September

September starts off with an annotated list of several important dates followed by activity sheets for many of the entries. You may want to recognize a particular event that occurred without doing an investigation or activity sheet. You may also want your students to read about an event and report to the class what they found out through their own research.

The information that follows is a brief overview to help you and your students with background information. You will want to consult other resources, including your science texts, for more specific information.

Some September Dates to Remember and Background Information for the Activities

Activity sheets are provided for starred dates only. It is your decision whether to give the students facts on each entry. And for the trivia game referred to, go to Appendix 5.

3* Viking 2 *landed on Mars (1976). Viking 2* found proof of a past watery environment on Mars. Introduce your students to the fascinating facts about this planet—its canyons, channels, lava plains, and different seasons. See Activity Sheet 1.1.

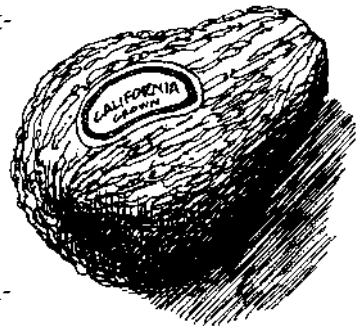
A day on Mars is 24.5 hours in Earth time; a year is 687 days. Called the "red planet," Mars rotates on an axis similar to Earth's. Through space exploration, like the *Mars Global Surveyor, Pathfinder,* and *Mars Odyssey,*

we have learned much about this neighboring planet. This is a great time to encourage your students to think scientifically. Have them read and find out about Mars and imagine what the planet is like, especially its seasons. Activity Sheet 1.1 encourages students to think about Earth and its seasons, as well as what seasons might be like on another planet.

4 *Power Day in New York.* On this day in 1882, Thomas Edison and his electric power company officially opened its first electric power station on Pearl Street in Manhattan, making New York the first city to have citywide electricity.

9* *California Admission Day.* The state of California was admitted to the Union on this date in 1850. This is an opportunity to recognize California as one of our largest states, in both area and population. California leads the United States in agricultural production, growing many important food products such as the avocado.

Avocados were first planted in California in the mid-1800s. They are an important crop and are very nutritious. Activity Sheet 1.2 will help students learn firsthand about growing plants from seeds, transplanting plants, and recording their observations systematically. Have students learn about California's geography and products by visiting the home page Web site: www.ca.gov/state/portal/myca_homepage.jsp. (This is the first of several states students will encounter in this book.)



9 *Birthday of Luigi Galvani (1737).* Galvani was an Italian physicist and physician. He realized that animal muscle tissue had electricity as he observed and experimented with frogs' legs. His research influenced his contemporaries, such as Alessandro Volta, who created the first battery (the "voltaic pile"). The galvanometer, an instrument used to detect or measure a small electric current, was named in honor of Galvani. Volta proved that Galvani's theory was incorrect. He showed the frog's tissue was carrying an electric current between two metals.

10* *Elias Howe received a patent for the sewing machine (1846).* Where would we be without this important invention? This is a perfect time to introduce your students to the importance of science in the development of machines and other inventions.

Each year, thousands of people apply for and receive patents for their inventions. Introduce the students to the *World Almanac,* which lists the patents awarded each year.

Help students understand that a patent is an award—a grant and license given to someone for the exclusive use, sale, and distribution of his or her claimed invention. It is a legal protection. More than ninety thousand patents are distributed each year. Visit the U.S. Patent Web site at www.uspto.gov for information on patents. Let your students create an invention and describe it on Activity Sheet 1.3.

11 *First operation of hydroelectric generator at Hoover Dam.* In 1936, Hoover Dam sent power over 300 miles from the Colorado River in Nevada to Los Angeles, California. The dam stands 726 feet high and is 1,233 feet long. Encourage your students to find a picture of Hoover Dam in library books.

13* *Birthday of Walter Reed (1851).* This American pathologist is best remembered for his work in Cuba, where he helped identify the cause of yellow fever. Reed and his associates found that a mosquito was the carrier of this deadly disease, which infected many people.

This is an opportunity to find out about the anatomy of a mosquito and how it actually "bites" a person or an animal. Being aware of the feeding patterns of mosquitoes and ways to prevent getting bitten by them (they seldom feed in the middle of the day) is education for all. (See Activity Sheet 1.4.) Also, discuss any current events regarding mosquitoes and their nature, available through your newspapers, if appropriate, or Web sites. Updates on the West Nile virus can be found on the California state Web site: www.ca.gov/state/portal/myca_homepage.jsp.

13* *World's highest recorded temperature (Africa, 1922).* This is a good time to talk about seasonal differences around the world and temperature ranges (recording high and low temperatures). You may want to record your area's temperatures for a week and compare them to a previous year's statistics for the same dates.

Activity Sheet 1.5 helps students compute a mathematical average. It also helps them record important weather statistics. (September's trivia game in Appendix 5 reveals the recorded high temperature.)

14 *Birthday of Ivan Pavlov (1849).* This famous Russian received a Nobel Prize for his study of the physiology of animals and the structure of the brain and its relationship to nerves and muscles. (See the December entry and teacher information on the Nobel Prize.) He trained a dog to salivate on command, using a bell to teach the dog to associate food with a sound. Pavlov left a valuable legacy for science research. Many future scientists built on his findings in animal behavior and learning.

15* *Birthday of Frank Eugene Lutz (1879).* This famous American entomologist, educator, and museum curator was the first curator of the Department of Entomology at the American Museum of Natural History in New York. He established America's first guided nature trail in Harriman State Park, New York. As a young man, he was fascinated with insects and the process of metamorphosis, and he created insect dioramas.

In honor of Lutz, have students complete the chart on insect communication in Activity Sheet 1.6.

You may want them to work in small groups on completing the chart, and they could make a poster on insect communication and hang the posters in the classroom. You may also want to temporarily bring some insects into the classroom using bug cages, but only if the students have researched and safely caught the insect and plan to return it to its natural environment. Of course, for safety reasons, preapprove which insects may be observed, such as a cricket.

A visit to your local museum where insects are displayed may be an added benefit. Students can research insects online or in the library. The list of science books and literature in Appendix 2 can be used as a reference, but students should be encouraged to find their own more extensive and age-appropriate references by utilizing multiple resources.

Finally, talk to the students about seasonal autumn changes for insects, such as the migration of monarch butterflies and crickets laying their eggs. Since this is September, many insects are preparing for winter in certain climates, and for some, the last rite is the laying of eggs, which will usually hatch the following spring or summer.

18* *Birthday of Jean Foucalt, French physicist (1819).* Foucalt invented a method for measuring the speed of light. The experiment he devised was performed entirely within the laboratory. Foucalt found that the path of a light beam may be bent when it encounters an obstacle.

Activity Sheet 1.7 gives your students a chance to investigate what happens to light as it passes through water.

19* *Birthday of George Cadbury, English manufacturer (1839).* Cadbury chocolates are famous and enjoyed worldwide for their excellent quality

and delicious taste. Chocolate has its own tale to tell. The production begins with the cacao tree, grown in regions near the equator, such as Africa, Indonesia, and South America.

The tree produces a fruit the size of a pineapple, ripe with cocoa beans. The beans are fermented, dried, and roasted. Then the nib or meat of the bean is extracted in a process called *winnowing.*

Have students visit the Cadbury Web site at www.cadbury.co.uk. They can learn about the history of chocolate and how it is made, and how the cacao tree is harvested. For nutritional purposes, they can read the list of ingredients on chocolate bars or on Cadbury chocolate eggs.

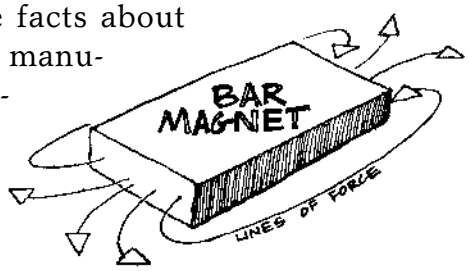
Cadbury's food processing techniques were scientific and as one of the first food processors to use scientific food processing techniques, this helped create a standard for federal legislation for good safety and guidelines for food manufacturing.

Have students research and find other food manufacturing sites for chocolate, such as www.hersheys.com. Here they can go on a virtual tour of the production of chocolate, from the trees used in production, to the dairy farms, to the final products. There is also a teacher site at www.hersheys.com to support this classroom lesson.

Students can complete Activity Sheet 1.8.

22* *Birthday of Michael Faraday, English chemist (1791).* Faraday contributed much to our knowledge of magnetism and electricity. He found that an electric current could be induced in a coil of wire when a permanent magnet is moved in and out of a wire coil. His work with electromagnets led to his law of electromagnetic induction.

