Mass To measure mass, or the amount of matter in an object, you will use a unit of measure known as the **gram (g).** One gram is approximately the mass of a paper clip. Larger masses are measured in kilograms (kg). Scientists use a balance to find the mass of an object.

Common Conversion
1 kg = 1,000 g

Activity

The mass of the potato in the picture is measured in kilograms. What is the mass of the potato? Suppose a recipe for potato salad called for one kilogram of potatoes. About how many potatoes would you need?

Temperature To measure the temperature of a substance, you will use the **Celsius scale.** Temperature is measured in degrees Celsius (°C) using a Celsius thermometer. Water freezes at 0°C and boils at 100°C.

Time The unit scientists use to measure time is the **second (s).**

Activity

What is the temperature of the liquid in degrees Celsius?

Converting SI Units

To use the SI system, you must know how to convert between units. Converting from one unit to another involves the skill of **calculating,** or using mathematical operations. Converting between SI units is similar to converting between dollars and dimes because both systems are based on powers of ten.

Suppose you want to convert a length of 80 centimeters to meters. Follow these steps to convert between units.

1. Begin by writing down the measurement you want to convert—in this example, 80 centimeters.
2. Write a conversion factor that represents the relationship between the two units you are converting. In this example, the relationship is 1 meter = 100 centimeters. Write this conversion factor as a fraction, making sure to place the units you are converting from (centimeters, in this example) in the denominator.
3. Multiply the measurement you want to convert by the fraction. When you do this, the units in the first measurement will cancel out with the units in the denominator. Your answer will be in the units you are converting to (meters, in this example).

Example

80 centimeters = ■ meters

$$80 \text{ centimeters} \times \frac{1 \text{ meter}}{100 \text{ centimeters}} = \frac{80 \text{ meters}}{100}$$

$$= 0.8 \text{ meters}$$

Activity

Convert between the following units.

1. 600 millimeters = ■ meters
2. 0.35 liters = ■ milliliters
3. 1,050 grams = ■ kilograms

Conducting a Scientific Investigation

In some ways, scientists are like detectives, piecing together clues to learn about a process or event. One way that scientists gather clues is by carrying out experiments. An experiment tests an idea in a careful, orderly manner. Although experiments do not all follow the same steps in the same order, many follow a pattern similar to the one described here.

Posing Questions

Experiments begin by asking a scientific question. A scientific question is one that can be answered by gathering evidence. For example, the question "Which freezes faster—fresh water or salt water?" is a scientific question because you can carry out an investigation and gather information to answer the question.

Developing a Hypothesis

The next step is to form a hypothesis. A **hypothesis** is a possible explanation for a set of observations or answer to a scientific question. In science, a hypothesis must be something that can be tested. A hypothesis can be worded as an *If . . . then . . .* statement. For example, a hypothesis might be *"If I add table salt to fresh water, then the water will freeze at a lower temperature."* A hypothesis worded this way serves as a rough outline of the experiment you should perform.

Designing an Experiment

Next you need to plan a way to test your hypothesis. Your plan should be written out as a step-by-step procedure and should describe the observations or measurements you will make.

Two important steps involved in designing an experiment are controlling variables and forming operational definitions.

Controlling Variables In a well-designed experiment, you need to keep all variables the same except for one. A **variable** is any factor that can change in an experiment. The factor that you change is called the **manipulated variable.** In this experiment, the manipulated variable is the amount of table salt added to the water. Other factors, such as the amount of water or the starting temperature, are kept constant.

The factor that changes as a result of the manipulated variable is called the **responding variable.** The responding variable is what you measure or observe to obtain your results. In this experiment, the responding variable is the temperature at which the water freezes.

An experiment in which all factors except one are kept constant is called a **controlled experiment.** Most controlled experiments include a test called the control. In this experiment, Container 3 is the control. Because no salt is added to Container 3, you can compare the results from the other containers to it. Any difference in results must be due to the addition of salt alone.

Forming Operational Definitions Another important aspect of a well-designed experiment is having clear operational definitions. An **operational definition** is a statement that describes how a particular variable is to be measured or how a term is to be defined. For example, in this experiment, how will you determine if the water has frozen? You might decide to insert a stick in each container at the start of the experiment. Your operational definition of "frozen" would be the time at which the stick can no longer move.

Experimental Procedure

1. Fill 3 containers with 300 milliliters of cold tap water.
2. Add 10 grams of salt to Container 1; stir. Add 20 grams of salt to Container 2; stir. Add no salt to Container 3.
3. Place the 3 containers in a freezer.
4. Check the containers every 15 minutes. Record your observations.

Interpreting Data

The observations and measurements you make in an experiment are called **data.** At the end of an experiment, you need to analyze the data to look for any patterns or trends. Patterns often become clear if you organize your data in a data table or graph. Then think through what the data reveal. Do they support your hypothesis? Do they point out a flaw in your experiment? Do you need to collect more data?

Drawing Conclusions

A **conclusion** is a statement that sums up what you have learned from an experiment. When you draw a conclusion, you need to decide whether the data you collected support your hypothesis or not. You may need to repeat an experiment several times before you can draw any conclusions from it. Conclusions often lead you to pose new questions and plan new experiments to answer them.

Activity

Is a ball's bounce affected by the height from which it is dropped? Using the steps just described, plan a controlled experiment to investigate this problem.

Technology Design Skills

Engineers are people who use scientific and technological knowledge to solve practical problems. To design new products, engineers usually follow the process described here, even though they may not follow these steps in the exact order. As you read the steps, think about how you might apply them in technology labs.

Identify a Need

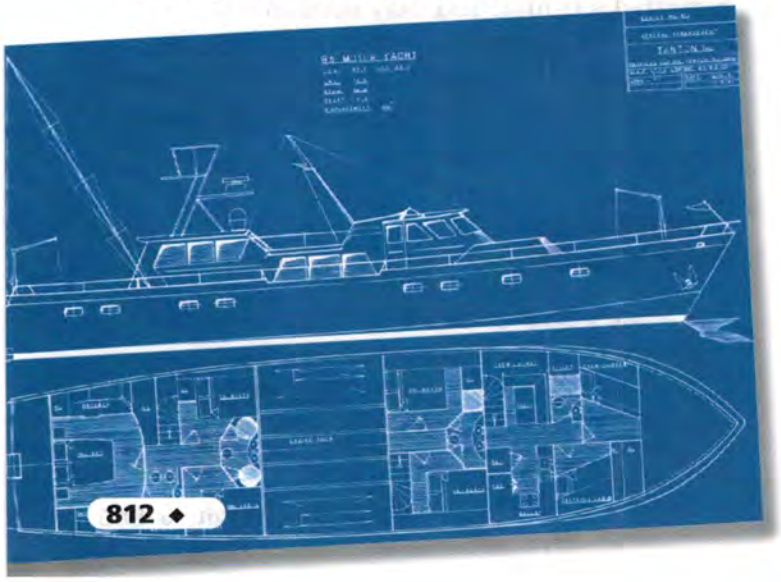
Before engineers begin designing a new product, they must first identify the need they are trying to meet. For example, suppose you are a member of a design team in a company that makes toys. Your team has identified a need: a toy boat that is inexpensive and easy to assemble.

Research the Problem

Engineers often begin by gathering information that will help them with their new design. This research may include finding articles in books, magazines, or on the Internet. It may also include talking to other engineers who have solved similar problems. Engineers often perform experiments related to the product they want to design.

For your toy boat, you could look at toys that are similar to the one you want to design. You might do research on the Internet. You could also test some materials to see whether they will work well in a toy boat.

Drawing for a boat design ▼



Design a Solution

Research gives engineers information that helps them design a product. When engineers design new products, they usually work in teams.

Generating Ideas Often design teams hold brainstorming meetings in which any team member can contribute ideas. **Brainstorming** is a creative process in which one team member's suggestions often spark ideas in other group members. Brainstorming can lead to new approaches to solving a design problem.

Evaluating Constraints During brainstorming, a design team will often come up with several possible designs. The team must then evaluate each one.

As part of their evaluation, engineers consider constraints. **Constraints** are factors that limit or restrict a product design. Physical characteristics, such as the properties of materials used to make your toy boat, are constraints. Money and time are also constraints. If the materials in a product cost a lot, or if the product takes a long time to make, the design may be impractical.

Making Trade-offs Design teams usually need to make trade-offs. In a **trade-off,** engineers give up one benefit of a proposed design in order to obtain another. In designing your toy boat, you will have to make trade-offs. For example, suppose one material is sturdy but not fully waterproof. Another material is more waterproof, but breakable. You may decide to give up the benefit of sturdiness in order to obtain the benefit of waterproofing.

Build and Evaluate a Prototype

Once the team has chosen a design plan, the engineers build a prototype of the product. A **prototype** is a working model used to test a design. Engineers evaluate the prototype to see whether it works well, is easy to operate, is safe to use, and holds up to repeated use.

Think of your toy boat. What would the prototype be like? Of what materials would it be made? How would you test it?

Troubleshoot and Redesign

Few prototypes work perfectly, which is why they need to be tested. Once a design team has tested a prototype, the members analyze the results and identify any problems. The team then tries to **troubleshoot,** or fix the design problems. For example, if your toy boat leaks or wobbles, the boat should be redesigned to eliminate those problems.

Communicate the Solution

A team needs to communicate the final design to the people who will manufacture and use the product. To do this, teams may use sketches, detailed drawings, computer simulations, and word descriptions.

Activity

You can use the technology design process to design and build a toy boat.

Research and Investigate

1. Visit the library or go online to research toy boats.
2. Investigate how a toy boat can be powered, including wind, rubber bands, or baking soda and vinegar.
3. Brainstorm materials, shapes, and steering for your boat.

Design and Build

4. Based on your research, design a toy boat that
   - is made of readily available materials
   - is no larger than 15 cm long and 10 cm wide
   - includes a power system, a rudder, and an area for cargo
   - travels 2 meters in a straight line carrying a load of 20 pennies
5. Sketch your design and write a step-by-step plan for building your boat. After your teacher approves your plan, build your boat.

Evaluate and Redesign

6. Test your boat, evaluate the results, and troubleshoot any problems.
7. Based on your evaluation, redesign your toy boat so it performs better.

Creating Data Tables and Graphs

How can you make sense of the data in a science experiment? The first step is to organize the data to help you understand them. Data tables and graphs are helpful tools for organizing data.

Data Tables

You have gathered your materials and set up your experiment. But before you start, you need to plan a way to record what happens during the experiment. By creating a data table, you can record your observations and measurements in an orderly way.

Suppose, for example, that a scientist conducted an experiment to find out how many Calories people of different body masses burn while doing various activities. The data table shows the results.

Notice in this data table that the manipulated variable (body mass) is the heading of one column. The responding variable (for Experiment 1, the number of Calories burned while bicycling) is the heading of the next column. Additional columns were added for related experiments.

Calories Burned in 30 Minutes

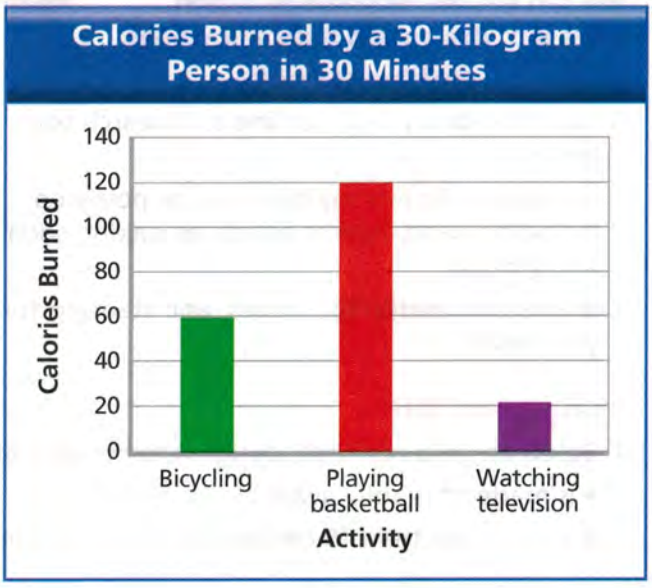
Body Mass	Experiment 1: Bicycling	Experiment 2: Playing Basketball	Experiment 3: Watching Television
30 kg	60 Calories	120 Calories	21 Calories
40 kg	77 Calories	164 Calories	27 Calories
50 kg	95 Calories	206 Calories	33 Calories
60 kg	114 Calories	248 Calories	38 Calories

Bar Graphs

To compare how many Calories a person burns doing various activities, you could create a bar graph. A bar graph is used to display data in a number of separate, or distinct, categories. In this example, bicycling, playing basketball, and watching television are the three categories.

To create a bar graph, follow these steps.

1. On graph paper, draw a horizontal, or *x*-, axis and a vertical, or *y*-, axis.
2. Write the names of the categories to be graphed along the horizontal axis. Include an overall label for the axis as well.
3. Label the vertical axis with the name of the responding variable. Include units of measurement. Then create a scale along the axis by marking off equally spaced numbers that cover the range of the data collected.
4. For each category, draw a solid bar using the scale on the vertical axis to determine the height. Make all the bars the same width.
5. Add a title that describes the graph.



Line Graphs

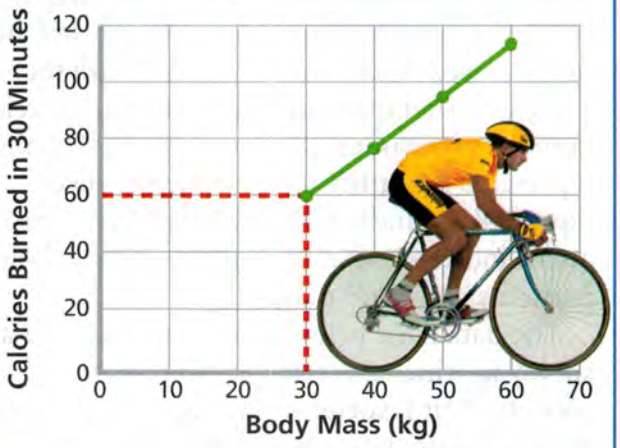
To see whether a relationship exists between body mass and the number of Calories burned while bicycling, you could create a line graph. A line graph is used to display data that show how one variable (the responding variable) changes in response to another variable (the manipulated variable). You can use a line graph when your manipulated variable is *continuous*, that is, when there are other points between the ones that you tested. In this example, body mass is a continuous variable because there are other body masses between 30 and 40 kilograms (for example, 31 kilograms). Time is another example of a continuous variable.

Line graphs are powerful tools because they allow you to estimate values for conditions that you did not test in the experiment. For example, you can use the line graph to estimate that a 35-kilogram person would burn 68 Calories while bicycling.

To create a line graph, follow these steps.

1. On graph paper, draw a horizontal, or *x*-, axis and a vertical, or *y*-, axis.
2. Label the horizontal axis with the name of the manipulated variable. Label the vertical axis with the name of the responding variable. Include units of measurement.
3. Create a scale on each axis by marking off equally spaced numbers that cover the range of the data collected.
4. Plot a point on the graph for each piece of data. In the line graph above, the dotted lines show how to plot the first data point (30 kilograms and 60 Calories). Follow an imaginary vertical line extending up from the horizontal axis at the 30-kilogram mark. Then follow an imaginary horizontal line extending across from the vertical axis at the 60-Calorie mark. Plot the point where the two lines intersect.

Effect of Body Mass on Calories Burned While Bicycling



5. Connect the plotted points with a solid line. (In some cases, it may be more appropriate to draw a line that shows the general trend of the plotted points. In those cases, some of the points may fall above or below the line. Also, not all graphs are linear. It may be more appropriate to draw a curve to connect the points.)
6. Add a title that identifies the variables or relationship in the graph.

Activity

Create line graphs to display the data from Experiment 2 and Experiment 3 in the data table.

Activity

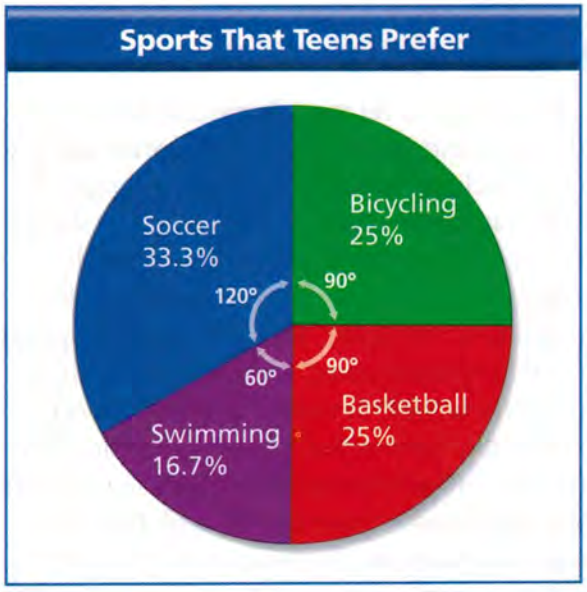
You read in the newspaper that a total of 4 centimeters of rain fell in your area in June, 2.5 centimeters fell in July, and 1.5 centimeters fell in August. What type of graph would you use to display these data? Use graph paper to create the graph.

Circle Graphs

Like bar graphs, circle graphs can be used to display data in a number of separate categories. Unlike bar graphs, however, circle graphs can only be used when you have data for *all* the categories that make up a given topic. A circle graph is sometimes called a pie chart. The pie represents the entire topic, while the slices represent the individual categories. The size of a slice indicates what percentage of the whole a particular category makes up.

The data table below shows the results of a survey in which 24 teenagers were asked to identify their favorite sport. The data were then used to create the circle graph at the right.

Favorite Sports	
Sport	Students
Soccer	8
Basketball	6
Bicycling	6
Swimming	4



To create a circle graph, follow these steps.

1. Use a compass to draw a circle. Mark the center with a point. Then draw a line from the center point to the top of the circle.
2. Determine the size of each "slice" by setting up a proportion where x equals the number of degrees in a slice. (*Note:* A circle contains 360 degrees.) For example, to find the number of degrees in the "soccer" slice, set up the following proportion:

$$\frac{\text{Students who prefer soccer}}{\text{Total number of students}} = \frac{x}{\text{Total number of degrees in a circle}}$$

$$\frac{8}{24} = \frac{x}{360}$$

Cross-multiply and solve for x.

$$24x = 8 \times 360$$
$$x = 120$$

The "soccer" slice should contain 120 degrees.

3. Use a protractor to measure the angle of the first slice, using the line you drew to the top of the circle as the 0° line. Draw a line from the center of the circle to the edge for the angle you measured.
4. Continue around the circle by measuring the size of each slice with the protractor. Start measuring from the edge of the previous slice so the wedges do not overlap. When you are done, the entire circle should be filled in.
5. Determine the percentage of the whole circle that each slice represents. To do this, divide the number of degrees in a slice by the total number of degrees in a circle (360), and multiply by 100%. For the "soccer" slice, you can find the percentage as follows:

$$\frac{120}{360} \times 100\% = 33.3\%$$

6. Use a different color for each slice. Label each slice with the category and with the percentage of the whole it represents.
7. Add a title to the circle graph.

Activity

In a class of 28 students, 12 students take the bus to school, 10 students walk, and 6 students ride their bicycles. Create a circle graph to display these data.

Math Review

Scientists use math to organize, analyze, and present data. This appendix will help you review some basic math skills.

Mean, Median, and Mode

The **mean** is the average, or the sum of the data divided by the number of data items. The middle number in a set of ordered data is called the **median.** The **mode** is the number that appears most often in a set of data.

Example

A scientist counted the number of distinct songs sung by seven different male birds and collected the data shown below.

Male Bird Songs

Bird	A	B	C	D	E	F	G
Number of Songs	36	29	40	35	28	36	27

To determine the mean number of songs, add the total number of songs and divide by the number of data items—in this case, the number of male birds.

$$\text{Mean} = \frac{231}{7} = 33 \text{ songs}$$

To find the median number of songs, arrange the data in numerical order and find the number in the middle of the series.

27 28 29 35 36 36 40

The number in the middle is 35, so the median number of songs is 35.

The mode is the value that appears most frequently. In the data, 36 appears twice, while each other item appears only once. Therefore, 36 songs is the mode.

Practice

Find out how many minutes it takes each student in your class to get to school. Then find the mean, median, and mode for the data.

Probability

Probability is the chance that an event will occur. Probability can be expressed as a ratio, a fraction, or a percentage. For example, when you flip a coin, the probability that the coin will land heads up is 1 in 2, or $\frac{1}{2}$, or 50 percent.

