



Graphing Scientific Data

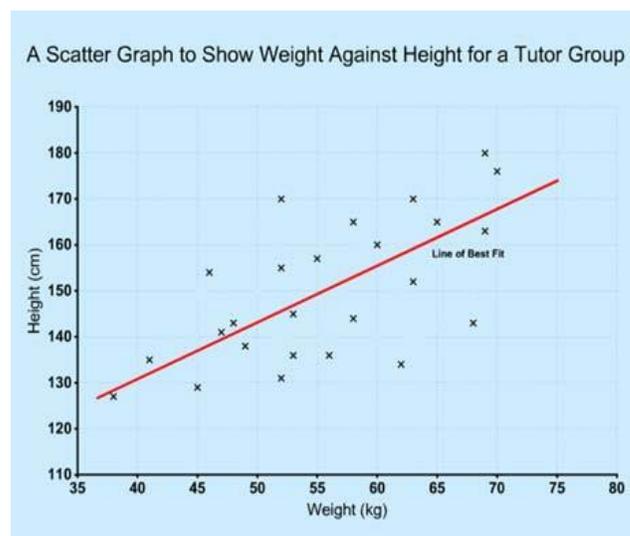
Graphs are a useful tool in science. They make trends in data easy to see. This semester we will see pie graphs, bar graphs, and the ever-so important: line graph.

A line graph displays the data collected during a controlled experiment. It shows the relationship between the independent and dependent variables.



The graph should contain:

- 1.) **The title:** is centered above the graph. It is written as the dependent variable versus the independent variable (e.g. Position vs Time for a 100 m Race).
- 2.) **The Independent Variable:** is placed on the horizontal or x-axis. Remember, this is the variable that can be controlled or manipulated by the experimenter.
- 3.) **The Dependent Variable:** is placed on the vertical or y-axis. It is the result of what happens because of the independent variable.
- 4.) **The Scales for each Variable:** Identify the range of your data and pick an easy multiple to achieve this range (e.g. multiples of 2, 5, 10). Remember that you do not have to start with 0 but you do need some room to extrapolate your data. Scales can be different for each axis. Spread out the data as much as the paper allows.
- 5.) **The Legend:** If more than one data set is included, place this either directly under the graph or on the right upper corner.



How to Construct a Line Graph

*** Use a PENCIL!***

1. Identify the variables.
2. Determine a scale for each axis.
3. Number and label the x and y axis. Don't forget to include units! Eg. Time (minutes)
4. Plot your data points, using a dot surrounded by a larger circle. Eg. (●)
5. Draw the graph. Use a ruler to draw a straight line of best fit (NOT connect the dots!). You can also draw a smoothed curved line if that better fits your data.
6. Title your graph (Dependent vs Independent Variable).
7. Add a legend if more than one data set is included.

Line Graph Checklist

- Is the independent variable plotted on the x-axis?
- Is each axis labelled with a name and units?
- Does each axis have a logical and neat scale?
- Are the data points recorded as a dot with a circle around them?
- Was a smoothed line of best fit used?
- Is there a title? Is the title labelled as the dependent vs independent variable?

If you answered "no" to any of these questions, fix it!

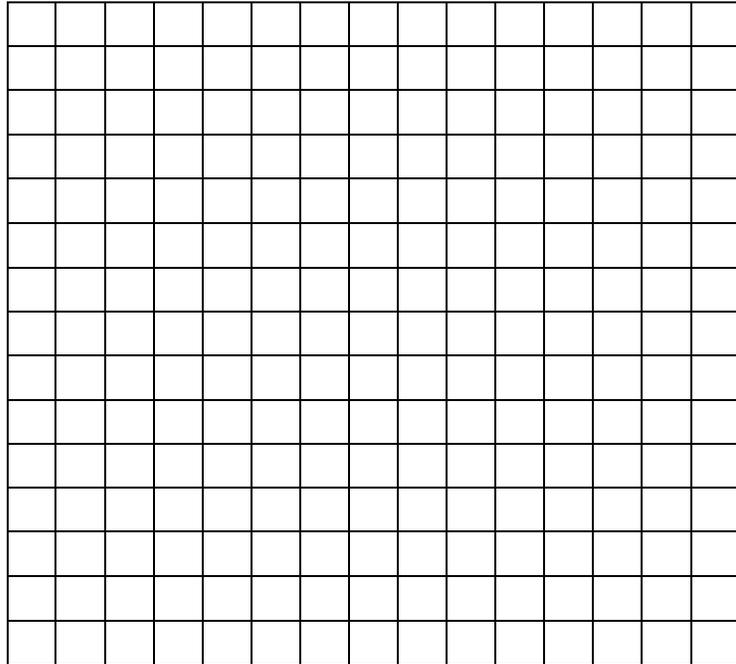
GRAPHING

Every graph needs the 6 following things:

