Name _____ Date _____ Class _____

CHAPTER 1 OBSERVING AND DESCRIBING

1-1 The Importance of Observation and Description

Being able to describe a concept or an image accurately is very important when communicating with someone else. Accurately describing something is not always as easy as it sounds. Have you ever seen something and, several days later, had someone ask you to describe it? Perhaps you have looked at a picture or a drawing in a textbook, and been asked to describe it on a test. How close is your description to the real thing?

In science, it is very important to be able to describe concepts and situations accurately and completely. A scientist must be able to describe his or her experiments and results clearly enough that another scientist can reproduce those findings exactly. Therefore, part of learning science includes developing your ability to describe things as clearly and accurately as possible.

Use Exercise 1 as a game you can play with your classmates. Have each person write a description of your classroom. After you have written your descriptions, compare them. You will probably find differences between each account.

Exercise 1 Observation and Description

a. Write as complete a description of your classroom as possible.

_____

_____

_____

_____

_____

_____

b. List two things that you did not list in your description but were included in a classmate's description.

_____

_____

c. Now list two things that your classmate did not list in his or her description but that you included.

_____

_____

Name _____ Date _____ Class _____

CHAPTER 1 OBSERVING AND DESCRIBING

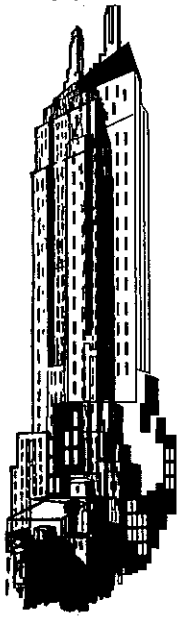
1-2 Spatial Patterns

Try writing a description of your pen or pencil. You could begin by describing the end, or eraser and move down the pen or pencil until you got to the tip. Or you could begin at the tip and describe the object moving upward to the end. Either way, you are depicting each part of the pen or pencil in terms of the part above or below it. You are following a pattern of describing the object along its shaft. This pattern is a **spatial pattern.** The word *spatial* refers to the position of an object or part of an object. Therefore, a *spatial pattern* is a pattern of description that follows the relative positions of the objects or parts of objects.

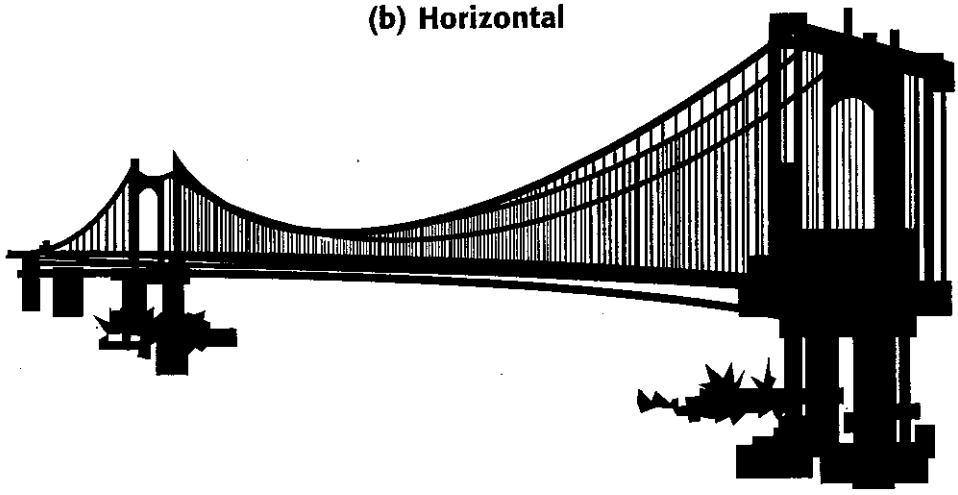
The spatial pattern that you choose depends on the shape and arrangement of the item you are describing. For example, if you are describing a tall or **vertical** item, such as the office building shown in **Figure 1-1(a),** you would want to start from the bottom and work your way up to the top. Or you might start at the top and work down to the bottom. On the other hand, if you were describing a long, relatively flat, or **horizontal,** subject, such as the bridge shown in **Figure 1-1(b),** you might use a left-to-right or right-to-left pattern.

FIGURE 1-1

(a) Vertical



(b) Horizontal



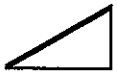
To describe a circular subject, such as a clock, you might start at the top (the number 12 position of a clock) and continue your description **clockwise.** You could also start at the bottom and continue your description in a **counterclockwise** direction. **Table 1-1** lists several spatial patterns and uses symbols to help illustrate them.

