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11.2 Heat Affects Water

Grade 7

Student Book pages 322–328

Time: 60 min

Vocabulary:

- climate
- cycle
- hurricanes
- ocean current
- precipitation
- tornadoes
- water cycle
- wind

Line Masters:

- LM 7D-25
- LM 7D-26

Skills Worksheets

- LM 1
- LM 7

Assessment Rubrics

- LM 2

11.2 Obtaining Water Quality

Grade 8

Student Book pages 317–323

Vocabulary:

- contaminants

Line Masters:

- LM 8D-10
- LM 8D-11

Skills Worksheets

- LM 1
- LM 7

Assessment Rubrics

- LM 2

BEFORE

Expectation Assessment Chart

STSE and Basic Concepts Expectations	Grade 7	Assessment Opportunities
3.5 explain how heat is transmitted through convection, and describe natural processes that depend on convection (e.g., <i>thunderstorms, land and sea breezes</i>)		<ul style="list-style-type: none"> • Check and Reflect, p. 328: 1–3, 7 • Chapter 11.0 Review, pp. 340–341: 9, 12–15 • Chapter 11.0 Quiz: 8, 14, 24 • Unit D Review, pp. 372, 374–375: 12, 34, 39–41 • Unit D Test: 24, 26
3.6 explain how heat is transmitted through radiation, and describe the effects of radiation from the Sun on different kinds of surfaces (e.g., <i>an ice-covered lake, a forest, an ocean, an asphalt road</i>)		<ul style="list-style-type: none"> • Check and Reflect, p. 328: 3, 7 • Chapter 11.0 Review, pp. 340–341: 8, 13–15 • Chapter 11.0 Quiz: 14, 23 • Unit D Review, pp. 372–375: 11, 25, 34, 39, 41 • Unit D Test: 8, 24, 25
Grade 8		
2.2 investigate how municipalities process water (e.g., <i>obtain it, test it, and treat it</i>) and manage water (e.g., <i>distribute it, measure consumption, and dispose of waste water</i>)		<ul style="list-style-type: none"> • Check and Reflect, p. 323: 2–5; p. 332: 1–5 • Chapter 11.0 Quiz: 6, 22, 14, 15, 24 • Unit D Test: 14, 18, 26
2.3 test water samples for a variety of chemical characteristics (e.g., <i>pH, salinity, chlorine</i>)		<ul style="list-style-type: none"> • D27 Inquiry Activity, p. 322 • Unit D Review, p. 364: 15, 16
2.7 use a variety of forms (e.g., <i>oral, written, graphic, multimedia</i>) to communicate with different audiences and for a variety of purposes (e.g., <i>using appropriate scientific conventions, draw a labelled diagram of a water treatment facility; create a brochure about the safe use of wells and septic tanks</i>)		<ul style="list-style-type: none"> • Check and Reflect, p. 316: 6 • Chapter 11.0 Review, p. 335: 9 • Unit D Review, pp. 364–365: 21, 24 • Chapter 11.0 Quiz: 22 • Unit D Test: 21
2.1 follow established safety procedures for the use of apparatus and chemicals (e.g., <i>when using water-testing equipment and water-testing chemicals</i>)		<ul style="list-style-type: none"> • D27 Inquiry Activity, p. 322 • Unit D Test: 6

Science Background

Grade 7

In section 11.2, students learn about the relationships between water and the atmosphere and heat flow in the water cycle. They learn that the Sun shines more directly on the regions above and below Earth’s equator. Therefore, Earth is not heated equally by the Sun’s radiation. This means that Earth’s land and water surfaces receive different amounts of heat from the Sun. The results are air currents (wind) and ocean currents. These currents provide a wide variety of weather conditions across our planet, including hurricanes and tornadoes.

You could introduce this section with dramatic videos of weather disturbances, which can be found on the Internet. Several free videos are available for downloading.

Grade 8

Section 11.2 discusses water quality in greater detail. Students learn that the components of water are categorized as biological, chemical, and physical, and that some of these components can be harmful if consumed by humans and animals. The section goes on to explain how underground and aboveground drinking water supplies are treated.