- 1) **Title**
- 2) **Independent Variable**
- 3) **Dependent Variable**
- 4) **Appropriate Scale**
- 5) **Labeled Axes**
- 6) **Data Points**
- 7) **Line of Best Fit**

Let's build one together from the following data set:

Time (s)	Distance (m)
0	0
1.0	2.0
2.0	3.5
3.0	5.5
4.0	7.5
5.0	11.0
6.0	12.5
7.0	14.5



Graphing Activity # 1

You are given the following data set showing the number of tadpoles that develop depending on the pH of pond water.

pH of water	Tadpoles
8.0	45
7.5	69
7.0	78
6.5	88
6.0	43
5.5	23

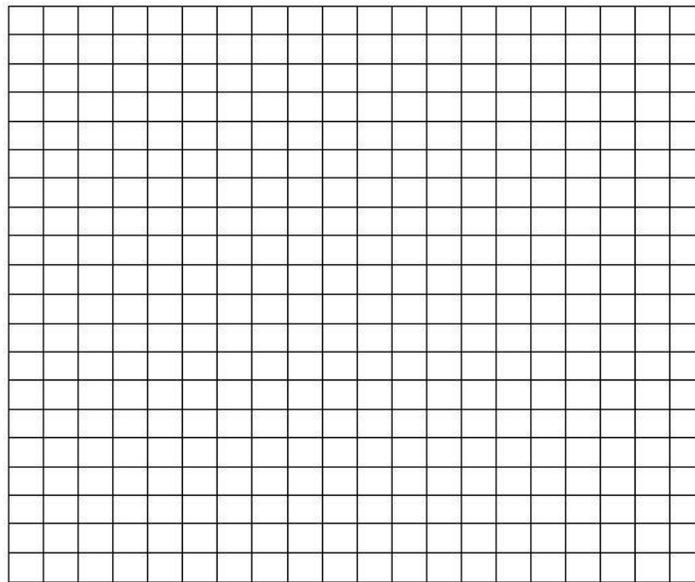
1. What is the independent variable? _____

2. Why is this the independent variable?

3. What is the dependent variable? _____

4. Why is this the dependent variable?

5. Use the data to complete the graph provided. Remember to title your graph, label the axes properly when setting up your scale, and to use a smoothed line of best fit.