The probability that an event will happen can be expressed in the following formula.

$$P(\text{event}) = \frac{\text{Number of times the event can occur}}{\text{Total number of possible events}}$$

Example

A paper bag contains 25 blue marbles, 5 green marbles, 5 orange marbles, and 15 yellow marbles. If you close your eyes and pick a marble from the bag, what is the probability that it will be yellow?

$$P(\text{yellow marbles}) = \frac{\text{15 yellow marbles}}{\text{50 marbles total}}$$

$$P = \frac{15}{50}, \text{ or } \frac{3}{10}, \text{ or } 30\%$$

Practice

Each side of a cube has a letter on it. Two sides have *A*, three sides have *B*, and one side has *C*. If you roll the cube, what is the probability that *A* will land on top?

Area

The **area** of a surface is the number of square units that cover it. The front cover of your textbook has an area of about 600 cm^2.

Area of a Rectangle and a Square To find the area of a rectangle, multiply its length times its width. The formula for the area of a rectangle is

$$A = \ell \times w, \text{ or } A = \ell w$$

Since all four sides of a square have the same length, the area of a square is the length of one side multiplied by itself, or squared.

$$A = s \times s, \text{ or } A = s^2$$

Example

A scientist is studying the plants in a field that measures 75 m × 45 m. What is the area of the field?

$A = \ell \times w$

$A = 75 \text{ m} \times 45 \text{ m}$

$A = 3{,}375 \text{ m}^2$

Area of a Circle The formula for the area of a circle is

$$A = \pi \times r \times r, \text{ or } A = \pi r^2$$

The length of the radius is represented by r, and the value of π is approximately $\frac{22}{7}$.

Example

Find the area of a circle with a radius of 14 cm.

$A = \pi r^2$

$A = 14 \times 14 \times \frac{22}{7}$

$A = 616 \text{ cm}^2$

Practice

Find the area of a circle that has a radius of 21 m.

Circumference

The distance around a circle is called the circumference. The formula for finding the circumference of a circle is

$$C = 2 \times \pi \times r, \text{ or } C = 2\pi r$$

Example

The radius of a circle is 35 cm. What is its circumference?

$C = 2\pi r$

$C = 2 \times 35 \times \frac{22}{7}$

$C = 220 \text{ cm}$

Practice

What is the circumference of a circle with a radius of 28 m?

Volume

The volume of an object is the number of cubic units it contains. The volume of a wastebasket, for example, might be about 26,000 cm^3.

Volume of a Rectangular Object To find the volume of a rectangular object, multiply the object's length times its width times its height.

$$V = \ell \times w \times h, \text{ or } V = \ell wh$$

Example

Find the volume of a box with length 24 cm, width 12 cm, and height 9 cm.

$V = \ell wh$

$V = 24 \text{ cm} \times 12 \text{ cm} \times 9 \text{ cm}$

$V = 2{,}592 \text{ cm}^3$

Practice

What is the volume of a rectangular object with length 17 cm, width 11 cm, and height 6 cm?

Fractions

A **fraction** is a way to express a part of a whole. In the fraction $\frac{4}{7}$, 4 is the numerator and 7 is the denominator.

Adding and Subtracting Fractions To add or subtract two or more fractions that have a common denominator, first add or subtract the numerators. Then write the sum or difference over the common denominator.

To find the sum or difference of fractions with different denominators, first find the least common multiple of the denominators. This is known as the least common denominator. Then convert each fraction to equivalent fractions with the least common denominator. Add or subtract the numerators. Then write the sum or difference over the common denominator.

Example

$$\frac{5}{6} - \frac{3}{4} = \frac{10}{12} - \frac{9}{12} = \frac{10 - 9}{12} = \frac{1}{12}$$

Multiplying Fractions To multiply two fractions, first multiply the two numerators, then multiply the two denominators.

Example

$$\frac{5}{6} \times \frac{2}{3} = \frac{5 \times 2}{6 \times 3} = \frac{10}{18} = \frac{5}{9}$$

Dividing Fractions Dividing by a fraction is the same as multiplying by its reciprocal. Reciprocals are numbers whose numerators and denominators have been switched. To divide one fraction by another, first invert the fraction you are dividing by—in other words, turn it upside down. Then multiply the two fractions.

Example

$$\frac{2}{5} \div \frac{7}{8} = \frac{2}{5} \times \frac{8}{7} = \frac{2 \times 8}{5 \times 7} = \frac{16}{35}$$

Practice

Solve the following: $\frac{3}{7} \div \frac{4}{5}$.

Decimals

Fractions whose denominators are 10, 100, or some other power of 10 are often expressed as decimals. For example, the fraction $\frac{9}{10}$ can be expressed as the decimal 0.9, and the fraction $\frac{7}{100}$ can be written as 0.07.

Adding and Subtracting With Decimals To add or subtract decimals, line up the decimal points before you carry out the operation.

Example

$$\begin{array}{r} 27.4 \\ +\ 6.19 \\ \hline 33.59 \end{array} \qquad \begin{array}{r} 278.635 \\ -\ 191.4 \\ \hline 87.235 \end{array}$$

Multiplying With Decimals When you multiply two numbers with decimals, the number of decimal places in the product is equal to the total number of decimal places in each number being multiplied.

Example

$$\begin{array}{rl} 46.2 & \text{(one decimal place)} \\ \times\ 2.37 & \text{(two decimal places)} \\ \hline 109.494 & \text{(three decimal places)} \end{array}$$

Dividing With Decimals To divide a decimal by a whole number, put the decimal point in the quotient above the decimal point in the dividend.

Example

$$15.5 \div 5$$

$$5\overline{)15.5}\ \ 3.1$$

To divide a decimal by a decimal, you need to rewrite the divisor as a whole number. Do this by multiplying both the divisor and dividend by the same multiple of 10.

Example

$$1.68 \div 4.2 = 16.8 \div 42$$

$$42\overline{)16.8}\ \ 0.4$$

Practice

Multiply 6.21 by 8.5.

Ratio and Proportion

A **ratio** compares two numbers by division. For example, suppose a scientist counts 800 wolves and 1,200 moose on an island. The ratio of wolves to moose can be written as a fraction, $\frac{800}{1{,}200}$, which can be reduced to $\frac{2}{3}$. The same ratio can also be expressed as 2 to 3 or 2 : 3.

A **proportion** is a mathematical sentence saying that two ratios are equivalent. For example, a proportion could state that $\frac{800 \text{ wolves}}{1{,}200 \text{ moose}} = \frac{2 \text{ wolves}}{3 \text{ moose}}$. You can sometimes set up a proportion to determine or estimate an unknown quantity. For example, suppose a scientist counts 25 beetles in an area of 10 square meters. The scientist wants to estimate the number of beetles in 100 square meters.

Example

1. Express the relationship between beetles and area as a ratio: $\frac{25}{10}$, simplified to $\frac{5}{2}$.
2. Set up a proportion, with x representing the number of beetles. The proportion can be stated as $\frac{5}{2} = \frac{x}{100}$.
3. Begin by cross-multiplying. In other words, multiply each fraction's numerator by the other fraction's denominator.

   $$5 \times 100 = 2 \times x, \text{ or } 500 = 2x$$

4. To find the value of x, divide both sides by 2. The result is 250, or 250 beetles in 100 square meters.

Practice

Find the value of x in the following proportion: $\frac{6}{7} = \frac{x}{49}$.

Percentage

A **percentage** is a ratio that compares a number to 100. For example, there are 37 granite rocks in a collection that consists of 100 rocks. The ratio $\frac{37}{100}$ can be written as 37%. Granite rocks make up 37% of the rock collection.

You can calculate percentages of numbers other than 100 by setting up a proportion.

Example

Rain falls on 9 days out of 30 in June. What percentage of the days in June were rainy?

$$\frac{9 \text{ days}}{30 \text{ days}} = \frac{d\%}{100\%}$$

To find the value of d, begin by cross-multiplying, as for any proportion:

$$9 \times 100 = 30 \times d \qquad d = \frac{900}{30} \qquad d = 30$$

Practice

There are 300 marbles in a jar, and 42 of those marbles are blue. What percentage of the marbles are blue?

Significant Figures

The **precision** of a measurement depends on the instrument you use to take the measurement. For example, if the smallest unit on the ruler is millimeters, then the most precise measurement you can make will be in millimeters.

The sum or difference of measurements can only be as precise as the least precise measurement being added or subtracted. Round your answer so that it has the same number of digits after the decimal as the least precise measurement. Round up if the last digit is 5 or more, and round down if the last digit is 4 or less.

Example

Subtract a temperature of 5.2°C from the temperature 75.46°C.

$$75.46 - 5.2 = 70.26$$

5.2 has the fewest digits after the decimal, so it is the least precise measurement. Since the last digit of the answer is 6, round up to 3. The most precise difference between the measurements is 70.3°C.

Practice

Add 26.4 m to 8.37 m. Round your answer according to the precision of the measurements.

Significant figures are the number of nonzero digits in a measurement. Zeroes between nonzero digits are also significant. For example, the measurements 12,500 L, 0.125 cm, and 2.05 kg all have three significant figures. When you multiply and divide measurements, the one with the fewest significant figures determines the number of significant figures in your answer.

Example

Multiply 110 g by 5.75 g.

$$110 \times 5.75 = 632.5$$

Because 110 has only two significant figures, round the answer to 630 g.

Scientific Notation

A **factor** is a number that divides into another number with no remainder. In the example, the number 3 is used as a factor four times.

An **exponent** tells how many times a number is used as a factor. For example, $3 \times 3 \times 3 \times 3$ can be written as 3^4. The exponent ^{4} indicates that the number 3 is used as a factor four times. Another way of expressing this is to say that 81 is equal to 3 to the fourth power.

Example

$$3^4 = 3 \times 3 \times 3 \times 3 = 81$$

Scientific notation uses exponents and powers of ten to write very large or very small numbers in shorter form. When you write a number in scientific notation, you write the number as two factors. The first factor is any number between 1 and 10. The second factor is a power of 10, such as 10^3 or 10^6.

Example

The average distance between the planet Mercury and the sun is 58,000,000 km. To write the first factor in scientific notation, insert a decimal point in the original number so that you have a number between 1 and 10. In the case of 58,000,000, the number is 5.8.

To determine the power of 10, count the number of places that the decimal point moved. In this case, it moved 7 places.

$$58{,}000{,}000 \text{ km} = 5.8 \times 10^7 \text{ km}$$

Practice

Express 6,590,000 in scientific notation.

Reading Comprehension Skills

Each section in your textbook introduces a Target Reading Skill. You will improve your reading comprehension by using the Target Reading Skills described below.

Using Prior Knowledge

Your prior knowledge is what you already know before you begin to read about a topic. Building on what you already know gives you a head start on learning new information. Before you begin a new assignment, think about what you know. You might look at the headings and the visuals to spark your memory. You can list what you know. Then, as you read, consider questions like these.

- How does what you learn relate to what you know?
- How did something you already know help you learn something new?
- Did your original ideas agree with what you have just learned?

Asking Questions

Asking yourself questions is an excellent way to focus on and remember new information in your textbook. For example, you can turn the text headings into questions. Then your questions can guide you to identify the important information as you read. Look at these examples:

Heading: Using Seismographic Data

Question: How are seismographic data used?

Heading: Kinds of Faults

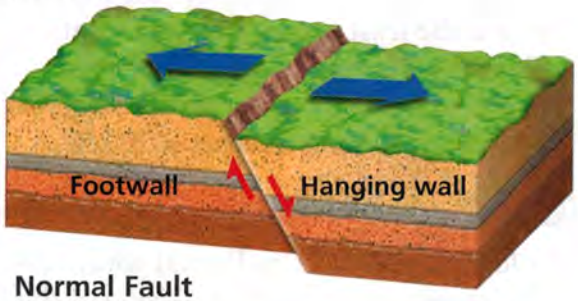
Question: What are the kinds of faults?

You do not have to limit your questions to text headings. Ask questions about anything that you need to clarify or that will help you understand the content. *What* and *how* are probably the most common question words, but you may also ask *why*, *who*, *when*, or *where* questions.

Previewing Visuals

Visuals are photographs, graphs, tables, diagrams, and illustrations. Visuals contain important information. Before you read, look at visuals and their labels and captions. This preview will help you prepare for what you will be reading.

Often you will be asked what you want to learn about a visual. For example, after you look at the normal fault diagram below, you might ask: What is the movement along a normal fault? Questions about visuals give you a purpose for reading—to answer your questions.



Normal Fault

Outlining

An outline shows the relationship between main ideas and supporting ideas. An outline has a formal structure. You write the main ideas, called topics, next to Roman numerals. The supporting ideas, called subtopics, are written under the main ideas and labeled A, B, C, and so on. An outline looks like this:

Technology and Society

I. Technology through history
II. The impact of technology on society
A.
B.

Identifying Main Ideas

When you are reading science material, it is important to try to understand the ideas and concepts that are in a passage. Each paragraph has a lot of information and detail. Good readers try to identify the most important—or biggest—idea in every paragraph or section. That's the main idea. The other information in the paragraph supports or further explains the main idea.

Sometimes main ideas are stated directly. In this book, some main ideas are identified for you as key concepts. These are printed in boldface type. However, you must identify other main ideas yourself. In order to do this, you must identify all the ideas within a paragraph or section. Then ask yourself which idea is big enough to include all the other ideas.

Comparing and Contrasting

When you compare and contrast, you examine the similarities and differences between things. You can compare and contrast in a Venn diagram or in a table.

Venn Diagram A Venn diagram consists of two overlapping circles. In the space where the circles overlap, you write the characteristics that the two items have in common. In one of the circles outside the area of overlap, you write the differing features or characteristics of one of the items. In the other circle outside the area of overlap, you write the differing characteristics of the other item.

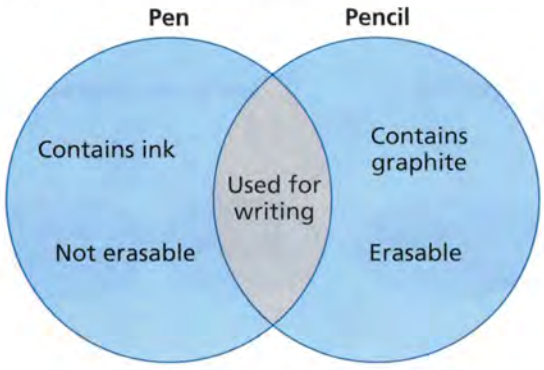


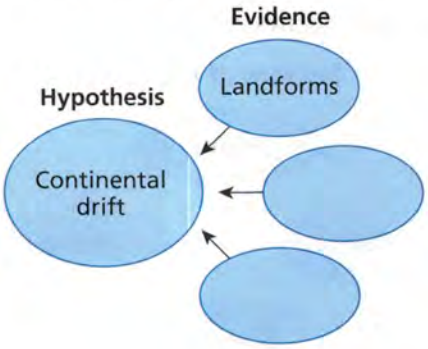
Table In a compare/contrast table, you list the characteristics or features to be compared across the top of the table. Then list the items to be compared in the left column. Complete the table by filling in information about each characteristic or feature.

Blood Vessel	Function	Structure of Wall
Artery	Carries blood away from heart	
Capillary		
Vein		

Identifying Supporting Evidence

A hypothesis is a possible explanation for observations made by scientists or an answer to a scientific question. Scientists must carry out investigations and gather evidence that either supports or disproves the hypothesis.

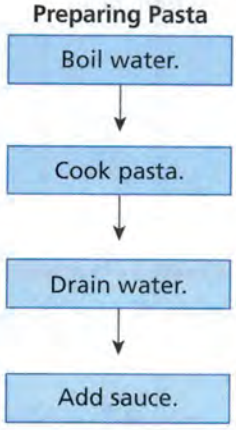
Identifying the supporting evidence for a hypothesis or theory can help you understand the hypothesis or theory. Evidence consists of facts—information whose accuracy can be confirmed by testing or observation.



Sequencing

A sequence is the order in which a series of events occurs. A flowchart or a cycle diagram can help you visualize a sequence.

Flowchart To make a flowchart, write a brief description of each step or event in a box. Place the boxes in order, with the first event at the top of the chart. Then draw an arrow to connect each step or event to the next.

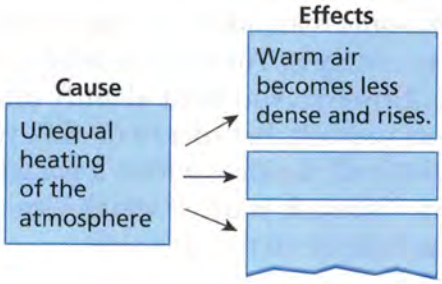


Cycle Diagram A cycle diagram shows a sequence that is continuous, or cyclical. A continuous sequence does not have an end because when the final event is over, the first event begins again. To create a cycle diagram, write the starting event in a box placed at the top of a page in the center. Then, moving in a clockwise direction, write each event in a box in its proper sequence. Draw arrows that connect each event to the one that occurs next.

Relating Cause and Effect

Science involves many cause-and-effect relationships. A cause makes something happen. An effect is what happens. When you recognize that one event causes another, you are relating cause and effect.

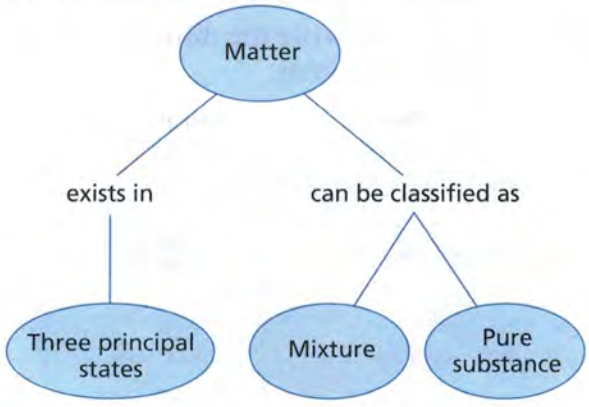
Words like *cause, because, effect, affect,* and *result* often signal a cause or an effect. Sometimes an effect can have more than one cause, or a cause can produce several effects.



Concept Mapping

Concept maps are useful tools for organizing information on any topic. A concept map begins with a main idea or core concept and shows how the idea can be subdivided into related subconcepts or smaller ideas.

You construct a concept map by placing concepts (usually nouns) in ovals and connecting them with linking words (usually verbs). The biggest concept or idea is placed in an oval at the top of the map. Related concepts are arranged in ovals below the big idea. The linking words connect the ovals.



Building Vocabulary

Knowing the meaning of these prefixes, suffixes, and roots will help you understand the meaning of words you do not recognize.

Word Origins Many science words come to English from other languages, such as Greek and Latin. By learning the meaning of a few common Greek and Latin roots, you can determine the meaning of unfamiliar science words.

Prefixes A prefix is a word part that is added at the beginning of a root or base word to change its meaning.

Suffixes A suffix is a word part that is added at the end of a root word to change the meaning.

Greek and Latin Roots

Greek Roots	Meaning	Example
ast-	star	astronaut
geo-	Earth	geology
metron-	measure	kilometer
opt-	eye	optician
photo-	light	photograph
scop-	see	microscope
therm-	heat	thermostat
Latin Roots	**Meaning**	**Example**
aqua-	water	aquarium
aud-	hear	auditorium
duc-, duct-	lead	conduct
flect-	bend	reflect
fract-, frag-	break	fracture
ject-	throw	reject
luc-	light	lucid
spec-	see	inspect

Prefixes and Suffixes

Prefix	Meaning	Example
com-, con-	with	communicate, concert
de-	from; down	decay
di-	two	divide
ex-, exo-	out	exhaust
in-, im-	in, into; not	inject, impossible
re-	again; back	reflect, recall
trans-	across	transfer
Suffix	**Meaning**	**Example**
-al	relating to	natural
-er, -or	one who	teacher, doctor
-ist	one who practices	scientist
-ity	state of	equality
-ology	study of	biology
-tion, -sion	state or quality of	reaction, tension

Safety Symbols

These symbols warn of possible dangers in the laboratory and remind you to work carefully.

Safety Goggles Wear safety goggles to protect your eyes in any activity involving chemicals, flames or heating, or glassware.

Lab Apron Wear a laboratory apron to protect your skin and clothing from damage.

Breakage Handle breakable materials, such as glassware, with care. Do not touch broken glassware.

Heat-Resistant Gloves Use an oven mitt or other hand protection when handling hot materials such as hot plates or hot glassware.

Plastic Gloves Wear disposable plastic gloves when working with organisms and harmful chemicals . Keep your hands away from your face, and dispose of the gloves according to your teacher's instructions.

Heating Use a clamp or tongs to pick up hot glassware. Do not touch hot objects with your bare hands.

Flames Before you work with flames, tie back loose hair and clothing. Follow instructions from your teacher about lighting and extinguishing flames.

