

McGraw-Hill Ryerson

DISCOVERING SCIENCE 8

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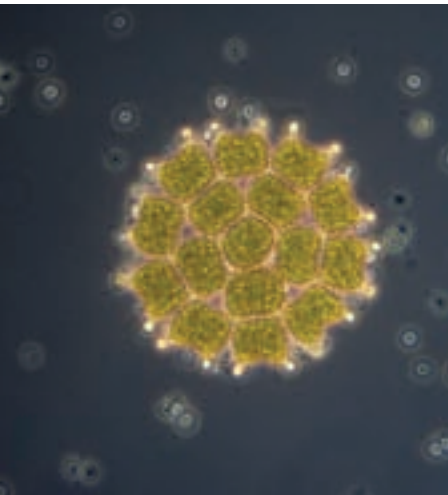
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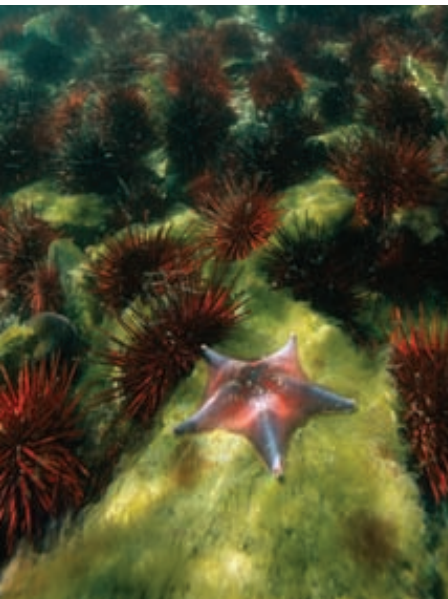
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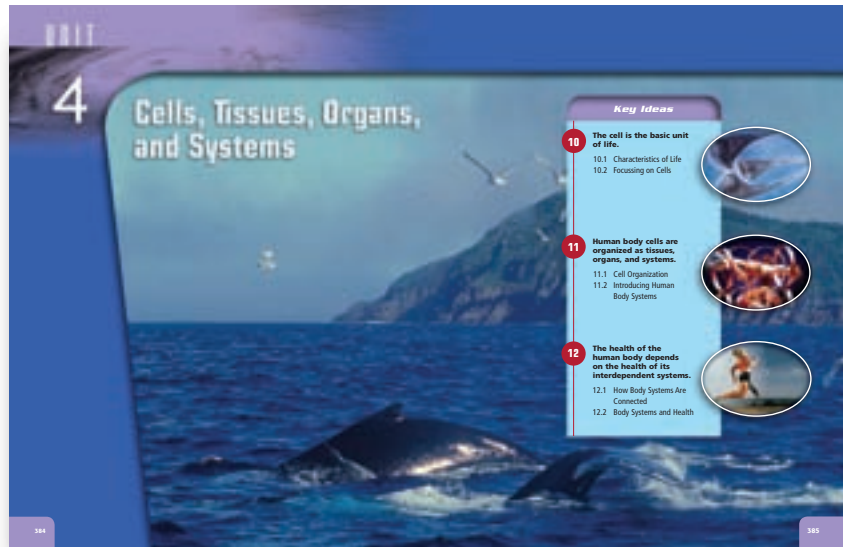


A Tour of Your Textbook

Welcome to *Discovering Science 8*. This textbook introduces you to the wonders of water systems, optics, fluids, and biological systems. To understand your book and how to use it, begin by taking a brief tour on the following pages. Then do the Scavenger Hunt on page xvii.

Unit Opener

- *Discovering Science 8* has four major units: Water Systems on Earth; Optics; Fluids; and Cells, Tissues, Organs, and Systems.
- Each unit opener photo is a window into the world of the Key Ideas you will study in the unit. The caption explains the photo.
- The unit opener identifies each of the unit's Key Ideas. These are the chapter titles.
- The small photos next to the Key Ideas are from the beginning of each chapter.



Getting Started

- The Getting Started helps you recall what you might already know about the Key Ideas in the unit.
- It helps you prepare for studying the unit by giving you the following:

- a short reading about an interesting topic related to the unit
- a short **Find Out Activity** so you can explore an idea related to the unit

The image is a screenshot of the 'Getting Started' page for Unit 4. On the left, there is a photograph of a tardigrade (water bear) on a mossy surface. Below the photo is a caption: 'This animal, called a tardigrade, is small enough that you need a magnifying device such as a microscope to see it.' To the right of the photo is a text block about tardigrades' survival capabilities. Further right is a 'Word Connect' box with a definition of 'Cryptobiosis'. Below these is a 'Living or Non-living?' section with a 'Find Out Activity' box. The activity includes a list of materials (magnifying glass, ruler, bowls, warm sugar water), a 'What to Do' section with numbered steps, and a 'What Did You Find Out?' section with numbered questions. The page number '388' is visible in the bottom left corner.