6. Using a complete sentence, state the general relationship between pH and tadpoles.

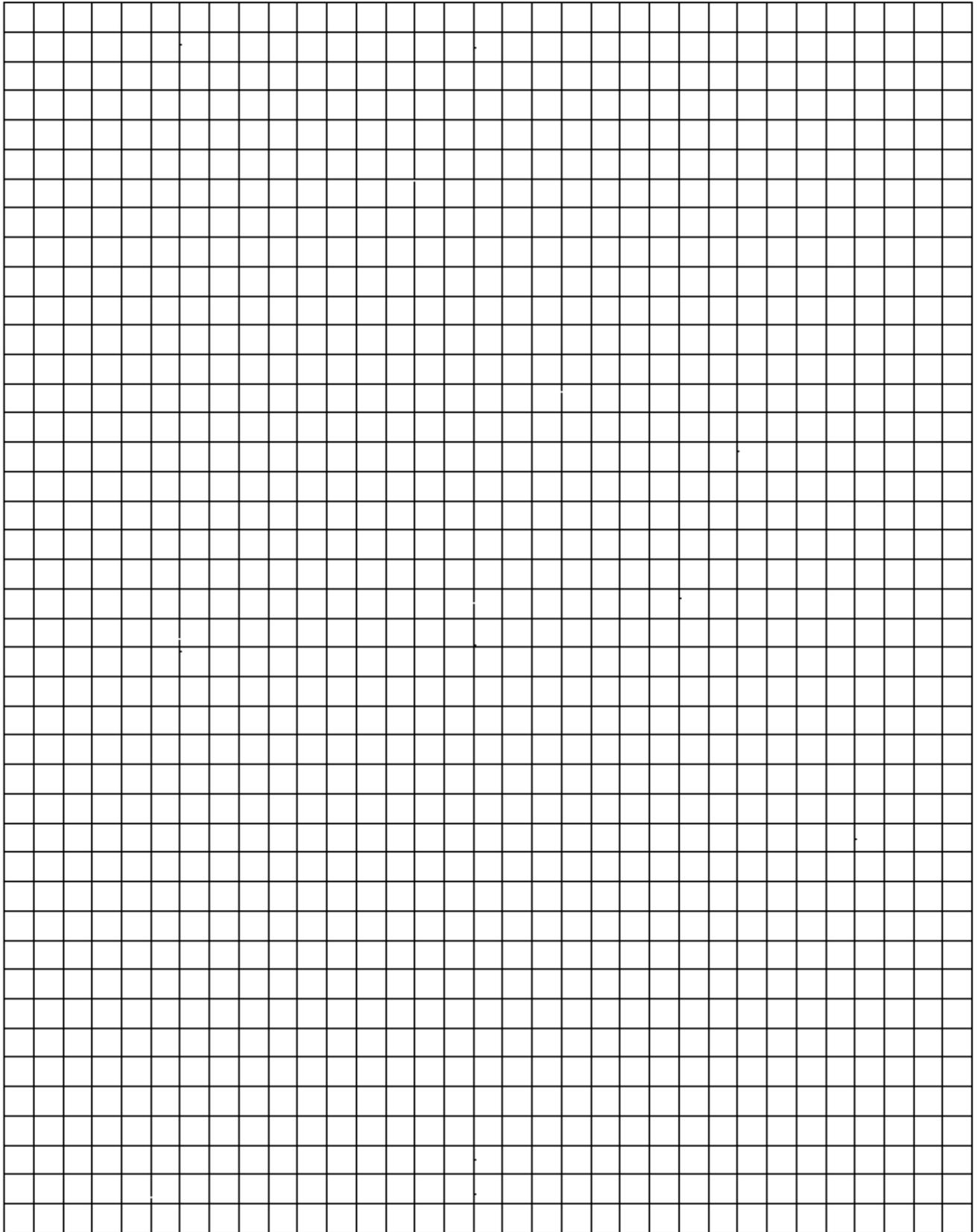
7. If the water's pH was 5.0, you would expect

Graphing Activity # 2

Diabetes is a disease affecting the insulin producing glands of the pancreas. If there is not enough insulin being produced by the cells, the amount of glucose in the blood will remain high. A blood glucose level above 140 for an extended period of time is not considered normal. This disease, if not brought under control, will lead to severe complications and even death.

1. Use the data in the table below to complete the graph provided. Remember to title your graph, label the axes properly when setting up your scale, make a key, and to write a legend for your graph when completed.

<u>Time After Eating (hrs.)</u>	<u>Glucose Level in ml/liter of blood in person A</u>	<u>Glucose Level in ml/liter of blood in person B</u>
0.5	170	180
1	155	195
1.5	140	230
2	135	245
2.5	140	235
3	135	225
4	130	200



Answer the following questions based on the Blood-Glucose graph you just completed.

1. What is the independent variable? time
2. Why is this the independent variable? This can be controlled as time is constant.
3. What is the dependent variable? Blood glucose level
4. Why is this the dependent variable? Because this is the factor we are watching to see change and is reliant upon the time passing.
5. Which, if any of the above individuals may have diabetes? Be sure to justify your answer! Person B has a likelihood as his/her glucose level was higher than 140 for the entire time
6. If the time period were extended to 6 hours, what would be the expected blood sugar level for
Person B? answers will vary, but should continue to fall
7. What would be a probable blood sugar level for person B at 3.5 hours? Answers may vary but possibly around 210.
8. Use one or more complete sentences to state a conclusion about the data in graph # 2. The level of glucose in our blood spikes about a half an hour after eating and then decreases over time.