Name: _____ Date: _____ Block: _____
Biology

# Graphing and Interpreting Data Activities

## Introduction

Graphing is used by scientists to display the data that is collected during a controlled experiment. Graphs must be constructed to accurately depict the data collected. The graph should contain the following major parts: the title, the independent variable, the dependent variable, the scales for each variable.

1.) **The title**: this shows what the graph is about. Reading the title should give the reader an idea about the graph. It should be a concise statement placed above the graph.

2.) **The Independent Variable**: this is the variable (part of the experiment that changes) that can be controlled or manipulated by the experimenter. This variable should be placed on the **horizontal or x-axis.**

3.) **The Dependent Variable**: this is the variable directly affected by the independent variable. It is the result of what happens because of the independent variable. This variable is placed on the **y or vertical axis.**

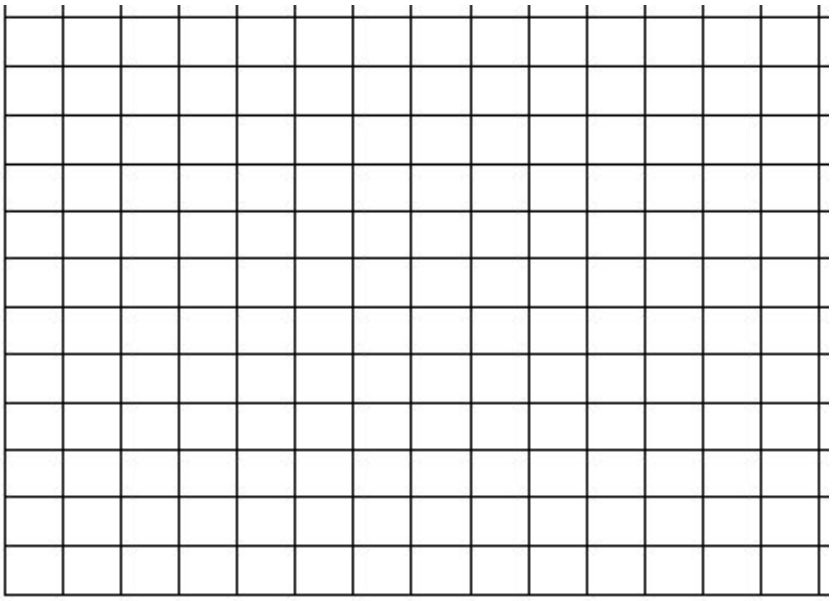
4.) **The Scales for each Variable**: In constructing a graph, one needs to know where to plot the points representing the data. In order to do this a scale must be employed that will include all the data points. Each block should have a **consistent amount or increment** on a particular axis. While the scale should allow as much of the graph to be taken up as possible, it is not a good idea to set up a scale that is hard to manage. For example, multiples of 5, 10, etc. are good, while multiples such as 1.22 are not! Your scale must be plotted on the amount of graph space available, and will be dictated by the data points.

This packet contains 2 bar graphs for review. The remainder is focused on line graphs.

**Bar Graph Review**

*A. Graph the following data in a **BAR graph**. Label and number the x and y-axis appropriately and give the graph a title.*

| # Hours of Study | Grade |
|---|---|
| 0 | 20 |
| 2 | 60 |
| 4 | 70 |
| 6 | 80 |
| 8 | 90 |
| 10 | 100 |