Table 1-1 Spatial Patterns

Pattern	Symbol	Pattern	Symbol
Top-to-bottom	↓	Clockwise	
Bottom-to-top	↑	Counterclockwise	
Left-to-right	→	In-to-outward	
Right-to-left	←	Out-to-inward	

Spatial patterns depend on *spatial relationships.* Remember that the word *spatial* means "position". Spatial relationships describe the position of one item relative to another. **Table 1-2** introduces some terms you are probably familiar with from your math class. These terms are useful for describing spatial relationships.

Table 1-2 Terms for Describing Spatial Relationships

Term	Definition	Example
Perpendicular	being at a 90° angle to another object or line	
Parallel	extending in the same direction, everywhere the same distance apart	
Diagonal	at an angle, not 90°, relative to another line or object	
Horizontal	flat, parallel to the horizon	
Vertical	pointing straight upward, perpendicular to the horizon	

A tall, straight tree could be described as **perpendicular** to the ground. You might describe the sugar-phosphate backbones of a DNA strand as being **parallel** to one another and connected by the nucleic-acid bases. As an airplane descends to land, it is **diagonal** to the ground.

Another pattern used to describe things involves numbers and measurements. This pattern is such an important part of science that we will examine the topic in a separate chapter.

Exercise 2 Spatial Relations

Complete each of the following tasks:

a. Draw a horizontal line from the point below.

•

b. Draw a vertical line from the point below.

•

c. Draw a line that is perpendicular to the line below.

_____

d. Draw a line that is parallel to the line below.

_____

e. Draw a line that is diagonal to the line below and that extends from lower right to upper left.

_____

Exercise 3 Clockwise and Counterclockwise

Look at the drawings below. Imagine that each set of wheels is connected by cords or rubber bands. As wheel **a** turns in the direction of the arrow, the other wheel(s), also turn. Decide which direction wheel **b** turns. As an example, item 1 is already done for you.

1. a. *counterclockwise*
b. *counterclockwise*

2. a. _____
b. _____

3. a. _____
b. _____

4. a. _____
b. _____

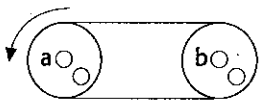
5. a. _____
b. _____

6. a. _____
b. _____

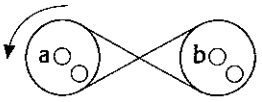
7. a. _____
b. _____

8. a. _____
b. _____

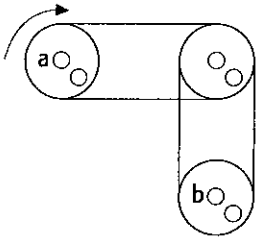
1.



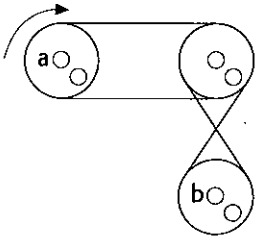
2.



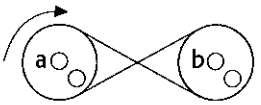
3.



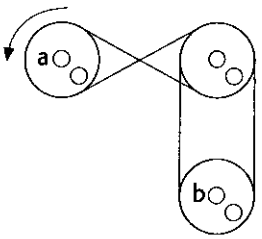
4.



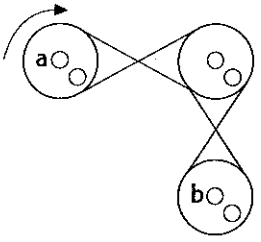
5.



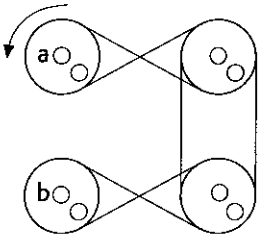
6.



7.



8.



Exercise 4 Describing a Three-Dimensional Object

Complete the following tasks.

a. From the lower left of the grid, count up two boxes and place a dot at that point.

b. Draw a 45° diagonal line running from the first dot toward the upper right. The line should be five boxes long.