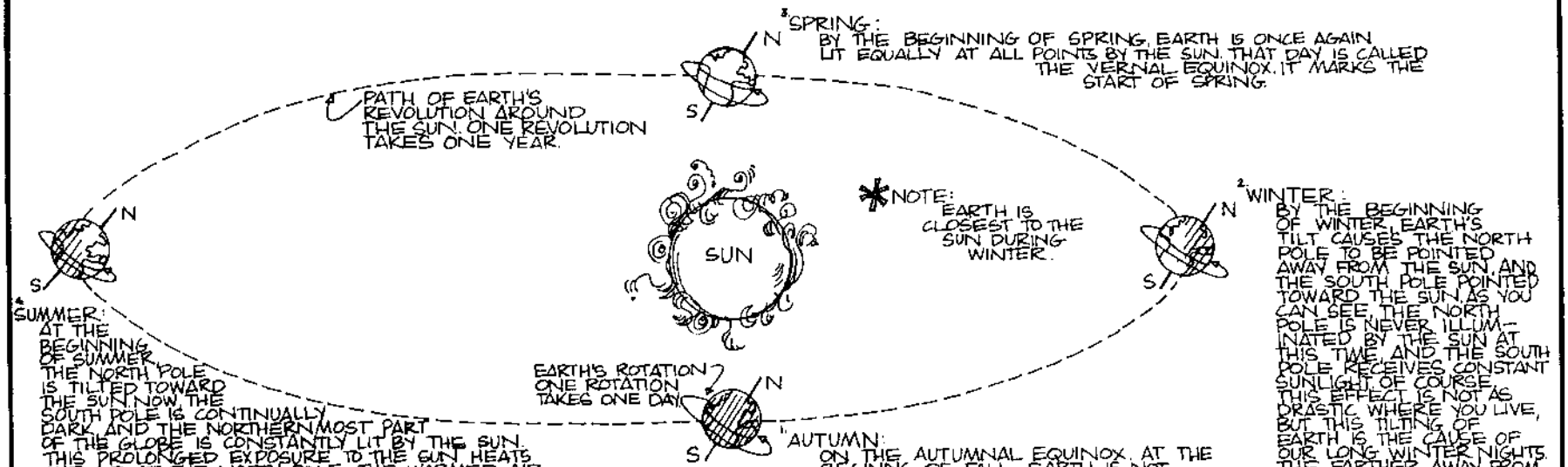
Help your students discover these facts about magnets: magnets exist in natural and manufactured forms; lodestone, a natural magnet, is a rock containing iron; and manufactured magnets attract iron and other metals and are frequently made of steel or iron.



Magnets have two ends called *poles.* Opposite poles attract; similar poles repel. The magnet operates in a field of energy called a *magnetic field.* Lines of force are observable between the ends of the magnets, where the greatest strength is found. Larger, more powerful magnets have broader and wider lines of force. (See Activity Sheet 1.9.)

20–23 *First day of fall, the autumnal equinox.* On the day of the equinox, which takes place between September 20 and 23, depending on the year, the sun crosses the celestial equator, and day and night are everywhere

THE EARTH IS TILTED ON ITS AXIS. IN OTHER WORDS, IF YOU WERE ABLE TO STICK A LONG POLE THROUGH THE EARTH, FROM THE NORTH POLE TO THE SOUTH POLE, IT WOULD LOOK LIKE THIS , AND NOT LIKE THIS . THIS TILTING OF THE EARTH CAUSES THE CHANGES IN TEMPERATURE AND WEATHER DURING THE DIFFERENT SEASONS OF THE YEAR. IT ALSO EXPLAINS WHY OUR DAYS ARE LONGER IN THE SUMMER AND SHORTER IN THE WINTER.



PATH OF EARTH'S REVOLUTION AROUND THE SUN. ONE REVOLUTION TAKES ONE YEAR.

EARTH'S ROTATION ONE ROTATION TAKES ONE DAY.

*NOTE: EARTH IS CLOSEST TO THE SUN DURING WINTER.

1 AUTUMN: ON THE AUTUMNAL EQUINOX, AT THE BEGINNING OF FALL, EARTH IS NOT TILTED AT ALL IN RELATION TO THE SUN AS EARTH ROTATES. ALL POINTS ON THE GLOBE GET THE SAME AMOUNT OF SUNLIGHT.

2 WINTER: BY THE BEGINNING OF WINTER, EARTH'S TILT CAUSES THE NORTH POLE TO BE POINTED AWAY FROM THE SUN, AND THE SOUTH POLE POINTED TOWARD THE SUN. AS YOU CAN SEE, THE NORTH POLE IS NEVER ILLUMINATED BY THE SUN AT THIS TIME, AND THE SOUTH POLE RECEIVES CONSTANT SUNLIGHT. OF COURSE, THIS EFFECT IS NOT AS DRASTIC WHERE YOU LIVE, BUT THIS TILTING OF EARTH IS THE CAUSE OF OUR LONG WINTER NIGHTS. THE FARTHER AWAY FROM THE EQUATOR YOU LIVE, THE MORE YOU WILL NOTICE A CHANGE IN THE NUMBER OF DAYLIGHT HOURS DURING THE WINTER MONTHS.

3 SPRING: BY THE BEGINNING OF SPRING, EARTH IS ONCE AGAIN LIT EQUALLY AT ALL POINTS BY THE SUN. THAT DAY IS CALLED THE VERNAL EQUINOX. IT MARKS THE START OF SPRING.

4 SUMMER: AT THE BEGINNING OF SUMMER THE NORTH POLE IS TILTED TOWARD THE SUN. NOW, THE SOUTH POLE IS CONTINUALLY DARK, AND THE NORTHERNMOST PART OF THE GLOBE IS CONSTANTLY LIT BY THE SUN. THIS PROLONGED EXPOSURE TO THE SUN HEATS THE AIR AT THE NORTH POLE. THE WARMED AIR MOVES SOUTH, BRINGING "SUMMERY" CONDITIONS TO THE NORTHERN HEMISPHERE.

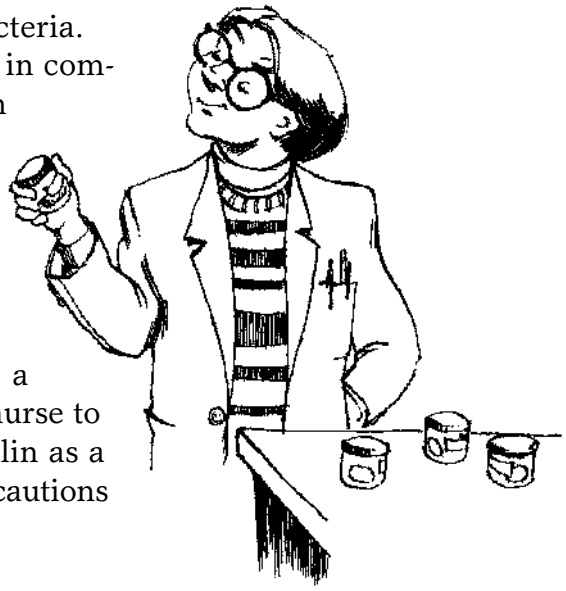
of equal length. After the autumnal equinox, Earth's tilt on its axis means that more of the sun's rays are directed at the Southern Hemisphere, so the hours of daylight decrease and hours of darkness increase in the Northern Hemisphere, and there is warm weather in the Southern Hemisphere and cool weather in the Northern Hemisphere.

Have your students draw pictures of the sun and Earth during the four seasons. Shade half of Earth in darkness. Have the students label the North and South Poles and the equator, as shown in the illustration.

24* *Birthday of Howard Florey, Australian-English pathologist (1898).* Penicillin was discovered in 1928 by Sir Alexander Fleming. Following his discovery, two other scientists, Howard Florey and Ernst Chain, isolated the drug and purified it for clinical use. All three men were awarded the coveted Nobel Prize. (See "Some December Dates to Remember" in Chapter Four.)

These advances in medicine have helped cut death rates from some infectious diseases. Penicillin is an antibiotic that works to destroy harmful bacteria.

Fleming discovered penicillin in common mold. He found that certain conditions encourage the growth of mold and certain conditions retard its growth. Help your students discover some of these conditions by doing the investigation provided in Activity 1.10.



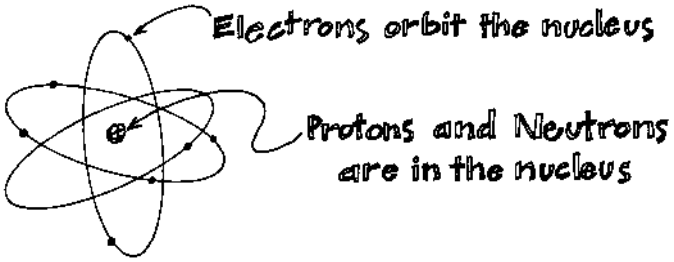
You may also want to invite a pharmacist, physician, or school nurse to talk to the students about penicillin as a helpful drug. Also discuss the precautions in taking it and in storing it.

26 *Birthday of Archibald Hill, English physiologist (1886).* This is an opportunity to recognize the contributions of another Nobel Prize winner. Hill, who won the prize in 1922, was a biophysicist and physiologist who experimented with frogs and their nerve and muscle tissues. He discovered the importance of oxygen as a gas to the functions of the body, including its role in the relaxation and recovery phases of muscular contractions. Like Galvani and Pavlov, Hill's extensive experimentation contributed to our understanding of physiology.

Although no activity is provided in conjunction with Hill, you may want to observe and talk about tadpoles and frogs and their physiology. There are computer-generated frog dissection programs available for purchase through science materials catalogues such as the biological supply company listed in Appendix 2.

30* *Birthday of Hans Geiger, German physicist (1882).* Geiger is known for his study of the atom and the invention of the Geiger counter, an instrument used to measure particles of radiation. Geiger found and identified the *alpha particle* as the nucleus of the helium atom. Like Edison and Faraday, his research was based on an understanding of the principles of magnetism, electricity, and the nature of the atom.

Here is an illustration of an atom. In the center is the nucleus, containing protons and neutrons. Orbiting around it are electrons.

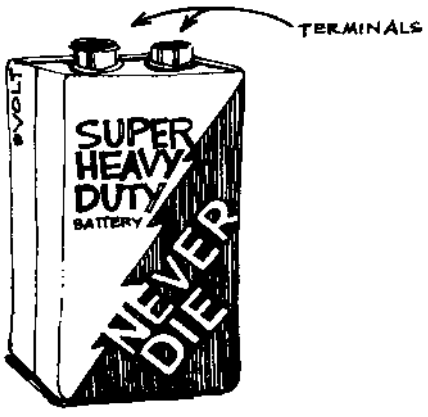


Protons and neutrons do not leave the atom, but electrons can. They can "hop" or move to another atom.

Geiger studied the composition of atoms, particularly helium atoms. You may want to have your students read about atoms, electricity, or helium. You may also want to introduce them to the Periodic Table.