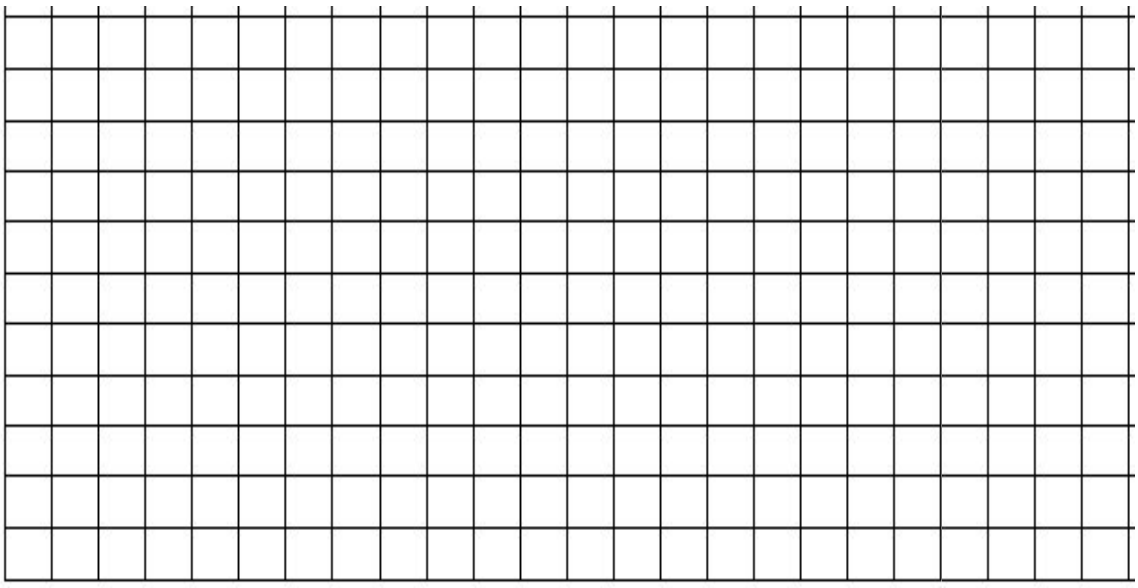


1. What is the independent variable? _____
2. What is the dependent variable? _____
3. What is the relationship between number of hours studied and the grade earned? _____

_____

*B. Graph the following data in a **BAR graph**. Label and number the x and y-axis appropriately and give the graph a title.*

| Month | # of deer |
|---|---|
| Sept | 38 |
| Oct | 32 |
| Nov | 26 |
| Dec | 20 |
| Jan | 15 |
| Feb | 12 |



1. What is the independent variable? _____
2. What is the dependent variable? _____
3. Based on the data, how does the deer population vary by month? _____

## Graphing and Interpreting Data: Line Graphs

1. pH measures how acidic a substance is. Water is considered neutral and generally has a pH of 7. You wanted to know if tadpoles would survive better in tanks of water that had a pH different than 7. You put 100 tadpoles into 6 different tanks of water that had different pH's and then counted how many tadpoles were still alive after 3 days. The results are in the table to the right:

| pH of water | Number of tadpoles |
|---|---|
| 8.0 | 45 |
| 7.5 | 69 |
| 7.0 | 78 |
| 6.5 | 88 |
| 6.0 | 43 |
| 5.5 | 23 |

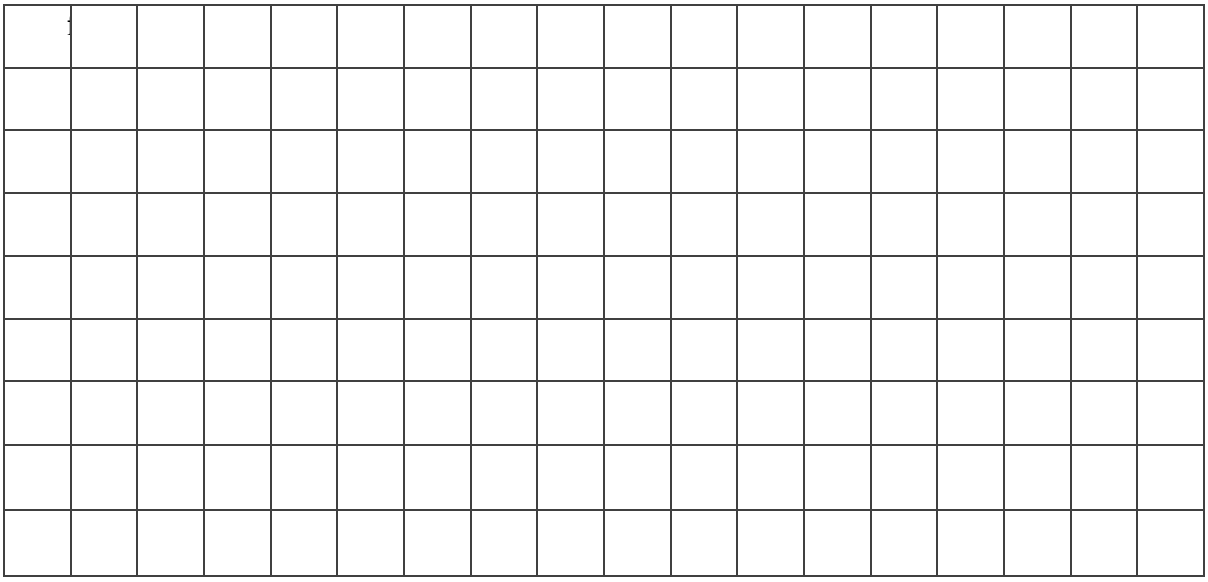
   a. What is the independent variable in this experiment?

