



Acceleration of Gravity Investigation

Name: _____ Date: _____

Purpose: What is the acceleration of gravity on the surface of Earth?

Skills: The student will:

- Use ticker tape analysis to determine the acceleration of gravity on the surface of the Earth.

Procedure:

1. Tape a small mass to a piece of ticker tape
2. Place the apparatus on the top of a table, near the edge.
3. Place a book on the floor to stop the impact of the mass with the floor.
4. Start the timer and drop the mass ($t = 0.017s$).
5. Remove ticker tape paper and return to desk.
6. Circle the starting dot (usually choose the second one away from the clump at the beginning.)
7. Stick the piece of ticker tape to the edge of this paper for analysis
8. Complete the ticker-tap analysis data table.
9. Complete the analysis.

Table: Analysis of Ticker Tape Information

A Dot#	B Time from start (s)	C Distance from start (cm)	D Interval time (s)	E Interval distance (cm)	F Average speed (cm/s)	G Mid-interval time (s)
1	0	0				
2						
3						
4						
5						
6						
7						
8						
9						
10						

Analysis:

Do the graphical analysis on Excel ®

1. Plot a d-t graph (distance-time) from the data (columns B and C)
2. Plot a v-t graph (speed-time) from the data (columns G and F)
3. Draw a best-fit line (trendline) through the data (does **not** have to go through zero).
4. Determine the slope of the line for the falling mass (slope of the line from the equation)

(Answers can go on this sheet – staple graphs to this sheet)

Questions:

1. Based on your analysis what is the acceleration of gravity in (cm/s/s) on the surface of Earth?
2. The actual value for the acceleration of gravity on Earth is 980 cm/s/s. How close is your value to this? Determine the percent error as well.
3. List 2 possible sources of error for this experiment. Explain what affect the source of error might have on the experimental value you determined (i.e. increase it, decrease it). Also, explain briefly how the errors could be fixed or reduced.

Problem:

Amanda is standing on the roof of a building. She wants to throw an egg from the roof to the ground. She throws the egg downward at precisely 7 m/s. The egg splatters on the ground with an impact speed of 42 m/s. Calculate the time it took the egg to reach the ground as well as the height of the building. [Answer this question in the space below; include a well labeled diagram.]

Research (Inquiry):

Using the Internet as a resource base, research and find out if the acceleration due to gravity is the same everywhere on the surface of the Earth. Is it different at the poles than at the equator? Does the gravitational acceleration change at different altitudes above the Earth's surface? Is there gravity in space? Write a few paragraph answer to these questions. Additional useful information can be included. Numerical values or other interesting facts can be included. Your report must be type written and well formatted with headers, page numbers, name, date, title and references. Cite all of your resources correctly using EasyBib:

<http://www.easybib.com/>

Name: _____

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Marking Rubric:

Application	Chart d-t graph: v-t graph: Question 1: Question 2:	2 2 2 2 2
Communication	Question 3: Research Question:	5 5
Thinking & Inquiry	Problem: Research Question:	5 10

Learning Skills:

Responsibility	Proper safety precautions are used consistently; lab materials are put away properly; requires minimal reminders of safety precautions. Lab work is completed on time according to the agreed upon timelines.	N	S	G	E
Self-Regulation	works well in group situation; accepts direction from peers and offers direction to peers; always maintains a positive voice and attitude when working within the group. Responds positively to other group members and peers within the classroom and lab setting; language is positive and appropriate; works to build positive and healthy peer-to-peer relationships	N	S	G	E
Collaboration	student seeks clarification when necessary, either from the teacher or from their peers; questions are clear and well thought out. Student approaches and responds to difficulties and challenges during the lab positively; student does not give up when faced with a challenge.	N	S	G	E
Independent Work	good use of time; student does not need to be reminded to stay on task; student is organized in their approach to the lab and completes lab in acceptable timeframe. Follows instructions of the teacher and the lab instructions with minimal supervision	N	S	G	E
Organization	Data is collected in an organized in a table; data tables, observations, records are clear, neat and organized. Demonstrates good knowledge of the lab procedures; works to follow each step before proceeding to the next step.	N	S	G	E