Chapter Opener

- The sentence of the chapter title is the Key Idea that you will study in this chapter.
- The chapter opener outlines What You Will Learn, Why It Is Important, and Skills You Will Use in the chapter.
- The **Foldables** exercise is a fun way to develop your study skills. Look for a Foldables exercise at the beginning of every chapter.

Chapter 10
The cell is the basic unit of life.

What You Will Learn

In this chapter, you will

- identify the characteristics of living things.
- identify and state the major functions of the parts of a compound light microscope.
- identify common structures of plant and animal cells, and explain their functions.

Why It Is Important

Understanding how cells function can help you understand how your body and other living systems function.

Skills You Will Use

In this chapter, you will

- learn the safe use of a microscope.
- use a light microscope to produce a clear image of cells.
- model the structures and functions of a cell.

FOLDABLES
Reading & Study Skills

Make the following Foldable to take notes on what you will learn in Chapter 10.

STEP 1 Collect 2 sheets of letter-size paper and layer them 2.5 cm apart vertically. (Hint: From the top of your index finger to your first knuckle is about 2.5 cm.) Keep the edges level.

STEP 2 Fold up the bottom edges of the paper to form 4 tabs.

STEP 3 Fold the papers and crease well to hold the tabs in place. Staple along the fold.

STEP 4 Label the tabs as shown. (Note: The first tab will be larger than shown here.)

Use all of the basic unit of life.
Living and Non-living Things
Cells
The Microscope

Summarize: As you read the chapter, summarize what you learn under the appropriate tabs.

388 MHR • Unit 4 Cells, Tissues, Organisms, and Systems Chapter 10 The cell is the basic unit of life. • MHR 389

Section Opener

- A number and a short title identify each new section in a chapter.
- The shaded light brown box below the section title contains a summary of the science concepts you will study in the section.
- The list of Key Terms in the margin identifies important new science terms that you will learn in the section.
- The **Did You Know?** margin feature, which appears in some section openers, is an interesting bit of information related to the section's topic.
- Some section openers include a **Find Out Activity** or a **Think About It Activity**.

1.2 Comparing Ocean Water and Fresh Water

Salt water differs from fresh water in several major ways. The main one is in its salinity. This characteristic gives ocean water a different density, freezing point, and boiling point than fresh water. Even though salt water and fresh water are connected, they play different roles in the water cycle.

Key Terms

density
freezing point
salinity

Although fresh water has tiny amounts of salt, ocean water is more than 200 times saltier. The amount of salt dissolved in a specific amount of water is called salinity. The average salinity in all the world's oceans is about 35 parts per thousand. This is the same as if you mixed 35 g of salt in 1 L of water. Salinity in sea water can differ depending on the location. Close to the equator, the salinity is high because of high rates of evaporation. When the water in the ocean transforms into vapour in the air, it leaves the salt behind. Water is very salty near the North and South Poles as well because when water freezes and changes into ice, it also leaves the salt behind. Near continents, the salinity is usually lower than in the middle parts of the ocean. The reason is that the fresh water from the rivers empties into the ocean and dilutes the salt water.

Did You Know?

Ocean water contains valuable minerals such as gold, copper, and uranium. However, before you consider mining the ocean's water, you should know that there is only about 1 part gold to every 250 billion parts of sea water. In other words, if you wanted a gram of gold, you would first have to make 250 thousand tonnes of ocean water evaporate.

Figure 1.5 Intense evaporation in tropical climates is the reason for high salinity in ocean waters near the equator.

14 MHR • Unit 1 Water Systems on Earth

1-2A Mini Distillation Find Out ACTIVITY

Have you ever walked along an oceanic beach on a sunny day and noticed patches of white on the sand where the tide has gone out? The white material is salt crystals that have been left behind after water has been evaporated by the Sun. Separating salt from salt water is a process called desalination. In this activity, you will simulate what happens when salt water evaporates.

Safety

- Be careful when handling glass.
- Be careful when handling hot equipment.

Materials

- 4 g salt
- microscope or magnifying glass
- watch glass
- laboratory balance
- 10 mL distilled water
- string rod
- 50 mL beaker
- 5 mL measuring spoon
- tongs
- hot plate or other heat source

What to Do

1. Observe a small sample of the salt under the microscope or magnifying glass. Describe the appearance of the crystals. Sketch one of the crystals in your notebook.
2. Measure and record the mass of the watch glass.
3. Put 1 g of salt into the beaker and add the distilled water. Stir until the salt is completely dissolved.
4. Carefully pour 5 mL of the solution into the watch glass.

5. At medium temperature, heat the watch glass on the heating plate (see below). Continue heating until the water has disappeared. Describe the appearance of the material left on the watch glass. This material is called "residue."

6. Wait until the materials have cooled down, and then measure the mass of the watch glass and the residue combined.

7. Clean up and put away the equipment you have used.

What Did You Find Out?

