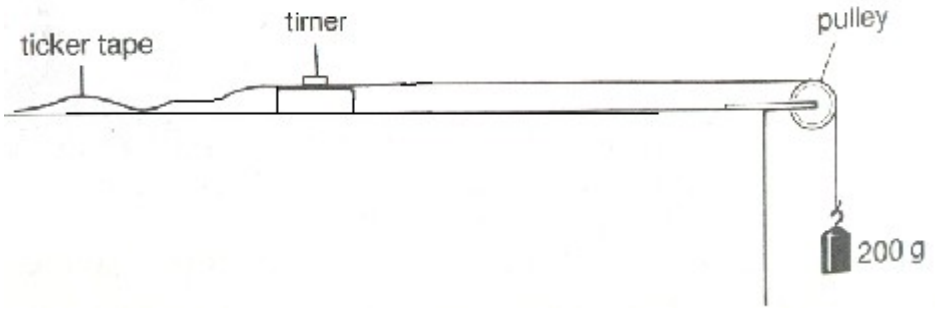
Gravitational Acceleration Lab Name: _____
SPH4C

Question: What is the magnitude of the acceleration due to gravity?

Prediction: The magnitude of the acceleration due to gravity will be _____.

Materials

200 g mass	ticker timer
string (about 1.5 m)	ticker tape (about 1.5 m)
pulley and clamp	sticky tape
ruler	calculator



Procedure:

1. Secure the ticker timer to the table about 1 m from the edge of the table.
2. Attach the pulley to the edge of the table.
3. Tie one end of the string to the mass and suspend the string over the pulley so that the mass is held about 1 m above the floor.
4. Tape the other end of the string to the ticker tape and thread the ticker tape through the timer so that there is no slack. (Trim the string or move the timer as necessary.)
5. Start the ticker table and release the mass. You should have at least 30 dots on your ticker tape.
6. Mark the first point on your tape with a zero. This point marks the beginning of your time interval, so for this point, time = 0.000 s and distance = 0.0 cm. Measure the distance between this zero point and the next point, for which the time elapsed is equal to one period of the ticker timer (1/60 s = 0.017 s). Record this distance in Table 1.
7. Repeat Step 6 for each of the dots along the length of the tape. Always measure the distance *from the zero dot*. (It is a good idea to number each of the points as you go along so you don't lose track of where you are.)
8. To find the *speed* at which the tape was moving at the first dot, measure the distance between the two dots on either side of it (the zero dot and the second dot) and divide by the time for two intervals, or 0.033 s. Record this speed in Table 2.

9. Repeat Step 8 for each of the dots along the length of the tape. Always measure the distance between the dots on either side of it.

Data and Analysis:

Table 1: Distance-time information for a 200 g mass in free-fall

Time (s)	Distance (cm)	Time (s)	Distance (cm)	Time (s)	Distance (cm)
0	0				
1/60 = 0.017					
2/60 = 0.033					

*Note: Position is always measured from the **zero dot** on the ticker tape.

1. Using the data in Table 1, plot a distance-time graph with time on the horizontal axis and distance on the vertical axis.
2. Draw the curve of best fit through these points to demonstrate that the motion was accelerated.

Table 2: Speed-time information for a 200 g mass in free-fall

Time (s)	Speed (cm/s)	Time (s)	Speed (cm/s)	Time (s)	Speed (cm/s)
0	0				
1/60 = 0.017					
2/60 = 0.033					

*Note: Speed is determined by taking the distance between the dots on either side and dividing by 0.033 s.

3. Using the data in Table 2, plot a speed-time graph with time on the horizontal axis and speed on the vertical axis.
4. Draw the line of best fit through these points.

5. Take two points on the line, (t_1, v_1) and (t_2, v_2) and calculate the slope of the line of best fit.

$$slope = \frac{\Delta v}{\Delta t} = \frac{v_2 - v_1}{t_2 - t_1} \quad =$$

What does this slope represent? _____

6. Calculate the percent error between this experimental value and the accepted value (9.8 m/s^2 or 980 cm/s^2).

$$percent\ error = \frac{|accepted - experimental|}{accepted}$$

Discussion: Identify at least two source of experimental error for this experiment.

_____

_____

_____

Conclusion:

The magnitude of the acceleration due to gravity was determined to be _____

which was within _____% of the expected value.