Electricity, the study of the movement of electrons of atoms in different patterns, is investigated in the recommended activity for this date. If electrons move in the same direction or pattern, we call this *DC,* or *direct current.* If they move in different directions, we call that *AC,* or *alternating current.*

Batteries use conductors to carry the electrons. Batteries are used to start electric currents. They make electrons flow in a certain path or direct current. Sometimes copper is used as a conductor, as it was in the first battery, created by Volta. (See the September 9 entry for Luigi Galvani.)



Batteries are measured in volts. In the investigation using Activity Sheet 1.11, have your students observe the path or circuit of electrons by using a battery to illuminate a lightbulb.

Name Date

Activity Sheet 1.1.

What Would the Fall Season Be Like on Mars?

On Earth, the fall season is different from the summer, spring, and winter seasons. There are changes in weather, the temperature, the growth of plants, the habits of animals, and the color of leaves in some trees. Think of all the changes that occur in the fall on Earth.

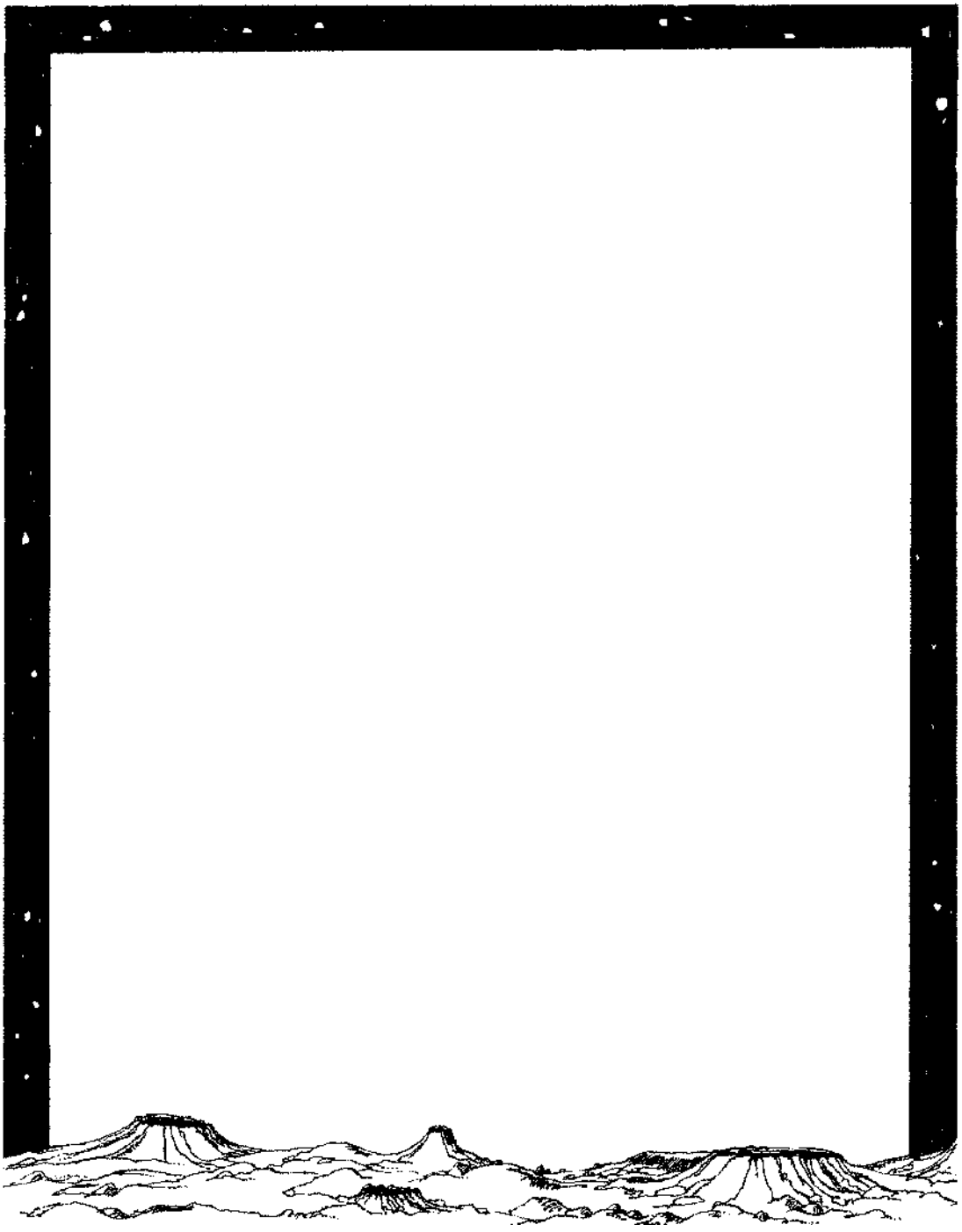
Now read about Mars and its seasons. Does the temperature change on that planet? Do the volcanoes, ice caps, and atmosphere change? Where is the planet in relation to the sun?

Use your imagination and some information you learn from your investigation to describe fall on Mars. Use the report form here to write your story. Be sure to include any interesting facts you learn about Mars. Remember there are science facts and there is science fiction, which is the art of embellishing the facts for the story. Then draw some pictures of Mars and share the story and sketches with your teacher and friends.

Visit these Web sites to tour Mars: www.mars.jpl.asa.gov/mgs and www.nineplanets.org/mars.html.

Name Date

What Would the Fall Season Be Like on Mars? *(Cont'd.)*



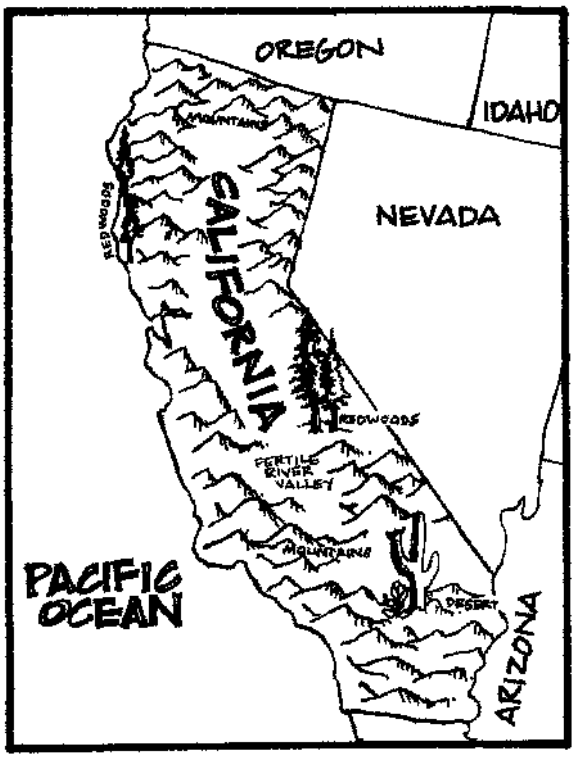
Name Date

Activity Sheet 1.2.

Celebrate California and the Avocado Tree

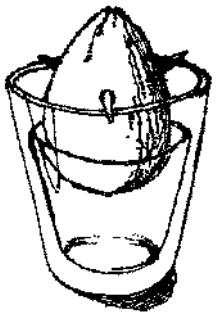
Materials

plastic container or glass jar
3 wooden toothpicks
avocado seed
water
potting soil
large pot
small shovel



Procedure

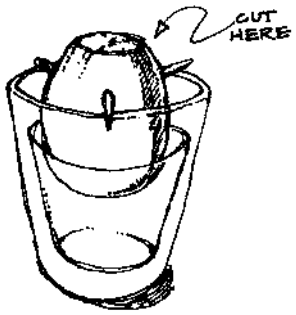
1. Fill the container or glass jar three-quarters full of water. Push the three toothpicks into the avocado seed so that the toothpicks hold half of the seed out of the water. The seed should look like the illustration, with the toothpicks supporting it.
2. Keep the water level touching about ¼ inch of the seed at all times. Give the seed sunlight; place it on a windowsill.



Name Date

Celebrate California and the Avocado Tree *(Cont'd.)*

3. Observe the roots as they appear on the seed. When a stem and leaves appear, transplant the growing seed to a large pot with soil.
4. Observe the growth of the tree.



Option: Cut off part of the pointed end of the seed before putting the toothpicks into it. See if the seed grows faster. The wider, broad end should face downward.

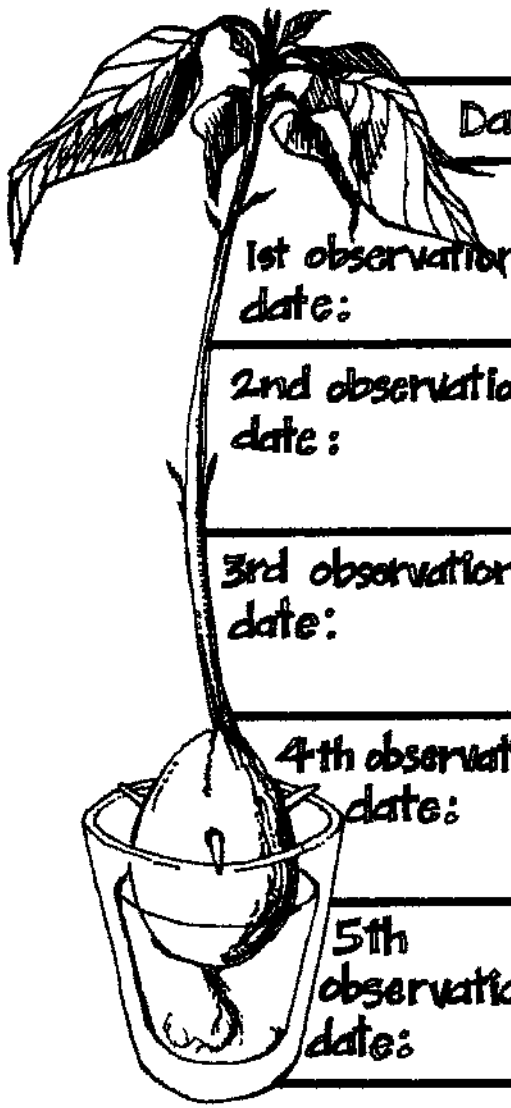
Conclusion

Complete the chart to show the dates and sketches of your avocado seed.

