NAME_____
PARTNERS:

Free Fall

OBJECTIVE: the objective of this lab is to graphically determine the acceleration of a freely falling object.

INTRODUCTION: When an object falls, it accelerates with the acceleration of gravity, g. the value is 9.8 m/s² near the surface of the Earth. For distances close to a meter the object falls in about one-half of a second. To determine the acceleration we must locate an object by position and time several times during the fall. We can do this by allowing a weight to pull a piece of timer-tape through a spark timer. By knowing the time interval between dots we can determine the position and time of the object and from it determine acceleration.

MATERIALS: Spark timer, timer tape, small mass, C-clamp for timer, meterstick, small amount of tape.

PROCEDURE:
1. Thread the tape through the gap and tape the mass to the end of the tape.
2. Stand on a chair or on the table holding the tape so that it is vertical. Start the timer and release the mass. You now have a record of the fall of the object.
3. On your tape mark the first dot and every sixth dot from that point. The timer makes 60 dots per second so you know that each interval you have just marked is equivalent

DATA & RESULTS:
4. Measure the distance **from the first dot** to each of the marked dots. Record these values in the data table below.

5. The average velocities must be calculated from the data. To calculate the average velocities find the **difference between each data point** and divide it by 0.1 sec.

TIME (sec.)	DISTANCE (m)	VELOCITY (m/s)
0.1		
0.2		
0.3		
0.4		
0.5		
0.6		
0.7		
0.8		
0.9		
1.0		

6. After you have obtained your data and calculated the velocities, you will need to plot a graph. The graph will be <u>VELOCITY vs TIME</u>.   NOTE: The first variable listed (VELOCITY, in this case) is always plotted on the vertical axis. Draw a **straight line** fitting your data points as good as possible.
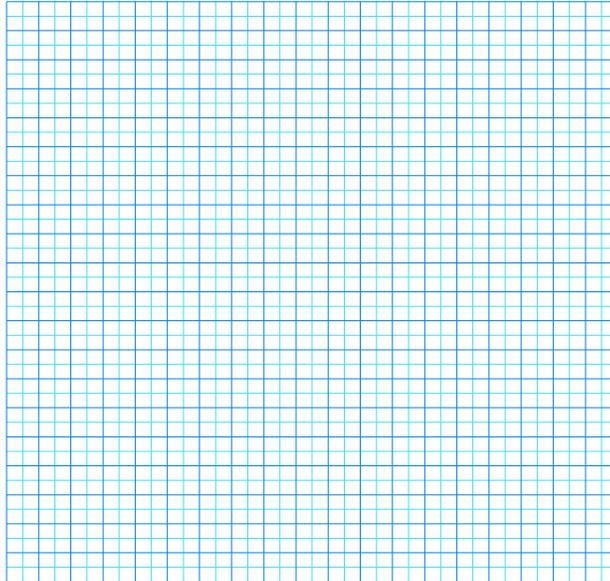
CALCULATIONS:
7. Find the slope of your graph by choosing *two points on your line*. Ask me if you're not sure how!
   NOTE: the units for your calculation will be in m/s/s (or m/s^2).
   SHOW WORK HERE

The slope is your **experimental value for the acceleration of gravity.**
 8. Find the percentage difference between your value and the accepted value of 9.8 m/s^2.
   SHOW WORK HERE

I know it's way off; your job is to explain why!

QUESTIONS:
   1. How would the slope of your velocity vs time graph change below if this experiment was performed on the moon?

   2. Give one or two *good* reasons for why your results are so off.