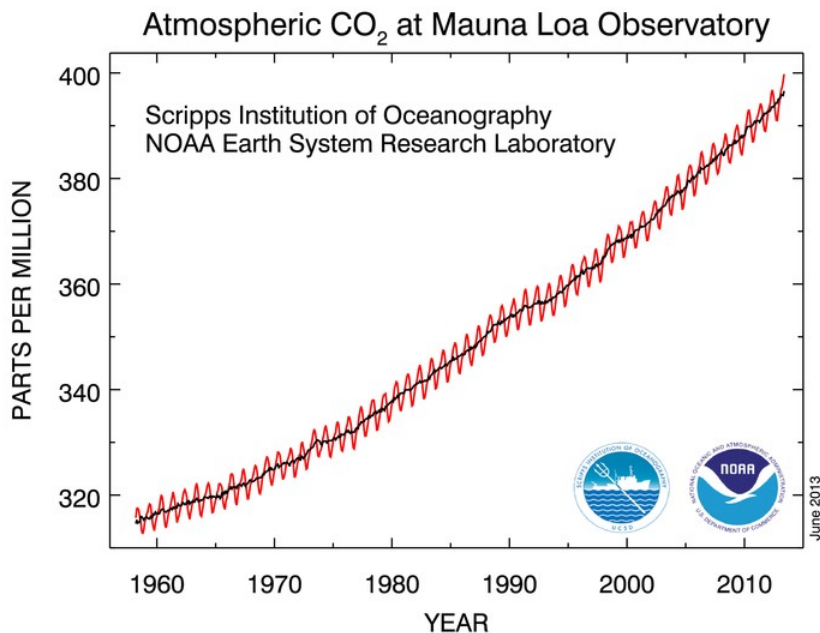


# Activity 5: Linear Equations

1. The graph below shows the concentration of carbon dioxide at the  
Mona Loa observatory in Hawaii for the past few decades.  
(a) On the graph below, draw the line that, in your opinion, best fits the  
data. (You should draw the line that goes through as many points  
as possible while having as many points above as below your line. )  
(b) Find the slope of that line making sure to include the correct units.  
(c) Explain the physical meaning of this slope.  
(d) Does it make sense to extend the line all the way back to the  
y-intercept? Explain why or why not.



2. A physicist in a perfect universe gathers the following data about the  
current flowing through a light bulb for different size batteries. (The

amount of current flowing through a device is measured in amps (A)

while the “size” of a battery is given by its voltage (V.)

(a) Explain why you can add the data point (0,0) to your graph even

though it is not explicitly given in the data set.

(b) Using the grid provided, make a plot of the data putting the current

on the y-axis and the voltage on the x-axis. (You’ll have to draw

your own axes. Also, label your axes as “Voltage” and “Current”

and not as “y” and “x”.)

(c) Find the slope for the graph (along with its proper unit).

(d) Write the linear equation that represents this data.

(e) Use your graph to determine the voltage needed to make 3A of

current flow through the light bulb.

Voltage	Current (A)
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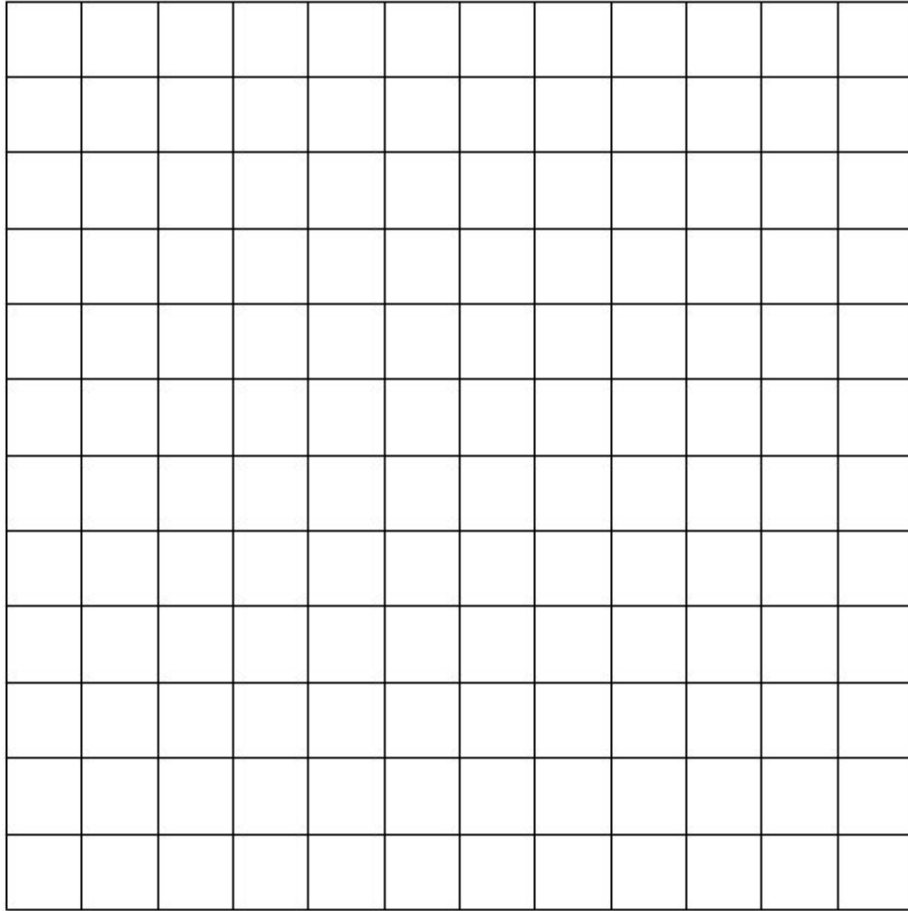
(V)	
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1.5	0.3
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5	1
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9	1.8
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12	2.4
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3. A physicist living in the real world gathers the following data about the current flowing through a light bulb for different size batteries.
- (a) Make a plot of the data putting the current on the y-axis and the voltage on the x-axis. (Since this is real-world data, the points will not fit perfectly on a line.)
  - (b) Find the slope for the graph (along with its proper unit).
  - (c) Write the linear equation that represents this data.



4. The following data is from an actual experiment measuring the current flowing through a piece of copper at different temperatures.

(a) Make a plot of the data putting the current on the y-axis and the

temperature on the x-axis. (Again, since this is real-world data, the points will not fit perfectly on a line.)

(b) Using just your graph (and no calculations), find how much current

would flow through this piece of copper if it were put in a refrigerator

whose temperature was  $3.5^{\circ}\text{C}$ ?

(c) Using just your graph, find the temperature at which 1 A of current

would flow through the copper?

Temperature ( $^{\circ}\text{C}$ )	Current (A)
23 (Room)	0.25
-196 (Liquid Nitrogen)	2
0 (Ice bath)	0.26
100 (Boiling water)	0.18
-80 (Dry Ice)	0.38


5. Using the meter sticks provided, measure the length of each group member's foot. Record that length in the table below using centimeters. Also, record the height of each member of your group also using centimeters. (If you only know your height in feet and inches, you'll have to convert.) Share your data with the other groups at your table to get at least 7 data points.
  - (a) Make a plot of the data putting the height on the y-axis and shoe size on the x-axis.

(b) Does your data seem to suggest a linear relationship between foot size and height? Explain.

Foot-Size	Height
(cm)	(cm)