For more information, visit www.dre.ca.gov/gardening.htm.

Name

Date



Date of original rooting:	Date of transplant:	
1st observation date:	description:	sketch:
2nd observation date:	description:	sketch:
3rd observation date:	description:	sketch:
4th observation date:	description:	sketch:
5th observation date:	description:	sketch:

Name Date

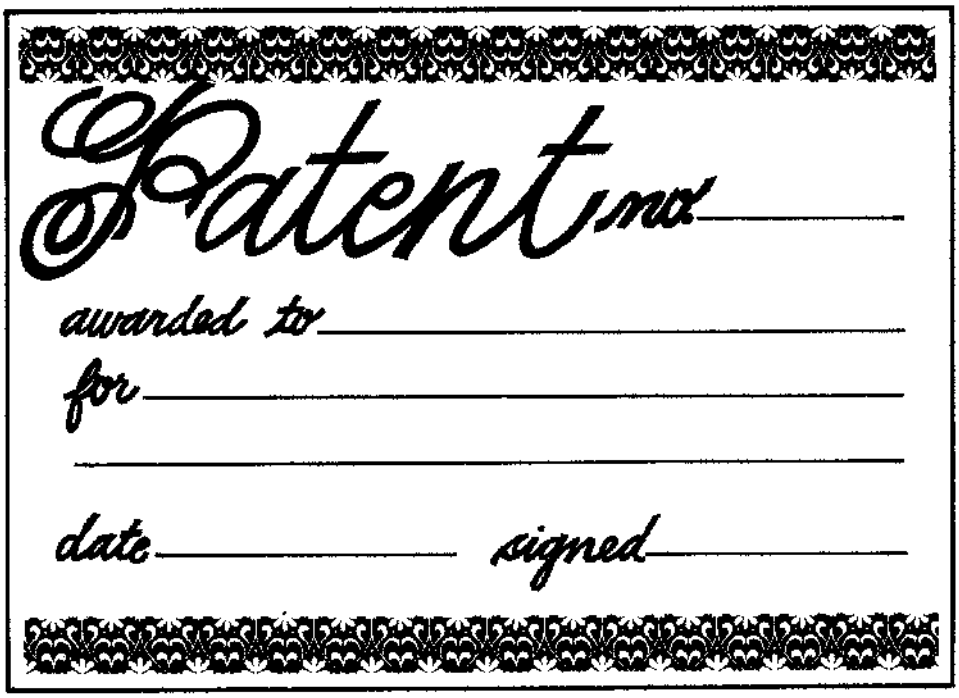
Activity Sheet 1.3.

Patent an Invention

Think about an invention you could make that might be patented. Use the form with this activity sheet to illustrate your invention and describe its purpose and use. You don't have to invent it, but you have to use your imagination and creativity and apply for your patent. Then your teacher will sign your patent award, shown below, for your success and discovery.

For example, in order to prevent burning buildings from collapsing too quickly, a new patent was issued for an invention of hollow beams filled with water and steam. Using these hollow beams in a building's infrastructure will minimize a potential fire's heat and slow damage, thus helping to prevent a building from collapsing. The patent number is 6,763,645, and you can visit the Web site of the U.S. Patent Office at www.uspto.gov for information.

More than 1.7 million U.S. patents have been issued since 1975. The *World Almanac* lists all major inventions and discoveries, including new finds in biology, physics, and chemistry, by nation, year, inventor, and invention. Read the almanac in your library or online at www.worldalmanacforkids.com. See if you can find when the Geiger counter was invented.

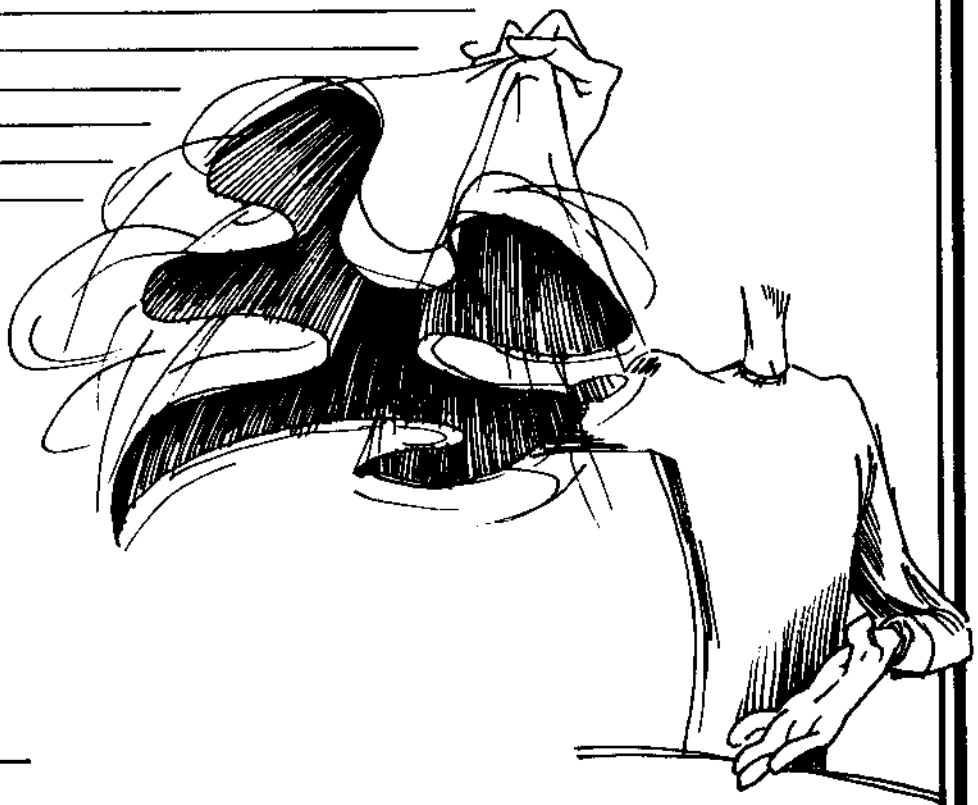


Name: _____ Date: _____

Write a description of your invention on the lines provided. Then draw a picture of your invention in the space on the table. Draw your face in the space provided.

_____
Patent Number

_____
Name of Invention



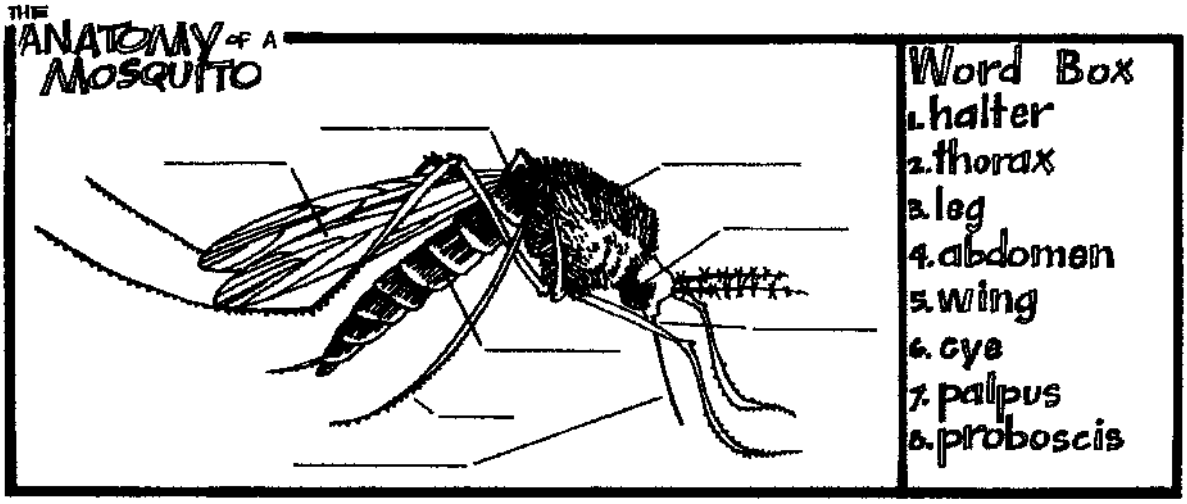
Name Date

Activity Sheet 1.4.

What Do You Know About Mosquitoes?

Do you know how a mosquito "bites"? In fact, it pierces (rather than bites) the skin with its sharp stylets that are attached to a long, thin tube called a *proboscis*. Within half a minute, the female mosquito is able to reach one of your blood vessels and withdraw blood that she needs to complete her egg production process. During the time her stylets are piercing and withdrawing blood, she injects a saliva fluid that temporarily keeps your blood from coagulating or clotting. The male mosquito feeds on plants and does not pierce the skin at all.

Using the diagram, complete the chart below. Label the body parts of the mosquito. Then try to find out how many species of mosquitoes exist.