No Flames When using flammable materials, make sure there are no flames, sparks, or other exposed heat sources present.

Corrosive Chemical Avoid getting acid or other corrosive chemicals on your skin or clothing or in your eyes. Do not inhale the vapors. Wash your hands after the activity.

Poison Do not let any poisonous chemical come into contact with your skin, and do not inhale its vapors. Wash your hands when you are finished with the activity.

Fumes Work in a ventilated area when harmful vapors may be involved. Avoid inhaling vapors directly. Only test an odor when directed to do so by your teacher, and use a wafting motion to direct the vapor toward your nose.

Sharp Object Scissors, scalpels, knives, needles, pins, and tacks can cut your skin. Always direct a sharp edge or point away from yourself and others.

Animal Safety Treat live or preserved animals or animal parts with care to avoid harming the animals or yourself. Wash your hands when you are finished with the activity.

Plant Safety Handle plants only as directed by your teacher. If you are allergic to certain plants, tell your teacher; do not do an activity involving those plants. Avoid touching harmful plants such as poison ivy. Wash your hands when you are finished with the activity.

Electric Shock To avoid electric shock, never use electrical equipment around water, or when the equipment is wet or your hands are wet. Be sure cords are untangled and cannot trip anyone. Unplug equipment not in use.

Physical Safety When an experiment involves physical activity, avoid injuring yourself or others. Alert your teacher if there is any reason you should not participate.

Disposal Dispose of chemicals and other laboratory materials safely. Follow the instructions from your teacher.

Hand Washing Wash your hands thoroughly when finished with the activity. Use soap and warm water. Rinse well.

General Safety Awareness When this symbol appears, follow the instructions provided. When you are asked to develop your own procedure in a lab, have your teacher approve your plan before you go further.

Science Safety Rules

General Precautions

Follow all instructions. Never perform activities without the approval and supervision of your teacher. Do not engage in horseplay. Never eat or drink in the laboratory. Keep work areas clean and uncluttered.

Dress Code

Wear safety goggles whenever you work with chemicals, glassware, heat sources such as burners, or any substance that might get into your eyes. If you wear contact lenses, notify your teacher.

Wear a lab apron or coat whenever you work with corrosive chemicals or substances that can stain. Wear disposable plastic gloves when working with organisms and harmful chemicals. Tie back long hair. Remove or tie back any article of clothing or jewelry that can hang down and touch chemicals, flames, or equipment. Roll up long sleeves. Never wear open shoes or sandals.

First Aid

Report all accidents, injuries, or fires to your teacher, no matter how minor. Be aware of the location of the first-aid kit, emergency equipment such as the fire extinguisher and fire blanket, and the nearest telephone. Know whom to contact in an emergency.

Heating and Fire Safety

Keep all combustible materials away from flames. When heating a substance in a test tube, make sure that the mouth of the tube is not pointed at you or anyone else. Never heat a liquid in a closed container. Use an oven mitt to pick up a container that has been heated.

Using Chemicals Safely

Never put your face near the mouth of a container that holds chemicals. Never touch, taste, or smell a chemical unless your teacher tells you to.

Use only those chemicals needed in the activity. Keep all containers closed when chemicals are not being used. Pour all chemicals over the sink or a container, not over your work surface. Dispose of excess chemicals as instructed by your teacher.

Be extra careful when working with acids or bases. When mixing an acid and water, always pour the water into the container first and then add the acid to the water. Never pour water into an acid. Wash chemical spills and splashes immediately with plenty of water.

Using Glassware Safely

If glassware is broken or chipped, notify your teacher immediately. Never handle broken or chipped glass with your bare hands.

Never force glass tubing or thermometers into a rubber stopper or rubber tubing. Have your teacher insert the glass tubing or thermometer if required for an activity.

Using Sharp Instruments

Handle sharp instruments with extreme care. Never cut material toward you; cut away from you.

Animal and Plant Safety

Never perform experiments that cause pain, discomfort, or harm to animals. Only handle animals if absolutely necessary. If you know that you are allergic to certain plants, molds, or animals, tell your teacher before doing an activity in which these are used. Wash your hands thoroughly after any activity involving animals, animal parts, plants, plant parts, or soil.

During field work, wear long pants, long sleeves, socks, and closed shoes. Avoid poisonous plants and fungi as well as plants with thorns.

End-of-Experiment Rules

Unplug all electrical equipment. Clean up your work area. Dispose of waste materials as instructed by your teacher. Wash your hands after every experiment.

Appendix B Using a Microscope

The microscope is an essential tool in the study of life science. It allows you to see things that are too small to be seen with the unaided eye.

You will probably use a compound microscope like the one you see here. The compound microscope has more than one lens that magnifies the object you view.

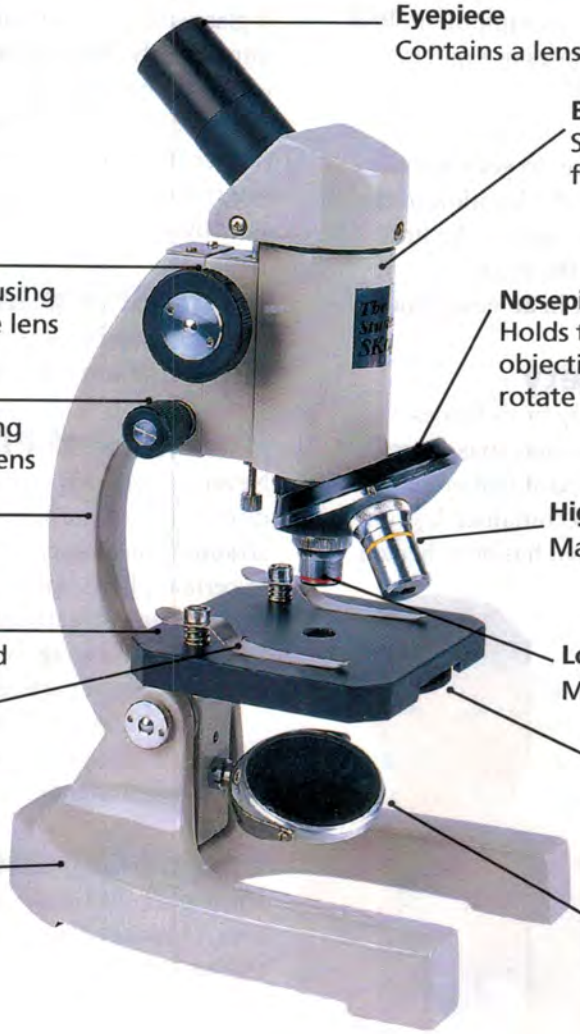
Typically, a compound microscope has one lens in the eyepiece, the part you look through. The eyepiece lens usually magnifies 10 ×. Any object you view through this lens would appear 10 times larger than it is.

The compound microscope may contain one or two other lenses called objective lenses. If there are two objective lenses, they are called the low-power and high-power objective lenses. The low-power objective lens usually magnifies 10 ×. The high-power objective lens usually magnifies 40 ×.

To calculate the total magnification with which you are viewing an object, multiply the magnification of the eyepiece lens by the magnification of the objective lens you are using. For example, the eyepiece's magnification of 10 × multiplied by the low-power objective's magnification of 10 × equals a total magnification of 100 ×.

Use the photo of the compound microscope to become familiar with the parts of the microscope and their functions.

The Parts of a Compound Microscope



Eyepiece
Contains a lens that magnifies about 10 ×

Body Tube
Separates the eyepiece lens from the objective lens

Coarse Adjustment Knob
Moves the body tube for focusing with the low-power objective lens

Nosepiece
Holds the low-power and high-power objective lenses; allows the lenses to rotate for viewing

Fine Adjustment Knob
Moves the body tube for focusing with the high-power objective lens

Arm
Supports the body tube

High-power Objective Lens
Magnifies about 40 ×

Stage
Supports the slide being used

Low-power Objective Lens
Magnifies about 10 ×

Stage Clip
Holds the slide in place

Diaphragm
Controls the amount of light passing through the opening of the stage

Base
Supports the microscope

Mirror
Reflects light upward through the diaphragm

Using the Microscope

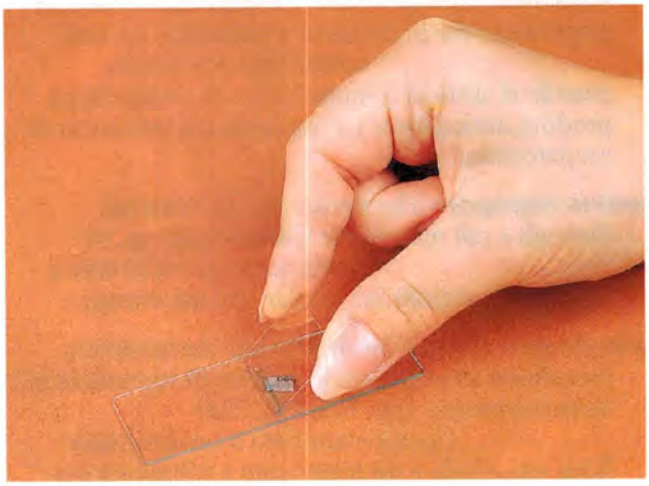
Use the following procedures when you are working with a microscope.

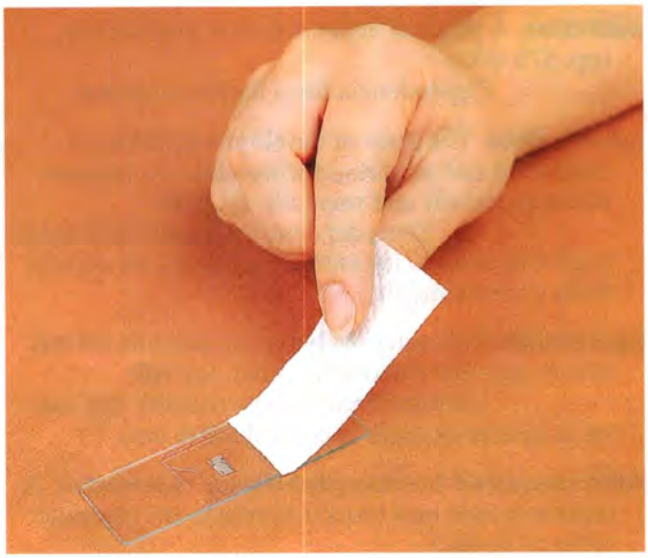
1. To carry the microscope, grasp the microscope's arm with one hand. Place your other hand under the base.
2. Place the microscope on a table with the arm toward you.
3. Turn the coarse adjustment knob to raise the body tube.
4. Revolve the nosepiece until the low-power objective lens clicks into place.
5. Adjust the diaphragm. While looking through the eyepiece, also adjust the mirror until you see a bright white circle of light. **CAUTION:** *Never use direct sunlight as a light source.*
6. Place a slide on the stage. Center the specimen over the opening on the stage. Use the stage clips to hold the slide in place. **CAUTION:** *Glass slides are fragile.*
7. Look at the stage from the side. Carefully turn the coarse adjustment knob to lower the body tube until the low-power objective almost touches the slide.
8. Looking through the eyepiece, very slowly turn the coarse adjustment knob until the specimen comes into focus.
9. To switch to the high-power objective lens, look at the microscope from the side. Carefully revolve the nosepiece until the high-power objective lens clicks into place. Make sure the lens does not hit the slide.
10. Looking through the eyepiece, turn the fine adjustment knob until the specimen comes into focus.

Making a Wet-Mount Slide

Use the following procedures to make a wet-mount slide of a specimen.

1. Obtain a clean microscope slide and a coverslip. **CAUTION:** *Glass slides and coverslips are fragile.*
2. Place the specimen on the slide. The specimen must be thin enough for light to pass through it.
3. Using a plastic dropper, place a drop of water on the specimen.
4. Gently place one edge of the coverslip against the slide so that it touches the edge of the water drop at a 45° angle. Slowly lower the coverslip over the specimen. If air bubbles are trapped beneath the coverslip, tap the coverslip gently with the eraser end of a pencil.
5. Remove any excess water at the edge of the coverslip with a paper towel.





English and Spanish Glossary

A

abdomen The hind section of an arthropod's body that contains its reproductive organs and part of its digestive tract. (p. 340)
abdomen Sección posterior del cuerpo de un artrópodo que contiene sus órganos reproductores y parte de su aparato digestivo.

abiotic factor A nonliving part of an organism's habitat. (p. 706)
factor abiótico La parte no viva del hábitat de un organismo.

absorption The process by which nutrients pass from the digestive system into the blood. (p. 517)
absorción Proceso por el cual las moléculas de los nutrientes pasan a través de la pared del sistema digestivo a la sangre.

active immunity Immunity that occurs when a person's own immune system produces antibodies in response to the presence of a pathogen. (p. 606)
inmunidad activa Inmunidad que ocurre cuando el sistema inmunológico de una persona produce anticuerpos en respuesta a la presencia de un patógeno.

active transport The movement of materials through a cell membrane using energy. (p. 84)
transporte activo Movimiento de materiales a través de la membrana celular que usa energía.

adaptation A behavior or physical characteristic that allows an organism to survive or reproduce in its environment. (pp. 175, 296, 723)
adaptación Comportamiento o característica física que ayuda a un organismo a sobrevivir o a reproducirse en su medio ambiente.

addiction A physical dependence on a substance. (pp. 575, 653)
adicción Dependencia física de una sustancia.

adolescence The stage of development between childhood and adulthood when children become adults physically and mentally. (p. 689)
adolescencia Etapa del desarrollo entre la niñez y la adultez cuando los niños empiezan a ser adultos física y mentalmente.

aggression A threatening behavior that one animal uses to gain control over another. (p. 446)
agresión Comportamiento amenazante que usa un animal para ganar el control sobre otro.

AIDS (acquired immunodeficiency syndrome) A disease caused by a virus that attacks the immune system. (p. 602)
SIDA (Síndrome de inmunodeficiencia adquirida) Enfermedad causada por un virus que ataca el sistema inmunológico.

alcoholism A disease in which a person is both physically addicted to and emotionally dependent on alcohol. (p. 657)
alcoholismo Enfermedad en la que una persona es adicta físicamente y dependiente emocionalmente del alcohol.

algae Plantlike protists. (p. 231)
algas Protistas con características vegetales.

alleles The different forms of a gene. (p. 113)
alelos Diferentes formas de un gen.

allergen A substance that causes an allergy. (p. 612)
alergeno Sustancia que causa la alergia.

allergy A disorder in which the immune system is overly sensitive to a foreign substance. (p. 612)
alergia Trastorno fisiológico en el cual el sistema inmunológico es extremadamente sensible a las sustancias externas.

alveoli Tiny sacs of lung tissue specialized for the movement of gases between air and blood. (p. 568)
alveolos Sacos diminutos de tejido pulmonar especializados en el intercambio de gases entre el aire y la sangre.

amino acid A small molecule that is linked chemically to other amino acids to form proteins.
amino ácido Pequeña molécula que se une químicamente a otros aminoácidos para formar proteínas. (pp. 77, 507)

amniotic egg An egg with a shell and internal membranes that keep the embryo moist (p. 389)
huevo amniótico Huevo con cáscara y membranas internas que mantiene al embrión húmedo.

amniotic sac A fluid-filled sac that cushions and protects a developing embryo and fetus in the uterus. (p. 684)
saco amniótico Saco lleno de líquido que amortigua y protege al embrión y al feto en desarrollo en el útero.

amphibian An ectothermic vertebrate that spends its early life in water and its adult life on land.
anfibio Vertebrado ectotérmico que pasa la primera etapa de su vida en el agua y la madurez en la tierra. (p. 382)

anabolic steroids Synthetic chemicals that are similar to hormones produced in the body. (p. 654)
esteroides anabólicos Sustancias químicas sintéticas que son semejantes a las hormonas producidas por el cuerpo.

angiosperm A flowering plant that produces seeds enclosed in a protective structure. (p. 276)
angiosperma Planta con flores que produce semillas encerradas en una estructura protectora.

annual A flowering plant that completes its life cycle in one growing season. (p. 287)
anual Planta con flores que completa su ciclo de vida en una sola temporada de crecimiento.

antenna An appendage on the head of an arthropod that contains sense organs. (p. 337)
antena Apéndice en la cabeza de un animal que contiene órganos sensoriales.

antibiotic A chemical that kills bacteria or slows their growth without harming body cells. (p. 608)
antibiótico Sustancia química que mata las bacterias o frena su crecimiento sin dañar las células del cuerpo humano.

antibody A protein produced by a B cell of the immune system that destroys pathogens. (p. 600)
anticuerpo Proteína producida por una célula B del sistema inmunológico que destruye un tipo específico de patógeno.

antigen A molecule that the immune system recognizes either as part of the body or as coming from outside the body. (p. 600)
antígeno Molécula en una célula que puede reconocer el sistema inmunológico como parte del cuerpo o como un agente extraño.

anus A muscular opening at the end of the rectum through which waste material is eliminated from the body. (pp. 318, 527)
ano Abertura muscular al final del recto a través de la cual se elimina el material de desecho digestivo del cuerpo.

aorta The largest artery in the body. (p. 539)
aorta La arteria más grande del cuerpo.

aquaculture The practice of raising fish and other water-dwelling organisms for food. (p. 788)
acuicultura Técnica del cultivo de peces y otros organismos acuáticos para consumo humano.

arachnid An arthropod with two body sections, four pairs of legs, and no antennae. (p. 340)
arácnido Artrópodo con dos secciones corporales, cuatro pares de patas y sin antenas.

artery A blood vessel that carries blood away from the heart. (p. 538)
arteria Vaso sanguíneo que transporta la sangre que sale del corazón.

arthropod An invertebrate that has an external skeleton, a segmented body, and jointed appendages. (p. 335)
artrópodo Invertebrado que tiene esqueleto externo, cuerpo segmentado y apéndices anexos.

asexual reproduction A reproductive process that involves only one parent and produces offspring that are identical to the parent. (pp. 220, 297)
reproducción asexual Proceso de reproducción que implica a sólo un progenitor y produce descendencia que es idéntica al progenitor.

asthma A disorder in which the respiratory passages narrow significantly. (p. 613)
asma Trastorno fisiológico por el cual las vías respiratorias se estrechan considerablemente.

atherosclerosis A condition in which an artery wall thickens from a buildup of fatty materials. (p. 553)
arteriosclerosis Condición en la que la pared de una arteria se hace más gruesa debido a la acumulación de materiales grasos.

atrium Each of the two upper chambers of the heart that receives blood that comes into the heart.
aurícula Cada una de las dos cámaras superiores del corazón que reciben la sangre que entra en el corazón. (pp. 384, 537)

autonomic nervous system The group of nerves in the peripheral nervous system that controls involuntary actions. (p. 637)
sistema nervioso autónomo Grupo de nervios en el sistema nervioso periférico que controla las acciones involuntarias.

autotroph An organism that makes its own food.
autótrofo Organismo que produce su propio alimento. (pp. 38, 87)

auxin A plant hormone that speeds up the rate of growth of plant cells. (p. 285)
auxina Hormona vegetal que acelera el crecimiento de las células de la planta.

axon A threadlike extension of a neuron that carries nerve impulses away from the cell body. (p. 628)
axón Extensión con forma de hilo de una neurona que lleva los impulsos nerviosos del cuerpo de la célula.