   b. What is the dependent variable?

   c. What are some variables that were held constant in this experiment?

   d. Which group is considered the control group?

   e. Graph the data in an appropriate line graph. Please include a title and label your axes accordingly.



   g. Based on this data, what is the optimum water pH for tadpole development?

   h. Between which two pH readings is there the greatest change in tadpole number?

   i. Based on your graph, approximately how many tadpoles would you expect to find in water that had a pH of 5.0?

2. Ethylene is a hormone produced by plants that regulates how fast the fruit ripens. You decided to do an experiment to see if you could speed up how fast a fruit ripens if you exposed it to additional ethylene. You formed 6 groups of 20 apples each and sprayed them with different amounts of ethylene and measured how long it took for the apples to ripen. The average time is listed in the data table.

| Amount of Ethylene ($mL/m^2$) | Days until Ripened |
|---|---|
| 0 | 17 |
| 10 | 15 |
| 15 | 13 |
| 20 | 10 |
| 25 | 9 |
| 30 | 8 |
| 35 | 7 |

a. What is the independent variable in this experiment?

b. What is the dependent variable?

c. What are some variables that were held constant in this experiment?

d. Which group is considered the control group?

e. Graph the data in an appropriate line graph. Please include a title and label your axes accordingly.

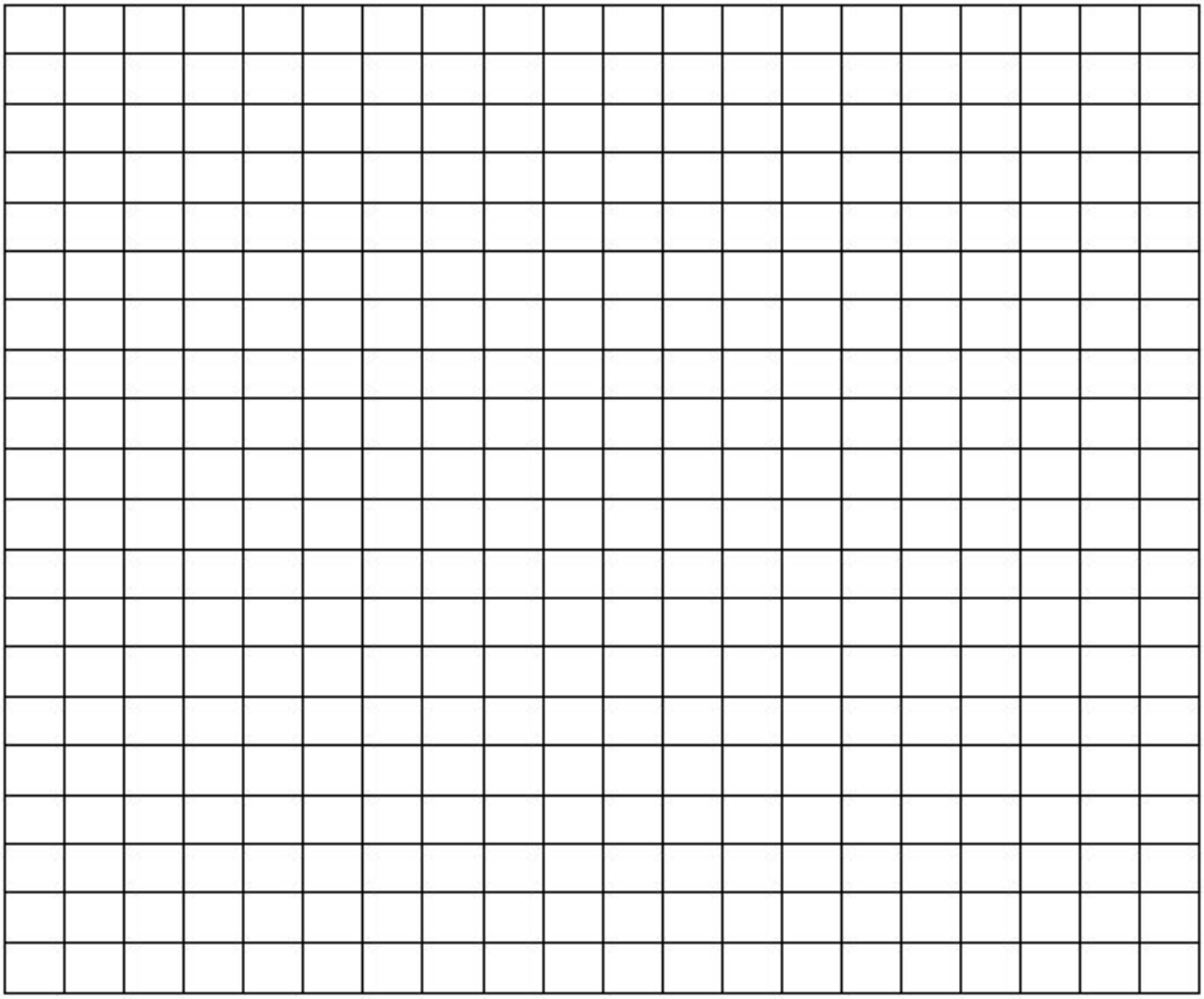
h. Based on this data, what is the optimum amount of ethylene that should be used to cause fruit to ripen the fastest?