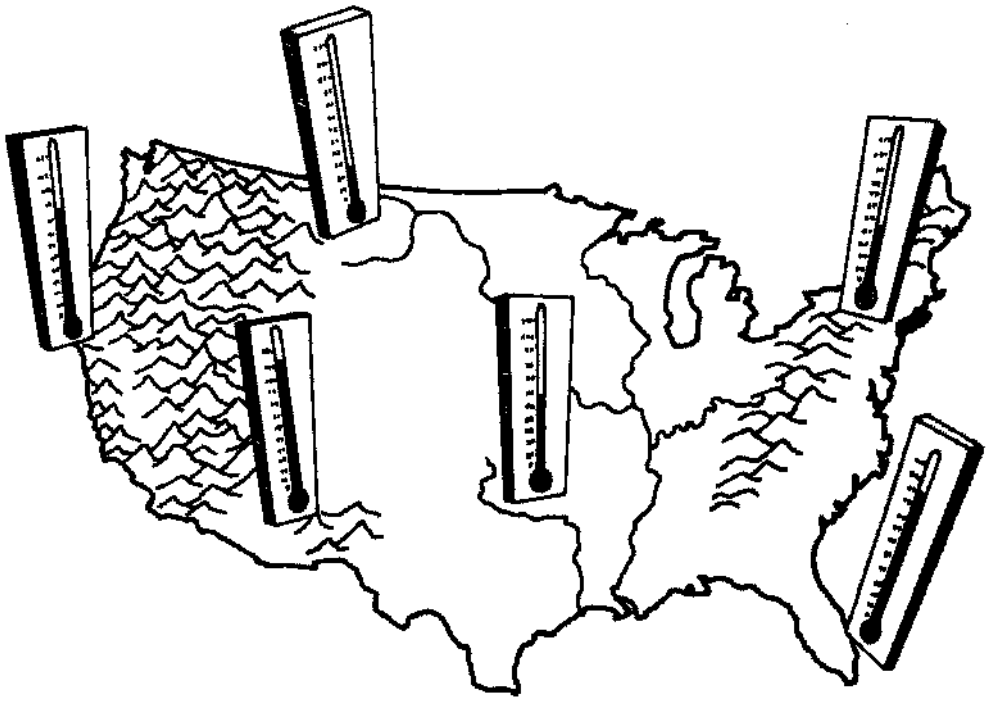


Fill in the blanks with words from the word box.

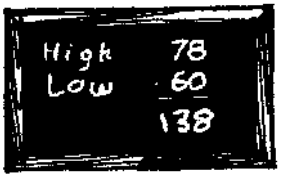
Name Date

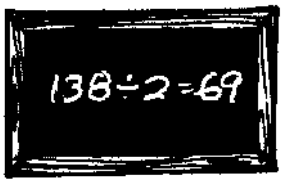
Activity Sheet 1.5.

Averaging Weather Temperatures



Make four copies of the chart on this activity sheet, and use it to record the high and low temperatures for four cities in different parts of the country for four days. Then average the high temperatures and the low temperatures for those four days. To take a statistical average, follow the example here:





The average of 78 and 60 is 69.

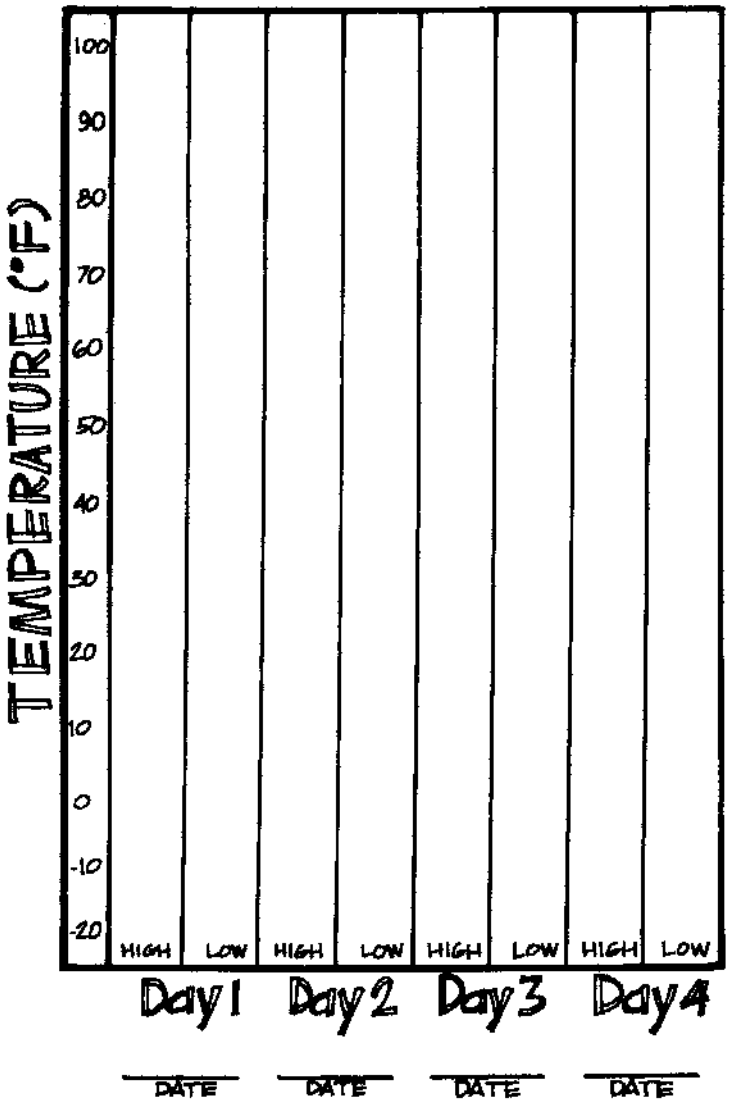
The average temperature in Boston on September 1 was 69°.

Name Date

Averaging Weather Temperatures *(Cont'd.)*

You need four copies of this chart. For each city, color in each column up to the line that marks the day's high and low temperatures. Then calculate the average temperature for each day.

CITY NAME



Average temperature
Day 1 _____

Average temperature
Day 2 _____

Average temperature
Day 3 _____

Average temperature
Day 4 _____

Name Date

Activity Sheet 1.6.

How Do Insects Communicate?

There are many kinds or species of insects that communicate or talk to each other. Some communicate by visual signal. Have you ever seen a firefly "flash"? Some communicate by sound. Have you ever heard a cricket "chirp"? Other insects communicate by releasing chemicals called *pheromones* to attract their mates. Did you know that moths do this? Also, some insects communicate by activity or movement. Have you seen a worker honey bee perform a "round dance" telling the other bees where the food is located?

Research insects and how they communicate by reading books on insects or reading sources on the Internet that provide valuable information regarding insect communication. Then complete the chart here: list three insects in each category, briefly explaining how they communicate.

"Science Fluency"

Look us up:

Definitions: (Write a definition for each word.)

Entomology: _____

_____

_____

Entomologist: _____

_____

_____

Pheromones: _____

_____

_____

Name Date

How Do Insects Communicate? *(Cont'd.)*

In each column, list three insects and how they communicate.

Insects that use visual signals 	Insects that use sound 	Insects that use chemicals 	Insects that use movement 
1.	1.	1.	1.
2.	2.	2.	2.
3.	3.	3.	3.

Name Date

Activity Sheet 1.7.

Can the Path of Light Be Bent?

In this activity, you will see how light appears to bend in the process called refraction.

Materials

hammer

small nail

empty coffee can with one end removed

2 or 3 sheets of 8½ × 11 black construction paper

masking tape

1½ cups of water

2-cup glass measuring cup

1 sheet of white construction paper or oak tag

flashlight

felt-tip marker

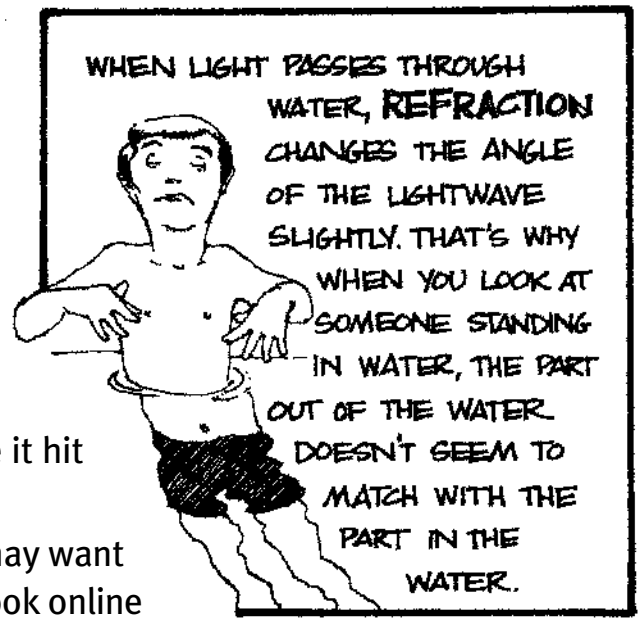
Procedure

1. Using the hammer and nail, make a tiny hole in the bottom of the coffee can. (**Caution:** Be careful when working with the hammer and nail, and look out for sharp edges around the nail hole.)
2. Completely cover the coffee can with black construction paper. Leave an opening for the pinhole on the bottom. Leave the other end open to insert the flashlight.
3. Lay the covered coffee can on its side on another sheet of black paper. Tape the can to the paper to keep it from rolling. Angle the can so that the pinhole is aimed at the measuring cup.
4. Fill the measuring cup with 1½ cups of water. Put the cup on top of and in the center of a sheet of white paper.

Name Date

Can the Path of Light Be Bent? *(Cont'd.)*

5. Completely darken the room. (It must be *absolutely* dark.) Turn on the flashlight, and aim it through the pinhole in the coffee can to the middle of the measuring cup.
6. Look at the path of the light. What happens when it reaches the cup of water?
7. Take your marker, and trace the path on the white paper. What is the direction once it hits water?



Conclusions

1. What did the path of light do once it hit the water?
2. Look up the word *refraction*. You may want to consult a science dictionary or look online for a reference dictionary to define it. What does it mean? Record the definition on your vocabulary form.
3. Can you make any science predictions regarding the angle of the light wave? Explain them on the back of this paper.

Name Date

Activity Sheet 1.8.

The Story of Chocolate, an Amazing Journey

We have delicious chocolate to eat thanks to families like the Hersheys in the United States and the Cadburys in England.

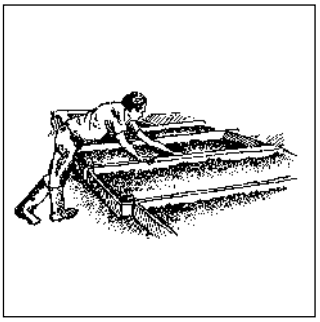
Did you ever wonder how chocolate is made? It starts with the growth of the cacao tree seedling and ends with the candy bar you buy. There are many steps along the way, which you can discover online. Visit the Cadbury Web site at www.cadbury.co.uk and www.cadburylearningzone.co.uk or the Hershey Web site at www.hersheys.com, and follow the amazing journey of chocolate, from the seedling to the finished product.