1. (a) Describe the residue left after the water had evaporated.
(b) What is the name of the residue?
2. Observe the residue under the microscope or magnifying glass. Is the residue's appearance any different from that of the original salt?
3. (a) To determine the mass of the residue alone, subtract the mass of the watch glass by itself from the mass of the watch glass and the residue. How does this amount compare with the original amount of salt?
(b) Is this what you would expect? Explain.
4. Describe how this method can be used to purify water.

Chapter 1 The water cycle plays a vital role on Earth • MHR 15

Find Out Activity

- This informal inquiry activity involves hands-on exploration, using simple materials and equipment.
- In these activities and in the investigations, you will use important science process skills, such as predicting, estimating, and hypothesizing.

Science Skill

- This box directs you to one of ten Science Skills sections at the back of the textbook. The Science Skills sections can help you with graphing, writing a hypothesis, using a microscope, and other skills.

Think About It Activity

- These activities look similar to Find Out Activities in the book but you do them at your desk. They do not require any special equipment.
- For these activities, you think about a particular idea related to the concepts you are studying in the section.
- You work on your own, with a partner, or in a group, and share your thoughts with your group or class.

Section Text and Activities

- The text of each section is divided into “chunks” to help you understand the content. Each chunk has a title.
- Each picture has a caption that explains what the picture is about.
- Key Terms and other terms you need to know are boldfaced in the text. Each boldfaced term is defined in the text and in the **Glossary** at the back of the textbook.
- **Reading Checks** contain questions that help you test your understanding of what you have just read.

- Find Out and Think About activities may appear throughout each section of a chapter as well as at the end of a section.

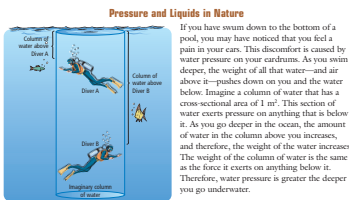


Figure 9.15 As you swim deeper in water, more pressure is exerted on you from the water above.

Figure 9.16 How do you feel pain in your ears when you swim underwater?



Atmospheric Pressure

Earth's atmosphere (the layer of gases surrounding Earth that are held by Earth's gravity) extends more than 160 km above Earth (see page 276 for details on Earth's atmosphere). Every layer of air exerts pressure on the layers below because all of the air particles are pulled toward Earth by the gravitational force. Imagine, when you extend your hand out, you are holding up the weight of a 160 km column of air. Close to Earth's surface, the entire atmosphere is pressing down on the air and compressing it. At higher levels, there is less air pressing down, and therefore, higher levels of air are not compressed as much as lower levels. As a result, air is less dense at higher altitudes.

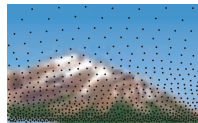


Figure 9.17 Because of Earth's gravitational pull, air particles (represented here by black dots) are most dense near the surface of Earth. The higher you go in altitude, the less dense the air particles, and therefore, the less atmospheric pressure (the amount of force that is exerted by the weight of the atmosphere) is exerted on you.

As you climb higher in the atmosphere, the amount of air above you decreases. Therefore, the air exerts less pressure on you. The air pressure inside your body, however, does not change as quickly. The pressure of any air that is trapped inside your body is still the same at the top of the mountain as it was when you were at the base of the mountain. How do you feel this difference in pressure between the inside and outside? Your eardrum is a very thin membrane that can move in response to a difference in air pressure. If the difference in pressure on either side of the eardrum becomes great, you experience a “pop” inside your ear as the pressure equalizes.

Reading Check

1. Why is water pressure greater the deeper you go?
2. Define compressibility.
3. Why are gases compressible?
4. Why are solids and liquids incompressible?
5. Why do your ears “pop” as your altitude increases?

Pressure and Liquids in Nature

If you have swam down to the bottom of a pool, you may have noticed that you feel a pain in your ears. This discomfort is caused by water pressure on your eardrums. As you swim deeper, the weight of all that water—and air above it—pushes down on you and the water below. Imagine a column of water that has a cross-sectional area of 1 m². This section of water exerts pressure on anything that is below it. As you go deeper in the ocean, the amount of water in the column above you increases, and therefore, the weight of the water increases. The weight of the column of water is the same as the force it exerts on anything below it. Therefore, water pressure is greater the deeper you go underwater.

Compressibility of Solids, Liquids, and Gases

Can you remember the particle theory's description of solids, liquids, and gases? One reason that gases have different properties than liquids and solids is because of the large spaces between the particles of gas. An interesting property of gases, then, is **compressibility**—the ability to be squeezed into a smaller volume, or space. Gases are compressible because gas particles are so far apart. The particles remain far enough apart, however, that they still behave like a gas, even when compressed.

