

A.S. Physics Summer Homework: *just when you thought you could relax*

This looks like a BIG, LONG assignment. It really isn't, but we wanted to make the instructions clear... including examples, so you'll know what you are trying to accomplish. If you already know how to use word processing and spreadsheet software, this will take you about 15 minutes. If not, then longer.

To business...

NOTE: There are tutorial videos that show you how to do all this stuff. You can find them **on or after June 17th** by going to Mr. DeCurtins' class web page at:

tinyurl.com/C2physics

then clicking the sidebar link *AS Physics HELP*.

Part 1: Stuff to Get

- ⇒ Access to the Internet. We will have and heavily use a class web page. Much of our homework will be on-line, much of it thru a service called WebAssign. We may often interact with you individually via email. Lab Reports and other documents will be submitted as Google Docs. For all of these you'll need **access to the Internet** and use of your M-A Google account.
- ⇒ Simple Lab Notebook, should be "quad ruled" with bound pages (i.e., held in by string). These are available at Walgreens etc. **Loose papers aren't acceptable...**
- ⇒ **Calculator** which must have the following functions: plussing, take-away, timesing, goes-into, square rooter, **trigonometry** and inverse trig functions.
- ⇒ An **empty, 2-liter soda bottle, rinsed clean**. [Just the cylindrically-shaped ones, **not** the "coke-bottle-shaped" ones.] If you don't drink soda at home (good!) try to find somebody else's empties. You'll need this for a lab later on. Please write your name on a small piece of paper and tape the paper to the bottle.



Part 2: Stuff to Do

We are doing this summer homework to develop & practice four skills:

- (1) Diagramming an experimental setup
 - (2) Computing values of an equation using spreadsheet software
 - (3) Plotting points and equations on a scaled graph using Google spreadsheet (or other) software
 - (4) Embedding objects into a word-processed document
- Objects include drawings, images, graphs, data tables, and equations.

You should know that "getting somebody else to do this for you" will hamper your performance and grade throughout the year in this class. In addition, "getting somebody else to do this for you" is cheating.

Here's the content summary of the document you need to produce as a Google doc. You'll need to share it with your AS Physics teacher by the first Monday of school. Instructions for each part are given later on in this assignment. We will use Google Docs because everybody has the same access to the same tools and this will allow us to share and critique each other's work during the year.

- Your name, student ID #, title, date, that sort of thing
- A paragraph of text (to show that you know how to put a paragraph into a document)
- A data table with column headings and numbers
- A graph containing both a set of points from the data table and a smooth equation plot
- A diagram that you have created using Google Drawing or other graphics tools
- A paragraph of text with mathematical equations embedded (not hand written).

The following two pages show (more or less) is what your homework document should look like.

Begin Sample

Art Gutierrez
 ID # 876504
 June 2, 2014

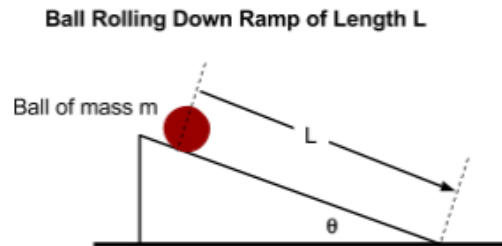
Art's AS Physics Summer Homework SAMPLE

Introduction:

This is my AS Physics Summer Homework. I completed this assignment during my summer trip to Milpitas. This introductory paragraph is simply to show that I know how to type in a paragraph that has an underlined section label which, in this case, is "Introduction".

Diagram

The diagram at right shows the setup for a lab experiment. It demonstrates that I know how to create a diagram and insert it into this document. This diagram was created as a Google Drawing and then pasted into the area at right.



Also note that this portion of the document has 2 columns. The left column contains this text and the right column contains the diagram itself.

Data

Before chucking a big data table into a lab report, I should write a sentence introducing it. In this case, I've made several columns of values computed by different functions. This table was created using Google Sheets and then pasted into this document. Notice the title above the table.