B

B cell A lymphocyte that produces proteins that help destroy pathogens. (p. 600)
célula B Linfocito que produce proteínas que ayudan a destruir un tipo específico de patógeno.

bacteria Single-celled organisms that lack a nucleus; prokaryotes. (p. 218)
bacteria Organismo unicelular que no tiene núcleo.

bacteriophage A virus that infects bacteria. (p. 211)
bacteriófago Virus que infecta bacterias.

behavior All the actions an animal performs. (p. 437)
comportamiento Todas las acciones que realiza un animal.

biennial A flowering plant that completes its life cycle in two years. (p. 287)
bienal Planta con flores que completa su ciclo de vida en dos años.

bilateral symmetry Body plan with two halves that are mirror images. (p. 301)
simetría bilateral La cualidad de ser divisible en mitades que son imágenes reflejas.

bile A substance produced by the liver that breaks up fat particles. (p. 525)
bilis Sustancia producida por el hígado que descompone las partículas de grasa.

binary fission A form of asexual reproduction in which one cell divides to form two identical cells.
fisión binaria Forma de reproducción asexual en la que una célula se divide para formar dos células idénticas. (p. 220)

binomial nomenclature The system for naming organisms in which each organism is given a unique, two-part scientific name. (p. 44)
nomenclatura binaria Sistema para nombrar organismos, en el cual a cada organismo se le da un nombre científico único de dos partes.

biodiversity The number of different species in an area. (p. 792)
biodiversidad Número de diferentes especies en un área determinada.

biogeography The study of where organisms live.
biogeografía Estudio del lugar donde viven los organismos. (p. 752)

biological control A natural predator or disease used to combat a pest insect. (p. 355)
control biológico Depredador o enfermedad natural liberada en un área para combatir una plaga de insectos.

biome A group of land ecosystems with similar climates and organisms. (p. 758)
bioma Grupo de ecosistemas terrestres con climas y organismos similares.

biotic factor A living part of an organism's habitat.
factor biótico La parte viva del hábitat de un organismo. (p. 705)

bird An endothermic vertebrate that has feathers and a four-chambered heart, and lays eggs. (p. 407)
ave Vertebrado endotérmico que tiene plumas, un corazón de 4 cámaras y pone huevos.

birth rate The number of births in a population in a certain amount of time. (p. 714)
tasa de natalidad Número de nacimientos en una población en un período determinado.

bivalve A mollusk that has two shells held together by hinges and strong muscles. (p. 331)
bivalvo Molusco que tiene dos conchas unidas por charnelas y fuertes músculos.

blood pressure The pressure that is exerted by the blood against the walls of blood vessels. (p. 542)
presión arterial Presión que ejerce la sangre contra las paredes de los vasos sanguíneos.

brain The part of the central nervous system that is located in the skull and controls most functions in the body. (p. 633)
encéfalo Parte del sistema nervioso central que está ubicado en el cráneo y controla la mayoría de las funciones del cuerpo.

brain stem The part of the brain that lies between the cerebellum and spinal cord, and controls the body's involuntary actions. (p. 634)
tronco encefálico Parte del encéfalo que se encuentra entre el cerebelo y la médula espinal, y controla las acciones involuntarias del cuerpo.

branching tree A diagram that shows how scientists think different groups of organisms are related.
árbol ramificado Diagrama que muestra cómo piensan los científicos que se relacionan diferentes grupos de organismos. (p. 186)

bronchi The passages that direct air into the lungs.
bronquios Conductos que dirigen el aire hacia los pulmones. (p. 568)

bronchitis An irritation of the breathing passages in which the small passages become narrower than normal and may be clogged with mucus. (p. 576)
bronquitis Irritación de los conductos respiratorios en la que los conductos pequeños se hacen más estrechos de lo normal y se pueden obstruir con mucosidad.

budding A form of asexual reproduction of yeast in which a new cell grows out of the body of a parent.
gemación Forma de reproducción asexual de las levaduras, en la que una nueva célula crece del cuerpo de su progenitor. (p. 238)

C

calorie The amount of energy needed to raise the temperature of one gram of water by one degree Celsius. (p. 503)
caloría Cantidad de energía que se necesita para elevar la temperatura de un gramo de agua un grado Celsius.

cambium A layer of cells in a plant that produces new phloem and xylem cells. (p. 268)
cámbium Una capa de células de una planta que produce nuevas células de floema y xilema.

cancer A disease in which some body cells divide uncontrollably. (p. 493)
cáncer Enfermedad en la que algunas células del cuerpo se dividen descontroladamente.

canopy A leafy roof formed by tall trees. (p. 760)
bóveda arbórea Cubierta densa formada por las cimas hojeadas de los árboles altos.

capillary A tiny blood vessel where substances are exchanged between the blood and the body cells.
capilar Vaso sanguíneo minúsculo donde se intercambian las sustancias de la sangre y las células del cuerpo. (p. 538)

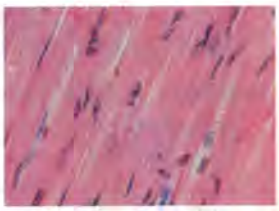
captive breeding The mating of animals in zoos or wildlife preserves. (p. 800)
reproducción en cautiverio Apareamiento de animales en zoológicos y reservas naturales.

carbohydrate An energy-rich organic compound made of the elements carbon, hydrogen, and oxygen. (pp. 76, 504)
carbohidrato Compuesto orgánico altamente energético hecho de elementos de carbono, hidrógeno y oxígeno.

carbon monoxide A colorless, odorless gas produced when substances—including tobacco—are burned. (p. 575)
monóxido de carbono Gas incoloro e inodoro producido cuando se queman algunas sustancias, incluido el tabaco.

carcinogen A substance or a factor in the environment that can cause cancer. (p. 614)
carcinógeno Sustancia o factor en el ambiente que puede causar cáncer.

cardiac muscle Muscle tissue found only in the heart. (p. 485)
músculo cardiaco Tejido muscular que sólo se encuentra en el corazón.



cardiovascular system The body system that consists of the heart, blood vessels, and blood; circulatory system. (p. 534)
sistema cardiovascular Sistema corporal que está formado por el corazón, los vasos sanguíneos y la sangre; tambien llamado sistema circulatoria.

carnivore A consumer that eats only animals. (pp. 330, 741)
carnívoro Consumidor que come sólo animales.

carrier A person who has one recessive allele for a trait, but does not have the trait. (p. 149)
portador Persona que tiene un alelo recesivo para un determinado rasgo, pero que no tiene el rasgo.

carrying capacity The largest population that an area can support. (p. 717)
capacidad de carga La mayor población que puede sustentar un área.

cartilage A connective tissue that is more flexible than bone and that protects the ends of bones and keeps them from rubbing together. (pp. 377, 477)
cartílago Tejido conectivo que es más flexible que el hueso y que protege los extremos de los huesos y evita que se rocen.

cast A type of fossil that forms when a mold becomes filled in with minerals that then harden. (p. 190)
vaciado Tipo de fósil que se forma cuando un molde se llena con minerales que luego se endurecen.

cell The basic unit of structure and function in living things. (pp. 34, 51, 295, 469)
célula Unidad básica de estructura y función de los seres vivos.

cell cycle The regular sequence of growth and division that cells undergo. (p. 96)
ciclo celular Secuencia regular de crecimiento y división de las células.

cell membrane The outside cell boundary that controls which substances can enter or leave the cell.
membrana celular Estructura celular que controla qué sustancias pueden entrar y salir de la célula. (pp. 61, 469)

cell theory A widely accepted explanation of the relationship between cells and living things. (p. 54)
teoría celular Explicación ampliamente aceptada sobre la relación entre las células y los seres vivos.

cell wall A rigid layer of nonliving material that surrounds the cells of plants and some other organisms. (p. 61)
pared celular Capa rígida de material no vivo que rodea las células vegetales y de algunos organismos.

central nervous system The division of the nervous system consisting of the brain and spinal cord.
sistema nervioso central División del sistema nervioso formado por el encéfalo y la médula espinal. (p. 632)

cephalopod An ocean-dwelling mollusk whose foot is adapted as tentacles that surround its mouth.
cefalópodo Molusco que vive en el océano, cuyas extremidades se adaptaron a la forma de tentáculos alrededor de su boca. (p. 332)

cerebellum The part of the brain that coordinates muscle action and helps maintain balance. (p. 634)
cerebelo Parte del encéfalo que coordina las acciones de los músculos y ayuda a mantener el equilibrio.

cerebrum The part of the brain that interprets input from the senses, controls movement, and carries out complex mental processes. (p. 634)
cerebro Parte del encéfalo que interpreta los estímulos de los sentidos, controla el movimiento y realiza procesos mentales complejos.

chlorophyll A green pigment found in the chloroplasts of plants, algae, and some bacteria. (p. 88)
clorofila Pigmento verde que se encuentra en los cloroplastos de las plantas, algas y algunas bacterias.

chloroplast A structure in the cells of plants and some other organisms that captures energy from sunlight and uses it to produce food. (p. 66)
cloroplasto Estructura en las células vegetales y algunos otros organismos que capturan la energía de la luz solar y la usan para producir alimento.

chordate The phylum whose members have a notochord, a nerve cord, and slits in their throat area at some point in their lives. (p. 368)
cordado Fílum cuyos miembros poseen un notocordio, un cordón nervioso y aberturas en el área de la garganta en alguna etapa de su vida.

chromosome A doubled rod of condensed chromatin (p. 97)
cromosoma Doble bastón de cromatina condensada; contiene ADN que transporta información genética.

cilia The hairlike projections on the outside of cells that move in a wavelike manner. (pp. 229, 567)
cilios Finas proyecciones en el exterior de las células, que se mueven de manera ondulante.

circadian rhythm A behavior cycle that occurs over a period of approximately one day. (p. 450)
ritmo circadiano Ciclo de comportamiento que ocurre en un período de aproximadamente un día.

classification The process of grouping things based on their similarities. (pp. 10, 43)
clasificación Proceso de agrupar cosas según sus semejanzas.

clear-cutting The process of cutting down all the trees in an area at once. (p. 785)
tala total Proceso de cortar simultáneamente todos los árboles de un área.

climate The typical weather pattern in an area over a long period of time. (p. 755)
clima Patrón típico del tiempo en un área durante un largo período.

clone An organism that is genetically identical to the organism from which it was produced. (p. 159)
clon Organismo que es genéticamente idéntico al organismo del que proviene.

closed circulatory system A circulatory system in which blood moves only within a connected network of tubes called blood vessels. (p. 319)
sistema circulatorio cerrado Sistema circulatorio en el cual la sangre se mueve sólo dentro de una red conectada de conductos llamados vasos sanguíneos.

cnidarian An invertebrate animal that uses stinging cells to capture food and defend itself. (p. 307)
cnidario Animal invertebrado que usa células punzantes para capturar alimento y defenderse.

cochlea A snail-shaped tube in the inner ear that is lined with receptor cells that respond to sound.
cóclea Tubo en forma de caracol en el oído interno que está recubierto de células receptoras que responden al sonido. (p. 647)

codominance A condition in which neither of two alleles of a gene is dominant or recessive. (p. 123)
codominancia Condición en la que ninguno de los dos alelos de un gen es dominante ni recesivo.

colony A group of individual organisms living or growing together. (p. 310)
colonia Grupo de mucho animales individuales.

commensalism A relationship between two species in which one species benefits and the other is neither helped nor harmed. (p. 728)
comensalismo Relación entre dos especies donde una se beneficia y la otra no obtiene ni beneficio ni perjuicio.

communicating The process of sharing ideas with others through writing and speaking. (p. 17)
comunicar Proceso de compartir ideas con otras personas a través de la escritura o el lenguage hablado.

community All the different populations that live together in an area. (p. 707)
comunidad Todas las diferentes poblaciones que viven juntas en un área.

compact bone Hard, dense bone tissue that is beneath the outer membrane of a bone. (p. 478)
hueso compacto Tejido de hueso denso y duro que se encuentra debajo de la membrana externa de un hueso.

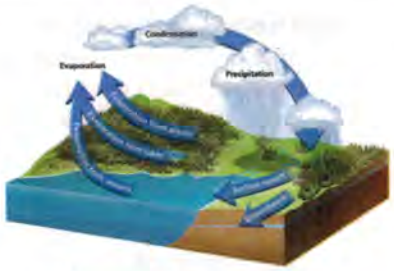
competition The struggle between organisms to survive as they attempt to use the same limited resource. (p. 724)
competencia Lucha entre organismos por los recursos limitados en un hábitat.

complete metamorphosis A type of metamorphosis characterized by four dramatically different stages. (p. 346)
metamorfosis completa Tipo de metamorfosis caracterizado por cuatro etapas muy diferentes.

compound Two or more elements that are chemically combined. (p. 75)
compuesto Dos o más elementos que se combinan químicamente.

concussion A bruiselike injury of the brain that occurs when the soft tissue of the brain collides against the skull. (p. 639)
contusión Magulladura en el encéfalo que ocurre cuando el tejido suave del encéfalo choca contra el cráneo.

condensation The process by which a gas changes to a liquid. (p. 747)
condensación Proceso por el cual un gas se convierte en líquido.



conditioning The process of learning to connect a stimulus with a good or bad outcome. (p. 440)
condicionamiento Proceso de aprendizaje que relaciona un estímulo con un suceso bueno o malo.

cone The reproductive structure of a gymnosperm.
cono Estructura reproductora de una gimnosperma. (p. 274)

coniferous tree A tree that produces its seeds in cones and that has needle-shaped leaves. (p. 764)
árbol conífero Árbol que produce sus semillas en conos y sus hojas tienen forma de aguja.

conjugation The process in which a unicellular organism transfers some of its genetic material to another unicellular organism. (p. 220)
conjugación Proceso por el cual un organismo unicelular transfiere parte de su material genético a otro organismo unicelular.

connective tissue A body tissue that provides support for the body and connects all of its parts.
tejido conectivo Tejido que da soporte al cuerpo y conecta todas sus partes. (p. 470)

consumer An organism that obtains energy by feeding on other organisms. (pp. 350, 741)
consumidor Organismo que obtiene energía alimentándose de otros organismos.

continental drift The very slow motion of the continents. (p. 753)
deriva continental Movimiento muy lento de los continentes.

contour feather A large feather that helps give shape to a bird's body. (p. 407)
pluma remera Pluma grande que ayuda a dar forma al cuerpo del ave.

contractile vacuole The cell structure that collects extra water from the cytoplasm and then expels it from the cell. (p. 228)
vacuola contráctil Estructura celular que recoge el agua sobrante del citoplasma y luego la expulsa de la célula.

controlled experiment An experiment in which only one variable is manipulated at a time. (p. 16)
experimento controlado Experimento en el cual sólo una variable es manipulada a la vez.

coral reef A diverse environment named for the coral animals that make up its stony structure.
arrecife de coral Medio ambiente diverso nombrado así por los animales coralinos que forman la estructura rocosa. (p. 310)

cornea The clear tissue that covers the front of the eye. (p. 643)
córnea Tejido transparente que cubre el frente del ojo.

coronary artery An artery that supplies blood to the heart itself. (p. 540)
arteria coronaria Arteria que lleva sangre al corazón en sí.

cotyledon A seed leaf. (p. 264)
cotiledón Hoja de una semilla.

courtship behavior The behavior that animals of the same species engage in to prepare for mating.
comportamiento de cortejo Comportamiento en el que participan los animales de la misma especie en preparación para el apareamiento. (p. 447)

critical night length The number of hours of darkness that determines whether or not a plant will flower. (p. 286)
longitud nocturna crítica El número de horas de oscuridad que determina si florece una planta o no.

crop A bird's internal storage pouch that allows it to store food inside its body after swallowing it.
buche Depósito de almacenamiento interno del ave que permite guardar el alimento dentro del ave después de tragarlo. (p. 409)

crustacean An arthropod that has two or three body sections, five or more pairs of legs, and two pairs of antennae. (p. 338)
crustáceo Artrópodo que tiene dos o tres secciones corporales, cinco o más pares de patas y dos pares de antenas.

cuticle The waxy, waterproof layer that covers the leaves and stems of most plants. (p. 252)
cutícula Capa cerosa e impermeable que cubre las hojas y los tallos de la mayoría de las plantas.

cytokinesis The final stage of the cell cycle, in which the cell's cytoplasm divides, distributing the organelles into each of the two new cells. (p. 100)
citocinesis Fase final del ciclo celular en la cual se divide el citoplasma de la célula y se distribuyen los organelos en cada una de las dos nuevas células.

cytoplasm The material within a cell apart from the nucleus. (pp. 63, 469)
citoplasma Material que hay en una célula, pero fuera del núcleo.

D

data Facts, figures, and other evidence gathered through observations. (p. 16)
dato Hecho, cifra u otra evidencia reunida por medio de las observaciones.

day-neutral plant A plant with a flowering cycle that is not sensitive to periods of light and dark.
planta de día neutro Planta cuyo ciclo de floración no es sensible a la duración de los períodos de luz y oscuridad. (p. 286)

death rate The number of deaths in a population in a certain amount of time. (p. 714)
tasa de mortalidad Número de muertes en una población en un período determinado.

deciduous tree A tree that sheds its leaves and grows new ones each year. (p. 763)
árbol caducifolio Árbol cuyas hojas caen y vuelven a crecer anualmente.

decomposer An organism that breaks down chemicals from wastes and dead organisms, and returns important materials to the soil and water. (pp. 224, 350, 741)
descomponedor Organismo que separa sustancias químicas de los organismos muertos y devuelve materiales importantes al suelo y al agua.

dendrite A threadlike extension of a neuron that carries nerve impulses toward the cell body.
dendrita Extensión en forma de hilo de una neurona que lleva los impulsos nerviosos hacia el cuerpo de las células. (p. 628)

depressant A drug that slows down the activity of the central nervous system. (p. 654)
sustancia depresora Droga que disminuye la velocidad de la actividad del sistema nervioso central.

dermis The inner layer of the skin. (p. 491)
dermis Capa más interna de la piel.

desert An area that receives less than 25 centimeters of precipitation per year. (p. 761)
desierto Área que recibe menos de 25 centímetros de precipitación al año.

development The process of change that occurs during an organism's life to produce a more complex organism. (p. 35)
desarrollo Proceso de cambio que ocurre durante la vida de un organismo, mediante el cual se desarrolla un organismo más complejo.

diabetes A condition in which either the pancreas fails to produce enough insulin or the body's cells can't use it properly. (p. 613)
diabetes Condición en la que el páncreas no puede producir suficiente insulina o las células del cuerpo no la pueden usar adecuadamente.

diaphragm A large muscle located at the bottom of a mammal's rib cage that functions in breathing.
diafragma Músculo grande ubicado en la parte inferior de la caja torácica de un mamífero que participa en la respiración. (pp. 422, 570)

dicot An angiosperm that has two seed leaves.
dicotiledónea Angiosperma cuyas semillas tienen dos cotiledones. (p. 280)

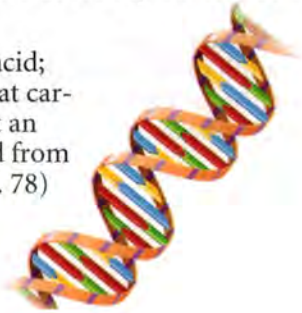
Dietary Reference Intakes (DRIs) Guidelines for the amounts of nutrients needed daily. (p. 514)
Dietéticas ingestas de referencia Pautas que muestran la cantidad de nutrientes que se necesitan diariamente.

diffusion The process by which molecules move from an area of higher concentration to an area of lower concentration. (pp. 81, 541)
difusión Proceso por el cual las moléculas se mueven de un área de mayor concentración a otra de menor concentración.

digestion The process by which the body breaks down food into small nutrient molecules. (p. 517)
digestión Proceso por el cual el cuerpo descompone la comida en pequeñas moléculas de nutrientes.

dispersal The movement of organisms from one place to another. (p. 753)
dispersión Movimiento de los organismos de un lugar a otro.

DNA Deoxyribonucleic acid; the genetic material that carries information about an organism and is passed from parent to offspring. (p. 78)



ADN Ácido desoxirribonucleico; material genético que lleva información sobre un organismo y que se pasa de padres a hijos.

dominant allele An allele whose trait always shows up in the organism when the allele is present.
alelo dominante Alelo cuyo rasgo siempre se manifiesta en el organismo, cuando el alelo está presente. (p. 113)

dormancy A period when an organism's growth or activity stops. (p. 286)
dormición Período durante el cual se suspende el crecimiento o la actividad de un organismo.

down feather A short, fluffy feather that traps heat and keeps a bird warm. (p. 407)
plumones Plumas cortas y mullidas que atrapan el calor y mantienen al ave abrigada.

drug Any chemical taken into the body that causes changes in a person's body or behavior. (p. 651)
droga Cualquier sustancia química que se incorpora al cuerpo, que causa cambios en el cuerpo o comportamiento de una persona.

drug abuse The deliberate misuse of drugs for purposes other than medical. (p. 651)
abuso de drogas Uso indebido deliberado de drogas para fines no médicos.