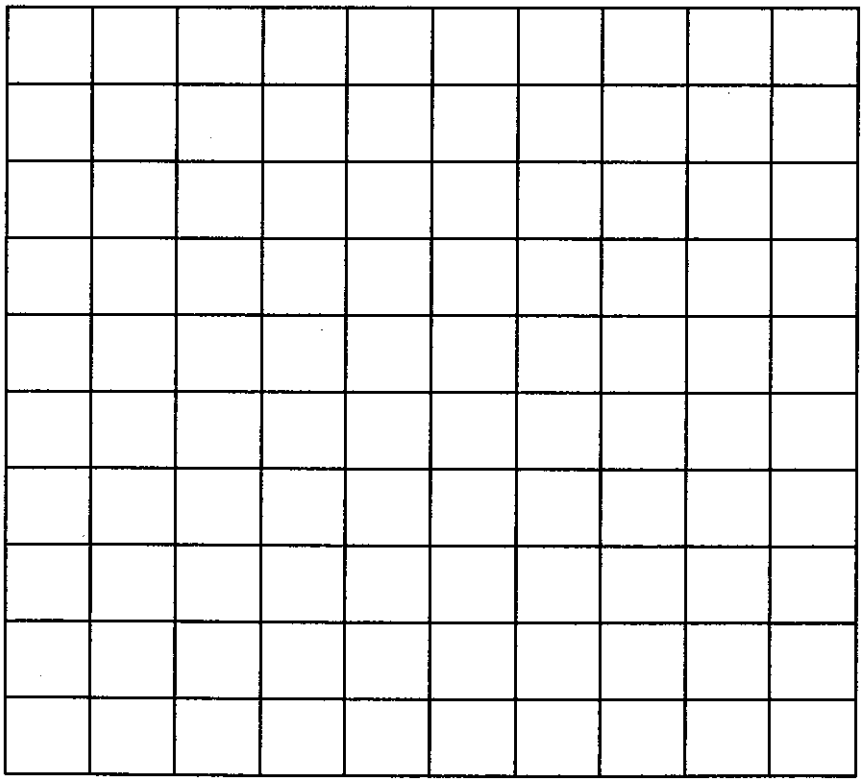
c. Draw a dot at the end of the line.

d. From that dot, count over five boxes horizontally to the right and down two boxes vertically. Draw a dot at that point. Connect that dot with the uppermost dot in the center.

e. From the dot on the far right, draw a 45° diagonal line that runs to the lower left. The line should be three boxes long. Draw a dot at the end of the line.

f. At that point, draw a horizontal line that connects the dot to the first dot that you drew. The line should run from right to left.

g. Go back to the previous dot and draw a diagonal line that connects that point to the uppermost point.



What kind of structure did you draw?

_____

Name _____ Date _____ Class _____

CHAPTER 1 OBSERVING AND DESCRIBING

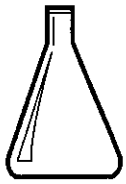
1-3 Using Figurative Language

An accurate description of an object might include a discussion of its size, shape, color, texture, or hardness. To discuss these properties, an author may use **figurative language.** Figurative language often compares two objects that seem very different, but are alike in some important way.

Figure 1-2(a) shows how the shape of two items can be compared. **Figure 1-2(b)** shows how shape can be compared to a letter. **Figure 1-2(c)** shows how shape can be compared to a geometric figure.

FIGURE 1-2

(a) The *cone-shaped* flask is called an Erlenmeyer flask.



(b) The *S-shaped* curve in the road produced a dangerous place where drivers needed to slow down.

(c) A *hexagon-shaped,* or six-sided, sign usually means "stop."

Size can also be a basis for comparison. For example, a white dwarf is a *planet-sized* star. You can describe other features of an object by using different combinations of words. The material *amber* could be described as a yellow, *glasslike* pebble. Items can also be compared based on the quality of thickness or thinness. Consider the following description: A *paper-thin* membrane protects the embryo from a hostile environment.

Another way of describing an unknown object is to simply say that it resembles something else. For example, if you needed to describe an eel to a person who has never seen one, you might say that an eel resembles a snake.

Complete descriptions are formed by combining comparisons of size, shape, and other features. Examine the following three sentences. The first and second sentences are incomplete descriptions of a white dwarf. The third sentence combines the first two to form a more complete description. Exercise 5 gives you practice in combining ideas to complete a description.

(1) A white dwarf is a star.
(2) It is the size of a planet.
(3) A white dwarf is a planet-sized star.

Exercises 6 through 9 will give *you* the chance to describe a variety of things, using all of the techniques you have learned so far.

Exercise 5 Writing Complete Descriptions

For each item, combine the first two sentences to form a single sentence. Use the white-dwarf example as a guide.

a. The pyramids are huge buildings.
They are shaped like triangles.

