

## Step 5: Observe, Record, & Analyze Data (Part 3)

Scientific observations need to be recorded in an organized way so the experimenter can analyze the information. All experiments produce data, which are the facts, figures, and other evidence gathered through observations. Making sense of the data is called data interpretation.

Examine the two sets of data below.

### Data Set #1

Five pots were planted with pea plants. Pot #1 received no fertilizer and grew to 2 cm. Pot #2 received 5 ml of fertilizer and grew to a height of 10 cm. Pot #3 was given 10 ml of fertilizer and grew to be 17 cm. Finally, Pot #4 grew to a height of 12.5 cm after receiving 15 ml of fertilizer.

### Data Set #2 (Data Table)

The effect of different amounts of fertilizer on plant height

Amount of Fertilizer (ml)	Height of Plant (cm)
0	2
5	10
10	17
15	12.5

1. Which data set communicates the information more clearly? \_\_\_\_\_

Explain. \_\_\_\_\_

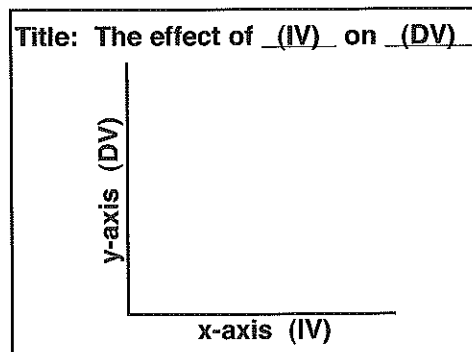
When you create a data table, you should usually use this form to write a title: "The effect of the independent variable (IV) on the dependent variable (DV)." Place the IV in the left column of the table and the DV in the right column.

*On a separate sheet of paper, create a data table for each set of data below. Remember to include a title.*

- Seeds were planted at different temperatures. The height of the plants was measured after one week.  
8°C = 4 cm    12°C = 7 cm    16°C = 9.5 cm    18°C = 11 cm    22°C = 16 cm    24°C = 12 cm
- Every other month, bears in the state park were counted.  
January = 45 bears    March = 50 bears    May = 56 bear  
July = 53 bears    September = 48 bears    November = 42 bears
- Different kinds of balls were dropped from a desktop. The height of each ball's bounce was measured.  
Baseball = 10 cm    golf ball = 60 cm    basketball = 48 cm  
Ping-pong ball = 22 cm    football = 8 cm
- A student investigated how the amount of study time affected scores on a math test.  
0 hours = 51 points    1 hour = 68 points    2 hours = 72 points  
3 hours = 75 points    4 hours = 80 points    5 hours = 91 points

After making a data table, scientists look for patterns in their data. Often it is easiest to detect patterns once the data is put into graph form. You must decide whether a line graph or bar graph is appropriate for your data. To decide which type of graph to use, look at your IV. If the IV represents the passage of time or change over time, make a line graph. If the IV represents separate types of things, make a bar graph.

A graph should have a title, usually written in the form "The effect of the IV on the DV." The IV is always written on the graph's x-axis (horizontal axis), while the DV is placed on the y-axis (vertical axis). You must label each axis with its variable.



*Use the four data tables you created for items 2-5 above and, on a piece of graph paper, make a graph for each data table. Remember to give each graph a title and label each axis.*

## Step 6: Draw Conclusions

The final step in the scientific process is to draw conclusions. A conclusion is a summary of what you have learned from the experiment. When reaching conclusions, you should decide whether the data you collected supports your hypothesis or not. It is also important to consider if you have collected enough data or if more testing needs to occur before a conclusion can be reached. Examining the process you used and deciding if there were any unidentified or unexpected variables that could have affected the results is also necessary when drawing conclusions. Remember, it is not a problem if the experiment does not turn out how you expected or does not support your hypothesis. Conclusions often lead to new scientific questions and experiments!

