

• **Scientific Investigation and Reasoning**
Lesson 2: Scientific Data
Reading Comprehension

Scientific Data

1 Scientists collect data during experiments. They collect data by observing or measuring. Scientists use the data to find the results of an experiment.

2 Many types of data include numbers and units. Such data may include measurements, such as time, length, temperature, and volume. In science, data is shown using the metric system. The metric system is the system of measurement used in science. Measurements of the metric system have base units. Base units include meter, liter, and gram. Prefixes can be added to base units. For example, the prefix kilo- can be added to gram. A kilogram is a measurement of 1,000 grams.

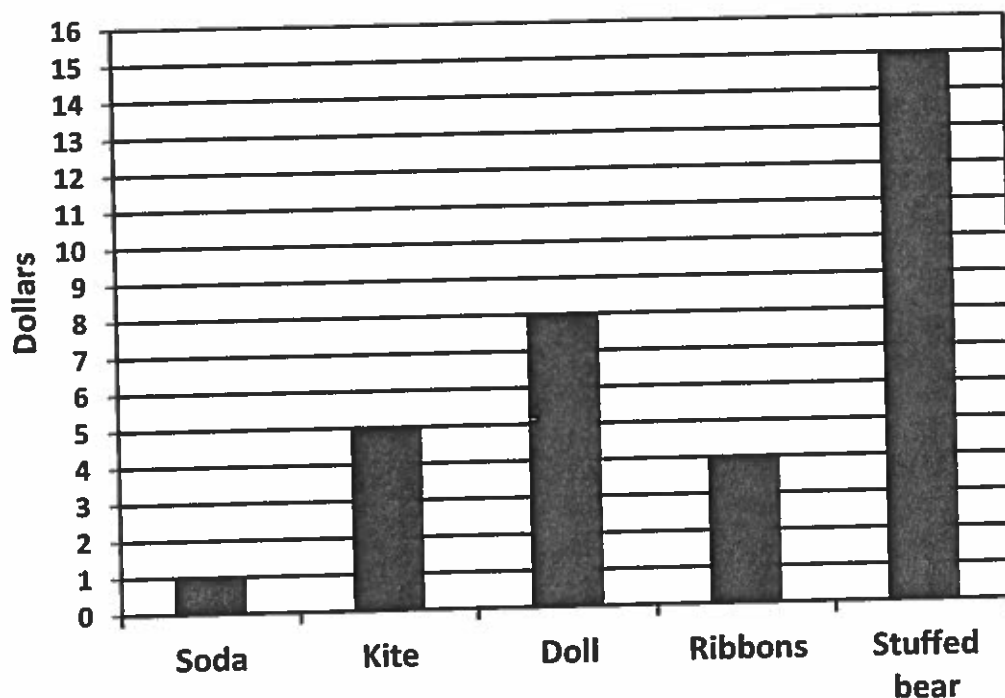
3 Data can be organized and shown in many ways. A table organizes data in rows and columns. Tables help to show the results of an experiment. Suppose you want to see how fast your heart beats at different times of the day. You measure your heartbeat each day during the week. You put the results in a table, as shown below. The table shows that your heart beats the fastest at 9:00 am.

Heartbeat Rate

Day	7:00 am	9:00 am	1:00 pm
Monday	76 beats per minute	98 beats per minute	82 beats per minute
Tuesday	70 beats per minute	95 beats per minute	79 beats per minute
Wednesday	73 beats per minute	100 beats per minute	81 beats per minute
Thursday	72 beats per minute	97 beats per minute	80 beats per minute
Friday	75 beats per minute	96 beats per minute	83 beats per minute

4 You could also show data in a bar graph. A bar graph uses bars of different lengths to compare data. A bar graph displays data made of numbers. This type of data usually comes from measurements. Temperatures, lengths, heights, and masses are measurements. Perhaps you want to compare the costs of items at a school fair. You could put the costs in a bar graph. You can see from the graph that soda is the least expensive item. Also, you can see that a doll costs twice as much as ribbons.




Item costs at school fair



5 You will collect data other than numbers, also. This data is information that describes something. Such information comes from using the senses. Descriptions include such things as colors and designs. You may write notes to describe the behaviors of animals. Or, you may keep notes about the different colors and textures of soils that you study. This type of data is often put in a notebook or on a computer.

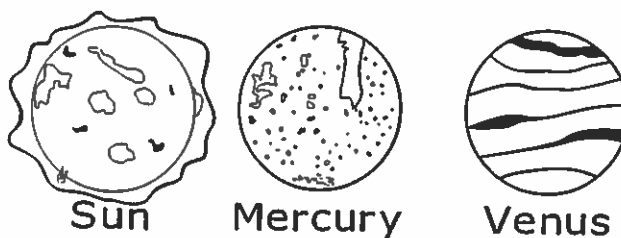
- 6 Descriptions can be put in a chart. Suppose you walk along a beach and count how many rocks of different shapes you see. You could put the results in a chart, as shown below.

Rocks on beach

Shape	Number seen
	6
	24
	9

7 Another way to display data is by making a model. A model represents a part of the natural world. A model can help explain movements of objects in space. A map is a model that shows the locations of different places on Earth. It shows the locations of cities, roads, and other areas. Maps also show distances between places. A globe is another type of model. It shows the shape Earth. Most globes also show the tilt of Earth on its axis. A globe can also show how the Earth rotates on its axis.

8 Models are useful in experiments, but they do have limitations. Suppose you drew a model of the sun, Mercury, and Venus, as shown below. The model helps you see that Mercury is located closer to the sun than Venus. However, the model does not help you understand how much bigger the sun is than the planets. Also, the model does not show the way that Mercury and Venus revolve around the sun.



9 After looking at data, a scientist may make an inference. An inference is a judgment based only on the data of an experiment. It is not based on an observation. For example, look at the table of heartbeat rates. You might make an inference that your heart beats fastest at 9:00 am each day. However, the table does not show your heartbeat at 5:00 pm, or many other times. It only shows your heartbeat rate at 3 different times. If you checked your heartbeat at more times during the day, you might find it beats faster at another time.

10 After experiments are done, a scientist may make a conclusion. A conclusion is an explanation for a hypothesis based on both observations and experiments. You may perform many experiments to test a hypothesis. The observations and data from all the experiments may give lead you to an answer. Then, you can make a conclusion.

11 People who sell products give you data about the products. Data is found on labels and in advertisements. This data helps you choose if you want to buy the products. You read the data to find out if a product has everything you want. Suppose you want to try a new orange juice product. You want it to be made from real oranges, and you want it all natural. Oscar's Orange Juice claims to be all natural. But you can see that they do add artificial flavors. So, you can conclude it is not all natural.

On Sale Now!

**1 gallon
Oscar's Orange Juice
Only \$2.35!
All natural
Made with real oranges
100% daily Vitamin C**



***Artificial flavors added**