

# Graphing practice for direct and indirect proportions.

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Useful conceptual definitions:

***If two quantities are directly proportional, then their ratio is constant.***

$$\text{Direct} \rightarrow X/Y = k; \text{ i.e. } X = kY$$

***If two quantities are inversely proportional, then their product is constant.***

$$XY=k; \text{ which can also be written as } Y=k/X$$

A **line of best fit** is a straight **or** curved line that best represents the data on a scatter plot. ***This line may pass through some of the points, none of the points, or all of the points.***

## **Predicting:**

- If you are looking for values that fall within the plotted values, you are ***interpolating***.
- If you are looking for values that fall outside the plotted values, you are ***extrapolating***. **Be careful** when extrapolating. The further away from the plotted values you go, the less reliable is your prediction.<sup>1</sup>

## **SITUATION 1:**

***A Pretend Lab:*** Suppose we took a group of physics students and measured their heights (in METERS, of course). Then, we sent them outside on a sunny day and told them to measure the lengths of their shadows. We did this because we wanted to know if there what kind of relationship exists between students' heights and the lengths of their shadows. So after we collect the data, we should put it in a chart and then divide one value by the other to find the ratio and see if it stayed the same. Since this is a pretend lab, I've made up data and put it in the chart below.

Student	Height in meters	Shadow in meters
1	1.44	.33
2	1.35	.29
3	1.38	.30
4	.85	.20
5	1.26	.31
6	1.61	.36
7	1.15	.24
8	1.29	.31

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<sup>1</sup> <http://regentsprep.org/REgents/math/ALGEBRA/AD4/linefit.htm>

## **SITUATION 2:**

**Another Pretend Lab:** Once again, I am going to make up data, this time showing the volume of a gas as we increased the pressure. The volume will be measured in mL and the pressure in atmospheres. Here are the results. Remember, this data is fake. We're just doing this for practice.

Trial #	Pressure (atm)	Volume (mL)
1	1.0	30.1
2	1.4	21.9
3	1.8	17.7
4	2.2	14.6
5	2.6	11.8
6	3.0	9.8
7	3.4	8.8
8	3.8	8.2

## **INSTRUCTIONS:**

1. For each of the situations presented above, graph all **data points** (*do not graph student or trial #'s*) and use a line of best fit to adequately represent the data provided. Make sure to correctly label and set up units for all axes. You may do this in Excel if you wish.
2. **You** must make the correct decision as to which piece of data belongs to which axes.
3. **Identify and label each axes** (i.e. variable) as dependent or independent (with their respective labels and units) and **explain your rationale**.
4. Make sure to properly **title** your graph.
5. **Identify** each situation as either a **direct or indirect proportion** and **explain your decision**. *Hint: you **may** need to show some calculations to back-up your decision.*
6. Both graphs may be done on the same sheet of graph paper, using one side per graph with all accompanying explanations on the same sheet of paper. You may also choose to complete this assignment using Excel.