Name: _____ Date: _____

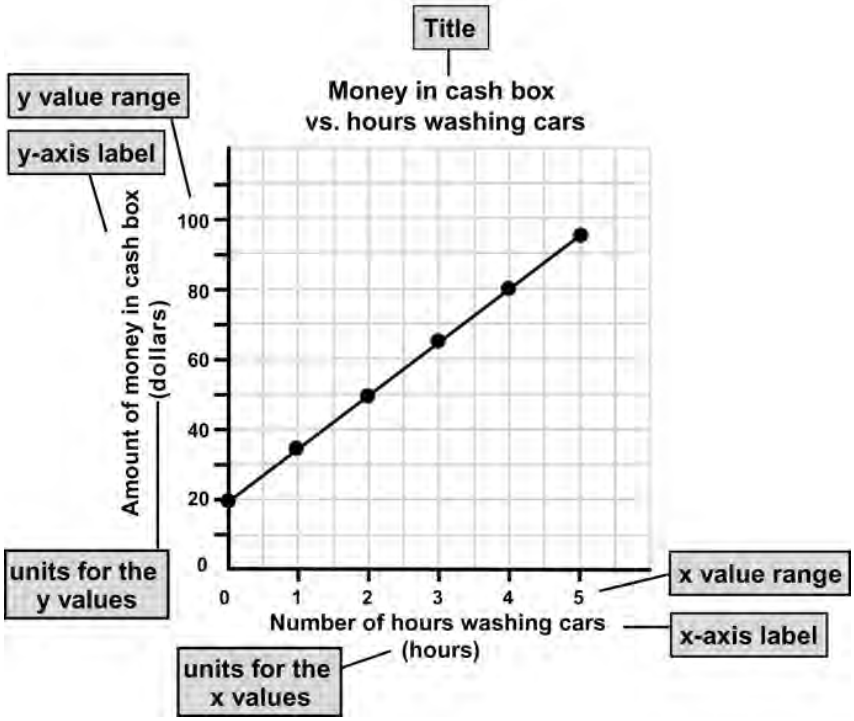
CONTENT 1.4

1.4 Interpreting Graphs

READ

The four main kinds of graphs are scatterplots, bar graphs, pie graphs, and line graphs.

To learn how to interpret graphs, we will start with an example of a scatterplot. The data presented on the scatterplot below is the amount of money in a cash box during a car wash that lasted for five hours. Use this graph to follow the steps and answer the questions below.



PRACTICE

Step 1: Read the labels on the graph.

1. What is the title of the graph?
2. Read the labels for the *x*-axis and the y-axis. What two variables are represented on the graph?

Step 2: Read the units used for the variable on the *x*-axis and the variable on the *y*-axis.

3. What unit is used for the variable on the *x*-axis?
4. What unit is used for the variable on the *y*-axis?

Step 3: Look at the range of values on the *x*- and *y*-axes. Do the range of values make sense? What would the data look like if the range of values on the axes was spread out more or less?

5. What is the range of values for the x-axis?

6. The range of values for the *y*-axis is 0 to $120. What would the graph look like if the range of values was 0 to $500? Where would the data appear on the graph if this were the case?

Step 4: After looking at the parts of the graph, pay attention to the data that is plotted. Is there a relationship between the two variables?

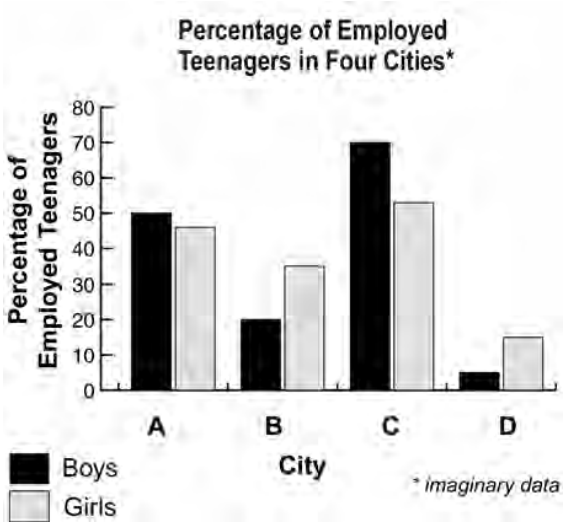
7. Is there a relationship between the variables that are represented on the graph?

Step 5: Write a sentence that describes the information presented on the graph. For example, you may say, "As the values for the variable on the *x*-axis increase, the values for the variable on the *y*-axis decrease."