_____

_____

b. The bridge has two supports.
The supports are shaped like pyramids.

_____

_____

c. An igloo is a building.
It is shaped like a dome.

_____

_____

d. Pterodactyls were reptiles that lived 150 million years ago.
They were like birds.

_____

_____

e. Resin is a thick substance.
It is the color of honey.

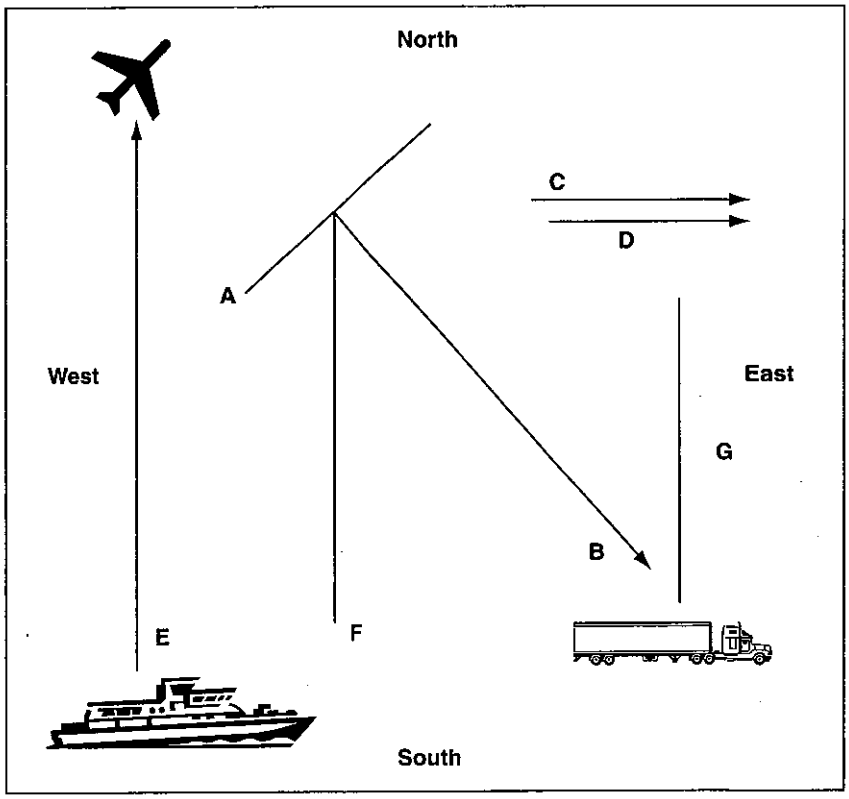
_____

_____

Name _____ Date _____ Class _____

Exercise 6 Using Spatial Relations to Describe Position

Study the drawing below and answer the questions that follow it:



a. Where is the airplane within the box?

_____

_____

_____

b. Where is the boat within the box?

_____

_____

_____

c. What is the location and compass direction of line B?

_____

_____

_____

d. What is the relationship between lines A and B?

_____

_____

_____

e. What is the relationship between lines C and D?

_____

_____

_____

f. What is the relationship between lines B and F?

_____

_____

_____

g. Describe line E in two different ways.

_____

_____

_____

_____

_____

_____

h. What is the relationship between the truck and (i) line G, (ii) line D, (iii) line B?