i. Based on your graph, approximately how many days would you expect it to take for apples to ripen if they were sprayed with 50 mL of ethylene?

3. The data table shows water temperatures at various depths in an ocean.

| **Water Depth (meters)** | **Temperature (°C)** |
|---|---|
| 50 | 18 |
| 75 | 15 |
| 100 | 12 |
| 150 | 5 |
| 200 | 4 |

Using the information in the data table, construct a line graph on the grid below. *Label and number the x and y-axis appropriately and give the graph a title.*



1. State the general relationship between temperature and water depth.

_____

_____

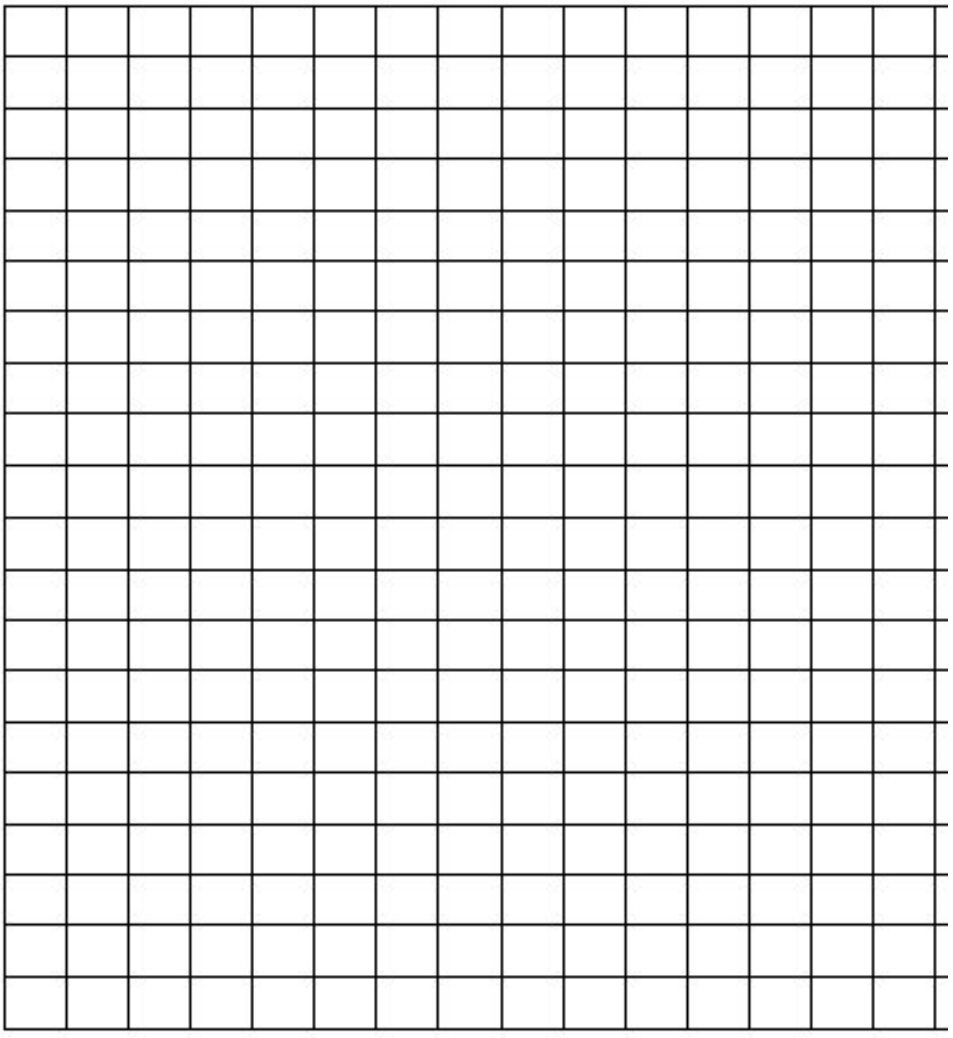
2. The approximate water temperature at a depth of 125 meters would be closest to:

(A) 15°C (B) 8°C (C) 13°C (D) 3°C

4. A student counted the total number of leaves in a group of duckweed plants over a 5-day period. The data collected are shown in the table below. Using the information in the data table, construct a line graph on the grid provided. *Label and number the x and y-axis appropriately and give the graph a title.*

**Growth of Duckweed Leaves**

| Time in Days | Number of Leaves |
|---|---|
| 0 | 15 |
| 1 | 20 |
| 2 | 25 |
| 3 | 40 |
| 4 | 60 |
| 5 | 80 |



1. The time it takes for the number of leaves to increase from 15 to 30 is approximately
   (A) 2.0 days (B) 2.3 days (C) 2.9 days (D) 3.2 days

2. State what would most likely happen to the production of oxygen by duckweed plants if the intensity and duration of exposure to light were increased.

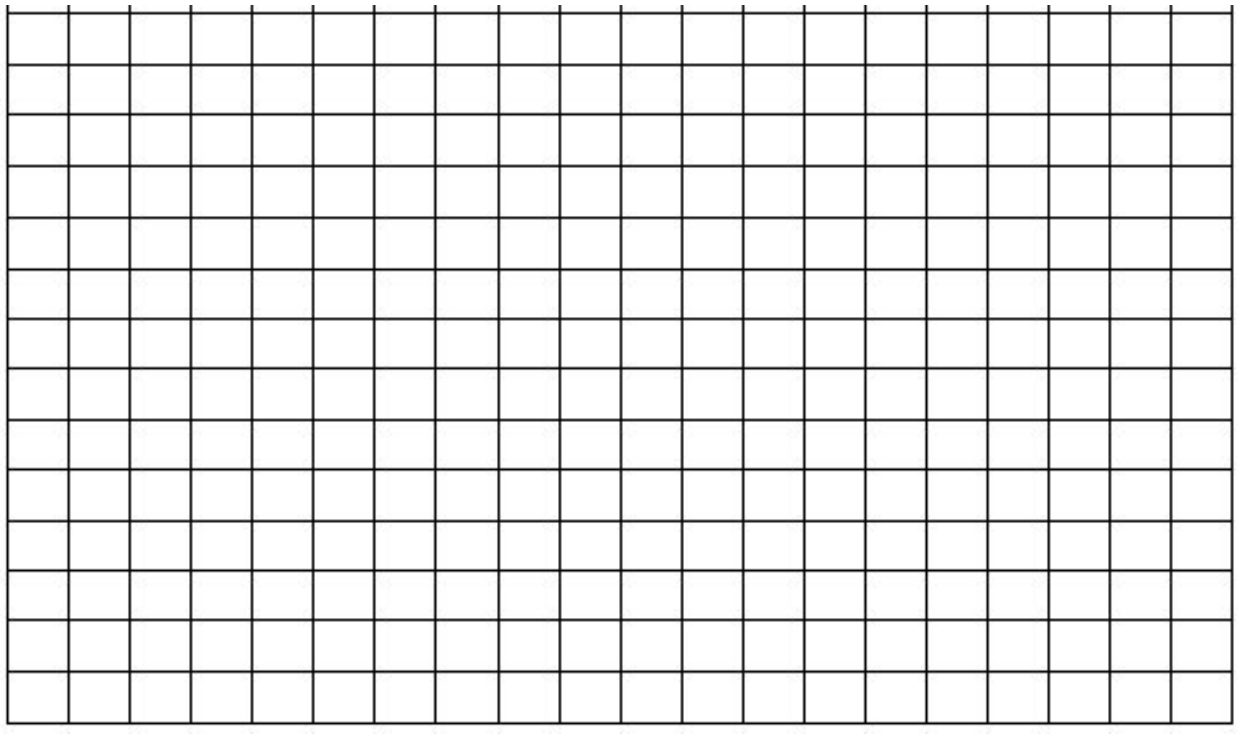
_____

_____

## 2 Line Graphs on the Same Grid

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, and make a key.

| Depth in meters | Number of bubbles/min Plant A | Number of Bubbles/min Plant B |
|---|---|---|
| 2 | 29 | 21 |
| 5 | 36 | 27 |
| 10 | 45 | 40 |
| 16 | 32 | 50 |