8. Write your own description of the graph.

9. The theater club at your school needs to raise $1000 for a trip that they want to take. They will be taking the trip next fall. It is now April. Based on the graph, would you recommend that the group wash cars to raise money? Write out a detailed response to this question. Be sure to provide evidence to support your reasons for your recommendation.

Now, apply what you know about interpreting graphs to a bar graph. Use the steps from part one to help you answer the questions.



1. What is the title of this graph?

2. What variables are represented on the graph? (Hint: there are three variables.) Describe each variable in terms of the categories or the range of values used.

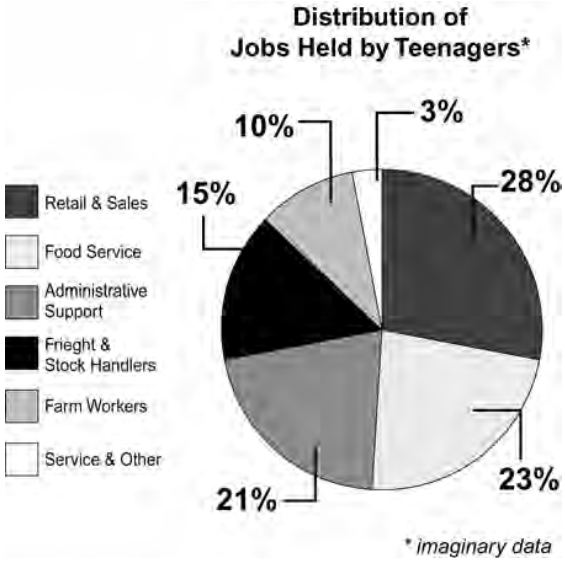
3. Write a sentence that describes how the percentage of teenagers employed compares from city to city. Do not state any conclusions about the data in your sentence.

4. Write a sentence that describes how the percentage of boys employed compares to the percentage of girls employed. Do not state any conclusions about the data in your sentence.

5. Based on the data represented in the graph, come up with a hypothesis for why the percentage of teenagers employed differs from city to city.

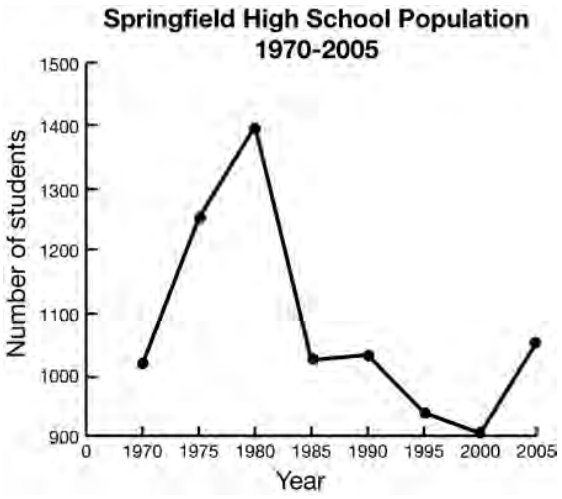
6. Based on the data represented in the graph, come up with a hypothesis to explain the employment differences between boys and girls in these cities.

Now, apply what you know about interpreting graphs to a pie graph. Use the steps from part one to help you answer the questions.



1. What is the title of this graph?
2. What variables are represented on the graph? (Hint: there are two variables.)
3. Are any units used in this graph? Explain your answer.
4. If you were going to report on this data, what would you say? Write two to three sentences that describe this graph. Do not state any conclusions about the data in your sentence.
5. Come up with a hypothesis based on the data in this graph. Briefly describe how you would test your hypothesis.
6. Do you have a job? If so, in which category does your job fit? Do you think this pie graph accurately represents the working teenager population in your area? Explain your response.

Finally, apply what you know about interpreting graphs to a line graph. Use the steps from part one to help you answer the questions.



1. What is the title of this graph?
2. What variables are represented on the graph? (Hint: there are two variables.)
3. What is the range of values for each variable?
4. Write a sentence that describes the change in student population at Springfield High School from 1970 to 1985. Do not state any conclusions about the data in your sentence.
5. a. Come up with a possible reason for the sudden drop in population between 1980 and 1985.
   b. If this were your high school, how could you find out if your explanation is correct?
6. Explain why this graph is a line graph, not a scatterplot.