E

eardrum The membrane that separates the outer ear from the middle ear, and that vibrates when sound waves strike it. (p. 647)
tímpano Membrana que separa el oído externo del oído medio, y que vibra cuando le llegan ondas sonoras.

echinoderm A radially symmetrical invertebrate that lives on the ocean floor and has an internal skeleton and a water vascular system. (p. 358)
equinodermo Invertebrado con simetría radial que vive en el suelo oceánico y tiene un esqueleto interno.

ecology The study of how organisms interact with their environment. (pp. 350, 708)
ecología El estudio de cómo interactúan los organismos con su medio ambiente.

ecosystem The community of organisms that live in a particular area, along with their nonliving surroundings. (p. 708)
ecosistema Comunidad de organismos que viven en un área determinada, junto con su medio ambiente no vivo.

ectotherm An animal whose body does not produce much internal heat. (p. 370)
ectotermo Animal cuyo cuerpo no produce mucho calor interno.

egg A female sex cell. (p. 675)
óvulo Célula sexual femenina.

element Any substance that cannot be broken down into simpler substances. (p. 74)
elemento Cualquier sustancia que no puede descomponerse en sustancias más pequeñas.

embryo A young organism that develops from a zygote (p. 264); a developing human during the first eight weeks after fertilization. (p. 683)
embrión Organismo joven que se desarrolla a partir de un cigoto; humano en desarrollo durante las primeras ocho semanas después de ocurrir la fecundación.

emigration Leaving a population. (p. 714)
emigración Abandono de una población.

emphysema A serious disease that destroys lung tissue and causes breathing difficulties. (p. 577)
enfisema Enfermedad grave que destruye el tejido pulmonar y causa dificultades respiratorias.

endangered species A species in danger of becoming extinct in the near future. (p. 797)
especie en peligro de extinción Especie que corre el riesgo de desaparecer en el futuro próximo.

endocrine gland A structure of the endocrine system that produces and releases its chemical products directly into the bloodstream. (p. 667)
glándula endocrina Estructura del sistema endocrino que produce y libera sus productos químicos directamente a la corriente sanguínea.

endoplasmic reticulum A cell structure that forms passageways in which proteins and other materials are carried through the cell. (p. 63)
retículo endoplasmático Estructura celular que forma un laberinto de pasajes por los que se transportan las proteínas y otros materiales de una parte de la célula a otra.

endoskeleton An internal skeleton. (p. 358)
endoesqueleto Esqueleto interno.

endospore A small, rounded, thick-walled, resting cell that forms inside a bacterial cell. (p. 221)
endospora Célula pequeña y redonda de paredes gruesas que se encuentra en reposo, que se forma dentro de una célula bacteriana.

endotherm An animal whose body controls and regulates its temperature by controlling the internal heat it produces. (p. 371)
endotermo Animal cuyo cuerpo controla y regula su temperatura controlando el calor interno que produce.

energy pyramid A diagram that shows the amount of energy that moves from one feeding level to another in a food web. (p. 744)
pirámide de la energía Diagrama que muestra la cantidad de energía que pasa de un nivel de alimentación a otro en una red alimentaria.

engineer A person who is trained to use both technological and scientific knowledge to solve practical problems. (p. 21)
ingeniero Persona capacitada para usar conocimientos tecnológicos y científicos para resolver problemas prácticos.

environmental science The study of the natural processes that occur in the environment and how humans can affect them. (p. 781)
ciencias del medio ambiente Estudio de los procesos naturales que ocurren en el medio ambiente y cómo los seres humanos pueden afectarlos.

enzyme A protein that speeds up chemical reactions in a living thing. (p. 77, 519)
enzima Proteína que acelera las reacciones químicas en un ser vivo.

epidermis The outer layer of the skin. (p. 490)
epidermis Capa más externa de la piel.

epiglottis A flap of tissue that seals off the windpipe and prevents food from entering. (p. 519)
epiglotis Extensión de tejido que sella la entrada de la tráquea impidiendo la entrada del alimento.

epithelial tissue A body tissue that covers the surfaces of the body, inside and out. (p. 470)
tejido epitelial Tejido corporal que cubre la superficie del cuerpo, por dentro y por fuera.

esophagus A muscular tube that connects the mouth to the stomach. (p. 519)
esófago Tubo muscular que conecta la boca con el estómago.

estimate An approximation of a number, based on reasonable assumptions. (p. 712)
estimación Cálculo aproximado de un número, basándose en supuestos razonables.

estrogen A hormone produced by the ovaries that controls the development of eggs and adult female characteristics. (p. 678)
estrógeno Hormona producida por los ovarios que controla el desarrollo de los óvulos y de las características femeninas adultas.

estuary A habitat in which the fresh water of a river meets the salt water of the ocean. (p. 768)
estuario Hábitat en el cual el agua dulce de un río se encuentra con el agua salada del mar.

eukaryote An organism whose cells contain nuclei.
eucariota Organismo cuyas células contienen núcleo. (p. 48)

evaporation The process by which molecules of a liquid absorb energy and change to a gas. (p. 747)
evaporación Proceso por el cual las moléculas de un líquido absorben energía y pasan al estado gaseoso.

evolution The gradual change in a species over time.
evolución Cambio gradual de una especie a través del tiempo. (p. 176)

excretion The process by which wastes are removed from the body. (p. 579)
excreción Proceso por el cual se eliminan los desechos del cuerpo.

exoskeleton A waxy, waterproof outer shell or outer skeleton that protects the animal and helps prevent evaporation of water. (p. 336)
exoesqueleto Concha externa cerosa e impermeable o esqueleto externo que protege al animal y ayuda a evitar la evaporación del agua.

exotic species Species that are carried to a new location by people. (p. 754)
especies exóticas Especies que lleva la gente a un nuevo lugar.

extinction The disappearance of all members of a species from Earth. (pp. 193, 796)
extinción Desaparición de la Tierra de todos los miembros de una especie.

F

fallopian tube A passageway for eggs from an ovary to the uterus. (p. 678)
trompa de falopio Pasaje por el que pasan los óvulos desde un ovario al útero.

farsightedness The condition in which a person can see distant objects clearly. (p. 645)
hipermetropía Condición en la que una persona puede ver claramente los objetos distantes.

fat Energy-containing nutrients that are composed of carbon, oxygen, and hydrogen. (p. 505)
grasas Nutrientes que contienen energía y están compuestos de carbono, oxígeno e hidrógeno.

fermentation The process by which cells break down molecules to release energy without using oxygen. (p. 93)
fermentación Proceso por el cual las células descomponen las moléculas para liberar energía sin usar oxígeno.

fertilization The joining of a sperm and an egg.
fecundación Unión de un espermatozoide y un óvulo. (pp. 111, 297, 675)

fetus A developing human from the ninth week of development until birth. (p. 683)
feto Humano en desarrollo desde la novena semana de desarrollo hasta el nacimiento.

fish An ectothermic vertebrate that lives in the water and has fins. (p. 375)
pez Vertebrado ectotérmico que vive en el agua y tiene branquias.

fishery An area with a large population of valuable ocean organisms. (p. 787)
pesquería Área con una gran población de organismos marinos.

flagellum A long, whiplike structure that helps a cell to move. (p. 218)
flagelo Estructura larga con forma de látigo que ayuda a la célula para moverse.

flower The reproductive structure of an angiosperm. (p. 276)
flor Estructura reproductora de una angiosperma.

follicle Structure in the dermis of the skin from which a strand of hair grows. (p. 491)
folículo Estructura en la dermis de la piel de donde crece un pelo.

food chain A series of events in which one organism eats another and obtains energy. (pp. 350, 742)
cadena alimentaria Serie de sucesos en los que un organismo se come a otro y obtiene energía.

food web The pattern of overlapping food chains in an ecosystem. (p. 742)
red alimentaria Patrón de cadenas alimentarias sobrepuestas en un ecosistema.

fossil The preserved remains or traces of an organism that lived in the past. (p. 173, 396)
fósil Restos o huellas preservados de un organismo que vivió en el pasado.

fossil record The millions of fossils that scientists have collected. (p. 192)
registro fósil Los millones de fósiles que han descubierto los científicos.

free-living organism An organism that does not live in or on other organisms. (p. 316)
organismo autónomo Organismo que no vive dentro o sobre otro organismo.

frond The leaf of a fern plant. (p. 259)
fronda Hoja de un helecho.

fruit The ripened ovary and other structures of an angiosperm that enclose one or more seeds. (p. 278)
fruto Ovario maduro y otras estructuras que encierran una o más semillas de una angiosperma.

fruiting body The reproductive structure of a fungus that contains many hyphae and produces spores. (p. 238)
órgano fructífero Estructura reproductora de un hongo que contiene muchas hifas y produce esporas.

fungus A eukaryotic organism that has cell walls, uses spores to reproduce, and is a heterotroph that feeds by absorbing its food. (p. 236)
hongo Organismo eucariótico que posee paredes celulares, usa esporas para reproducirse y es un heterótrofo que se alimenta absorbiendo su comida.

G

gallbladder The organ that stores bile after it is produced by the liver. (p. 525)
vesícula Órgano que almacena la bilis después de ser producida por el hígado.

gametophyte The stage in the life cycle of a plant in which the plant produces gametes, or sex cells.
gametofito Etapa en el ciclo de vida de una planta en la cual la planta produce gametos, es decir, células sexuales. (p. 254)

gastropod A mollusk with a single shell or no shell.
gasterópodo Molusco con una única concha o sin concha. (p. 330)

gene The set of information that controls a trait; a segment of DNA on a chromosone that codes for a specific trait. (p. 113)
gen Conjunto de información que controla un rasgo; un segmento de ADN en un cromosoma el cual codifica un rasgo determinado.

gene therapy The insertion of working copies of a gene into the cells of a person with a genetic disorder in an attempt to correct the disorder. (p. 161)
terapia génica Inserción de copias activas de un gen en las células de una persona con un trastorno genético para intentar corregir dicho trastorno.

genetic disorder An abnormal condition that a person inherits through genes or chromosomes.
trastorno genético Condición anormal que hereda una persona a través de genes o cromosomas. (p. 152)

genetic engineering The transfer of a gene from the DNA of one organism into another organism, in order to produce an organism with desired traits. (p. 160)
ingeniería genética Transferencia de un gen desde el ADN de un organismo a otro, para producir un organismo con los rasgos deseados.

genetics The scientific study of heredity. (p. 110)
genética Ciencia que estudia la herencia.

genome All of the DNA in one cell of an organism.
genoma Todo el ADN de una célula de un organismo. (p. 162)

genotype An organism's genetic makeup, or allele combinations. (p. 122)
genotipo Composición genética de un organismo, es decir, las combinaciones de los alelos.

genus A classification grouping that consists of a number of similar, closely related species. (p. 44)
género Clasificación por grupo formada por un número de especies similares y muy relacionadas.

germination The sprouting of the embryo from a seed that occurs where the embryo resumes growth. (p. 266)
germinación La brotadura del embrión de una semilla; ocurre cuando el embrión prosigue su crecimiento.

gestation period The length of time between fertilization and birth of a mammal. (p. 424)
período de gestación Tiempo entre la fecundación y el nacimiento del mamífero.

gill An organ that removes oxygen from water. (p. 329)
branquia Órgano que extrae el oxígeno del agua.

gizzard A muscular, thick-walled part of a bird's stomach that squeezes and grinds partially digested food. (p. 409)
molleja Parte muscular, de paredes gruesas del estómago del ave que exprime y muele parcialmente el alimento digerido.

glucose A sugar that is the major source of energy for the body's cells. (p. 504)
glucosa Azúcar que es la principal fuente de energía de las células del cuerpo.

Golgi body A structure in a cell that receives proteins and other newly formed materials from the endoplasmic reticulum, packages them, and distributes them to other parts of the cell. (p. 66)
aparato de Golgi Estructura en la célula que recibe del retículo endoplasmático las proteínas y otros materiales recientemente formados, los empaqueta y los distribuye a otras partes de la célula.

gradual metamorphosis A type of metamorphosis in which an egg hatches into a nymph that resembles an adult, and which has no distinctly different larval stage. (p. 346)
metamorfosis gradual Tipo de metamorfosis en la que un huevo incubado pasa a la etapa de ninfa con aspecto de adulto, y no tiene una etapa de larva diferenciada.

gradualism The theory that evolution occurs slowly but steadily. (p. 197)
gradualismo Teoría que enuncia que la evolución ocurre lenta pero continuamente.

grassland An area populated by grasses and other nonwoody plants. Most grasslands get 25 to 75 centimeters of rain each year. (p. 762)
pradera Área poblada de pastos y de otras plantas no leñosas. La mayoría de las praderas recibe de 25 a 75 centímetros de lluvia al año.

gymnosperm A plant that produces seeds that are not enclosed by a protective fruit. (p. 272)
gimnosperma Planta cuyas semillas no están encerradas en una fruta protectora.

H

habitat The specific environment that provides the things an organism needs to live, grow, and reproduce. (pp. 386, 705)
hábitat Medio ambiente específico que proporciona las cosas que un organismo necesita para vivir, crecer y reproducirse.

habitat destruction The loss of a natural habitat.
destrucción del hábitat Pérdida de un hábitat natural. (p. 798)

habitat fragmentation The breaking of a habitat into smaller, isolated pieces. (p. 798)
fragmentación del hábitat Desintegración de un hábitat en porciones aisladas más pequeñas.

half-life The time it takes for half of the atoms in a radioactive element to decay. (p. 192)
vida media Tiempo que demoran en desintegrarse la mitad de los átomos de un elemento radiactivo.

heart A hollow, muscular organ that pumps blood throughout the body. (p. 536)
corazón Órgano muscular hueco que bombea sangre a todo el cuerpo.

heart attack A condition in which blood flow to part of the heart muscle is blocked, causing heart cells to die. (p. 553)
infarto cardiaco Condición en la que se obstruye el flujo de sangre a una parte del músculo cardiaco, lo que causa la muerte de las células cardiacas.

hemoglobin An iron-containing protein that binds chemically to oxygen molecules. (p. 546)
hemoglobina Proteína que contiene hierro, y que se enlaza químicamente a las moléculas de oxígeno.

herbivore A consumer that eats only plants. (pp. 330, 741)
herbívoro Consumidor que come sólo plantas.

heredity The passing of traits from parents to offspring. (p. 110)
herencia Transmisión de rasgos de padres a hijos.

heterotroph An organism that cannot make its own food. (pp. 38, 87)
heterótrofo Organismo que no puede producir su propio alimento.

heterozygous Having two different alleles for a trait. (p. 122)
heterocigoto Tener dos alelos diferentes para el mismo rasgo.

hibernation A state of greatly reduced body activity that occurs during the winter. (p. 450)
hibernación Estado de gran disminución de la actividad corporal que ocurre durante el invierno.

histamine A chemical that is responsible for the symptoms of an allergy. (p. 612)
histamina Sustancia química responsable de los síntomas de una alergia.

HIV (human immunodeficiency virus) The virus that causes AIDS. (p. 602)
VIH (Virus de la inmunodeficiencia humana) Virus que causa el SIDA.

homeostasis The maintenance of stable internal conditions in an organism. (pp. 40, 472)
homeostasis Mantenimiento de condiciones internas estables.

homologous structures Body parts that are structurally similar in related species and that provide evidence for a common ancestor. (p. 184)
estructuras homólogas Partes del cuerpo que son estructuralmente similares entre las especies relacionadas; proveen evidencia de que las estructuras se heredaron de un antepasado común.

homozygous Having two identical alleles for a trait.
homocigoto Tener dos alelos idénticos para el mismo rasgo. (p. 122)

hormone A chemical in an organism that produces a specific effect such as growth or development.
hormona Sustancia química en un organismo que afecta el crecimiento y el desarrollo. (pp. 285, 667)

host The organism that a parasite or virus lives in or on. (pp. 210, 316, 729)
huésped Organismo dentro o fuera del cual vive un parásito.

hybrid An organism that has two different alleles for a trait; an organism that is heterozygous for a particular trait. (p. 114)
híbrido Organismo que tiene dos alelos diferentes para un rasgo; un organismo que es heterocigoto para un rasgo en particular.

hybridization A selective breeding method in which two genetically different individuals are crossed. (p. 158)
hibridación Método de cruce selectivo en el cual se cruzan dos individuos genéticamente diferentes.

hypertension A disorder in which a person's blood pressure is consistently higher than normal; also called high blood pressure. (p. 554)
hipertensión Trastorno en el que la presión arterial de una persona es constantemente más alta de lo normal; tambien se llama presión alta.

hyphae The branching, threadlike tubes that make up the bodies of multicellular fungi. (p. 237)
hifas Delgados tubos ramificados que constituyen el cuerpo de los hongos multicelulares.

hypothalamus A part of the brain that links the nervous system and the endocrine system. (p. 668)
hipotálamo Parte del encéfalo que une el sistema nervioso con el sistema endocrino.

hypothesis A possible explanation for a set of observations or answer to a scientific question; must be testable. (p. 15)
hipótesis Explicación posible a un conjunto de observaciones o respuesta a una pregunta científica; debe ser verificable.

I

immigration Moving into a population. (p. 714)
inmigración Ingreso a una población.

immune response Part of the body's defense against pathogens, in which cells of the immune system react to each kind of pathogen with a defense targeted specifically at that pathogen. (p. 600)
reacción inmunológica Parte de la defensa del cuerpo contra los patógenos en la que las células del sistema inmunológico reaccionan a cada tipo de patógeno con una defensa específica.

immunity The body's ability to destroy pathogens before they can cause disease. (p. 606)
inmunidad Capacidad del cuerpo para destruir los patógenos antes de que causen enfermedades.

imprinting A process in which newly hatched birds or newborn mammals learn to follow the first moving object they see. (p. 439)
impronta Proceso por el cual las aves o mamíferos recién nacidos aprenden a seguir al primero objeto que ven.

inbreeding A selective breeding method in which two individuals with identical or similar sets of alleles are crossed. (p. 158)
endogamia Método de cruce selectivo en el que se cruzan dos individuos con pares de alelos idénticos o semejantes.

infectious disease A disease caused by the presence of a living thing in the body. (p. 593)
enfermedad infecciosa Enfermedad causada por la presencia de un ser vivo en el cuerpo.

inferring The process of making an inference, an interpretation based on observations and prior knowledge. (p. 8)
inferir Proceso de realizar una inferencia; una interpretación basada en observaciones y conocimiento previo.

inflammatory response Part of the body's defense against pathogens, in which fluid and white blood cells leak from blood vessels into tissues, and white blood cells destroy pathogens. (p. 599)
reacción inflamatoria Parte de la defensa del cuerpo contra los patógenos en la cual los fluidos y los glóbulos blancos salen de los vasos sanguíneos hacia los tejidos y destruyen los patógenos descomponiéndolos.

insect An arthropod with three body sections, six legs, one pair of antennae, and usually one or two pairs of wings. (p. 344)
insecto Artrópodo con tres secciones corporales, seis patas, un par de antenas y normalmente uno o dos pares de alas.

insight learning The process of learning how to solve a problem or do something new by applying what is already known. (p. 442)
aprendizaje por discernimiento Proceso de aprender cómo resolver un problema o hacer algo nuevo aplicando lo que ya se sabe.

instinct An inborn behavior pattern that an animal performs correctly the first time. (p. 438)
instinto Patrón innato de conducta que un animal ejecuta correctamente desde la primera vez.

insulin A chemical produced in the pancreas that enables the body's cells to take in glucose from the blood and use it for energy. (p. 613)
insulina Sustancia química que se produce en el páncreas, que permite que las células del cuerpo absorban glucosa de la sangre y la usen como energía.

interneuron A neuron that carries nerve impulses from one neuron to another. (p. 628)
interneurona Neurona que lleva los impulsos nerviosos de una neurona a otra.

interphase The stage of the cell cycle that takes place before cell division occurs. (p. 96)
interfase Fase del ciclo celular que ocurre antes de la división.

intertidal zone The area between the highest high-tide line and lowest low-tide line. (p. 768)
zona intermareal Área entre la línea más alta de la marea alta y la línea más baja de la marea baja.

invertebrate An animal that does not have a backbone. (p. 299)
invertebrado Animal que no posee columna vertebral.

involuntary muscle A muscle that is not under conscious control. (p. 482)
músculos involuntarios Músculo que no se puede controlar conscientemente.

iris The circular structure that surrounds the pupil and regulates the amount of light entering the eye.
iris Estructura circular que rodea la pupila y regula la cantidad de luz que entra en el ojo. (p. 643)

J

joint A place in the body where two bones come together. (p. 476)
articulación Lugar en el cuerpo en donde se unen dos huesos.

K

karyotype A picture of all the chromosomes in a cell arranged in pairs. (p. 154)
cariotipo Imagen de todos los cromosomas de una célula, organizados en parejas.

keystone species A species that influences the survival of many others in an ecosystem. (p. 793)
especie clave Especie que influye en la supervivencia de muchas otras en un ecosistema.

kidney A major organ of the excretory system that removes urea and other wastes from the blood.
riñón Órgano principal del sistema excretor que elimina la urea y otros materiales de desecho de la sangre. (pp. 388, 580)

L

large intestine The last section of the digestive system, where water is absorbed into the blood and the remaining material is eliminated from the body. (p. 527)
intestino grueso Última sección del sistema digestivo, donde se absorbe el agua hacia el torrente sanguíneo y los materiales restantes son eliminados del cuerpo.

larva The immature form of an animal that looks very different from the adult. (p. 305)
larva Forma inmadura de un animal que se ve muy diferente al adulto.

larynx The voice box (p. 572)
laringe Dos pliegues de tejido que forman la caja sonora humana.