The Water Treatment Plant

A detailed diagram of a water treatment plant is given on student book page 320. Students learn that tests are performed on our drinking water to check for the presence of certain bacteria, a broad range of chemical substances such as lead and nitrates, and radioactivity. Nitrates and nitrites are analyzed quarterly in the drinking water treatment systems. If levels are found to exceed maximum levels, an “adverse” event is considered to be present. Such an event must be reported to the government Medical Officer of Health, and that office’s guidelines must be followed. Nitrite is especially dangerous if it gets into our drinking water. It competes with hemoglobin in the blood for oxygen. This is of concern in infants because of their size. It can cause a rare condition known as “Blue Baby Syndrome.”

Regarding D27 Inquiry Activity: Be a Water Quality Inspector

The pH test – The pH test is a measurement of the concentration of hydrogen ions in a solution. A logarithmic scale from 0 to 14 is used, with 7 being pH neutral. All pH measurements above 7 (i.e., 8–14) are basic, with 14 being the strongest base. All pH measurements below 7 (i.e., 6–0) are acidic, with 0 being the strongest acid.

pH Values for Some Common Solutions	
Solution	pH Value
battery acid	0
vinegar	2
acid rain	4
pure water	7
seawater	8
ammonia	11
liquid drain cleaner	14

Measuring chlorine content – The addition of silver nitrate to a water sample containing sodium chloride (salt) causes a precipitate of silver chloride, which gives the sample a milky appearance. This would be a positive test for the presence of chlorine in the form of sodium chloride in the water sample. This test is done on ocean-going ships to determine whether ocean water (salt water) has contaminated the cargo. **Note: Responsible disposal of silver nitrate is necessary. Contact your local hazardous waste department for instructions.**

For additional information on these topics, go to ScienceSource.ca.

Preparing for Differentiated Instruction

DI
Grade 7

For this section, students need to understand that Earth is not heated equally by the Sun's radiation. You can easily illustrate this concept using a globe and a flashlight.

Grade 8

For this section, students need to understand the factors that affect water quality and that water must be tested and treated before it is safe to drink. You can show the testing and treatment of water with a class demonstration (see D27 Inquiry Activity: Be a Water Quality Inspector) and by discussing Figure 11.13.

ESL/ELL Strategy

Grade 7

- To help students understand the vocabulary in this section, you can provide them with a set of paper tags that each have a concept, a vocabulary term, a definition, or an explanation. At their desks, students can match each concept or vocabulary tag with a definition or explanation tag. Alternatively, you can create a one-page matching exercise for students.

Grade 8

- Consider using LM 8D-11 Answers to Obtaining Water Quality: Fill in the Blanks to teach the terms from this section in context. Have students use translation dictionaries to look up the words in their first language.
- Partner English language learners with proficient English-speakers to read the text and complete LM 8D-10 Obtaining Water Quality: Fill in the Blanks. Have students take turns reading the paragraphs and completing the blanks on the worksheet.

DURING

D28 Starting Point: Wonderful Water
Grade 7 Student Book page 322
D25 Starting Point: How Much Do You Know about Your Drinking Water?
Grade 8 Student Book page 317
Grade 7/8


Have both grades complete the Starting Point activities as they both deal with the topic of water. Use the grade 7 writing activity as an introduction to the discussion topic of the grade 8 activity. Ask students to share some of their writing before moving on to the discussion.

Grade 7

D28 Starting Point: Wonderful Water
Student Book page 322

Activity Notes

Students are asked to do some quick writing on the topic "How Do I Depend on Water?" Prompt students to use a different paragraph for each new category of use. Some examples of categories are cleaning, drinking, and leisure (e.g., swimming, surfing). While most students may limit their writing to liquid water, some students will quickly realize that frozen water (i.e., snow, ice) and water vapour are also important to humans. These students could include skiing, snowboarding, curling, ice-skating, and hockey in their writing.

Grade 8

D25 Starting Point: How Much Do You Know about Your Drinking Water?
Student Book page 317

This activity gives students the opportunity to really think about their drinking water. They may be surprised by how little they know about it.

Activity Notes

Suggestion: Find out ahead of time what body of water supplies the drinking water in your school. Also determine whether the water is chlorinated. Then make note of any water storage facilities that exist in your school neighbourhood. Try the website for the municipality to obtain this information. A call to the Public Works department will usually prove to be successful as well.

