

Unit 1: Scientific Reasoning

One learning goal I would like to set for this unit is:

The letter grade I want to earn for this unit is: _____

What are three specific things I need to do in order to earn this grade?	Did I do it?
1. _____	☐
2. _____	☐
3. _____	☐

My quiz scores for this unit:

Quiz 1A	Quiz 1B	Quiz 1C	Quiz 1D	Quiz 1E

Name: _____ Period: _____

How well do I understand Unit 1?

Shade in each box completely to show your understanding level for each objective.

- 1- I saw this in class, or I was absent and got notes from someone or from Canvas.
- 2- I am beginning to understand. This makes sense when I see this in class, but I struggle with it.
- 3- I understand what is important. I can do the homework if I can look at my notes.
- 4- I understand completely. I can do the homework without help. I could teach it to another student.

1A Experimental Design

Identify Independent and Dependent Variables in an experiment	1	2	3	4
Identify & justify variables that must be kept constant.	1	2	3	4

1B Graphing Data

Demonstrate the steps of graphing.	1	2	3	4
Identify where to plot the independent and dependent variables.	1	2	3	4
Identify the shapes of graphs.	1	2	3	4

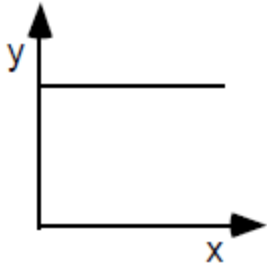
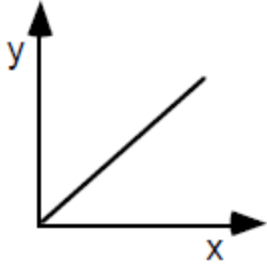
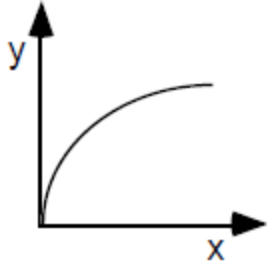
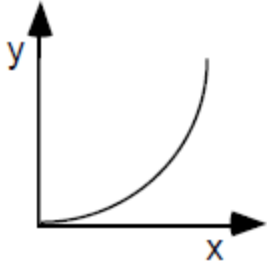
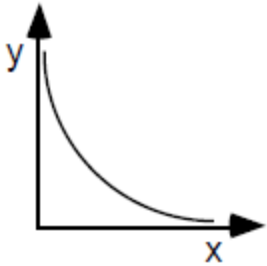
1C Interpreting Graphs

Determine the slope of a linear graph	1	2	3	4
Determine the intercept of a linear graph	1	2	3	4
Use proper units for slope & intercept	1	2	3	4
Write the equation of a linear graph with correct units	1	2	3	4
Use the equation of a line to make a prediction	1	2	3	4
Use the scale of a graph to determine numerical values	1	2	3	4

1D Linearizing Graphs

Identify the relationship (proportionality) for the five shapes of graphs.	1	2	3	4
Create a new calculated column that will yield a straight line when graphed.	1	2	3	4
Create the new linear graph, following the steps of graphing.	1	2	3	4

variable	constant	Independent variable	Dependent variable
slope	intercept	$slope = \frac{rise}{run}$	$y = mx + b$
trial	negligible	qualitative	quantitative
Period (T)	time (t)	second (s)	linearize

Graph	Shape	Relationship	How to Linearize
	Horizontal line	y is not related to x	Nothing needed
	Linear	$y \propto x$	Nothing needed
	Side Opening Parabola	$y^2 \propto x$	Calculate y^2 for each y in the data table Replace y with y^2 on the graph
	Top Opening Parabola	$y \propto x^2$	Calculate x^2 for each x in the data table Replace x with x^2 on the graph
	Inverse	$y \propto 1/x$	Calculate $1/x$ for each x in the data table Replace x with $1/x$ on the graph