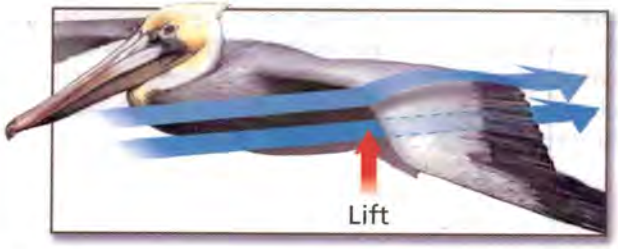
learning The process that leads to changes in behavior based on practice or experience. (p. 438)
aprendizaje Proceso que conduce a cambios en el comportamiento basados en la práctica o la experiencia.

lens The flexible structure that focuses light that has entered the eye. (p. 643)
cristalino Estructura flexible que enfoca la luz que entra en el ojo.

lichen The combination of a fungus and either an alga or an autotrophic bacterium that live together in a mutualistic relationship. (p. 241)
liquen Combinación de un hongo y una alga o bien una bacteria autótrofa, que viven juntos en una relación de mutualismo.

life science The study of living things. (p. 12)
ciencias de la vida Estudio de los seres vivos.

lift The difference in pressure between the upper and lower surfaces of a bird's wings that produces an upward force that causes the bird to rise. (p. 417)
fuerza de elevación Diferencia de presión entre la superficie superior e inferior de las alas de un ave, que produce una fuerza ascendente que permite que el ave se eleve.



ligament Strong connective tissue that holds bones together in movable joints. (p. 477)
ligamentos Tejido conectivo resistente que une los huesos en las articulaciones móviles.

limiting factor An environmental factor that prevents a population from increasing. (p. 716)
factor limitante Factor ambiental que impide el crecimiento de una población.

lipid Energy-rich organic compound, such as a fat, oil, or wax, that is made of carbon, hydrogen, and oxygen. (p. 76)
lípido Compuesto orgánico rico en energía, como grasa, aceite y cera, formado por carbono, hidrógeno y oxígeno.

liver The body's largest organ; it produces bile, breaks down medicines, and helps eliminate nitrogen from the body. (p. 525)
hígado Órgano más grande del cuerpo; tiene una funcíon en muchos procesos coporales.

long-day plant A plant that flowers when the nights are shorter than the plant's critical night length.
planta de día largo Una planta que florece cuando las noches son más cortas que la longitud nocturna critica de la planta. (p. 286)

lung An organ found in air-breathing vertebrates that exchanges oxygen and carbon dioxide with the blood. (pp. 384, 568)
pulmón Órgano que se encuentra en los vertebrados que respiran aire, con el que intercambian oxígeno y dióxido de carbono con la sangre.

lymph The fluid that the lymphatic system collects and returns to the bloodstream. (p. 551)
linfa Fluido que el sistema linfático recoge y devuelve al torrente sanguíneo.

lymph node A small knob of tissue in the lymphatic system that filters lymph, trapping bacteria and other microorganisms that cause disease. (p. 551)
ganglio linfático Pequeña prominencia de tejido en el sistema linfático que filtra la linfa, atrapando las bacterias y otros microorganismos que causan enfermedades.

lymphatic system A network of veinlike vessels that returns the fluid that leaks out of blood vessels to the bloodstream. (p. 550)
sistema linfático Red de vasos semejantes a venas que devuelve al torrente sanguíneo el fluido que sale de los vasos sanguíneos.

lymphocyte White blood cell that distinguishes between each kind of pathogen. (p. 600)
linfocito Glóbulo blanco que reacciona a cada tipo de patógeno con una defensa específica.

lysosome A small, round cell structure containing chemicals that break down large food particles into smaller ones. (p. 66)
lisosoma Pequeña estructura celular redonda que contiene sustancias químicas que descomponen las partículas de alimento grandes en otras más simples.

M

making models The process of creating representations of complex objects or processes. (p. 11)
hacer modelos Proceso de crear representaciones de objetos o procesos complejos.

mammal An endothermic vertebrate with a four-chambered heart, skin covered with fur or hair, and young fed with milk from the mother's body. (p. 420)
mamífero Vertebrado endotérmico con un corazón de cuatro cámaras y piel cubierta de pelaje o pelo, que alimenta a sus crías con leche materna.

mammary gland An organ in female mammals that produces milk for the mammal's young. (p. 421)
glándula mamaria Órgano en los mamíferos hembra que produce leche para alimentar a las crías.

manipulated variable The one factor that a scientist changes during an experiment; also called independent variable. (p. 16)
variable manipulada Único factor que un científico cambia durante un experimento; también llamada variable independiente.

marrow The soft connective tissue that fills the internal spaces in bone. (p. 478)
médula ósea Tejido conectivo suave que rellena los espacios internos de un hueso.

marsupial A mammal whose young are born alive at an early stage of development, and which usually continue to develop in a pouch on their mother's body. (p. 424)
marsupial Mamífero cuyas crías nacen vivas en una etapa muy temprana del desarrollo, y que normalmente sigue su desarrollo en una bolsa en el cuerpo de la madre.

medusa The cnidarian body plan having a bowl shape and adapted for a free-swimming life.
medusa Cnidario cuyo cuerpo se caracteriza por tener forma de cuenco, y que está adaptado para nadar libremente en el agua. (p. 307)

meiosis The process that occurs in the formation of sex cells (sperm and egg) by which the number of chromosomes is reduced by half. (p. 128)
meiosis Proceso que ocurre en la formación de las células sexuales (espermatozoide y óvulo) por el cual el número de cromosomas se reduce a la mitad.

melanin A pigment that gives skin its color. (p. 491)
melanina Pigmento que da color a la piel.

menstrual cycle The cycle of changes that occurs in the female reproductive system, during which an egg develops and the uterus prepares for the arrival of a fertilized egg. (p. 679)
ciclo menstrual Ciclo de cambios que ocurre en el sistema reproductor femenino, durante el cual se desarrolla un óvulo, y el útero se prepara para la llegada del óvulo fecundado.

menstruation The process in which the thickened lining of the uterus breaks down, and blood and tissue then pass out of the female body. (p. 680)
menstruación Proceso en el cual el grueso recubrimiento del útero se descompone la sangre y el tejido salen del cuerpo femenino.

messenger RNA RNA that copies the coded message from DNA in the nucleus and carries the message into the cytoplasm. (p. 133)
ARN mensajero ARN que copia el mensaje codificado del ADN en el núcleo y lo lleva al citoplasma.

metamorphosis A process in which an animal's body undergoes dramatic changes in form during its life cycle. (p. 339)
metamorfosis Proceso por el cual el cuerpo de un animal cambia de manera drástica durante su ciclo de vida.

microscope An instrument that makes small objects look larger. (p. 51)
microscopio Instrumento que hace que los objetos pequeños se vean más grandes.

migration The regular, periodic journey of an animal from one place to another and back again for feeding or reproduction. (p. 450)
migración Viaje regular y periódico de un animal de un lugar a otro y de regreso al mismo lugar con el propósito de alimentarse o reproducirse.

minerals Nutrients that are needed by the body in small amounts and are not made by living things.
minerales Nutrientes que el cuerpo necesita en pequeñas cantidades y que no producen los seres vivos. (p. 510)

mitochondria Rod-shaped cell structures that convert energy in food molecules to energy the cell can use to carry out its functions. (p. 63)
mitocondria Estructura celular con forma de bastón que transforma la energía de las moléculas de alimentos en energía que la célula puede usar para llevar a cabo sus funciones.

mitosis The stage of the cell cycle during which the cell's nucleus divides into two new nuclei and one copy of the DNA is distributed into each daughter cell. (p. 97)
mitosis Fase del ciclo celular durante la cual el núcleo de la célula se divide en dos nuevos nucleolos y se distribuye una copia del ADN a cada célula hija.

mold A type of fossil formed when a shell or other hard part of an organism dissolves, leaving an empty space in the shape of the part. (p. 190)
molde Tipo de fósil que se forma cuando el caparazón, concha u otra parte dura de un organismo enterrado se disuelve y deja un área hueca con la forma de esa parte.

mollusk An invertebrate with a soft, unsegmented body; most are protected by a hard outer shell.
molusco Invertebrado con cuerpo blando y sin segmentos; la mayoría están protegidos por una concha exterior dura. (p. 329)

molting The process of shedding an outgrown exoskeleton. (p. 336)
muda Proceso de cambio de un exoesqueleto a otro.

monocot An angiosperm with one seed leaf. (p. 280)
monocotiledónea Angiosperma cuyas semillas tienen un solo cotiledón.

monotreme A mammal that lays eggs. (p. 424)
monotrema Mamífero que pone huevos.

motor neuron A neuron that sends an impulse to a muscle or gland, causing the muscle or gland to react.
neurona motora Neurona que envía un impulso a un músculo o glándula, haciendo que el músculo o la glándula reaccione. (p. 628)

mucus A thick, slippery substance produced by the body. (p. 519)
mucosidad Sustancia espesa y lubricante que produce el cuerpo.

multicellular Consisting of many cells. (p. 34)
multicelular Que se compone de muchas células.

multiple alleles Three or more forms of a gene that code for a single trait. (p. 146)
alelo múltiple Tres o más formas de un gen que codifican un solo rasgo.

muscle tissue A body tissue that contracts or shortens, making body parts move. (p. 470)
tejido muscular Tejido corporal que se contrae o acorta, permitiendo así que se muevan las partes del cuerpo.

mutation A change in a gene or chromosome. (p. 136)
mutación Cambio en un gen o cromosoma.

mutualism A close relationship between organisms of two species in which both organisms benefit.
mutualismo Relación entre dos especies de la cual ambas se benefician. (pp. 230, 728)

N

natural resource Anything in the environment that is used by people. (p. 779)
recurso natural Cualquier cosa del medio ambiente que usa la gente.

natural selection A process by which individuals that are better adapted to their environment are more likely to survive and reproduce than others of the same species. (pp. 177, 723)
selección natural Proceso por el cual los individuos que se adaptan mejor a sus ambientes tienen más posibilidades de sobrevivir y reproducirse que otros miembros de la misma especie.

nearsightedness The condition in which a person can see nearby objects clearly. (p. 645)
miopía Condición en la que una persona puede ver claramente los objetos cercanos.

negative feedback A process in which a system is turned off by the condition it produces. (p. 670)
reacción negativa Proceso en el cual un sistema se apaga por la condición que produce.

nephron Small filtering structure found in the kidneys that removes wastes from blood and produces urine.
nefrón Estructura diminuta de filtración que hay en los riñones, que elimina los desechos de la sangre y que produce la orina. (p. 580)

neritic zone The region of shallow ocean water over the continental shelf. (p. 768)
zona nerítica Región donde el agua del océano es poco profunda sobre la placa continental.

nerve A bundle of nerve fibers. (p. 628)
nervio Conjunto de fibras nerviosas.

nerve impulse The message carried by a neuron.
impulso nervioso Mensaje que lleva una neurona. (p. 628)

nervous tissue A body tissue that carries electrical messages back and forth between the brain and every other part of the body. (p. 470)
tejido nervioso Tejido corporal que lleva mensajes eléctricos entre el encéfalo y todas las demás partes del cuerpo y viceversa.

neuron A cell that carries information through the nervous system. (p. 628)
neurona Célula que lleva información a través del sistema nervioso.

niche The role of an organism in its habitat, or how it makes its living. (p. 723)
nicho Función de un organismo en su hábitat, o cómo sobrevive.

nicotine A stimulant drug in tobacco that increases the activities of the nervous system, heart, and other organs. (p. 575)
nicotina Sustancia química en el tabaco que acelera la actividad del sistema nervioso, corazón y otros órganos.

nitrogen fixation The process of changing free nitrogen gas into a usable form. (p. 750)
fijación del nitrógeno Proceso de conversión del gas nitrógeno libre en una forma aprovechable.

noninfectious disease A disease that is not caused by a pathogen. (p. 611)
enfermedad no infecciosa Enfermedad que no es causada por un patógeno.

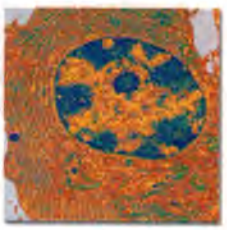
nonrenewable resource A natural resource that is not replaced in a useful time frame. (p. 779)
recurso no renovable Recurso natural que no se restaura una vez usado, en un período relativamente corto.

nonvascular plant A low-growing plant that lacks true vascular tissue. (p. 253)
planta no vascular Planta de crecimiento lento que carece de tejido vascular verdadero.

notochord A flexible rod that supports a chordate's back. (p. 368)
notocordio Bastoncillo flexible que sostiene el lomo de los cordados.

nucleic acid Very large organic molecule made of carbon, oxygen, hydrogen, nitrogen, and phosphorus, that contains the instructions cells need to carry out all the functions of life. (p. 78)
ácido nucléico Molécula orgánica muy grande compuesta de carbono, oxígeno, hidrógeno, nitrógeno y fósforo, que contiene las instrucciones que las células necesitan para realizar todas las funciones vitales.

nucleus The control center of a eukaryotic cell that directs the cell's activities and contains the information that determines the cell's form and function. (pp. 47, 469)
núcleo Centro de control de la célula eucariota que dirige las actividades de la célula y que contiene información que determina la forma y función de la célula.



nutrients Substances in food that provide the raw materials and energy the body needs to carry out all its essential processes. (p. 502)
nutrientes Sustancias en los alimentos que proveen la materia prima y la energía que necesita el cuerpo para realizar los procesos elementales.

nymph A stage of gradual metamorphosis that usually resembles the adult insect. (p. 346)
ninfa Etapa de la metamorfosis gradual en la que normalmente el insecto se parece a un insecto adulto.

O

observing The process of using one or more of your senses to gather information. (p. 7)
observar Proceso de usar uno o más de los cinco sentidos para reunir información.

omnivore A consumer that eats both plants and animals. (pp. 331, 741)
omnívoro Consumidor que come tanto plantas como animales.

open circulatory system A circulatory system in which the heart pumps blood into open spaces in the body, and blood is not confined to blood vessels. (p. 329)
sistema circulatorio abierto Sistema circulatorio en el que el corazón bombea la sangre en espacios abiertos del cuerpo y la sangre no se mantiene en vasos sanguíneos.

operational definition A statement that describes how to measure a particular variable or how to define a particular term. (p. 16)
definición operativa Enunciado que describe cómo medir una variable determinada o cómo definir un término determinado.

organ A structure in the body that is composed of different kinds of tissue. (pp. 295, 470)
órgano Estructura del cuerpo compuesta de diferentes tipos de tejidos.

organ system A group of organs that work together to perform a major function in the body. (p. 470)
sistema de órganos Grupo de órganos que trabajan juntos para realizar una función importante del cuerpo.

organelle A tiny cell structure that carries out a specific function within the cell. (p. 60)
organelo Diminuta estructura celular que realiza una función específica dentro de la célula.

organism A living thing. (pp. 34, 705)
organismo Ser vivo.

osmosis The diffusion of water molecules through a selectively permeable membrane. (p. 82)
ósmosis Difusión de las moléculas de agua a través de una membrana con permeabilidad selectiva.

osteoporosis A condition in which the body's bones become weak and break easily. (p. 481)
osteoporosis Condición en la cual los huesos del cuerpo se debilitan y se rompen fácilmente.

ovary A flower structure that encloses and protects ovules and seeds as they develop; Organ of the female reproductive system in which eggs and estrogen are produced. (pp. 277, 678)
ovario Estructura de la flor que encierra y protege a los óvulos y a las semillas durante su desarrollo; órgano del sistema reproductor femenino en el cual se producen los óvulos y el estrógeno.

ovulation The process in which a mature egg is released from the ovary into a fallopian tube.
ovulación Proceso en el cual el óvulo maduro sale del ovario y va a la trompa de falopio. (p. 680)

ovule A structure that contains an egg cell. (p. 274)
óvulo Estructura que contiene una célula reproductora femenina.

P

pacemaker A group of cells located in the right atrium that sends out signals that make the heart muscle contract and that regulates heartbeat rate.
marcapasos Grupo de células ubicado en la aurícula derecha que envía señales para que el músculo cardiaco se contraiga, y que regula el ritmo cardiaco. (p. 537)

paleontologist A scientist who studies extinct organisms, examines fossil structure, and makes comparisons to present-day organisms. (p. 398)
paleontólogo Científico que estudia los organismos extintos, examina las estructuras de los fósiles y los compara con los organismos de la actualidad.

pancreas A triangular organ that lies between the stomach and the small intestine. (p. 526)
páncreas Órgano triangular ubicado entre el estómago y la primera parte del al intestino delgado.

parasite The organism that benefits by living on or in a host in a parasitism interaction. (pp. 210, 316)
parásito Organismo que se beneficia de vivir en la superficie o en el interior de un húesped en una interacción de parasitismo.

parasitism A relationship in which one organism lives on or in a host and harms it. (p. 729)
parasitismo Relación en la cual un organismo vive en la superficie o en el interior de un huésped y lo perjudica.

passive immunity Immunity in which antibodies are given to a person rather than produced within the person's own body. (p. 610)
inmunidad pasiva Inmunidad en la que los anticuerpos vienen de otro organismo y no del cuerpo de la propia persona.

passive transport The movement of materials through a cell membrane without using the cell's energy. (p. 84)
transporte pasivo Movimiento de materiales a través de la membrana celular sin el uso de energía.

pasteurization A process of heating food to a temperature that is high enough to kill most harmful bacteria without changing the taste of the food.
pasteurización Proceso de calentamiento del alimento a una temperatura suficientemente alta como para matar la mayoría de las bacterias dañinas sin cambiar el sabor de la comida. (p. 223)

pathogen An organism that causes disease. (p. 593)
patógeno Organismo que causa enfermedades.

pedigree A chart or "family tree" that tracks which members of a family have a particular trait.
genealogía Tabla o "árbol genealógico" que muestra qué miembros de una familia tienen un rasgo en particular. (p. 153)

penis The organ through which both semen and urine leave the male body. (p. 677)
pene Órgano a través del cual salen del cuerpo masculino tanto el semen como la orina.

Percent Daily Value A value that shows how the nutritional content of one serving of food fits into the diet of a person who consumes 2,000 Calories per day. (p. 513)
Porcentaje de valor diario Valor que muestra cómo el contenido nutricional de una porción de alimento se corresponde con la dieta de una persona que consume 2,000 Calorías al día.

perennial A flowering plant that lives for more than two years. (p. 287)
perenne Planta con flores que vive más de dos años.

peripheral nervous system The division of the nervous system consisting of all of the nerves located outside the central nervous system. (p. 632)
sistema nervioso periférico Parte del sistema nervioso formada por todos los nervios ubicados fuera del sistema central nervioso.

peristalsis Involuntary waves of muscle contraction that keep food moving along in one direction through the digestive system. (p. 519)
peristaltismo Ondulaciones involuntarias de contracción muscular que empujan el alimento en una dirección a través del sistema digestivo.

permafrost Soil that is frozen all year. (p. 765)
permagélido Suelo que está congelado todo el año.

pesticide A chemical designed to kill a pest animal.
pesticida Sustancia química diseñada para matar una plaga animal. (p. 355)

petal A colorful, leaflike structure of some flowers.
pétalo Estructura de color brillante, en forma de hoja que tienen algunas flores. (p. 276)

petrified fossil A fossil formed when minerals replace all or part of an organism. (p. 190)
fósil petrificado Fósil que se forma cuando los minerales reemplazan todo el organismo o parte de él.

phagocyte A white blood cell that destroys pathogens by engulfing them and breaking them down.
fagocito Glóbulo blanco que destruye los patógenos envolviéndolos y descomponiéndolos. (p. 599)

pharynx The throat. (p. 567)
faringe Garganta.

phenotype An organism's physical appearance, or visible traits. (p. 122)
fenotipo Apariencia física de un organismo, es decir, los rasgos visibles.

pheromone A chemical released by one animal that affects the behavior of another animal of the same species. (p. 445)
feromona Sustancia química liberada por un animal que afecta el comportamiento de otro animal de la misma especie.

phloem The vascular tissue through which food moves in some plants. (p. 263)
floema Tejido vascular por el que circula el alimento en algunas plantas.

photoperiodism A plant's response to seasonal changes in length of night and day. (p. 286)
fotoperiodicidad Respuesta de una planta a los cambios de día y noche por las estaciones.

photosynthesis The process in which some organisms use water along with sunlight and carbon dioxide to make their own food. (pp. 87, 706)
fotosíntesis Proceso por el cual los organismos usan el agua junto con la luz solar y el dióxido de carbono para producir su alimento.

phylum One of the major groups into which biologists classify members of a kingdom. (p. 298)
fílum Uno de alrededor de 35 grupos principales en los que los biólogos clasifican los miembros del reino animal.

pigment A colored chemical that absorbs light.
pigmento Compuesto químico de color que absorbe luz. (p. 88)

pioneer species The first species to populate an area. (p. 731)
especies pioneras Primeras especies en poblar una región.

pistil The female reproductive part of a flower. (p. 277)
pistilo Parte reproductora femenina de una flor.

