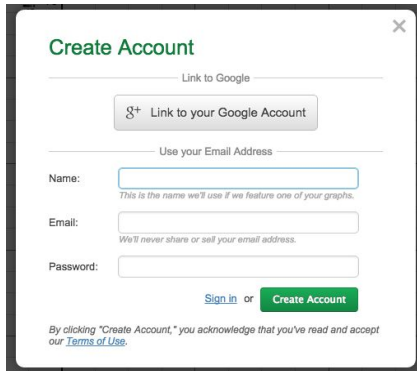# Desmos Training for State Science Test
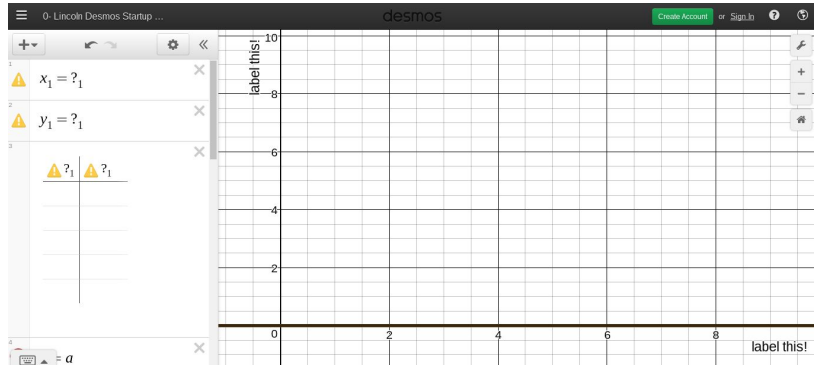
Follow the steps below to practice using Desmos as a calculator and as a tool to graph data.

Creating an account:

1. Go to https://www.desmos.com/

2. In the upper right corner, click on "create account."

3. Click "*g*+ Link to your Google Account." If prompted, click "allow."

4. Follow the on-screen directions to sign in to your **student4pps** google account. Your name should now appear in the upper right.

Doing calculations with Desmos:

You can use Desmos as a calculator! To access this ability, you need to click on this button in the bottom left hand corner of the screen.

1. To use Desmos as a calculator, simply click in a new line on the left hand side of the screen (below your data table and equation), and begin entering your function.
2. Try entering 12 divided by 4, and make sure you see where you find the answer of 3.

$$\frac{12}{4}$$

$$= 3$$

3. Desmos also has several statistical functions built into the program that you can apply to a data set. Please watch the following video tutorial:

https://tinyurl.com/rx9ck37

Creating a graph: You can also use Desmos as a tool to plot data and determine a line of best fit. Let's make a data table to enter your data.

1. In the top left corner, click on the + button, and select "Table". Then enter the following data. Data points should automatically appear on the graph.

2. **Label your axes:** Let's pretend the data you entered above, was from an experiment in which we varied the mass of an object and recorded the net force required to accelerate it at a constant rate of 2 m/s^2.

    a. Mass (kg) will be graphed on the x-axis, and Net Force (N) will be graphed on the y-axis.

    b. To label these axes, in the top, right-hand corner of the graph, click on the "monkey wrench" symbol. This will give you your graph options.

    c. Here, next to the X-Axis and Y-Axis, where it says, "insert label", type your axis label (with units)

   d. This is where you can also define the range for your axes.
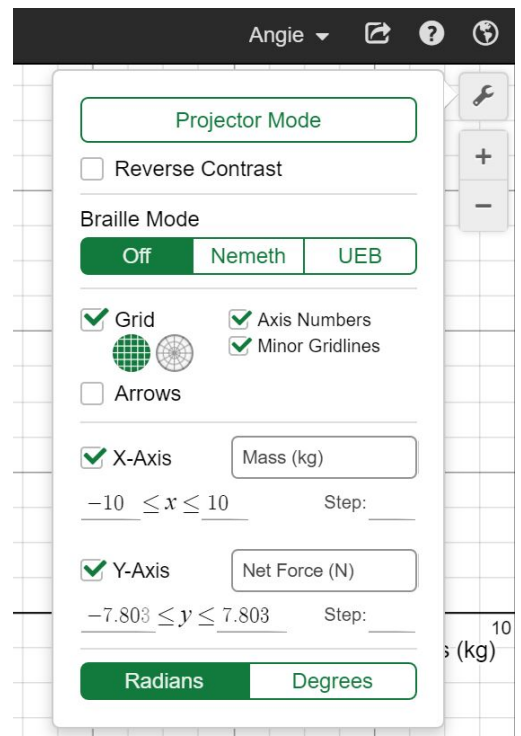
Adding a best-fit line or curve to your graph:

1. In the top left of the screen, click the + button again, and choose "function". There is now a blank space below the data table that you can type in the function for your line of best fit.