What if a liquid or a solid was compressed? The empty space between liquid and solid particles is already so small that when a force is applied to compress them, they cannot move much closer together. Because they cannot be squeezed into a smaller volume, liquids and solids are said to be **incompressible**.

Internet connect

Submersibles are underwater vehicles capable of allowing humans to go down 2000 m below the ocean's surface. Find out what scientists are finding at these depths. Go to www.discovermagazine.com.

Suggested Activity

Investigation 9-22 on page 365.

When Archimedes stepped into the bath, he sank because he weighed more than the water he displaced. When he stepped onto the boat, however, a larger volume of water was displaced. Boats are often wedge-shaped, the more they are pushed down, the more water they displace. The weight of the displaced water exceeded the combined weight of Archimedes and the boat. Therefore, the buoyant force was greater than the force of gravity, and so Archimedes and the boat floated on the surface.



Archimedes' made the following conclusion now known as Archimedes' principle: *The buoyant force acting on an object equals the weight (force of gravity) of the fluid displaced by the object.*

Suggested Activity

Find Out Activity 9-18 on page 342.

9-1A The Amazing Floating Egg

Find out ACTIVITY

Do you think that different liquids exert a similar buoyant force? Find out for yourself in this activity.

What You Need

glass
water
fresh egg

What to Do

1. Place an egg in a glass half-full of water and observe what happens. Record your observations.
2. Stir salt into the water one teaspoon at a time, stop adding salt when the egg floats.
3. When the egg is floating, carefully add more tap water slowly and near the side of the glass so that the fresh water and the salt water do not mix. Continue to add water until the glass is almost full.

What Did You Find Out?

1. Give a possible explanation for why the egg floated in the salt water.
2. Provide an reasonable explanation for the behaviour of the egg when you added water in step 3.

Suggested Activity

- These small margin features indicate where your teacher may have you do one of the activities from the end of the section.

Conduct an Investigation

- These formal labs give you the opportunity to develop science skills using various equipment and materials.
- In these investigations, you can ask questions about science, make observations, and obtain results.
- You then analyze your results to determine what they tell you about the topic you are investigating.
- Safety icons and safety warnings alert you to any special precautions you should take to help maintain a safe classroom environment.
- Each investigation has one of the following focusses: inquiry, decision-making, or problem-solving.
- At least once in every unit, you will see an activity or investigation that is identified as "Core", which means that is an especially important topic of investigation.

9-1C Build a Density Tower **Conduct an INVESTIGATION**

Inquiry Focus

SkillCheck

- Observing
- Explaining
- Making conclusions
- Predicting

Do you think density plays a role when a fluid supports an object? Find out in this investigation.

Problem
How can you build a tower out of liquids that support each other as well as solids?

Safety

Do not pour substances down the drain. Dispose of them as instructed by your teacher.

Materials

- tall plastic jar or cup (or transparent container) with lid
- cork
- toothpick or wood chip
- paper clips
- rubber gloves
- water, with food colouring added
- vegetable oil

Procedure

1. Combine the water, oil, cork, woodchip, and paper clips in the container. Allow the substances to settle again. If the shaken tower appears different, draw a new labelled sketch. Wash your hands after this investigation.

Analyze

1. Make a data table and rank the substances in the density tower in order from least dense (1) to most dense (5).
2. Which substances are denser than a liquid? Which substances are less dense than water?

Conclude and Apply

3. Can a solid be less dense than a liquid? Use the particle theory to explain your answer.
4. Does the volume of an object determine its density?

Extend Your Skills

5. Add more items of your choice to the density tower, such as a rubber stopper, a small rubber duck, a small plastic toy, and a safety pin. Predict where you think these objects will settle in the tower. Then test your prediction.

End-of-Section Features

- These features give you an opportunity to learn about applications or explorations of the topic you have studied in the section.
- The “www” in “www science” stands for “wild, weird, and wonderful.” These features describe interesting and unusual science.
- **National Geographic Visualizing Science** features are exciting visual representations of a science topic.
- **Science Watch** features provide information on past and current scientific topics and research.
- **Science-Math Connect** features connect the science you learned in the section to math concepts.
- **Career Connect** features are interviews with people who have a career related to the unit.

Wild, Weird, Wonderful

This feature is available in the digital edition of the textbook.

Wave-Weathered Wonders

Newfoundland and Labrador's coasts are home to hundreds of spectacular examples of how wave action weathers and erodes coastal rock. Below are just a few of these incredible features. How many more examples of coastal formations in Newfoundland and Labrador can you think of?

The Arches

Located north of Parsons Pond on the Great Northern Peninsula, the Arches are a spectacular example of rock erosion by the ocean. Wave action eventually separated this piece of limestone from the coast. The two arches were once sea caves and the continuous wear from waves slowly transformed the caves into arches.

The Spout

Located on the East Coast Trail, the Spout is a popular attraction for hikers.

The Dungeon

The Dungeon is a huge sea cavern that collapsed. It is located near the tip of the Bonaventure Peninsula.