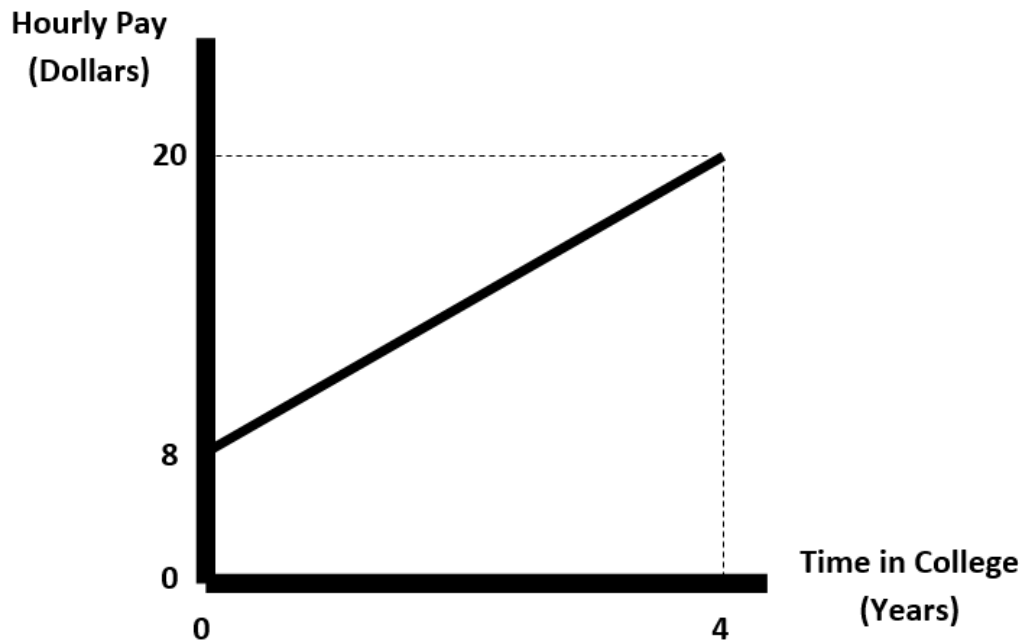
Problem Set 1

1. A student performed an experiment with a metal sphere. The student shot the sphere from a slingshot and measured its maximum height. Six different trials were performed with the sphere being shot at a different angle from the horizontal for each trial.

- a. What is the relationship being studied?
- b. What is the independent variable in this experiment?
- c. What is the dependent variable in this experiment?
- d. What variable must be held constant throughout this experiment?

2. Describe the relationships which we proved in our pendulum lab. The variables included were period, mass, amplitude, and length. Use complete, English sentences to describe the relationships!!

Problem Set 3



1. What shape is this graph?
2. Write a statement of proportionality. Use correct variable names.
3. Calculate the slope (include correct units).
4. Determine the vertical intercept (include correct units).
5. Write the mathematical model (equation) with correct variables, numbers, and units.
6. Fill in the sentence describing the relationship between the two variables:

***As a person's _____ increases, then their
_____ increases as well.***

Problem Set 4

Look at your graphs from Problem Set 2. We will use the same data sets to practice linearizing graphs to get the slope, intercept, and equation for each one. If the original graph is linear, write the slope, intercept, and equation of the line. If not linear, linearize it first, and then write the slope, intercept, and equation of the line.

Be sure to use correct variables, and correct numbers and units on slope & intercept.

Data Set #1

Volume (m ³)	Pressure (Pa)
0.5	8
1	4
2	2
4	1
5	0.8
8	0.5
10	0.4

Slope:

Intercept:

Equation:

Data Set #2

Time (s)	Position (m)
0.2	0.12
0.5	0.75
1	3
2	12
3	27
4	48
5	75

Slope:

Intercept:

Equation:

Name: _____

Data Set #3

Age (months)	Weight (pounds)
1	7.3
2	9.4
3	10.5
4	12.0
5	13.0
6	14.3
7	15.2
8	16.7

Slope:

Intercept:

Equation:

Data Set #4

Time (s)	Velocity (m/s)
0.3	10
1.2	20
2.7	30
4.8	40
7.5	50
10.8	60
14.7	70
19.2	80

Slope:

Intercept:

Equation:

Problem Set 2

Name: _____

Graph each set of data. Assume the first column is the independent variable.

Write the shape name below each data set. Use the variable names given in the data sets (do not use X or Y).