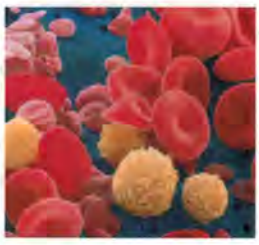
pituitary gland An endocrine gland that controls many body activities. (p. 670)
glándula pituitaria Glándula endocrina que controla muchas actividades corporales.

placenta A membrane that becomes the link between the developing embryo or fetus and the mother. (pp. 425, 684)
placenta Membrana que se convierte en la unión entre el embrión o feto en desarrollo y la madre.

placental mammal A mammal that develops inside its mother's body until its body systems can function independently. (p. 425)
mamífero placentario Mamífero que se desarrolla dentro del cuerpo de la madre hasta que sus sistemas corporales pueden funcionar por sí solos.

plasma The liquid part of blood. (p. 545)
plasma Parte líquida de la sangre.

platelet A cell fragment that plays an important part in forming blood clots. (p. 548)
plaqueta Fragmento de célula que juega un papel muy importante en la formación de coágulos sanguíneos.



poaching Illegal killing or removal of wildlife from their habitats. (p. 798)
caza ilegal Matanza o eliminación de la fauna silvestre de su hábitat.

pollen Tiny particles (male gametophytes) produced by seed plants that contain the cells that later become sperm cells. (p. 263)
polen Partículas diminutas (gametofitos masculinos) producidas por las plantas de semillas que contienen las células que posteriormente se convierten en células reproductoras masculinas.

pollination The transfer of pollen from male reproductive structures to female reproductive structures in plants. (p. 274)
polinización Transferencia de polen de las estructuras reproductoras masculinas a las estructuras reproductoras femeninas de las plantas.

pollinator An animal that carries pollen from one plant to another of the same species, enabling plants to reproduce. (p. 354)
polinizador Animal que lleva polen de una planta a otra de la misma especie, permitiendo que las plantas se reproduzcan.

pollution Contamination of Earth's land, water, or air. (p. 779)
contaminación Polución del suelo, agua y aire de la Tierra.

polyp The cnidarian body plan is characterized by a vaselike shape and that usually adapted for a life attached to an underwater surface. (p. 307)
pólipo Cnidario cuyo cuerpo se caracteriza por tener forma cilíndrica, y que generalmente está adaptado para vivir adherido a una superficie submarina.

population All the members of one species in a particular area. (p. 707)
población Todos los miembros de una especie en un área particular.

population density The number of individuals in an area of a specific size. (p. 716)
densidad de población Número de individuos en un área de un tamaño específico.

pore An opening through which sweat reaches the surface of the skin. (p. 491)
poro Abertura a través de la cual el sudor sale a la superficie de la piel.

precipitation Rain, snow, sleet, or hail. (p. 747)
precipitación Lluvia, nieve, aguanieve o granizo.

predation An interaction in which one organism kills another for food. (p. 725)
depredación Interacción en la cual un organismo mata y se come a otro.

predator The organism that does the killing in a predation interaction. (p. 725)
depredador Organismo que mata en la depredación.

predicting The process of forecasting what will happen based on past experience or evidence. (p. 9)
predecir Proceso de pronosticar lo que va a suceder en el futuro, basado en la experiencia pasada o en evidencia.

prey An organism that is killed and eaten by another organism. (p. 725)
presa Organismo que otro organismo mata y come.

primary succession The series of changes that occur in an area where no soil or organisms exist. (p. 731)
sucesión primaria Serie de cambios que ocurren en un área en donde no existe suelo ni organismos.

probability A number that describes how likely it is that an event will occur. (p. 118)
probabilidad Número que describe la posibilidad de que ocurra un suceso.

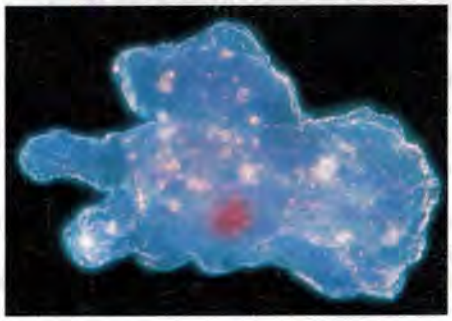
producer An organism that can make its own food.
productor Organismo que puede elaborar su propio alimento. (pp. 350, 741)

prokaryote An organism whose cells lack a nucleus and some other cell structures. (p. 47)
procariota Organismo cuyas células carecen de núcleo y otras estructuras celulares.

protein Large organic molecule made of carbon, hydrogen, oxygen, nitrogen, and sometimes sulfur.
proteína Molécula orgánica grande compuesta de carbono, hidrógeno, oxígeno, nitrógeno y, a veces, azufre. (pp. 77, 507)

protist A eukaryotic organism that cannot be classified as an animal, plant, or fungus. (p. 227)
protista Organismo eucariótico que no se puede clasificar como animal, planta ni hongo.

protozoan An animal-like protist. (p. 227)
protozoario Protista con características animales.



pseudopod A "false foot" or temporary bulge of cytoplasm used for feeding and movement in some protozoans. (p. 228)
seudópodo "Falso pie" o abultamiento temporal del citoplasma, que algunos protozoarios usan para alimentarse o desplazarse.

puberty The period of sexual development in which the body becomes able to reproduce. (p. 689)
pubertad Período de desarrollo sexual durante la adolescencia en el que el cuerpo se vuelve capaz de reproducir.

pulse The alternating expansion and relaxation of an artery wall as blood travels through an artery.
pulso Expansión y relajación alternada de una pared arterial a medida que la sangre viaja por la arteria. (p. 540)

punctuated equilibria The theory that species evolve during short periods of rapid change.
equilibrio puntuado Teoría que enuncia que las especies evolucionan durante períodos breves de cambios rápidos. (p. 197)

Punnett square A chart that shows all the possible combinations of alleles that can result from a genetic cross. (p. 120)
cuadrado de Punnett Tabla que muestra todas las combinaciones posibles de los alelos que pueden resultar de una cruza genética.

pupa The third stage of complete metamorphosis, in which an insect changes from a larva to an adult.
pupa Tercera etapa de la metamorfosis completa, en la cual un insecto cambia de larva a adulto. (p. 346)

pupil The opening through which light enters the eye. (p. 643)
pupila Abertura por la que entra la luz al ojo.

purebred The offspring of many generations that have the same traits. (p. 111)
cepa pura raza pura Descendiente de muchas generaciones que tienen los mismos rasgos.

Q

qualitative observation An observation that deals with characteristics that cannot be expressed in numbers. (p. 7)
observación cualitativa Observación que se centra en las características que no se pueden expresar con números.

quantitative observation An observation that deals with a number or amount. (p. 7)
observación cuantitativa Observación que se centra en un número o cantidad.

R

radial symmetry The quality of having many lines of symmetry that all pass through a central point.
simetría radial Cualidad de tener muchos ejes de simetría que pasan por un punto central. (p. 301)

radioactive dating A technique used to determine the actual age of a fossil on the basis of the amount of a radioactive element it contains. (p. 192)
datación radiactiva Técnica que se usa para determinar la edad real de un fósil basándose en la cantidad de elementos radiactivos que contiene.

radioactive element An unstable element that breaks down into a different element. (p. 192)
elemento radiactivo Elemento inestable que se descompone en un elemento diferente.

radula A flexible ribbon of tiny teeth in mollusks. (p. 330)
rádula Hilera flexible de minúsculos dientes en los moluscos.

receiver A device that receives radio waves and converts them into a sound or light signal. (p. 455)
receptor Aparato que recibe las ondas de radio y las convierte en señales de sonido o de luz.

recessive allele An allele that is masked when a dominant allele is present. (p. 113)
alelo recesivo Alelo que queda oculto cuando está presente un alelo dominante.

rectum The end of the large intestine where waste material is compressed into a solid form before being eliminated. (p. 527)
recto Final del intestino grueso, donde el material de desecho se comprime a una forma sólida antes de ser eliminado.

red blood cell A cell in the blood that takes up oxygen in the lungs and delivers it to cells elsewhere in the body. (p. 546)
glóbulo rojo Célula de la sangre que capta el oxígeno en los pulmones y lo lleva a las células de todo el cuerpo.

reflex An automatic response that occurs rapidly and without conscious control. (p. 637)
reflejo Respuesta automática que ocurre muy rápidamente y sin control consciente.

relative dating A technique used to determine which of two fossils is older. (p. 191)
datación relativa Técnica que se usa para determinar cuál de dos fósiles es más antiguo.

renewable resource A resource that is either always available or is naturally replaced in a relatively short time. (p. 779)
recurso renovable Recurso que está siempre disponible o que es restituido de manera natural en un período relativamente corto.

replication The process by which a cell makes a copy of the DNA in its nucleus. (p. 96)
replicación Proceso por el cual una célula copia el ADN de su núcleo.

reptile An ectothermic vertebrate that lays eggs and has lungs and scaly skin. (p. 388)
reptil Vertebrado ectotérmico que pone huevos, y que tiene pulmones y piel con escamas.

respiration The process by which cells break down simple food molecules to release the energy they contain. (pp. 91, 565)
respiración Proceso por el cual las células descomponen moléculas simples de alimento para liberar la energía que contienen.

responding variable The factor that changes as a result of changes to the manipulated, or independent, variable in an experiment; also called dependent variable. (p. 16)
variable respuesta Factor que cambia como resultado del cambio de la variable manipulada, o independiente, en un experimento; también llamada variable dependiente.

response An action or change in behavior that occurs in reaction to a stimulus. (pp. 35, 437, 627)
respuesta Acción o cambio en el comportamiento que ocurre como resultado de un estímulo.

retina The layer of receptor cells at the back of the eye on which an image is focused. (p. 644)
retina Capa de células receptoras en la parte posterior del ojo donde se enfoca una imagen.

rhizoid A thin, rootlike structure that anchors a moss and absorbs water and nutrients. (p. 257)
rizoide Estructura fina parecida a una raíz que sujeta un musgo al suelo, y que absorbe el agua y los nutrientes.

ribosome A small grain-like structure in the cytoplasm of a cell where proteins are made. (p. 63)
ribosoma Estructura pequeña parecida a un grano en el citoplasma de una célula donde se fabrican las proteínas.

RNA Ribonucleic acid; a nucleic acid that plays an important role in the production of proteins. (p. 78)
ARN Ácido ribonucleico; ácido nucleico que juega un papel importante en la producción de proteínas.

root cap A structure that covers the tip of a root, protecting the root from injury. (p. 267)
cofia Estructura que cubre la punta de una raíz y la protege contra daños.

S

saliva The fluid released when the mouth waters that plays an important role in both mechanical and chemical digestion. (p. 518)
saliva Líquido liberado por la boca que juega un papel muy importante en la digestión química y mecánica.

satellite An instrument that orbits a celestial body, such as Earth. (p. 456)
satélite Instrumento que orbita un cuerpo celeste, como la Tierra.

savanna A grassland close to the equator that receives as much as 120 centimeters of rain per year. (p. 762)
sabana Tierra de pastos próxima al ecuador que recibe hasta 120 centímetros de lluvia al año.

scavenger A carnivore that feeds on the bodies of dead organisms. (pp. 316, 741)
carroñero Carnívoro que se alimenta del cuerpo de animales muertos.

science A way of learning about the natural world and the knowledge gained through the process.
ciencia Estudio del mundo natural a través de observaciones y del razonamiento lógico. (p. 6)

scientific inquiry The diverse ways in which scientists study the natural world and propose explanations based on evidence they gather. (p. 14)
investigación científica Diversidad de métodos con los que los científicos estudian el mundo natural y proponen explicaciones del mismo basadas en la evidencia que reúnen.

scientific theory A well-tested concept that explains a wide range of observations. (p. 176)
teoría científica Concepto comprobado que explica una amplia gama de observaciones.

scrotum An external pouch of skin in which the testes are located. (p. 676)
escroto Bolsa externa de piel en donde se ubican los testículos.

secondary succession The series of changes that occur in an area where the ecosystem has been disturbed, but where soil and organisms still exist.
sucesión secundaria Serie de cambios que ocurren en un área después de la perturbación de un ecosistema, pero donde todavía hay suelo y organismos. (p. 732)

sedimentary rock Rock formed of hardened layers of sediments. (p. 396)
roca sedimentaria Roca formada por las capas endurecidas de sedimentos.

seed The plant structure that contains a young plant inside a protective covering. (p. 263)
semilla Estructura de una planta que contiene una plántula dentro de una cubierta protectora.

selective breeding The process of selecting a few organisms with desired traits to serve as parents of the next generation. (p. 158)
cruce selectivo Proceso de selección de algunos organismos con los rasgos deseados para que sirvan de como progenitores de la siguiente generación.

selective cutting The process of cutting down only some trees in an area. (p. 785)
tala selectiva Proceso de cortar sólo algunos árboles de un área.

selectively permeable A property of cell membranes that allows some substances to pass through, while others cannot. (p. 80)
permeabilidad selectiva Propiedad de las membranas celulares que permite que algunas sustancias pasen y otras no.

semen A mixture of sperm and fluids. (p. 677)
semen Mezcla de células de espermatozoides y fluidos.

semicircular canals Structures in the inner ear that are responsible for the sense of balance. (p. 648)
canales semicirculares Estructuras en el oído interno responsables del sentido del equilibrio.

sensory neuron A neuron that picks up stimuli from the internal or external environment and converts each stimulus into a nerve impulse.
neurona sensorial Proceso de selección de algunos organismos con los rasgos deseados para servir como progenitores de la siguiente generación. (p. 628)

sepal A leaflike structure that encloses the bud of a flower. (p. 276)
sépalo Estructura, parecida a una hoja, que encierra el botón de una flor.

sex chromosomes A pair of chromosomes carrying genes that determine whether a person is male or female. (p. 147)
cromosomas sexuales Par de cromosomas portadores de genes que determinan si una persona es macho o hembra.

sex-linked gene A gene that is carried on the X or Y chromosome. (p. 148)
gen ligado al sexo Gen portador del cromosoma X o Y.

sexual reproduction A reproductive process that involves two parents that combine their genetic material to produce a new organism, which differs from both parents. (pp. 220, 297)
reproducción sexual Proceso de reproducción que implica a dos progenitores que combinan su material genético para producir un nuevo organismo diferente a los dos progenitores.

short-day plant A plant that flowers when the nights are longer than the plant's critical night length.
planta de día corto Una planta que florece cuando las noches son más largas que la longitud nocturna critica de la planta. (p. 286)

skeletal muscle A muscle that is attached to the bones of the skeleton and provides the force that moves the bones. (p. 484)
músculos esqueléticos Músculo que está unido a los huesos del esqueleto y que proporciona la fuerza para que los huesos se muevan.

skeleton The inner framework made of all the bones of the body. (p. 474)
esqueleto Estructura formada por todos los huesos del cuerpo.

small intestine The part of the digestive system in which most chemical digestion takes place. (p. 524)
intestino delgado Parte del sistema digestivo en la cual se produce la mayoría de la digestión química.

smooth muscle Involuntary muscle found inside many internal organs of the body. (p. 484)
músculos lisos Músculo involuntario que se encuentra dentro de muchos órganos internos del cuerpo.

society A group of closely related animals of the same species that divide up the labor and work together in a highly organized way. (p. 449)
sociedad Grupo de animales de la misma especie estrechamente relacionados que se dividen el trabajo y lo realizan juntos de una manera altamente organizada.

somatic nervous system The group of nerves in the peripheral nervous system that controls voluntary actions. (p. 637)
sistema nervioso somático Grupo de nervios en el sistema nervioso periférico que controla las acciones voluntarias.

species A group of organisms that are physically similar and can mate with each other and produce offspring that can also mate and reproduce. (pp. 44, 173, 707)
especie Grupo de organismos que son físicamente semejantes, se pueden cruzar y producen crías que también se pueden cruzar y reproducir.

sperm A male sex cell. (p. 675)
espermatozoide Célula sexual masculina.

spinal cord The thick column of nerve tissue that links the brain to most of the nerves in the peripheral nervous system. (p. 633)
médula espinal Columna gruesa de tejido nervioso que une el encéfalo con la mayoría de los nervios en el sistema nervioso periférico.

spongy bone Layer of bone tissue having many small spaces and found just inside the layer of compact bone. (p. 478)
hueso esponjoso Capa de tejido de un hueso que tiene muchos espacios pequeños y se encuentra justo dentro de la capa del hueso compacto.

spontaneous generation The mistaken idea that living things arise from nonliving sources. (p. 36)
generación espontánea Idea equivocada de que los seres vivos surgen de fuentes inertes.

spore A tiny cell that is able to grow into a new organism. (p. 234)
espora Célula diminuta que, al crecer, puede convertirse en un nuevo organismo.

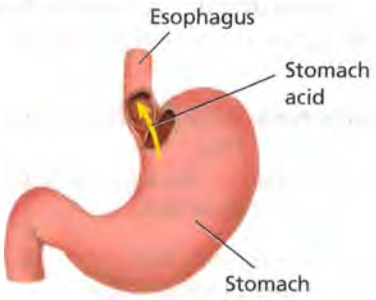
sporophyte The stage in the life cycle of a plant in which the plant produces spores. (p. 254)
esporofito Etapa en el ciclo de vida de una planta en la que la planta produce esporas.

stamen A male reproductive part of a flower.
estambre Parte reproductora masculina de una flor. (p. 276)

stimulant A drug that speeds up body processes.
estimulante Droga que acelera los procesos del cuerpo. (p. 654)

stimulus A change in an organism's surroundings that causes the organism to react. (pp. 35, 437)
estímulo Cambio en el entorno de un organismo que le hace reaccionar.

stomach A J-shaped, muscular pouch located in the abdomen. (p. 520)
estómago Bolsa muscular con forma de J localizada en el abdomen.



stomata Small openings on a leaf through which oxygen and carbon dioxide can move. (p. 89)
estomas Pequeños orificios en la superficie inferior de la hoja a través de los cuales se intercambia oxígeno y dióxido de carbono.

stress The reaction of a person's body to potentially threatening, challenging, or disturbing events. (p. 473)
estrés Reacción del cuerpo de un individuo a amenazas, retos o sucesos molestos potenciales.

striated muscle A muscle that appears banded; also called skeletal muscle. (p. 484)
músculo estriado Músculo con forma de franjas; también se llama músculo esquelético.

succession The series of predictable changes that occur in a community over time. (p. 730)
sucesión Serie de cambios predecibles que ocurren en una comunidad a través del tiempo.

sustainable yield An amount of a renewable resource that can be harvested regularly without reducing the future supply. (p. 786)
rendimiento sostenible Cantidad de un recurso renovable que puede ser recolectado constantemente sin reducir el abastecimiento futuro.

swim bladder An internal, gas-filled organ that helps a bony fish stabilize its body at different water depths.
vejiga natatoria Órgano interno lleno de gas que ayuda a un pez con esqueleto a estabilizar su cuerpo a diferentes profundidades. (p. 379)

symbiosis A close relationship between two organisms of different species that benefits at least one of the organisms. (pp. 230, 728)
simbiosis Relación estrecha entre especies de la que se beneficia al menos una de ellas.

synapse The junction where one neuron can transfer an impulse to the next structure. (p. 630)
sinapsis Unión donde una neurona puede transferir un impulso a la siguiente estructura.