Answers to Questions

1. Students' answers may vary if rural students are in the class. Otherwise, students should have the same answer.

Continued ➔

Section 11.2 65

2. Students' answers may vary if rural students are in the class. Otherwise, students should have the same answer. If the school receives water from a municipal treatment plant, the answer will be, "Yes, the water is chlorinated."
3. Students' answers will vary depending on the community. Sample answers: a water tower, an aboveground (but covered) reservoir.

Teaching Suggestions

Grade 7/8



- Use a modified jigsaw strategy with both grades to teach section 11.2:
 - Assign same-grade groups of three or four students per subsection of section 11.2. You may need to separate or combine sections depending on the number of students in the class and the number of students in each grade. Provide each group with chart paper and markers.
 - Explain to students that each group is responsible for reading and understanding their assigned subsection, identifying key points, writing the key points on chart paper, and presenting its information to the rest of the class.
 - Ensure each student in the group is assigned a role (e.g., reader, recorder, discussion facilitator, presenter).
 - When students are finished, have each group present to the whole class. Remind students to take notes on the other groups' presentations as they are responsible for the information from the entire section. Alternating presentations between grades will give students sufficient time to catch up on their note-taking between presentations.
 - Once all groups have presented, ask the grade 7 students to complete LM 7D-25 Heat Affects Water: Fill in the Blanks and the grade 8 students to complete LM 7D-10 Obtaining Water Quality: Fill in the Blanks. Pair English language learners with English-speaking students to complete the activity.

Grade 7

- Have the grade 8 students complete the Learning Checkpoint activity on page 321 of their student book while you discuss the following points with the grade 7 students:
 - Ensure students understand that when scientists talk about cycles in nature, they are referring to a sequence of events that repeats. Later in this unit, students will learn about the rock cycle.
 - The two parts to Figure 11.10 illustrate that water does indeed "disappear," at least from view. In reality, the water is not gone from the face of the Earth; it has merely returned to the atmosphere.
 - There are two changes of state involved in all forms of precipitation in the water cycle: water must evaporate from Earth's land and oceans, and water must condense and fall. If the temperature is sufficiently cold, the water droplets may partly or entirely freeze and fall as sleet or snow, or perhaps even as hail.
 - In introducing students to Weather and the Water Cycle, Figure 11.13 is important since it illustrates that the Sun's energy is more direct at the equator than at latitudes above or below the equator. This is why it is easy to sunburn at lower latitudes. Note that Figure 11.13 shows Earth to be vertical in orientation in order to simplify the drawing. In reality, Earth is tilted at an angle of 23.5°. (This is an angle, not a temperature.) However, Earth's tilt is not relevant to this discussion of how the Sun heats our planet.
 - Earth is not heated equally by the Sun's radiation. Illustrate this concept using a globe and a flashlight. If the flashlight beam is too wide, the front of the flashlight can be covered by a piece of cardboard (or a piece of aluminum foil) that has a 1-cm hole cut in it. The globe could be tilted at the correct angle of 23.5°, or it could be held as shown in Figure 11.13. Hold the flashlight so that it shines directly on Earth's equator. Allow students to see the size of the circle (or oval) of light that falls on the globe's surface. Move the flashlight vertically up or down so that it shines on a different part of the globe, as shown by the different bands of the Sun's rays in Figure 11.13. Students will easily see that the light beam from the flashlight covers a larger portion of the globe's surface at parts of the globe away from the equator. Since the flashlight is emitting the same strength of light, the brightness of the light on each part of the globe away from the equator must be less. Similarly, the Sun's light shines less directly and less strongly on northern and southern regions of Earth than it does at the equator.

- Page 325 introduces students to ocean currents and their effect on climate. In Figure 11.14, note that eastern Canada receives a warm-water ocean current from the southern United States but also receives a cold-water ocean current from Greenland and northern Canada. Eastern Canada experiences hot summers and cold winters. Canada’s west coast, however, receives only a warm-water ocean current, which produces a more moderate climate (and frequent El Niño conditions)—rainy winters with less snow and moderate temperatures in summer. A question later in the unit asks students to explain why there are different climate conditions on Canada’s west and east coasts.

D26 Learning Checkpoint: The Water You Drink

Grade 8 Student Book page 321

Grade 8

You may want to use the students’ answers as additional formative assessment.