The Hole in the Wall

This feature is located near the community of Joe Batt's Arm. Wave and frost action eroded a weak section of rock material, creating a hole in the ocean-side cliff. The hole extends through the other side of the cliff, making it possible to see the valley on the other side.

Check Your Understanding

Checking Concepts

1. (a) Name the five major oceans on Earth.
(b) Which is the largest and which is the smallest?
2. Scientists speculate that most of the water that originally formed the oceans several billion years ago came from two different sources. What are these sources?
3. What are the wide, flat areas of ocean basins called?
4. What is the name of the ocean floor where two tectonic plates are moving apart?
5. What feature marks the location where one tectonic plate is pushed underneath another plate?
6. What is the steep side of the edge of a continent called?

Understanding Key Ideas

7. How did the continents move into their current location?
8. Explain how erupting volcanoes contributed to the formations of oceans.
9. Briefly describe each of the following features of the ocean floor and explain how they formed:
(a) ridge
(b) trench

10. The diagram below shows the cross section of an edge of a continent. Draw the diagram in your notebook and label each part.

11. Name three modern technologies that have helped scientists explore the deep ocean.

Pause and Reflect

As tectonic plates slide around, they occasionally bump into one another. Colliding plates are responsible for everything from building mountains to triggering earthquakes and volcanoes. In some places on Earth, tectonic plates move as fast as 17 cm a year. However, the average rate of movement is about 2.5 cm a year. With that information, calculate how far the average plate (a) has moved in your lifetime, and (b) how far it will move if you live to be 100 years old.

Chapter 2 Oceans control the water cycle • MHR 81

Check Your Understanding

- These section review questions test your new knowledge.

Pause and Reflect

- These features help you stop and think about what you now know about the topics explained in the chapter. They also make connections among ideas throughout your book.

Chapter Review

Prepare Your Own Summary
 In this chapter, you investigated how a wave model of light can help you understand the properties of light. Create your own summary of key ideas from this chapter. You may want to include graphic organizers or illustrations with your notes. Use the following headings to organize your notes:

- Early Ideas About Light
- Features of Waves
- The Visible Spectrum
- Reflection and Refraction
- Benefits and Risks of Using Electromagnetic Radiation

Checking Concepts

- Who was Pythagoras and what were his ideas about light?
- Describe one early technology that involved lenses.
- Who provided evidence for the wave theory of light?
- Name each of the following for the diagram below:
 (a) F
 (b) G
 (c) H
 (d) J

- What is the relationship between wavelength and frequency?
- Give examples of two ways in which light waves are similar to sound waves.
- Describe how you would measure the length of a water wave made by tapping the end of a pencil through the surface of a bowl of water.
- (a) What similarities do the waves of all colours of light share?
 (b) How do waves of different colours of light differ?
- What unit is used for measuring frequency?
- Describe the difference between wavelength and wave amplitude.

Use the diagram below to answer questions 11, 12, and 13.

- (a) What is the amplitude of Wave A?
 (b) What is the wavelength of Wave A?
- (a) What is the amplitude of Wave B?
 (b) What is the wavelength of Wave B?
- (a) What is the amplitude of Wave C?
 (b) What is the wavelength of Wave C?

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Chapter Review

- At the end of each chapter, these two pages can help you study for a chapter test.
- The guide under the heading “Prepare Your Own Summary” can help you summarize what you have learned in the chapter.
- The review questions help you recall, think about, and apply what you have learned.

Unit Summary

- This is a summary of the Key Ideas and Key Terms covered in the unit.
- The photographs next to the Key Terms are from the chapter openers to remind you of what you covered in that chapter.

Unit Summary

4.1 The cell is the basic unit of life.

- All living things have characteristics that demonstrate they are alive. These include the ability to grow, to move, to reproduce, and to respond to stimuli. (10.1)
- Some living things are very small and can be observed only with a microscope. (10.1)
- A compound light microscope is an important tool in the study of cells and microscopic living things. (10.1)

Key Terms

- arm
- base
- cell
- cell membrane
- cell theory
- cell wall
- chloroplast
- coarse adjustment knob
- compound light microscope
- cytoplasm
- iris diaphragm
- eyepiece
- fine adjustment knob
- light source
- magnification power
- mitochondria
- nucleus
- objective lenses
- organelle
- resolving power
- revolving nosepiece
- stage
- tube
- vacuole

4.2 Human body cells are organized as tissues, organs, and systems.

- A system is made up of parts that work together as a whole. (11.1)
- Each system of the human body consists of organs that are made up of different kinds of tissue. (11.1)
- Tissues are made up of many similar cells working together to carry out a specific function. (11.1)
- The human body is made up of eleven systems that, working independently and together, support and maintain the function of the whole body. (11.2)