Examine each data set shown below. Then, on the lines provided, give a brief summary of what the experimenter can conclude from the data.

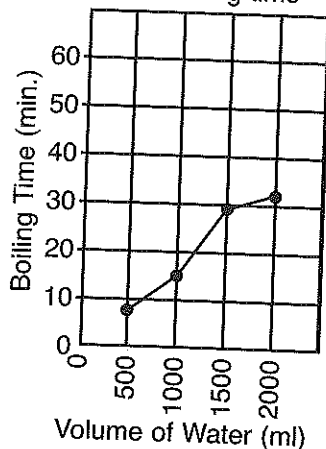
1. The effect of different activities on the heart rate of students (in beats per minute)

Student	Heart Rate (at rest)	Heart Rate (walking)	Heart Rate (running)
1	72	83	102
2	81	101	119
3	74	89	112

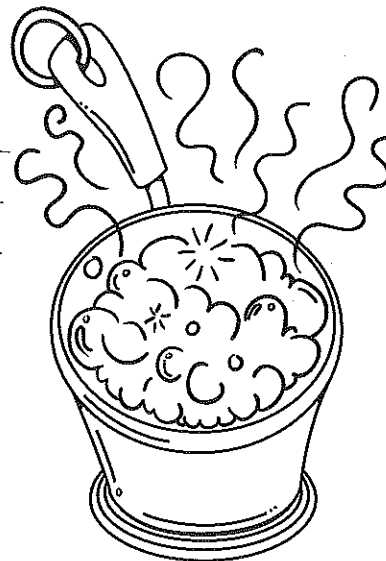
Conclusions: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

2. The effect of the volume of water in a pot on boiling time (in minutes)

Effect of volume of water on boiling time



Conclusions: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



3. The effect of the distance from the hoop (in meters) on the number of baskets made

Distance from the hoop (meters)	Number of baskets made
1	12
2	10
3	9
4	5

Conclusions: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Step 6: Draw Conclusions (Part 2)



An effective conclusion should summarize the findings of the experiment, state whether the hypothesis was supported by the data or not, and address any problems that happened during the experiment.

*Read the experiment descriptions below. Using the information given, write an effective conclusion for each experiment.*

1. Trisha is curious about magnets. She finds four magnets of different shapes and sizes: a small round one she labels "A," a long bar magnet she labels "B," a horseshoe magnet she labels "C," and a long cylinder magnet she labels "D." She is trying to find out if the size and shape of a magnet affect the strength of it. She decides to see how many paper clips each magnet can pick up in a paper clip chain to test the magnets' strength. Trisha's hypothesis is that the largest magnet (C) will be the strongest. After testing, Trisha finds out that magnet A picked up 6 paper clips, magnet B picked up 4, magnet C picked up 3, and magnet D picked up 2 paper clips.

Conclusion: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. De'Andre's grandma once told him that if he wore light colored clothes in the summer he wouldn't get as hot. He decides to see if she was right. De'Andre hypothesizes that the color black will heat the most and white will heat the least. He takes 4 pieces of the same weight of colored paper (black, white, green, and red) and folds them to create a small pocket. He places a thermometer inside of each pocket. Next, he shines an identical light on each pocket. He records the temperature shown on each thermometer every 10 minutes for an hour. After one hour, De'Andre notices that the black pocket has the highest temperature, followed by green, then red. White has the lowest temperature.

Conclusion: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Molly is experimenting with water. She wants to see if the rate of evaporation changes when water is covered. She pours 50 ml of water into each of 3 cups. She leaves one uncovered, covers one with plastic wrap, and covers the last with a paper towel secured with a rubber band. She makes a hypothesis that the water in the uncovered cup will evaporate the fastest. She leaves all the cups in the same place. After 24 hours, she compares the water level in each cup and notices that the uncovered cup has less water in it than the others. The cup covered with plastic wrap has evaporated the least, leaving the most water in that cup.

Conclusion: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_