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CONTENT 1.4

1.4 Recognizing Patterns on Graphs

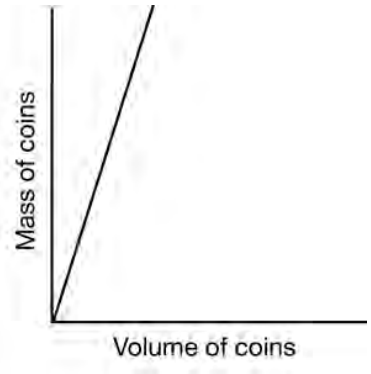
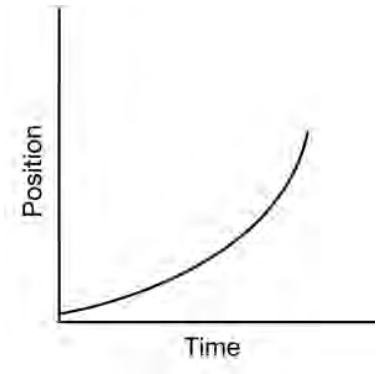
READ

In physical science class, you will do laboratory experiments to answer questions such as: If I change this, what will happen to that? For example, you might ask: If I change the mass of a toy car by adding some cargo, what will happen to its acceleration down a ramp? Or, you might ask: If I change the temperature of some water in a beaker by heating it on a burner, what will happen to the amount of sugar that I can dissolve in it?

Making a scatterplot graph of your results can help you recognize patterns in your data. In order to share your results with others, it is helpful to understand the vocabulary that scientists use to describe patterns seen on scatterplot graphs. In this skill sheet, you will practice describing some of these patterns.

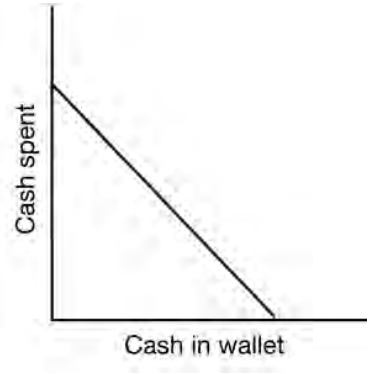
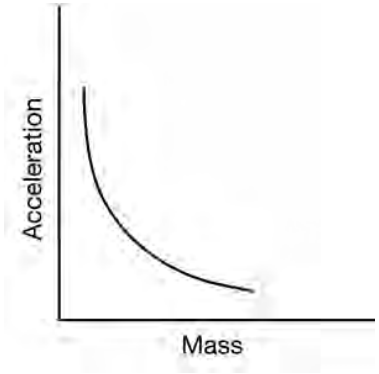
EXAMPLE

Take a look at these two graphs:

Direct relationship between variables	
	

In each case, the line or curve slopes up from left to right. This tells you there is a **direct relationship** between the *x*- and *y*-variables. If you increase the *x*-value, the *y*-value will also increase.

Here are two more graphs:

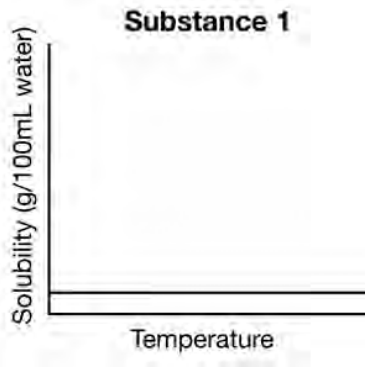
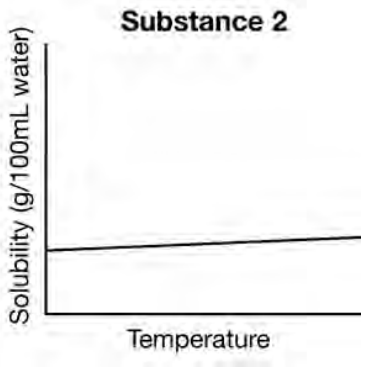
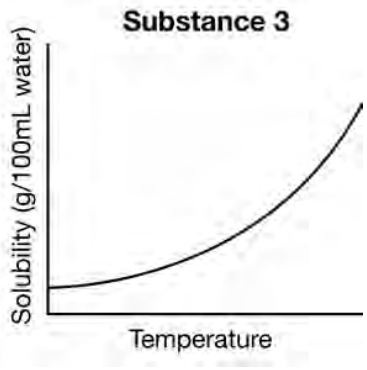
Inverse relationship between variables	
	

In each case, the line or curve slopes down from left to right. This tells you there is an **inverse relationship** between the *x*- and *y*-variables. If you increase the *x*-value, the *y*-value will decrease.

Sometimes your graphs will be a straight line. This tells you there is a **linear relationship** between variables.

If the graph is a curve, we say that the relationship is **non-linear**.

Scatterplots can also help us describe the strength of the relationship between two variables. The following graphs show the number of grams of three different substances that will dissolve in 100 ml of water at different temperatures.

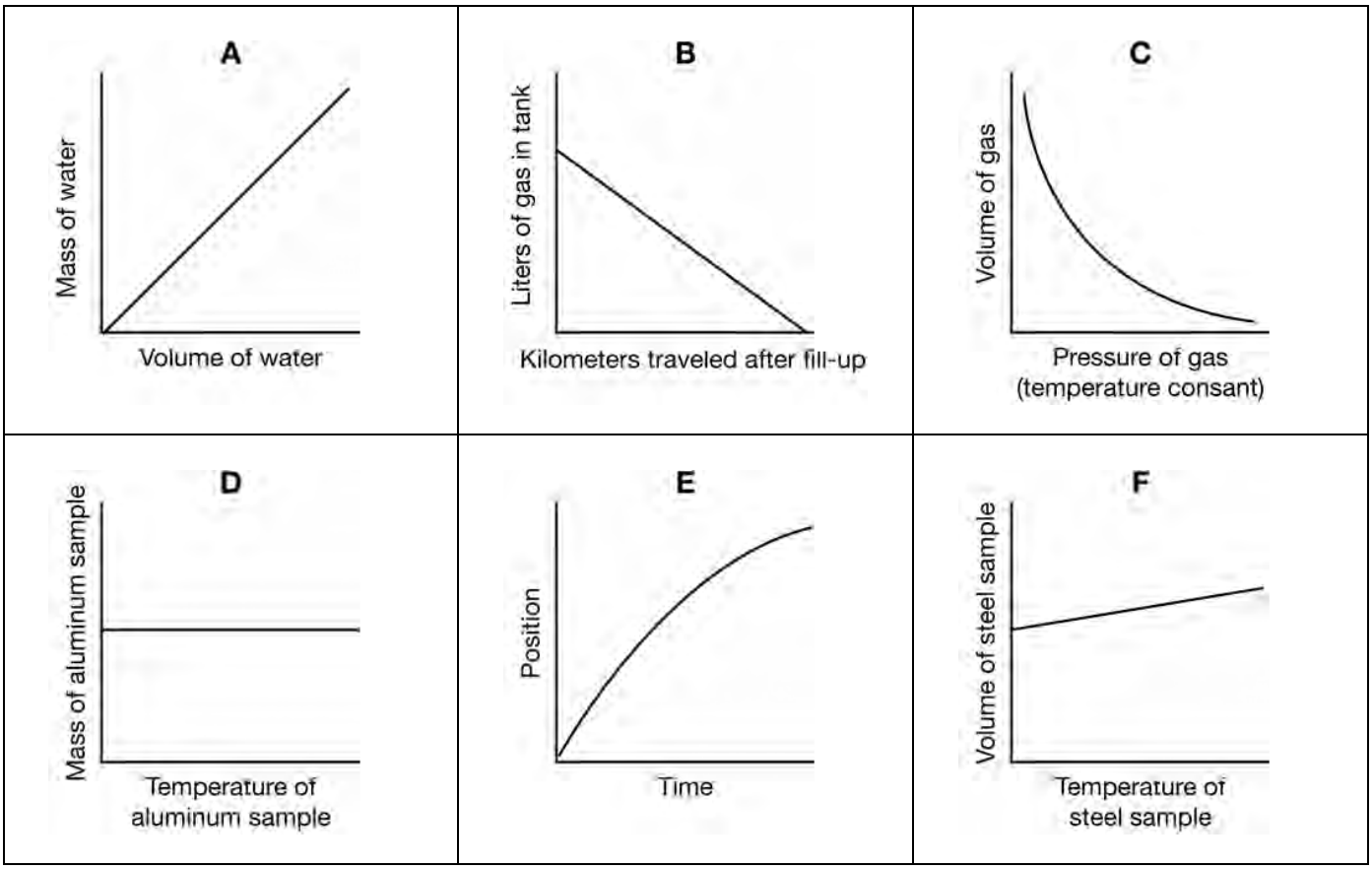
No relationship	Weak relationship	Strong relationship
		

Substance A: The amount that will dissolve is not related to temperature. No relationship.
Substance B: The amount that will dissolve increases slightly with temperature. This is a weak relationship.
Substance C: The amount that will dissolve increases a lot with temperature. This is a strong relationship.

CONTENT 1.4

PRACTICE

Answer the following questions about graphs A–F, below.



1. Name three graphs which show a direct relationship between variables.
2. Name two graphs which show an inverse relationship between variables.
3. Name three graphs which show a linear relationship between variables.
4. Name two graphs which show non-linear relationships.
5. In which graph does a change in the x-variable cause NO CHANGE in the *y*-variable?
6. Which graph shows a stronger relationship between variables, graph A or graph F?