Data Set #1

Volume (m ³)	Pressure (Pa)
0.5	8
1	4
2	2
4	1
5	0.8
8	0.5
10	0.4

Data Set #2

Time (s)	Position (m)
0.2	0.12
0.5	0.75
1	3
2	12
3	27
4	48
5	75

Shape #1: _____

Shape #2: _____

Data Set #3

Age (months)	Weight (pounds)
1	7.3
2	9.4
3	10.5
4	12.0
5	13.0
6	14.3
7	15.2
8	16.7

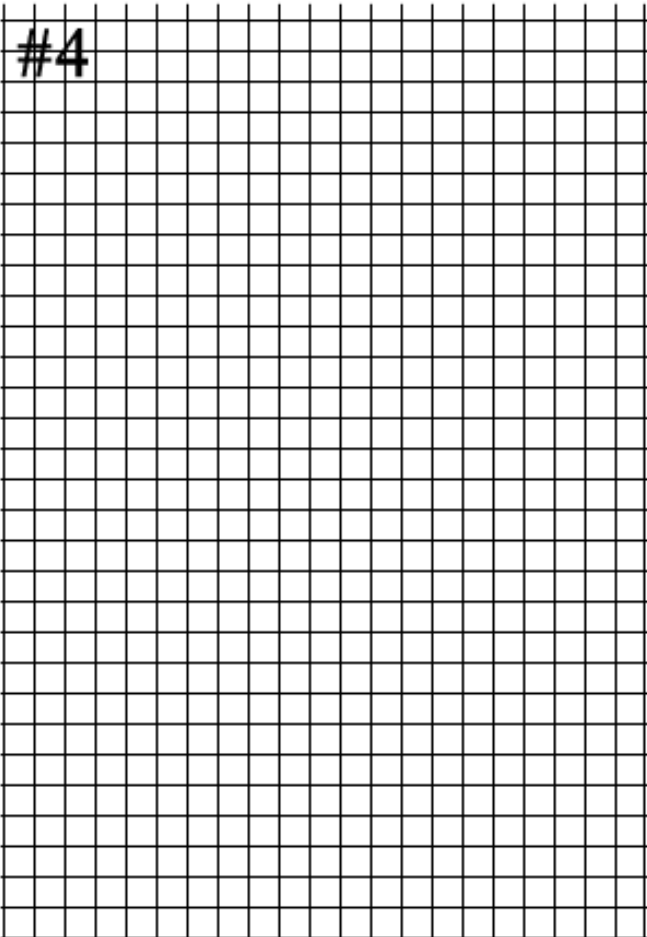