Then use the information you learned to unscramble the following pictures of the production of chocolate and correctly number them from 1 to 7. Write the numeral 1 under the first picture in the amazing journey of chocolate, and follow the same process numbering the rest.

Name Date

The Story of Chocolate, an Amazing Journey *(Cont'd.)*

On the line beneath the picture, correctly number the pictures from numeral 1 to numeral 7, as they occur in the production of chocolate.



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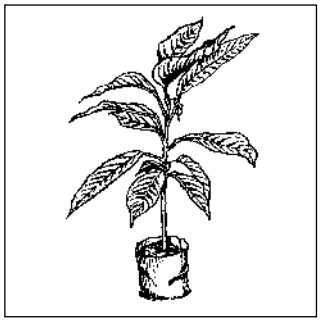

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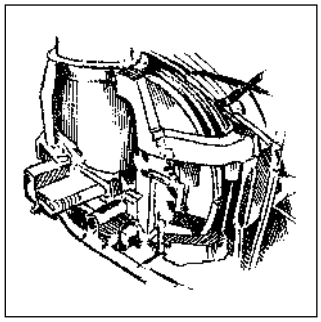

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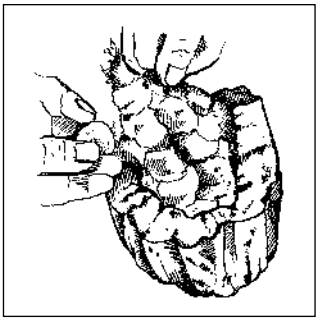

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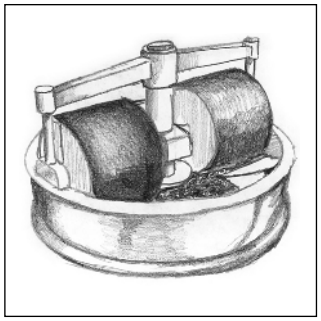

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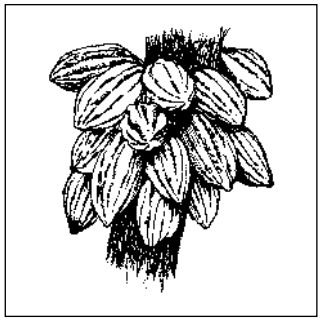

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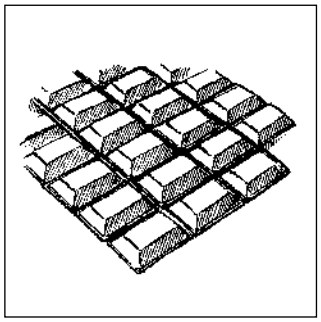

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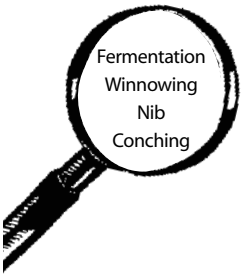
Name Date

The Story of Chocolate, an Amazing Journey *(Cont'd.)*

"Science Fluency"

Look us up:



Definitions: (Write a definition for each word.)

Fermentation: _____

_____

_____

Winnowing: _____

_____

_____

Nib: _____

_____

_____

Conching: _____

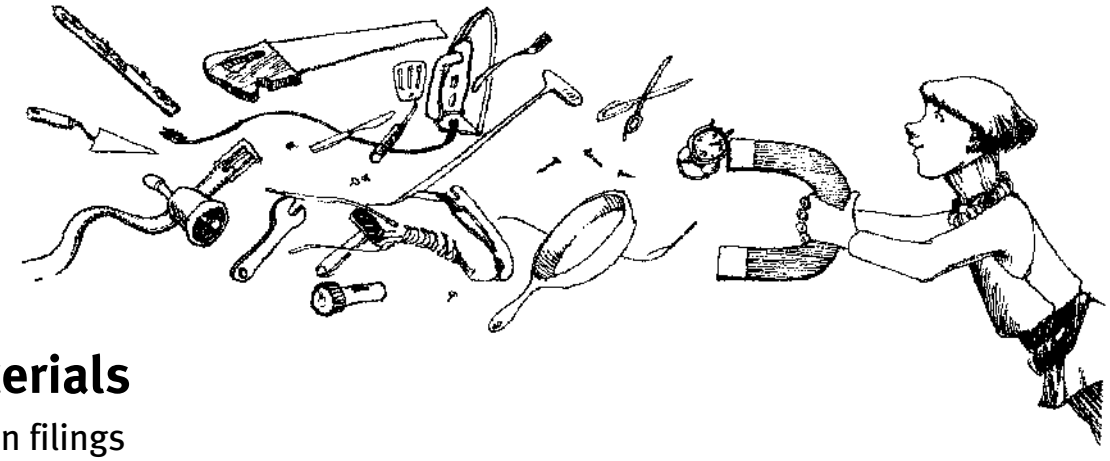
_____

_____

Name Date

Activity Sheet 1.9.

Observing Magnetic Lines of Force



Materials

iron filings

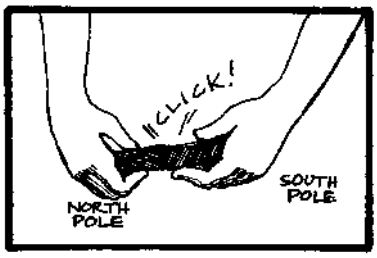
paper or oak tag

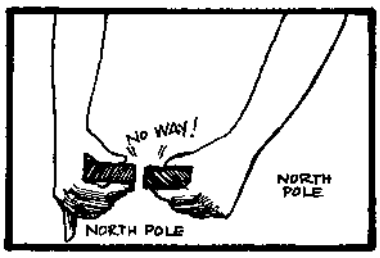
4 bar magnets

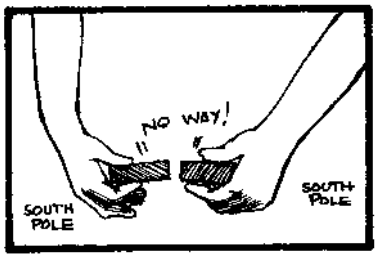
nail

Procedure

1. Sprinkle some iron filings on a piece of paper or oak tag. You may need two people to hold the paper.
2. Beneath the paper, experiment with the bar magnets. Start by holding one bar magnet under the paper. What happens to the filings?
3. Next, put two magnets under the paper. Put their like poles together. What happens to the filings?



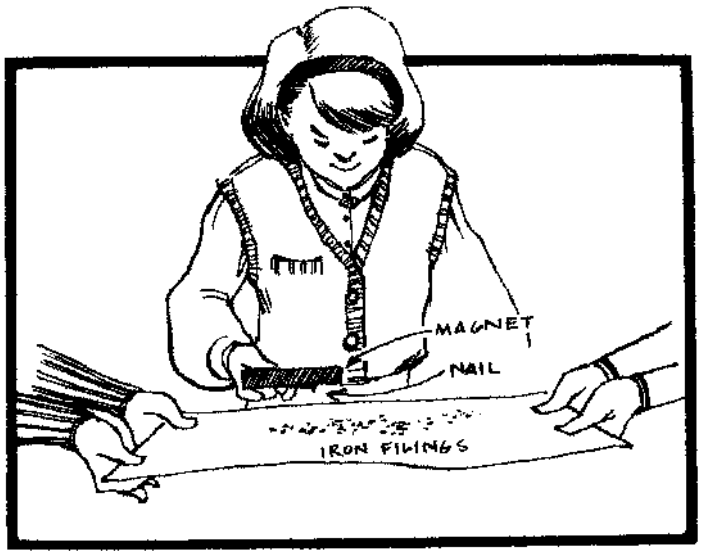




Name Date

Observing Magnetic Lines of Force *(Cont'd.)*

4. Now put the two magnets under the paper. Put their opposite poles together. What happens to the filings? Pull the ends farther apart. What is the pattern of the filings as you separate the ends?
5. Take the nail, and hold it above the filings on top of the paper. The magnet should not be near the nail.
6. Next, take the nail and hold it beneath the magnet on top of the filings as shown in the illustration.



7. What happens to the filings? Separate the magnet from the nail slowly by raising it higher in the air. What happens to the filings now?

Name Date

Observing Magnetic Lines of Force *(Cont'd.)*

Conclusions

1. Draw sketches of the lines of force for the like poles.

2. Draw sketches of the lines of force for the unlike poles.

3. Draw a sketch of the lines of force for the single magnet.

4. Was the nail able to act as a magnet at any time? Look up the term *temporary magnet* in a book on magnetism. Did the nail become a temporary magnet?

To understand more and witness an animation of an electric generator at work, visit this Web site: www.sciencejoywagon.com/physicszone/lesson/otherpub/wfendt/generatorengl.htm.

Two other great Web sites are: www.wvic.com/how-gen-works.htm and www.amasei.com/amateur/coilgen.htm.

Name Date

Activity Sheet 1.10.

Understanding Mold

In this activity, you will have the chance to learn about mold, a fuzzy material that often grows on plant or animal matter that is often damp or decaying.

Materials

6 empty baby food jars with lids

1 household sponge cut into 3 squares to fit the bottoms of 3 jars

water

scissors

3 bread rolls made without preservatives

pencil and paper to make labels

tongs

cellophane tape

plastic bag and twist-tie

Warning: Adult supervision required. Students with asthma or mold allergy should not participate.

Procedure

1. Put the three cut sponges in the bottom of three baby food jars.
2. Dampen the sponges with water until they are wet but not soaking.
3. Divide the three rolls into six equal parts—one for each jar. Put three pieces on top of the three wet sponges in the three baby food jars. Put the other three pieces of rolls into the remaining three baby food jars. Put the lids on top of all six jars.