Key Terms

- circulatory system
- digestive system
- excretory system
- muscular system
- nervous system
- organ
- organ system
- respiratory system
- system
- tissue

4.3 The health of the body depends on the health of its interdependent systems.

- All the cells of the body have the same basic need for energy, nutrients, and oxygen to carry out their functions. All cells also have the same basic needs for removing wastes. (12.1)
- Body systems work together to provide cells with what they need. Thus, they support themselves, one another, and the whole human body. (12.1)
- All body systems work together with other body systems. (12.2)
- If one system does not function properly, the whole network of systems is disrupted, and the whole body is affected. In the same way, maintaining the health of each body system keeps the network of systems, and the whole body, healthy. (12.2)
- Factors such as diet, exercise, and stress affect the health of the body systems. (12.2)

Key Terms

- genetic factors
- hormones
- lifestyle factors

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Chapter 12 The health of the body depends on the health of its interdependent systems. • MHR 461

End-of-Unit Project and Integrated Research Investigation

- Each Project lets you apply key concepts and skills from the unit. You complete the Project as part of a team.
- For the Integrated Research Investigation, you explore a unit-related topic. You have an opportunity to use current information that you have researched to do a report or presentation about that topic.

Project

Building an Optical Device

Modern optical technologies make use of combinations of lenses, mirrors, prisms, and other optical elements. In this project, you will design, build, and test a device that uses both mirrors and lenses.

Problem
 Design an optical device that uses at least three stages. You must use at least one mirror and at least one lens. You can use more if you choose. You will use the device to see behind you or around corners and to see distant objects clearly.

Safety

- use care when handling sharp glass objects and knives.

Materials

- variety of lenses (convex and concave)
- plane mirrors (one or more)
- cardboard
- tape
- scissors
- glue
- marker
- pencil

Criteria

- In a small group, design and build an optical device.
- The device must use both mirrors and lenses.
- The device must allow you to magnify tiny or distant objects, or to see behind you, over a barrier, or around a corner.
- The image must be clear.

Procedure

- With your group, brainstorm ideas about what you will build. The toy periscope shown here might give you some ideas.
- Make a sketch of the device with specifications including dimensions. List the materials that you will need.
- Collect the materials that you will need.
- Show your plans to your teacher and get approval before you begin to build your device.
- Assemble and test your device. If it does not work the way you intended for it to work, discuss what modifications you could make.
- If necessary, make modifications until your device functions properly.

Report Out

- In your small group, plan a presentation that you can report to your class.
 - Include the materials that you used.
 - Explain and demonstrate how your device works.
- Evaluate your device. Discuss how well it met your original expectations.

Mirrors for Reflecting Telescopes

You have learned a lot about mirrors and lenses and how they are used. In this investigation, you will do research to learn more about one specific application of mirrors for astronomical telescopes.

Background
 Galileo designed and built refracting telescopes. Isaac Newton designed and built the first reflecting telescope in 1668. These early telescopes were used to make important discoveries, such as the moons of Jupiter. Astronomers today, however, are building “bigger and better” telescopes. Most large astronomical telescopes are reflecting telescopes. Some, like the one shown here, do not even look like telescopes.

Find Out More
 Use print resources and the Internet, starting at www.discoveringtelescopes.ca, to learn more about mirrors for large astronomical telescopes. The following questions provide a starting point.

- Why are telescope mirrors so large? What can astronomers learn by using these extremely large mirrors that they cannot learn with smaller telescopes?
- What is a liquid mirror? How can a liquid have a curved surface necessary for collecting and focusing light?
- How big is the largest mirror for a telescope?
- How heavy are the large mirrors?

Report Out
 Prepare a poster, brochure, or electronic presentation that you could use to provide information to your classmates. Include photographs, a discussion, and a summary of the things that you learned through your research. If possible, give an oral presentation to your class.

All modern reflecting telescopes have very large mirrors. Some are as large as 10 m in diameter. Other telescopes have several different mirrors that work together. Some institutions are developing liquid mirrors like the one in the photograph on the right for use in telescopes.

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Chapter 6 Lenses reflect light to form images. • MHR 257

Unit Review

- At the end of each unit, these pages can help you study for a unit test.
- The review questions help you recall, think about, and apply what you have learned.

Visualizing Key Ideas

1. Copy the concept map about light into your notebook. Complete the concept map to help review Unit 2.

Using Key Terms

2. Indicate whether the following statements are true or false. If a statement is false, rewrite it to make it true.

- The amplitude of a wave is the distance from a crest to a trough.
- Infrared waves transfer heat.
- Translucent materials prevent light from penetrating the object.
- Refraction is the bending of the direction of a wave when it passes from one medium to another.
- Specular reflection scatters light, preventing the formation of an image.
- The angle of reflection is the angle between a reflected wave and the reflecting surface.
- A real image can be seen if you place a screen where the image is focused.
- When parallel rays are reflected from a convex mirror, they travel toward each other and pass through the focal point.
- Concave mirrors always spread light out, and therefore cannot form images.
- When a ray passes from a less dense medium to a more dense medium, the ray bends away from the normal.
- Far-sighted vision results when light rays produce an image before they reach the retina.
- Convex lenses always form virtual images.
- Microscopes have objective lenses but telescopes do not.
- A refracting telescope is made of a combination of lenses and mirrors.