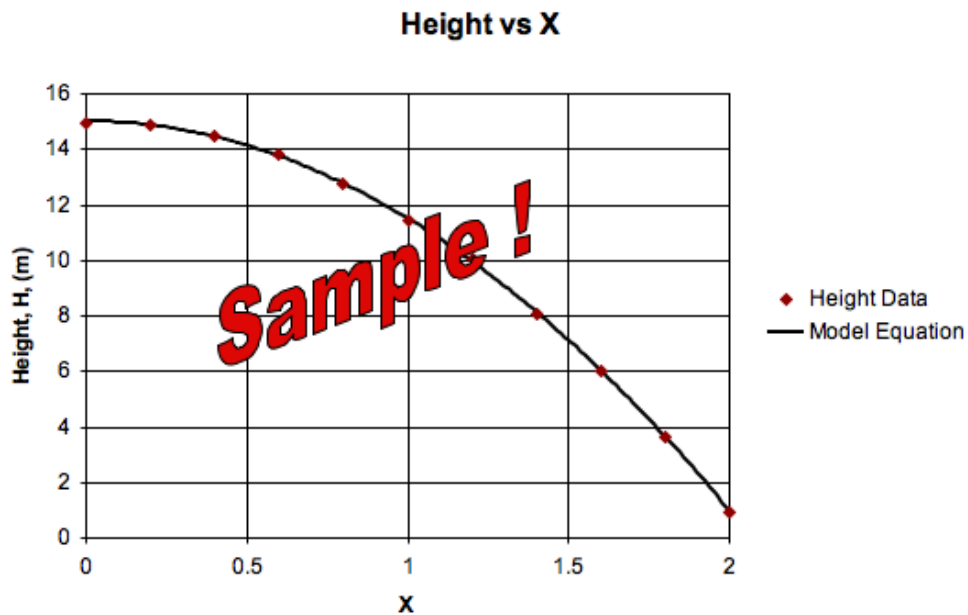
Computed Function Values

| x | $y = 7x$ | $y = 6x^2$ | $y = 5/x$ | $y = 4 \sqrt{x}$ | Heights (m) |
|------|----------|------------|-----------|------------------|-------------|
| 0.00 | 0.00 | 0.00 | #DIV/0! | 0.00 | 14.93 |
| 0.20 | 1.40 | 0.24 | 25.00 | 1.79 | 14.86 |
| 0.40 | 2.80 | 0.96 | 12.50 | 2.53 | 14.46 |
| 0.60 | 4.20 | 2.16 | 8.33 | 3.10 | 13.81 |
| 0.80 | 5.60 | 3.84 | 6.25 | 3.58 | 12.73 |
| 1.00 | 7.00 | 6.00 | 5.00 | 4.00 | 11.42 |
| 1.20 | 8.40 | 8.64 | 4.17 | 4.38 | 10.03 |
| 1.40 | 9.80 | 11.76 | 3.57 | 4.73 | 8.07 |
| 1.60 | 11.20 | 15.36 | 3.13 | 5.06 | 5.99 |
| 1.80 | 12.60 | 19.44 | 2.78 | 5.37 | 3.64 |
| 2.00 | 14.00 | 24.00 | 2.50 | 5.66 | 0.92 |

Sample!

Graph

This graph plots a set of data points. It also plots (as a smooth, thin curve) the function $y = 15 - 3.5x^2$. It was created in a spreadsheet program and then pasted into this document. Notice that the smooth curve is *smooth*, not a chunky connect-the-dots plot. Note that the graph does not have a frame (box line) around it. Note that the graph has a title.

Mathematical Notation

This final element of the document shows how math should look in a lab report or other writing. Note that the equations are centered on the page and appear *by themselves*, not embedded in the text lines of the paragraph.

$$y = 15 - 3.5x^2$$

This sort of formatting makes math easy to read. This is much better than writing equations in words like this: "y equals fifteen minus three point five x squared"(as many students tend to do) or embedding the equation in the lines of text like this: $y = 15 - 3.5x^2$ as even more students tend to do.

**This is
THE END
of the sample.**

End Sample

Instructions for Completing the Summer Homework Assignment

Use Google Docs¹ to create a document containing the following items. Each section (i.e., from Introduction on down) should have a heading (the name of the section) underlined and appearing on the left as in the sample document above.

1. Name, etc.:

Your name, ID#, and the date should be on 3 lines in the upper right corner of the first page. The first letters of each line should be aligned (one above the other).

2. Title:

A title (your name & "AS Physics Summer Homework") should appear centered (use centering tool, do NOT just type a bunch of blanks in front of the words), in **bold**.