Name Date

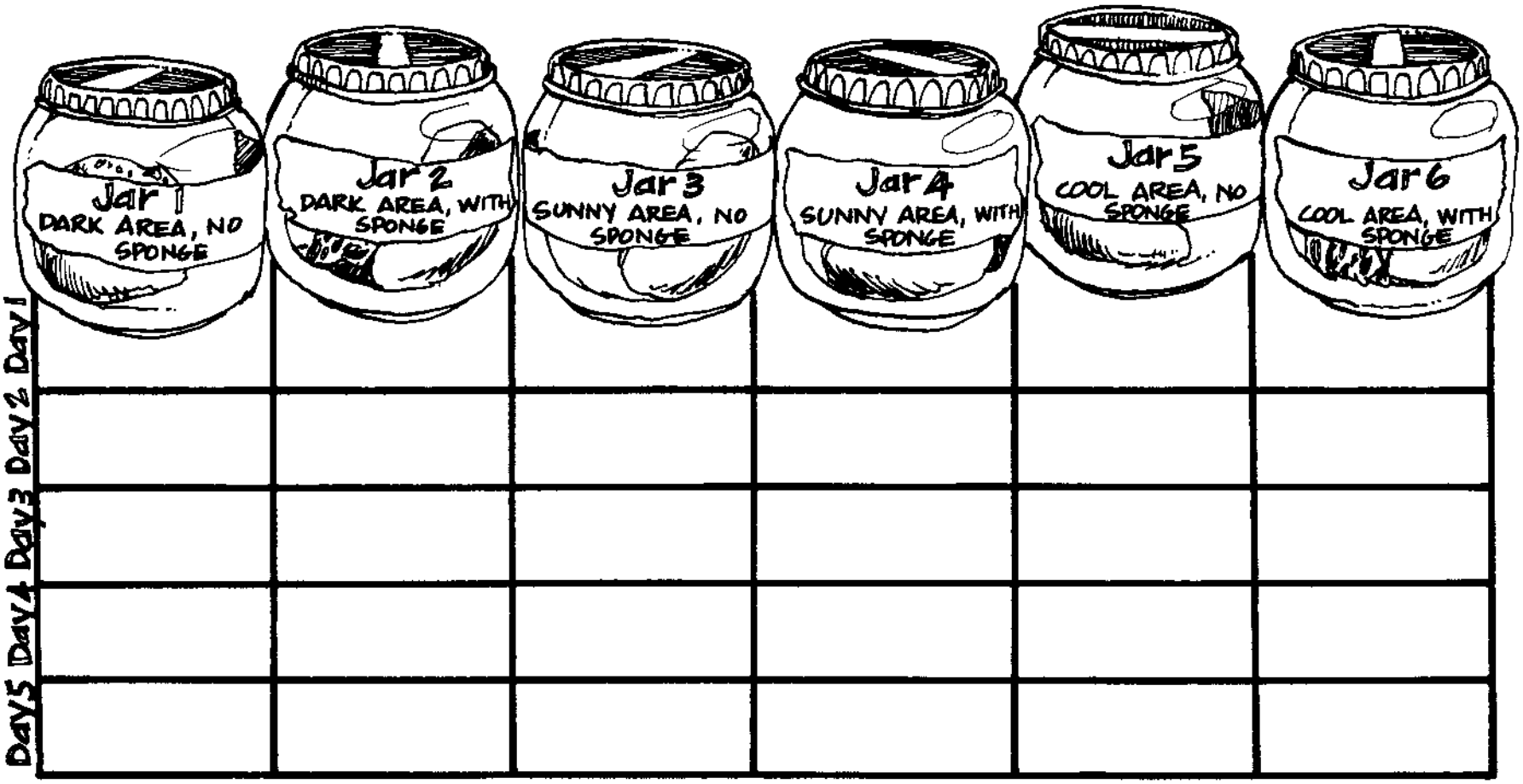
Understanding Mold *(Cont'd.)*

4. Make labels for the six jars to indicate locations of the investigation: one dark area (under the cabinet or in the closet), one sunny area (near the window), and one cool area (in an ice bucket or in the refrigerator but not the freezer). Tape the labels to the six jars. The jars will be placed in pairs, two jars in each of the three locations—one with a sponge and one without a sponge. Tape the labels to the jars.
5. Observe the jars for the next week. Look at the six jars every day and return them after observation. Record your results on the Mold Observation Chart.
6. After completing the chart on the last day, remove the bread from each jar, using tongs if necessary. Observe the growth and appearance of the molds. Place the bread and the sponges in a plastic bag, and tie it for your teacher to discard.

Conclusions

1. Complete the Mold Observation Chart.
2. What conditions encouraged the most growth of mold?

Mold Observation Chart



Name Date

Activity Sheet 1.11.

What Makes a Complete Circuit?

Materials

1 6-volt dry cell battery

1 small (3.5 to 6 volts) flashlight bulb

1 lightbulb holder, sized to fit lightbulb

scissors or wire cutters

2 1-foot pieces of coated flex wire

screwdriver

Procedure

1. Place the dry cell battery on a table. Examine the two terminals. Do they look alike?
2. Screw the small lightbulb into the lightbulb holder.
3. Use scissors or wire cutters to carefully strip the ends (remove the protective coating) from the flex wire so that the wire is exposed about 1 inch on each end.

4. Attach the ends of the two wires to the battery terminals and the lightbulb holder terminals. Use the screwdriver to unscrew the screws on the lightbulb holder. Once the wires are connected, tighten the lightbulb holder screws to secure the wire.

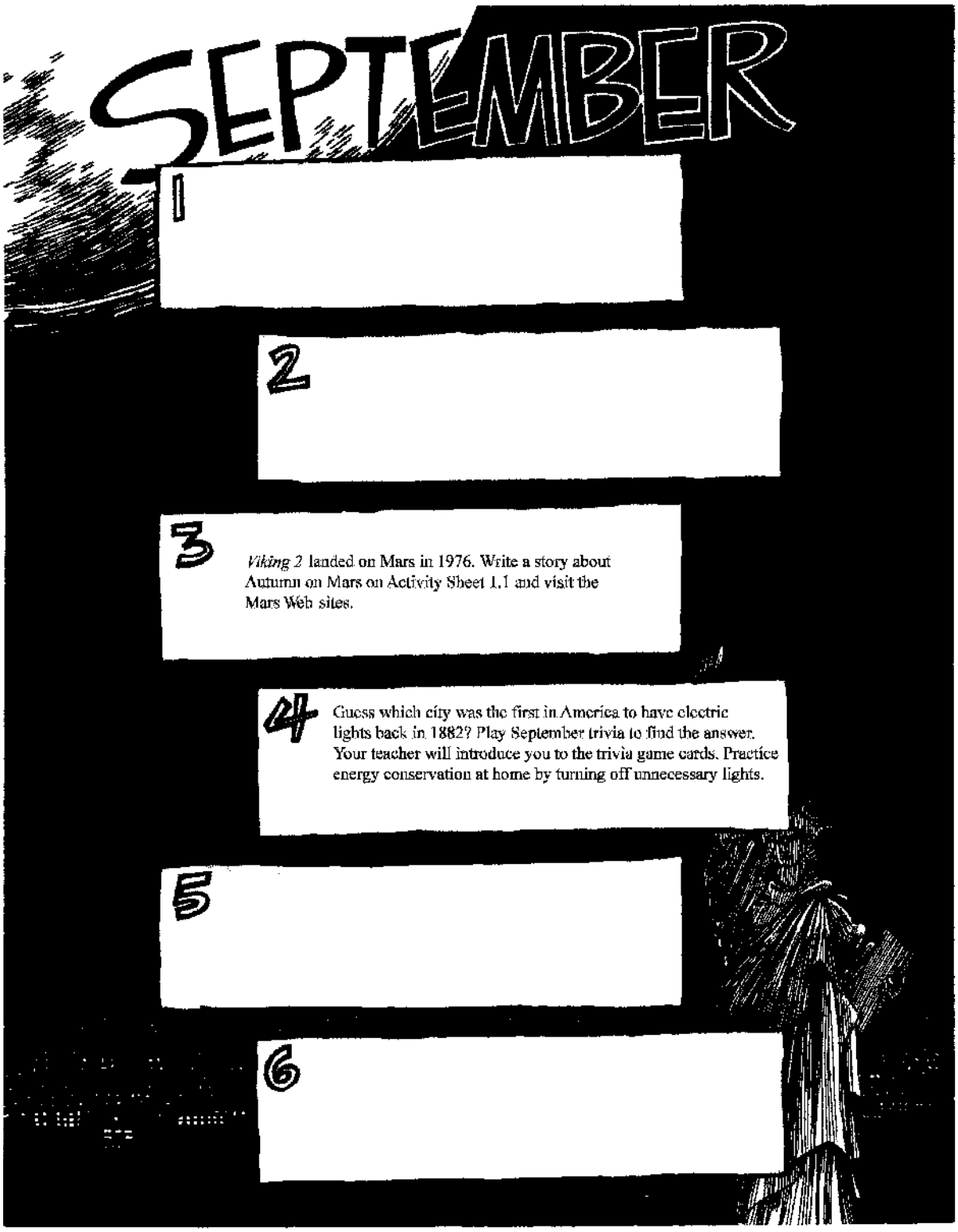
   An optional choice for connecting is available for viewing at http://www.dl.ket.org/physics/companion/thepc/compan/current/index.htm.