Checking Concepts

- Describe one situation in which early technologies involving light made new scientific discoveries possible.
- Draw a light wave. Label amplitude, wavelength, trough, and crest.
- Explain how a prism affects white light that passes through it.
- How do transparent and translucent materials differ when light strikes them?
- Explain why light, but not sound, can travel through a vacuum.
- Describe one application of microwaves and one application of X rays.
- State the law of reflection.
- How can light rays that are involved in both specular and diffuse reflection all follow the law of reflection?
- Explain how a change in the speed of a wave can cause a change in the direction of a wave.
- Describe the characteristics of images formed by plane mirrors.
- When drawing a ray diagram for a concave mirror, one of the rays that you draw goes from the top of the object through the focal point to the mirror. How will you draw the reflected ray?
- What will be the characteristics of the image of an object that is between the focal point and twice the distance to the focal point from a concave mirror? If you need to, draw a ray diagram to analyze the image.
- Make a sketch to show how you would find the focal point for a convex mirror.
- Explain the difference between real and virtual images.

Other Features

Word Connect

- The Word Connect margin feature gives you additional information on scientific terms.

Explore More

- You can “Explore More” by following the suggestions in these features to investigate further a topic you have studied.

internet connect

- These features help you research more information about a topic.
- The *Discovering Science 8* web site links you to other web sites related to the topic you are researching.



- The safety icons are extremely important. They alert you to any safety precautions you should take, such as wearing safety glasses or a lab coat. Other safety icons used in *Discovering Science 8* are shown on page xxi.

Exploring *Discovering Science 8*

A Scavenger Hunt

Use your *Discovering Science 8* textbook to answer the following questions.

1. What is the web address for the textbook?
2. What four units will you study in *Discovering Science 8*?
3. How many Key Ideas are there in *Discovering Science 8*?
4. What is a Key Idea? How can the Key Ideas help you study?
5. Where can you find examples of the study tool called Foldables?
6. At the beginning of each section, there is a light brown shaded box containing text. What is the purpose of this shaded text?
7. Name four different margin features and describe what each one is about.
8. What is the purpose of the Reading Checks?
9. Activities have a green background. What are three different types of activities in this textbook?
10. What do the three w's stand for in "www science"?
11. If you needed information on how to make a graph, where would you look?
12. Where can you find the definitions for the bolded words in the text?
13. Before a unit test, what parts of the book could you use to review the concepts covered in the unit?
14. On a sheet of paper or in your notebook, sketch an outline of your classroom. Mark the location and types of safety equipment there. What pages in *Discovering Science 8* provide safety information?
15. Scan through *Discovering Science 8* to look for something you find interesting and did not know before you read it in this textbook.



Safety in Your Science Classroom

Become familiar with the following safety rules and procedures. It is up to you to use them and your teacher's instructions to make your activities and investigations in *Discovering Science 8* safe and enjoyable. Your teacher will give you specific information about any other special safety rules that need to be used in your school.

1. Working with your teacher ...

- Listen carefully to any instructions your teacher gives you.
- Inform your teacher if you have any allergies, medical conditions, or other physical problems that could affect your work in the science classroom. Tell your teacher if you wear contact lenses or a hearing aid.
- Obtain your teacher's approval before beginning any activity you have designed for yourself.
- Know the location of the nearest fire exit, safety blanket, eyewash station, first-aid kit, and fire alarm.
- Know the evacuation procedure for the science laboratory.

2. Starting an activity or investigation ...

- Before starting an activity or investigation, read all of it. If you do not understand how to do any step, ask your teacher for help.
- Be sure you have checked the safety icons and have read and understood the safety precautions.
- Begin an activity or investigation only after your teacher tells you to start.

3. Wearing protective clothing ...

- When you are directed to do so, wear protective clothing, such as a lab coat and safety glasses. Always wear protective clothing when you are using materials that could pose a safety problem, such as unidentified substances, or when you are heating anything.
- Tie back long hair, and avoid wearing scarves, ties, or long necklaces.
- Avoid wearing loose or baggy clothing in the science lab.
- Shorts, short skirts, sandals, and open-toed shoes are not permitted in the science lab.

4. Acting responsibly ...

- Work carefully with a partner and make sure your work area is clear.
- Handle equipment and materials carefully.
- Make sure stools and chairs are resting securely on the floor.



- If other students are doing something that you consider dangerous, report it to your teacher.