| 25 | 20 | 34 |
| 30 | 10 | 20 |



Answer the following questions based on the graph above you just completed.

1. What is the independent variable? _____
2. What is the dependent variable? _____
3. Make a conclusion about the data in graph #1.

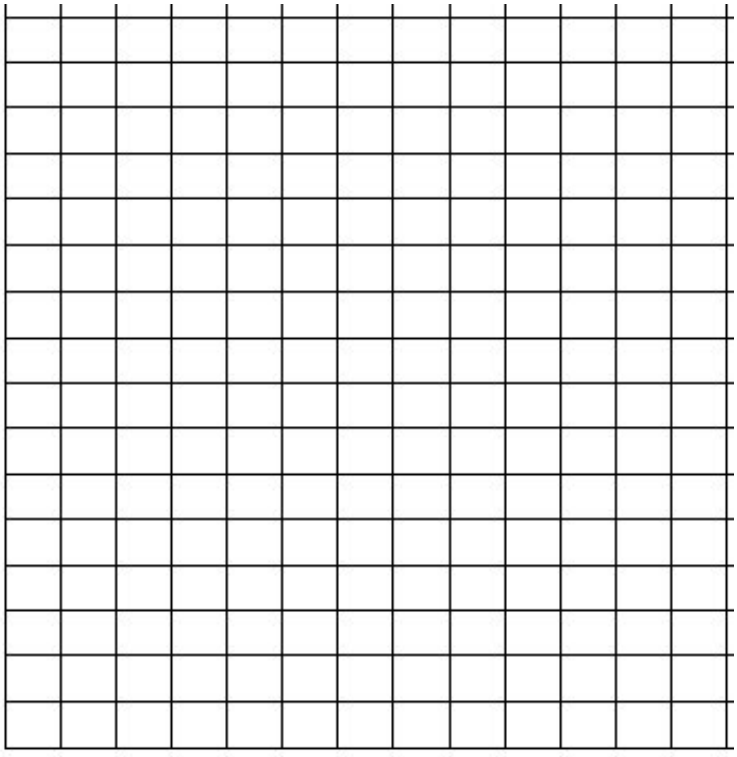
_____

_____

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.

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, and make a key.

| **Time After Eating (hrs.)** | **Glucose Level in ml/liter of blood in person A** | **Glucose Level in ml/liter of blood in person B** |
|---|---|---|
| 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 graph above you just completed.

1. What is the independent variable?

   _____

2. What is the dependent variable?

   _____

3. Which, if any, of the individuals has diabetes? Be sure to justify your answer!

   _____

   _____

4. If the time period were extended to 6 hours, what would be the expected blood sugar level for Person B? _____
5. What would be a probable blood sugar level for person B at 3.5 hours? _____
6. State a conclusion about the data in graph #2.

   _____

   _____