i. _____

_____

ii. _____

_____

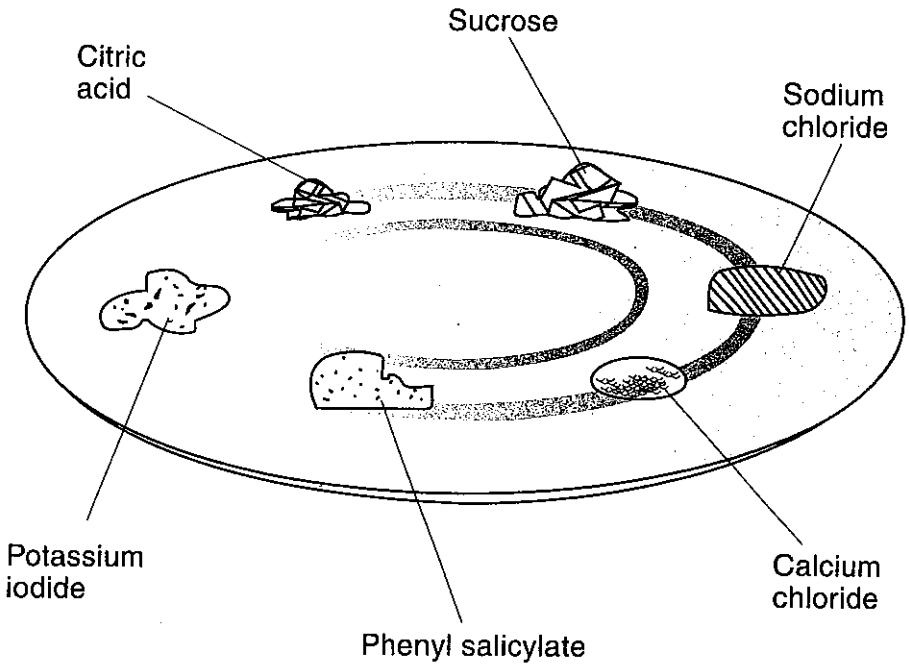
iii. _____

_____

Name _____ Date _____ Class _____

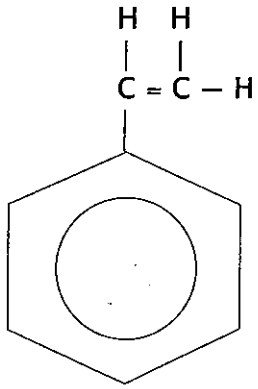
Exercise 7 Using Figurative Language

Suppose you were asked to describe the following picture to someone who needed to perform an experiment using the equipment shown. Write as complete a description of the image as possible.



Exercise 8 Describing a Model

Describe the model of the following styrene molecule. Styrene is a monomer found in polystyrene. Polystyrene is used to make plastic foam cups and other foam containers.

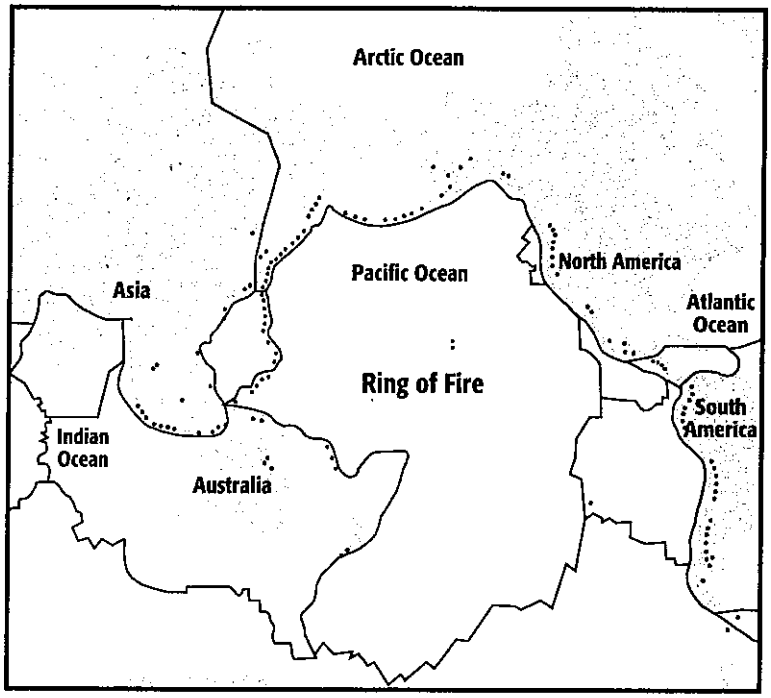


Name _____ Date _____ Class _____

Exercise 9 Terms Frequently Used in Descriptions

Volcanoes are most likely to form at the boundaries of tectonic plates. The solid lines on the map below indicate these boundaries. The dots represent the locations of volcanoes. Study the map below and write out a detailed description of where the volcanoes occur. Begin your description at the southern tip of the South American peninsula. The following terms might be useful in your description:

bends	slopes	arc	continues
branches	tip	coast	runs
descends	semi-circle	turns	north, south, etc...



GLOSSARY

clockwise in the direction that the hands of a clock normally move (3)

counterclockwise in the opposite direction of clockwise (3)

diagonal at an angle, not 90°, relative to another line or object (4)

figurative language words used to equate or find a resemblance between two things that are seemingly different (7)

horizontal flat, parallel to the horizon (2)

parallel extending in the same direction, everywhere the same distance apart, and not meeting (4)

perpendicular being at a 90° angle to another object or line (4)

spatial pattern a pattern of description that follows the relative positions of objects or parts of the objects (2)

vertical pointing straight upward, perpendicular to the horizon (2)