Name Date

What Makes a Complete Circuit? *(Cont'd.)*

Conclusions

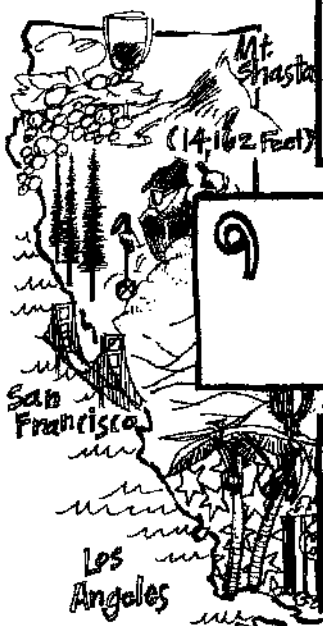
1. Why did you strip the coating from the wires?
2. What happens to the lightbulb when the wires are connected to the battery terminal and the lightbulb holder?
3. What happens to the light?
4. How does the battery help the electrons move? Do the electrons follow a certain path? Do they go in the same direction?



SEPTEMBER

7 Your teacher will show you how to use the Science Vocabulary List and your Mini-Report Form during this week.

8



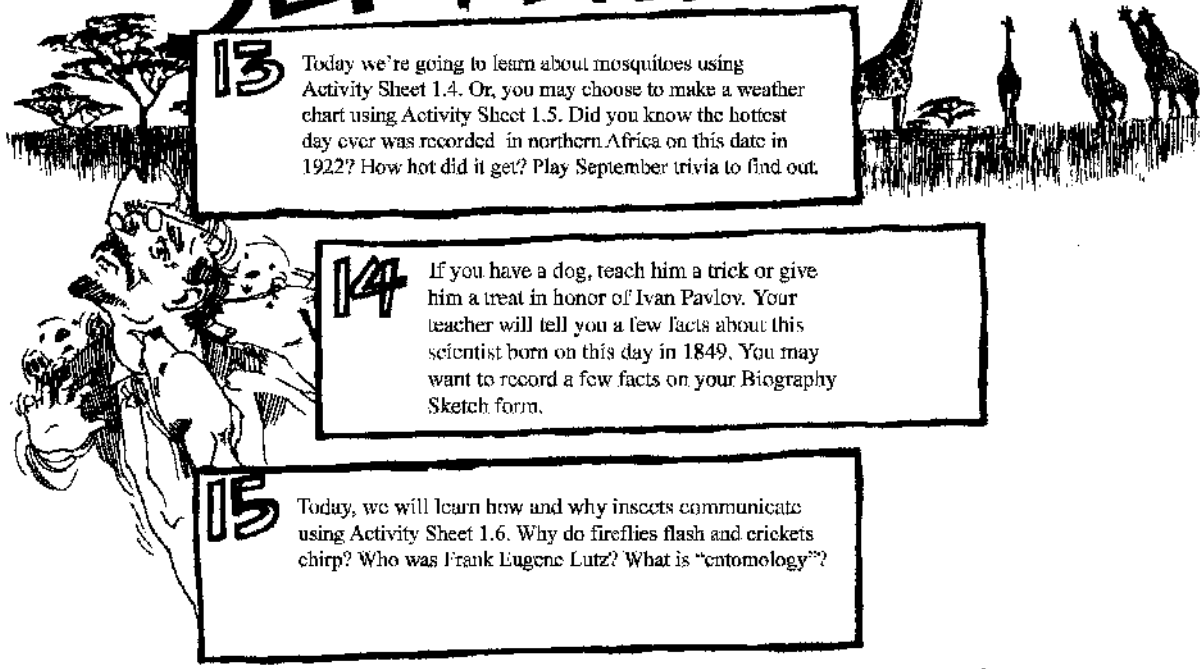
9 Name the large western state that celebrates its statehood today. Then plant and observe the growth of an avocado seed by using Activity Sheet 1.2. Visit the state Web site and write a Mini-Report on this special state.

10 A very important machine was patented by Elias Howe in 1846 on this day. What is that machine? Play the trivia game to find out. Then do Activity Sheet 1.3.

11 This famous dam operated its first hydroelectric generator in 1936. What is the name of the dam? Play the trivia game to find out. Can you find a picture of this dam in your library or on the Internet? Look for resource books or with a search engine under the name of the dam.

12 In 1959, the first spacecraft from Earth landed on the moon. To find out the name of this Soviet spacecraft, play the trivia game. Think: Where is Earth in its yearly orbit around the sun? While Earth rotates on its axis, what does the moon do?

SEPTEMBER



13 Today we're going to learn about mosquitoes using Activity Sheet 1.4. Or, you may choose to make a weather chart using Activity Sheet 1.5. Did you know the hottest day ever was recorded in northern Africa on this date in 1922? How hot did it get? Play September trivia to find out.

14 If you have a dog, teach him a trick or give him a treat in honor of Ivan Pavlov. Your teacher will tell you a few facts about this scientist born on this day in 1849. You may want to record a few facts on your Biography Sketch form.

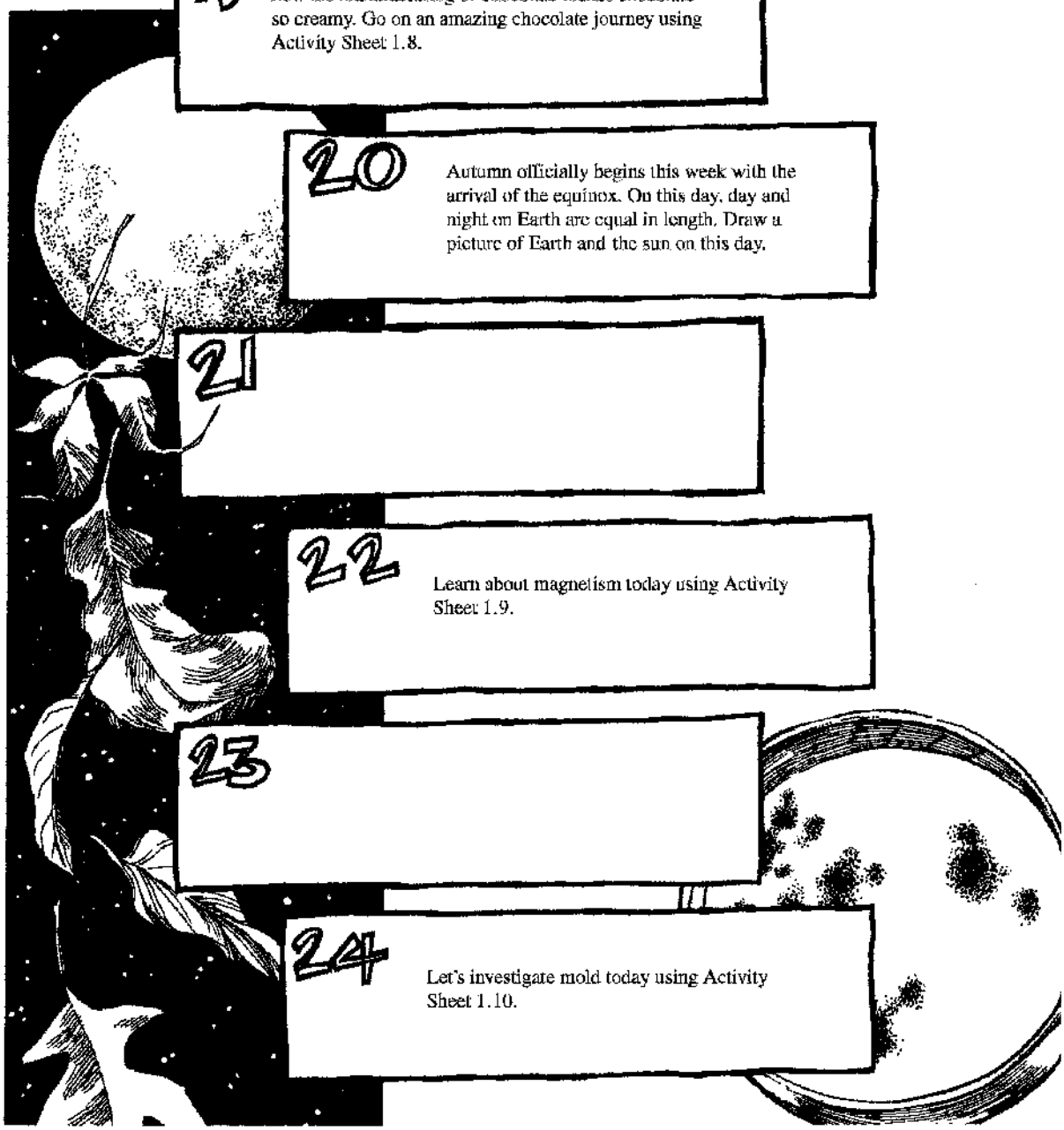
15 Today, we will learn how and why insects communicate using Activity Sheet 1.6. Why do fireflies flash and crickets chirp? Who was Frank Eugene Lutz? What is "entomology"?

16

17

18 Today you will experiment with light using Activity Sheet 1.7. What is *refraction*? Write its definition on your Vocabulary List.

SEPTEMBER



19 Celebrate the birthday of George Cadbury (1839). Learn how his manufacturing of chocolate makes chocolate so creamy. Go on an amazing chocolate journey using Activity Sheet 1.8.

20 Autumn officially begins this week with the arrival of the equinox. On this day, day and night on Earth are equal in length. Draw a picture of Earth and the sun on this day.

21

22 Learn about magnetism today using Activity Sheet 1.9.

23

24 Let's investigate mold today using Activity Sheet 1.10.

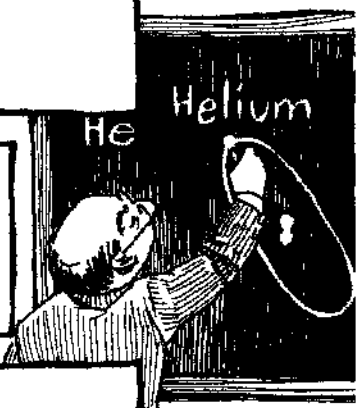
SEPTEMBER

25

26 Your teacher will tell you about a famous scientist named Archibald Hill. He was born on this date in 1886. Who was he?

27

28



29

30 Play September trivia game to find out about Hans Geiger. Then light a bulb by using Activity Sheet 1.11.