2. The table below gives the equations that are common in physics.

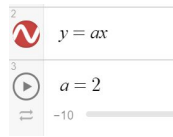| Equation	Pattern Name
$y = a$	linear (horizontal)
$y = ax$	linear (proportional)
$y = ax + b$	linear
$y = ax^2$	quadratic
$y = a/x$	inverse

3. Our data appears to be proportional, so in the space type the proportional equation: $y = ax$.

   Below the equation, click "add slider", and use the slider to adjust the constant (a-value) of the graph until it fits your data. It should look like this:
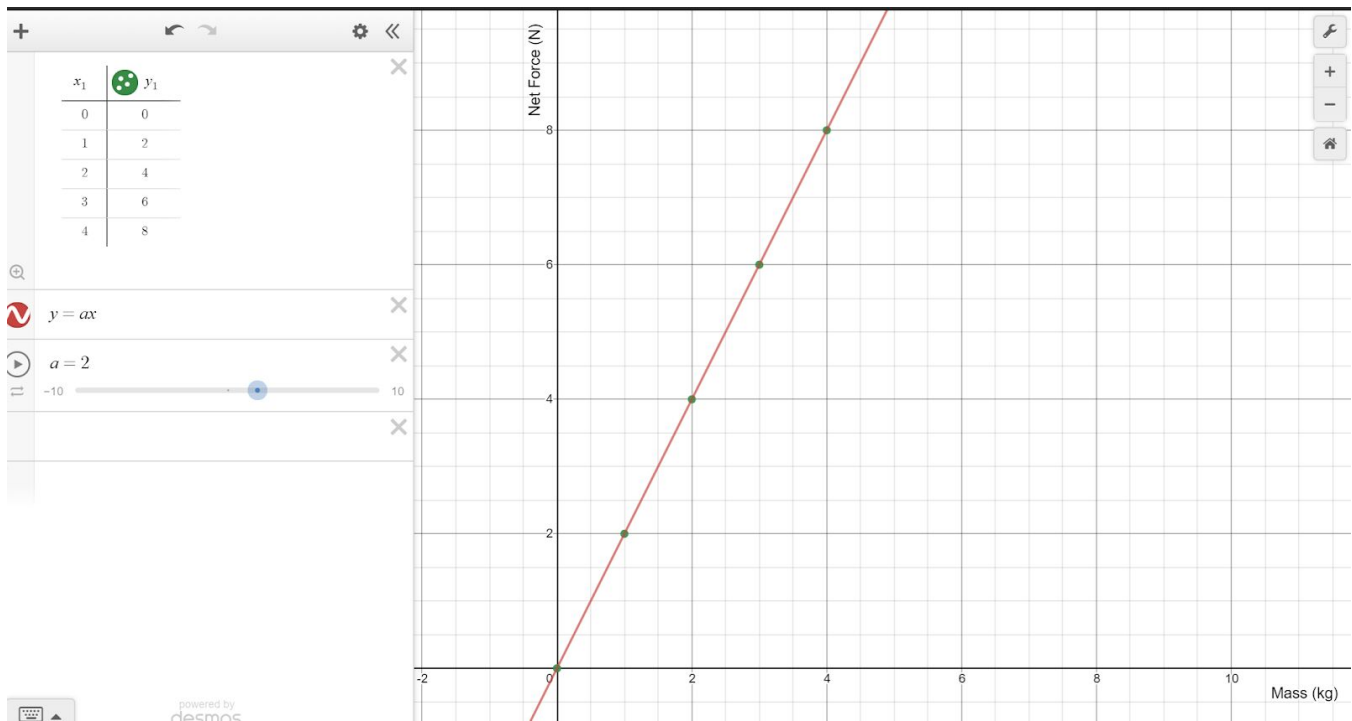
4. In general, when determining the line of best fit for your data, choose the **simplest line** to fit all of your data points.

   a. Note: If you fit "ax + b", an "add slider" button will appear for the "b" constant - click this to enable.

5. We can see that when a = 2, the RED line goes through all of the data points. Now we can create a ***science equation*** for our line of best fit.
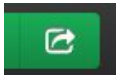

      i.   Our equation says :

      ii.   Combining these, we can get a ***math equation*** for the relationship to be: $y = 2x$

      iii.   Substituting the variables from our experiment for the letters in this ***math equation***, we get a ***science equation***:

Net Force = 2 Mass

      iv.   (Hey! We had a constant acceleration of 2 m/s^2 in this experiment! Coincidence? I think not!)

<u>Export your graph to a Google Doc or other document</u>:

1. Click on the export button in the upper right of the screen.

2. Click on "Image." It will open a new tab in your browser with the image. Either download/save the file to your google drive, or right-click (or double-click on a mac) and select "Copy image" and paste it into your document.
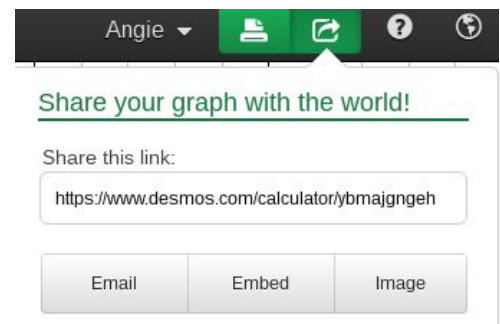
You are done! This graph auto-saves to your account in Desmos. If you want to re-name it to come back to it later, click on the name at the top to rename it (i.e. "physics - net force vs. mass graph").

Good luck with using Desmos! Please let me know if you have any questions!

~ Ms. McVay - amcvay@pps.net - Room 216