T

T cell A lymphocyte that identifies pathogens and distinguishes one pathogen from another. (p. 600)
célula T Linfocito que identifica los patógenos y distingue un patógeno de otro.

tadpole The larval form of a frog or a toad. (p. 383)
renacuajo Estado de larva de una rana o un sapo.

tar A dark, sticky substance that forms when tobacco burns. (p. 575)
alquitrán Sustancia oscura y pegajosa producida cuando se quema tabaco.

target cell A cell in the body that recognizes a hormone's chemical structure. (p. 668)
célula destinataria Célula del cuerpo que reconoce la estructura química de una hormona.

taxonomy The scientific study of how living things are classified. (p. 43)
taxonomía Estudio científico de cómo se clasifican los seres vivos.

technology How people modify the world around them to meet their needs or to solve practical problems. (p. 20)
tecnología Cómo la gente modifica el mundo que la rodea para satisfacer sus necesidades o para solucionar problemas prácticos.

tendon Strong connective tissue that attaches muscle to bone. (p. 484)
tendón Tejido conectivo resistente que une un músculo a un hueso.

territory An area that is occupied and defended by an animal or group of animals. (p. 447)
territorio Área que ocupa y defiende un animal o grupo de animales.

testis Organ of the male reproductive system in which sperm and testosterone are produced.
testículo Órgano del sistema reproductor masculino en el cual se producen los espermatozoides y la testosterona. (p. 676)

testosterone A hormone produced by the testes that controls the development of physical characteristics in mature men. (p. 676)
testosterona Hormona producida por los testículos que controla el desarrollo de las características físicas del hombre maduro.

thorax An arthropod's midsection, to which its wings and legs are attached. (p. 344)
tórax Sección media de un insecto, a la que están unidas las alas y las patas.

threatened species A species that could become endangered in the near future. (p. 797)
especie amenazada Especie que puede llegar a estar en peligro de extinción en el futuro próximo.

tissue A group of similar cells that perform the same function. (pp. 295, 470)
tejido Grupo de células semejantes que realizan la misma función.

tolerance A state in which a drug user needs larger amounts of the drug to produce the same effect on the body. (p. 652)
tolerancia Estado en el que un consumidor de drogas necesita mayores cantidades de la droga para que produzca el mismo efecto en el cuerpo.

toxin A poison produced by bacterial pathogens that damages cells. (p. 594)
toxina Veneno producido por patógenos bacterianos y que daña las células.

trachea The windpipe; a passage through which air moves in the respiratory systems (p. 568)
tráquea Conducto a través del cual se mueve el aire en el sistema respiratorio.

trait A characteristic that an organism can pass on to its offspring through its genes. (p. 110)
rasgo Característica que un organismo puede transmitir a su descendencia a través de sus genes.

transfer RNA RNA in the cytoplasm that carries an amino acid to the ribosome and adds it to the growing protein chain. (p. 133)
ARN de transferencia ARN en el citoplasma que lleva un aminoácido al ribosoma y lo suma a la cadena proteínica que se está formando.

transmitter A device that sends out signals in the form of radio waves. (p. 455)
transmisor Aparato que envía señales en forma de ondas de radio.

transpiration The process by which water is lost through a plant's leaves. (p. 271)
transpiración Proceso por el cual las hojas de una planta eliminan agua.

trial-and-error learning A form of conditioning in which an animal learns to perform a behavior more and more skillfully. (p. 441)
aprendizaje por ensayo y error Forma de condicionamiento en el cual un animal aprende a ejecutar un comportamiento más y más hábilmente.

tropism The growth response of a plant toward or away from a stimulus. (p. 284)
tropismo Respuesta de una planta a un estímulo, que consiste en crecer hacia el estímulo o en la dirección opuesta.

tube feet Extensions of an echinoderm's water vascular system that stick out from the body and function in movement and obtaining food. (p. 359)
pies ambulacrales Extensiones del sistema vascular de agua de un equinodermo que sobresalen del cuerpo y sirven para la locomoción y la obtención de alimento.

tumor An abnormal tissue mass that results from the rapid division of cells. (p. 614)
tumor Masa de tejido anormal que resulta de la rápida división de las células cancerosas.

tundra An extremely cold, dry biome. (p. 765)
tundra Bioma extremadamente frío y seco.

U

umbilical cord A ropelike structure that forms between the embryo or fetus and the placenta.
cordón umbilical Estructura con forma de cuerda que se forma entre el embrión o feto y la placenta. (p. 685)

understory A layer of shorter plants that grow in the shade of a forest canopy. (p. 760)
sotobosque Estrato de plantas de baja estatura que crecen a la sombra de la bóveda arborea.

unicellular Made of a single cell. (p. 34)
unicelular Compuesto por una sola célula.

urea A chemical that comes from the breakdown of proteins. (p. 580)
urea Sustancia química que viene de la descomposición de proteínas.

ureter A narrow tube that carries urine from one of the kidneys to the urinary bladder. (p. 580)
ureter Conducto estrecho que lleva la orina desde cada uno de los riñones a la vejiga urinaria.

urethra A small tube through which urine flows from the body. (p. 580)
uretra Pequeño conducto a través del cual fluye la orina desde el cuerpo.

urinary bladder A sacklike muscular organ that stores urine until it is eliminated from the body.
vejiga urinaria Órgano muscular con forma de saco que almacena la orina hasta que es eliminada del cuerpo. (p. 580)

urine A watery fluid produced by the kidneys that contains urea and other wastes. (pp. 388, 580)
orina Fluido acuoso producido por los riñones que contiene urea y otros materiales de desecho.

uterus The hollow muscular organ of the female reproductive system in which a fertilized egg develops. (p. 679)
utero Organo muscular hueco del sistema reproductor femenino en el que se desarrolla el bebé.

V

vaccination The process by which harmless antigens are deliberately introduced into a person's body to produce active immunity; also called immunization. (p. 607)
vacunación Proceso por el cual antígenos inocuos se introducen deliberadamente en el cuerpo de una persona para producir inmunidad activa; también se llama inmunización.

vaccine A substance used in a vaccination that consists of weakened or killed pathogens that can trigger the immune system into action. (pp. 215, 607)
vacuna Sustancia usada en una vacunación que está formada por patógenos que han sido debilitados o muertos pero que todavía pueden activar el sistema inmunológico.

vacuole A sac inside a cell that acts as a storage area.
vacuola Saco dentro de la célula que actúa como área de almacenamiento. (p. 66)

vagina A muscular passageway leading to the outside of the body; also called the birth canal. (p. 679)
vagina Pasaje muscular que lleva hacia afuera del cuerpo; también llamado canal de nacimiento.

valve A flap of tissue in the heart or a vein that prevents blood from flowing backward. (p. 537)
válvula Tapa de tejido en el corazón o en una vena que impide que la sangre fluya hacia atrás.

variable A factor in an experiment that can change.
variable Factor que puede cambiar en un experimento. (p. 16)

variation Any difference between individuals of the same species. (p. 177)
variación Cualquier diferencia entre individuos de la misma especie.

vascular plant A plant that has true vascular tissue.
planta vascular Planta que tiene tejido vascular verdadero. (p. 253)

vascular tissue The internal transporting tissue in some plants that is made up of tubelike structures.
tejido vascular Tejido de transporte interno en algunas plantas que está formado por estructuras parecidas a tubos. (p. 252)

vein A blood vessel that carries blood back to the heart. (p. 538)
vena Vaso sanguíneo que devuelve la sangre al corazón.

ventricle A lower chamber of the heart that pumps blood out to the lungs and body. (pp. 384, 537)
ventrículo Cámara inferior del corazón que bombea la sangre hacia los pulmones y el cuerpo.

vertebrae The small bones that make up the backbone. (pp. 369, 475)
vértebras Los huesecillos que forman la columna vertebral de un animal.

vertebrate An animal that has a backbone. (p. 299)
vertebrado Animal que posee columna vertebral.

villi Tiny finger-shaped structures that cover the inner surface of the small intestine and provide a large surface area through which digested food is absorbed. (p. 526)
vellosidades Pequeñas estructuras con forma de dedo que cubren la superficie interna del intestino delgado y proporcionan una amplia superficie a través de la cual se absorbe el alimento digerido.

virus A tiny, nonliving particle that invades and then reproduces inside a living cell. (p. 210)
virus Partícula diminuta no viva que invade una célula viva y luego se reproduce dentro de ella.

vitamins Molecules that act as helpers in a variety of chemical reactions within the body. (p. 508)
vitaminas Moléculas que actúan como ayudantes en gran variedad de reacciones químicas que se producen en el cuerpo.

vocal cords Folds of connective tissue that stretch across the opening of the larynx and produce a person's voice. (p. 572)
cuerdas vocales Pliegues de tejido conectivo que se extienden a lo largo de la abertura de la laringe y producen la voz de la persona.

voluntary muscle A muscle that is under conscious control. (p. 483)
músculos voluntarios Músculo que se puede controlar conscientemente.

W

water cycle The continuous process by which water moves from Earth's surface to the atmosphere and back. (p. 746)
ciclo del agua Proceso continuo mediante el cual el agua pasa de la superficie de la Tierra a la atmósfera y viceversa.

water vascular system A system of fluid-filled tubes in an echinoderm's body. (p. 359)
sistema vascular de agua Sistema de vasos llenos de líquidos en el cuerpo de un equinodermo.

white blood cell A blood cell that fights disease.
glóbulo blanco Célula de la sangre que protege contra las enfermedades. (p. 547)

withdrawal A period of adjustment that occurs when a drug-dependent person stops taking the drug. (p. 653)
síndrome de abstinencia Período de ajuste que ocurre cuando una persona adicta a las drogas deja de consumirlas.

X

xylem The vascular tissue through which water and nutrients move in some plants. (p. 263)
xilema Tejido vascular por el que circulan agua y nutrientes en algunas plantas.

Z

zygote A fertilized egg, produced by the joining of a sperm and an egg. (pp. 252, 675)
cigoto Óvulo fecundado, producido por la unión de un espermatozoide y un óvulo.

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Chapter 1 Pages 4-5, Barrett and MacKay: **5 inset,** Jon Chomitz; **7b,** Manoh Shah/Getty Images, Inc.; **7t,** Michael Nichols/National Geographic Society; **8,** K. & K. Ammann/Bruce Coleman, Inc.; **9,** Wild Chimpanzees.org; **10b,** Dorling Kindersley Media Library; **10t,** Wild Chimpanzees.org; **11l,** Irven De Vore/Anthrophoto file; **11r,** Adrian Warren/Lastrefuge.co.uk; **12b,** Tony Freeman/PhotoEdit; **12m,** ARS; **12t,** Tim Thompson/Stone/Getty Images, Inc.; **13l,** Dan Lamont/Corbis; **13r** Jeff Greenberg/PhotoEdit; **14b,** M.T. Frazier/Photo Researchers, Inc.; **14t,** Houghton Mifflin Company; **15, 16, 17 all,** Richard Haynes; **18,** Getty Images, Inc.; **19b,** Brad Mangin/Corbis; **19tl,** PhotoDisc, Inc./Getty Images, Inc.; **19tm,** Tony Freeman/PhotoEdit; **19tr,** Mark Antman/The Image Works; **20l,** Sean Cayton/The Image Works; **20r,** Getty Images, Inc.; **21l,** Clayton J. Price/CORBIS; **21m,** Phototake; **21r,** Photo Researchers; **22,** Getty Images, Inc.; **23b,** Richard Haynes; **23t,** Russ Lappa; **24, 25, 28b,** Richard Haynes; **28t,** Manoh Shah/Getty Images, Inc.; **30,** Renee Stockdale/Animals Animals.

Chapter 2 Pages 32-33, Roland Birke/Peter Arnold, Inc.; **33 inset,** Richard Haynes; **34,** Russ Lappa; **35l,** Michael & Patricia Fogden/CORBIS; **35r,** Biodisc/Visuals Unlimited; **36,** Breck Kent/Animals Animals; **37,** Superstock; **38-39,** Stephen J. Krasemann/DRK Photo; **38 inset,** Tom Brakefield/DRK Photo; **39 inset l,** Kennan Ward/Corbis; **39 inset r,** W. Perry Conway/Corbis; **40,** Michael Newman/PhotoEdit; **41, 42t,** Russ Lappa; **42b,** Inga Spence/The Picture Cube, Inc.; **43,** Biophoto Associates/Photo Researchers, Inc.; **44l,** Gerard Lacz/Animals Animals; **44m,** Gavriel Jecan/Art Wolfe, Inc.; **44r,** Ron Kimball Studios; **45,** Lynn Stone/Animals Animals; **46,** Thomas Kitchin/Tom Stack & Associates, Inc.; **48-49,** Daniel J. Krasemann/DRK Photo; **48 inset l,** Carolina Biological/Visuals Unlimited; **48 inset r,** W. Wayne Lockwood, M.D./Corbis; **49 inset l,** Photodisc/Getty Images, Inc.; **49 inset r,** E.R. Degginger/Animals Animals; **50t,** Richard Haynes; **50b,** McDonald Wildlife Photo, Inc./DRK Photo; **51t,** Photo Researcher, Inc.; **51b,** Richard Haynes; **52l,** FSU Research Foundation; **52m,** The Granger Collection; **52r, 53l,** Bettmann/Corbis; **53m,** Pascal Goetgheluck/SPL/Photo Researchers; **53r,** Lawrence Migdale/Stock Boston; **54,** John Locke/Dembinsky Photo Associates; **55,** Getty Images, Inc.; **56t,** Photo Researchers, Inc.; **56bl,** Sinclair Stammers/SPL/Photo Researchers, Inc.; **56br,** SPL/Photo Researchers, Inc.; **57,** CRNI/SPL/Photo Researchers, Inc.; **58,** Richard Haynes; **60t,** Runk/Schoenberger/Grant Heilman Photography, Inc.; **60b,** Corbis; **61l,** Runk/Schoenberger/Grant Heilman Photography; **61r,** Mike Abbey/Visuals Unlimited; **62,** Alfred Paskieka/SPL/Photo Researchers, Inc.; **63t,** Bill Longcore/Photo Researchers, Inc.; **63b,** SPL/Photo Researchers, Inc.; **66,** Photo Researchers, Inc.; **67t,** David Scott/CRNI/Phototake; **67b** Motta & S. Correr/SPL/Photo Researchers, Inc.; **68,** W. Wayne Lockwood, M.D./Corbis; **70,** Runk Schoenberger/Grant Heilman Photography.

Chapter 3 Pages 72-73, Michael J. Doolittle/The Image Works; **73 inset, 74t,** Russ Lappa; **74b,** Jeffrey A. Scovil; **75,** Digital Vision/Getty Images, Inc.; **76t,** Japack Company/Corbis; **76m,** Andrew Syred/Science Photo Library/Photo Researchers, Inc.; **76bl,** Getty Images, Inc.; **76br,** Vittoriano Rastelli/Corbis; **77,** Scheidermeyer/OSF/Animals Animals; **78,** CNRI/Science Photo Library; **79,** Richard Haynes; **80-81b,** Damilo P. Donadomi/Bruce Coleman, Inc.; **85,** M. Abbey/Visuals Unlimited; **86-87,** Todd Gustafson/Panoramic Images; **86t,** Russ Lappa; **87 inset,** Stephen J. Krasemann/Photo Researchers, Inc.; **88,** Biophoto Associates/Photo Researchers, Inc.; **89,** Dr. Jeremy Burgess/SPL/Photo Researchers, Inc.; **90,** Superstock; **94,** Richard Hutchins/PhotoEdit; **95t,** David Scharf/Peter Arnold, Inc.; **95b,** AP/Wide World Photos; **96-97t,** Royalty-Free/Corbis; **97b,** Biophoto Associates/Science Source/Photo Researchers, Inc.; **98 all, 99 all,** M. Abbey/Photo Researchers, Inc.; **100,** Visuals Unlimited; **103,** Runk/Schoenberger/Grant Heilman Photography; **104,** Royalty-Free/Corbis.

Chapter 4 Pages 108-109, Ron Kimball Studios; **109 inset,** Richard Haynes; **110t,** Getty Images, Inc.; **110bl,** Hulton Archive/Getty Images, Inc.; **110-111,** Jerry Howard/Positive Images; **113,** Dorling Kindersley; **114 both,** Meinrad Faltner/Corbis Stock Market; **115,** Villanova University; **116 tl,** Michael Newman/PhotoEdit; **116t,** David Young-Wolf/PhotoEdit; **116bl,** Mary Kate Denny/Photoedit; **116bml,** Nicolas Russell/Getty Images, Inc.; **116bmr,** David Young Wolf/PhotoEdit; **116br,** Corbis; **118t,** U.S. Mint/Omni-Photo Communications, Inc.; **118b,** David Young-Wolff/Photo Edit; **119,** Jim Cummins/Getty Images, Inc.; **124, 125t,** Dorling Kindersley; **125b,** Richard Haynes; **126,** Dennis Kunkel/PhotoTake, **127l,** Michael Abbey/Photo Researchers, Inc.; **127r** E.R. Degginger/Color-Pic, Inc.; **131,** Adrian Warren/Last Refuge Ltd.; **137,** Dorling Kindersley; **138,** Adrian Warren/Last Refuge Ltd.

Chapter 5 Pages 142-143, Royalty-Free/Corbis; **143 inset, 144t,** Richard Haynes; **144b,** Michael Newman/PhotoEdit; **145t,** Everett Collection; **145 all,** David Young-Wolf/PhotoEdit; **145m,** David Urbina/PhotoEdit; **145bl,** Michael Newman/PhotoEdit; **146,** Camille Tokerud/Stone/Getty Images, Inc.; **147 both,** Biophoto Associates/Photo Researchers, Inc.; **148l,** Corbis; **148r,** Michael Douma, Institute for Dynamic Educational Advancement; **150,** Amy Etra/PhotoEdit; **151t,** CNRI/Science Photo Library/Photo Researchers, Inc.; **151b,** Jonathan Nourok/PhotoEdit; **152 both,** Stanley Flegler/Visuals Unlimited; **153,** Craig Farraway; **155 both,** National Hemophilia Foundation; **156,** White Packert/Getty Images, Inc.; **157,** South West News Service; **158t,** Paul McCormick/Getty Images, Inc.; **158m,** Grant Heilman; **158bl,** Foodpix; **158bm,** Photo Researchers, Inc.; **158br,** Foodpix; **159,** The Image Works; **161l,** Animals Animals/Earth Scenes; **161r,** 5-D and Segrest Farms/AP/Wide World Photos; **162,** Photo Researchers, Inc.; **163,** David Parker/Photo Researchers, Inc.; **164t,** Nathan Benn/Corbis; **164b,** Getty Images, Inc.; **165,** Andrew Brooks/CORBIS; **166t,**The Image Works; **166b,** Craig Farraway.

Chapter 6 Pages 170-171, Tui De RoyMinden Pictures; **171 inset,** Richard Haynes; **172t,** Portrait by George Richmond/Down House, Downe/Bridgeman Art Library; **172 frame,** Dorling Kindersley; **172b,** Christopher Ralling; **173t, 173b,** Tui De Roy/Minden Pictures; **174t,** Photo Researchers, Inc.; **174b,** Jeremy Woodhouse/Masterfile; **175,** Dr. Jeremy Burgess/SPL/Photo Researchers, Inc.; **176t, 176b,** Barbara D. Livingston; **176b,** AP/Wide World Photos; **176 horseshoe,** Dorling Kindersley; **181, 182t,** Richard Haynes; **182b,** Dorling Kindersley; **183,** Michael K. Richardson; **184l,** G. Alamany & E. Vicouns/Corbis; **184m,** Photo Researchers, Inc.; **184r,** Robert Pearcy; **185l,** Gary Milburn/Tom Stack & Associates, Inc.; **185r,** Betty K. Bruce/Animals Animals/Earth Scenes; **187l, 187r,** Pat & Tom Leeson/Photo Researchers, Inc.; **189t,** James L. Amos/Photo Researchers, Inc.; **189b,** AP/Wide World Photos; **191,** Peter Pavlovsky/Fossils.de; **196 all,** Douglas Henderson; **197,** Breck P. Kent; **198,** Photo Researchers, Inc.; **202 t,** Bridgeman Art Library; **202b,** Myrleen Ferguson Cate/PhotoEdit; **203,** Ron Kimball; **204tl, 204bl, 204tr, 204 mr,** Corel Corp.; **204br,** Jack Daniels/Getty Images, Inc.; **205tl,** Corel Corp.; **205bl,** C. Jeanne White/Photo Researchers, Inc.; **205tr,** Dorling Kindersley; **205mr, 205br,** Corel Corp.; **206l,** G. K. & Vikki Hart/Getty Images, Inc.; **206r,** AP/ Wide World Photos; **207,** Corbis.

Chapter 7 Pages 208-209, Dennis Kunkel/Phototake; **209 inset,** Richard Haynes; **211,** Lee D. Simon/Science Source/Photo Researchers, Inc.; **212-213,** Peter Minister/Dorling Kindersley; **214,** Institut Pasteur/CNRI/Phototake; **215,** Esbin-Anderson/Omni-Photo; **216t,** Custom Medical Stock; **216b,** Dr. Linda Stannard, UCT/Science Photo Library/Photo Researchers, Inc.; **217,** Richard Haynes; **218,** USDA/Visuals Unlimited; **219l, 219m,** Dennis Kunkel/Phototake; **219r,** Photo