Egg Drop Tutorial

Drop vs. Stop

Mass of egg = 0.060 kg (60 grams)

Average time of stopwatches = _____s

1. Draw a vt-graph of the motion of the egg as it fell. (assume no air resistance)
2. On the **same** vt-graph above draw the motion of the egg stopping.(continue from where you left off on the previous question).
3. Describe in words what aspects of these motions look similar and which ones look different on your vt -graphs. (make a small data table to keep track).
4. Give a detailed description of the acceleration difference between **drop** and **stop.**
5. When does the egg begin to stop?
6. Calculate the velocity of the egg just before it landed (in other words, just before it began to stop and assume no air resistance).
7. Showing all work, calculate the distance the egg fell (assume the time measured was from dropping point to the moment just before it began to stop.)
8. Calculate the $\mathbf{v_f m}$ of the egg just before it began to stop.
9. How much **Δvm** $[m(v_f - v_i)]$ did the egg undergo from the moment it was dropped until it began to stop?
10. How does this compare to the **Δvm** of the egg while it was stopping?
11. How much **Δvm** would the egg undergo while it was stopping if it wasn't inside your devise (if we just dropped an egg by itself)?
12. How does this (your answer to #11) compare to the **Δvm** of your egg when it IS inside your devise (your answer to # 10)
13. Draw a labeled graph of **Δvm** on the **y axis** and **t** on the **x axis** of the egg stopping inside your device. No data points necessary just remember the mass stays the same and the velocity changes over time.
14. Draw a similar graph of just an egg alone being stopped by the concrete. (no devise to protect it)
15. What things are larger or smaller in each graph?
16. What are your thoughts on the difference between the egg being stopped by your devise and the egg being stopped by the concrete. Why does the egg break in one situation and not the other. **Be specific!!**
17. Calculate the time it took the egg to stop. In order to do this you must **estimate the distance** you think your egg moved in the device when it hit the concrete and then use **MMMPST**. (in meters)(Show all Work)
18. Calculate the acceleration of the stop.
19. Calculate the amount of force present during the drop. (Show all Work). What is causing that force?
20. Calculate the amount of force necessary to stop the egg. (Show all Work)

Fill in the following data table using either a calculation performed already during the tutorial, or by reasoning the answer from your knowledge of physics. If you calculated the answer, record the question # of that calculation in the "How?" column. If you reasoned it out write "R". If it was measured write "M". Some examples are already marked on your data table to get you started.

Direction orientation is the standard **up** is (+) and **down** is (-)

Drop Information				Stop Information			
Quantity	Magnitude	Direction + or -	How?	**Quantity**	Magnitude	Direction + or -	How?
$\mathbf{v_i}$		NA		$\mathbf{v_i}$			R
$\mathbf{v_f}$			#6	$\mathbf{v_f}$		NA	
a				**a**			
d				**d**			Estimation From Warm Up
t		NA	M	**t**		NA	
$\mathbf{mv_i}$				$\mathbf{mv_i}$			R
$\mathbf{mv_f}$			#8	$\mathbf{mv_f}$			
Δmv				**Δmv**			#10
F				**F**			