3. Introduction:

An underlined title (Introduction) should appear, followed by a paragraph of at least 3 lines. You can write any text you like on these 3 lines but the text must contain only complete sentences.

4. Diagram:

A diagram drawn by you using Google Drawing or any other screen-based drawing package. Your diagram must depict the lab setup described below and should appear on the right with descriptive text on the left. Don't put the text in a "text box". There is an appropriate way to push the diagram to the right and the text to the left. (See tutorial video for help.)

Description of Lab Setup:

A rectangular cart with small wheels.

5. Data:

An introductory paragraph of at least 3 lines but saying nearly anything you'd like is then followed by a data table. The table should have 6 columns as in the sample document above. The first and last columns (x and *Height Values*) should appear EXACTLY as shown in the Sample Document above. However, the coefficients of the values in the column functions should come from the ordered non-zero digits in your student ID number. For example, if your student ID number is: 710520 then the functions for which you should make columns are:

$y = 7x$ $y = 1x^2$ $y = 5/x$ $y = 2*\text{SQRT}(x)$ (where "SQRT" means "square root of ()").

Simply put, use the first 4 non-zero digits of your student ID #.

(Don't have 4 non-zeros? Lucky you. Then repeat as necessary for the remainder.)

The data table should have grid lines between the entries. The columns should have the function descriptions at the top (as shown). There should be a title at the top or bottom of the data table.

¹ You'll need a Google account. You already have one: your M-A Google account. Please use that.

6. Graph:

Another several lines of text of your choice followed by two graphs. (This is a change from the displayed sample above.)

Graph 1: Plot the height values (as individual points).
You can see them as the red dots on the sample graph.

Graph 2: Make a smooth plot of the function $y = 15 - 3.5x^2$ for the range $x = 0$ to 2 .

The graphs should have DIFFERENT titles than the sample shown above. The x and y axes should be labeled as shown. The graphs do NOT have to be in color, but in our digital world, color is free.

How do you make a smooth graph of a function?

Please use this method as we will extend it to additional computations during the year.

You can do it with Google sheets. The technique is simple once you get the hang of it. The basic idea is that you create a dense set of $(x, 15 - 3.5x^2)$ data pairs ... easy to do because the spreadsheet does the computation for you.

Follow these steps: (there will be tutorial videos for this by June 17th)

- (a) create closely spaced "synthetic" x data using the computing power of the spreadsheet. For this homework, "closely spaced" means every 0.05 units. Start by entering 0.0 for the first value of x. Then, in the cell below 0.0, tell the spreadsheet to add 0.05 to whatever the previous value was. Here's what it looks like:
After cell A3 is done, drag the *lower right corner of A3* down until you've gone far enough to create x values up to 2.0.

| | A | B |
|---|------------|----|
| 1 | x | y |
| 2 | 0 | 15 |
| 3 | =A2 + 0.05 | |

- (b) Create closely spaced "synthetic" $y = 15 - 3.5x^2$ data parallel to the just-created x data.
Here's what that looks like:

| | A | B |
|---|------|----------------|
| 1 | x | y |
| 2 | 0 | 15 |
| 3 | 0.05 | =15 - 3.5*A3^2 |

- (c) Then drag the lower right corner down on this formula's cell until you've computed its values up to $x = 2$.
(d) Now select all the data you've just created (including the X Y header row). Go to the top menu and Insert→Chart. Choose "Scatter" chart type. (See tutorial video for details.)

7. Math Notation:

Again with a few lines of text (just to prove you still know how to enter them correctly). Then a blank line. Then show the following math equation, centered, not part of text:

$$Ax^2 + Bx^3 = C_1 + \frac{\sqrt{\text{your student number}}}{\pi}$$

For example, if your student number was 876504 then you would show:

$$Ax^2 + Bx^3 = C_1 + \frac{\sqrt{876504}}{\pi}$$

NOTE:
DO NOT TRY TO ENTER THIS USING STANDARD KEYBOARD TYPING, e.g, **NOT** this:

$$Ax^2 + Bx^3 = C_1 + \sqrt{876504}/\pi$$

Finish off with a chunk of text stating that you are glad to now be done with the summer assignment.

See you in August...

Questions? Contact me

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tinyurl.com/C2physics