5. Handling edible substances ...

- Do not chew gum, eat, or drink in your science classroom.
- Do not taste any substances or draw any material into a tube with your mouth.
- Treat all substances in the lab as potentially dangerous or poisonous.
- This includes common household substances such as sugar and salt.

6. Working in a science classroom ...

- Make sure you understand all safety labels on school materials or those you bring from home. Familiarize yourself, as well, with the WHMIS symbols and the special safety symbols used in this book, found on page xxi.
- When carrying equipment for an activity or investigation, hold it carefully. Carry only one object or container at a time.
- Be aware of others during activities and investigations. Make room for students who may be carrying equipment to their work stations.

7. Working with sharp objects ...

- Always cut away from yourself and others when using a knife or razor blade.
- Always keep the pointed end of scissors or any pointed object facing away from yourself and others if you have to walk with such objects.
- If you notice sharp or jagged edges on any equipment, take special care with it and report it to your teacher.
- Dispose of broken glass in the glass disposal container as directed by your teacher.

8. Working with electrical equipment ...

- Make sure your hands are dry when touching electrical cords, plugs, or sockets.
- Pull the plug, not the cord, when unplugging electrical equipment.
- Report damaged equipment or frayed cords to your teacher.
- Place electrical cords where people will not trip over them.

9. Working with heat ...

- When heating an item, wear safety goggles and any other safety equipment that the text or your teacher advises.





- Always use heatproof containers.
- Point the open end of a container that is being heated away from yourself and others.
- Do not allow a container to boil dry.
- Handle hot objects carefully. Be especially careful with a hot plate that looks as though it has cooled down.
- If you use a Bunsen burner, make sure you understand fully how to light and use it safely.
- If you do receive a burn, inform your teacher, and apply cold water to the burned area immediately.

10. Working with various chemicals ...

- If any part of your body comes in contact with a liquid substance, wash the area immediately and thoroughly with water. If you come in contact with dry or powdered chemicals, brush off as much of the substance as possible and then wash thoroughly with water.
- Always handle substances carefully. If you are asked to smell a substance, never smell it directly. Hold the container slightly in front of and beneath your nose, and waft the fumes toward your nostrils.
- Hold containers away from your face when pouring liquids.

11. Working with living things ...

- Wash your hands after handling living organisms.

On a field trip:

- Try not to disturb the area any more than is absolutely necessary.
- If you move something, do it carefully, and always replace it carefully.
- If you are asked to remove plant material, remove it gently, and take as little as possible.

In the classroom:

- Treat living creatures with respect.
- Make sure that living creatures receive humane treatment while they are in your care.
- If possible, return living creatures to their natural environment when your work is complete.









12. Cleaning up in the science classroom ...

- Clean up any spills, according to your teacher's instructions.
- Clean equipment before you put it away.
- Wash your hands thoroughly after doing an activity or an investigation.
- Dispose of materials as directed by your teacher. Never discard materials in the sink unless your teacher requests it.

Safety

Safety Symbols

The following safety symbols are used to alert you to possible dangers. Be sure you understand each symbol used in an activity or investigation before you begin.

	Disposal Alert This symbol appears when care must be taken to dispose of materials properly.
	Thermal Safety This symbol appears as a reminder to use caution when handling hot objects.
	Sharp Object Safety This symbol appears when a danger of cuts or punctures caused by the use of sharp objects exists.
	Electrical Safety This symbol appears when care should be taken when using electrical equipment.
	Skin Protection Safety This symbol appears when use of caustic chemicals might irritate the skin or when contact with micro-organisms might transmit infection.
	Clothing Protection Safety A lab coat must be worn when this symbol appears.
	Fire Safety This symbol appears when care should be taken around open flames.
	Eye Safety This symbol appears when a danger to the eyes exists. Safety goggles must be worn when this symbol appears.









Instant Practice—Safety Symbols

Find four of the safety symbols in activities or investigations in this textbook. Record the page number and the title of the investigation or activity in which you found the symbol. What are the possible dangers in the activity or investigation you have identified that relate to each symbol?

WHMIS Symbols

Look carefully at the WHMIS (Workplace Hazardous Materials Information System) safety symbols shown here. The WHMIS symbols are used throughout Canada to identify dangerous materials used in all workplaces, including schools.

Make certain you understand what these symbols mean. When you see these symbols on containers in your classroom, at home, or in a workplace, use safety precautions.

	
Compressed Gas	Flammable and Combustible Material
	
Oxidizing Material	Corrosive Material
	
Poisonous and Infectious Material Causing Immediate and Serious Toxic Effects	Poisonous and Infectious Material Causing Other Toxic Effects
	
Biohazardous Infectious Material	Dangerously Reactive Material

Instant Practice—WHMIS

Find any two WHMIS symbols on containers in your school, or ask a parent or guardian to look for WHMIS symbols in a workplace. Record the name of the substance on which the symbols are used, and where you or your parent or guardian saw the containers stored. What dangers are associated with the substance in each container?