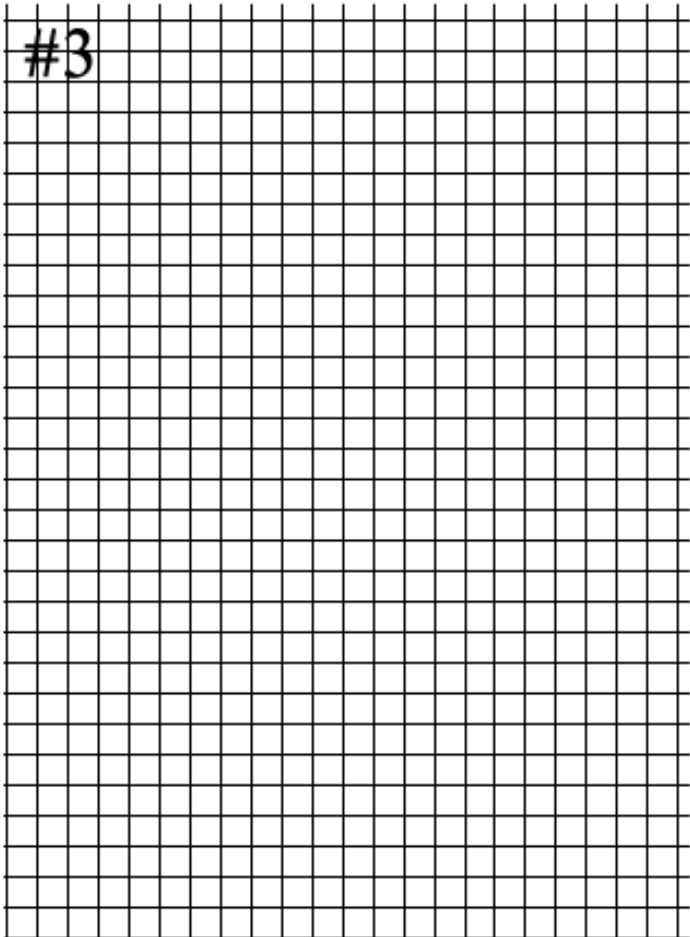
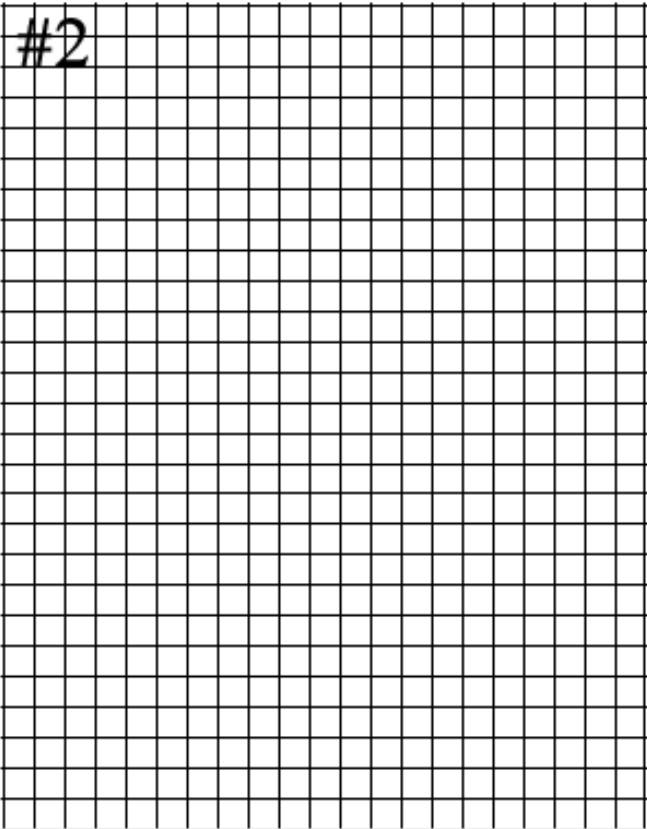
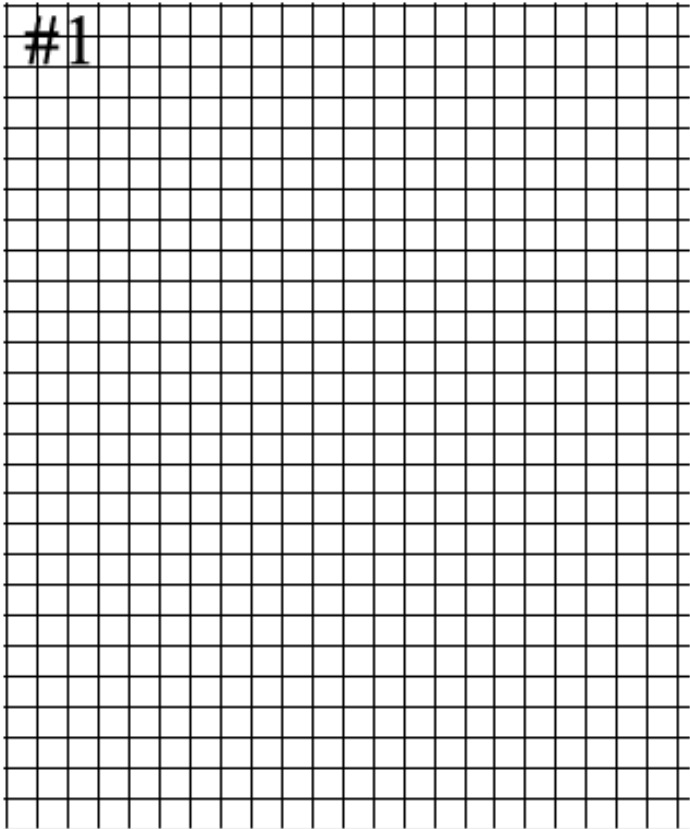
Data Set #4

Time (s)	Velocity (m/s)
0.3	10
1.2	20
2.7	30
4.8	40
7.5	50
10.8	60
14.7	70
19.2	80

Shape #3: _____

Shape #4: _____

Problem Set 2 Graphs:



Problem Set 4 Graphs:

