Show how you obtained each estimate on your graph paper.**