Answers to Questions

1. Students’ answers may vary. Sample answers: The water treatment process cannot remove all contaminants from our drinking water. Polluted water sources require more treatment than non-polluted sources, and water treatment is very expensive.
2. A microscopic parasite called *Giardia* causes the illness called “beaver fever.” Water in a treatment plant is filtered through extremely fine filters and is also usually chlorinated to prevent this illness.
3. Chlorine is sometimes added in the water treatment process to kill harmful micro-organisms that were not removed by the filtering processes.

**D30 Inquiry Activity: Bottled Weather—
Teacher Demonstration**

Grade 7 Student Book page 327

This grade 7 Inquiry Activity can be used as a demonstration for both grades. Pair grade 7 and grade 8 students together to ensure that all students have access to the grade 7 student book.

Grade 7/8**D30 Inquiry Activity: Bottled Weather—Teacher Demonstration**

Student Book page 327

Anchor Activity

This activity is suited to a range of learners.

Purpose

To have students a model of part of the weather cycle

Safety Precautions

Be careful when using matches. Do not smell the vapours from the match after striking it.

Activity Notes

- In this fascinating demonstration, you create a cloud inside a 2-L plastic bottle using only a match and warm water. Clouds form when water vapour cools down sufficiently to form tiny water droplets that are visible. This is exactly what happens in the atmosphere when warm, moist air rises and then cools: water droplets in the rising air form into clouds. It is a little tricky to see the cloud inside the bottle, but it is worth the effort. You or students may need to try the activity more than once to see the cloud.
- Viewing the bottle with a backdrop of black paper or another dark, vertical surface is helpful. Alternatively, if time is available, groups of students can try this activity. Note that groups of students lighting matches in a classroom may cause the classroom to have an odour. For this reason, you may wish to use a well-ventilated room if students are trying this activity.
- In step 3, you use a match that has been extinguished to add smoke particles into the bottle. After a few seconds, the smoke is no longer visible because it spreads out inside the bottle. But the tiny particles in the smoke are still floating around in the bottle. If you successively squeeze and release the sides of the plastic bottle as directed in step 6, students should be able to see a cloud inside the bottle.

Grouping: whole class

Time: 10 min

Skills: analyzing patterns, reporting results, observing, predicting, inferring

Materials & Equipment:

- 2 L or smaller colourless plastic bottle with cap (remove the label)
- warm water
- booklet of matches
- sheet of black paper
- safety goggles for each student and the teacher

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Explaining Why the Cloud Forms in the Bottle

- Invisible water molecules (water “particles”) are in the air and atmosphere all around us. We call them “water vapour.” Because water vapour is a gas, the particle theory predicts that the water particles are free to move around. By exhaling (breathing out), we add more water vapour to the air. (Just breathe a heavy breath onto a window or mirror and you will see some of this water vapour leaving your lungs.) You may wish to demonstrate this for students on a classroom window.
- When you squeeze the sides of the bottle, the pressure inside the bottle increases and forces the water particles closer together. Releasing the bottle allows the air inside the bottle to expand. Just as in nature, expanding air cools down as the water particles move farther apart. The temperature of the air inside the bottle drops slightly. This cooling forces the water particles to stick together more easily. They form larger droplets that we can see inside the bottle. In nature, these visible droplets are called “clouds.”
- Adding the smoke from the burning match to the bottle helps the cloud-forming process. Water particles will group together more easily if there are some solid particles in the air to act as a centre. The invisible smoke particles act as centres. In Earth’s atmosphere, the invisible particles in the air may be pollution (from vehicles or manufacturing smokestacks), smoke (from fires), or dust.
- Additional resources regarding this topic are available at ScienceSource.ca.

Answers to Questions**Analyzing and Interpreting**

7. Yes, there was invisible water vapour in the bottle before the match was placed inside. Students should be able to infer this answer from the section on evaporation on student book page 323 and by viewing Figure 11.12.
8. Students’ answers will vary but should include the following points: The miniature atmosphere inside the bottle had a high humidity due to the water vapour. When the bottle is squeezed, the pressure inside increases and the temperature inside the bottle actually increases slightly. As the bottle is released, the temperature inside drops as the air expands. This temperature drop causes the particles of water vapour to join together. Condensation inside the bottle is enhanced by the presence of the tiny smoke particles. The particles of water vapour condense on the particles of smoke. This process is similar to the process in the atmosphere—air is more likely to become foggy or rainy if air is polluted with tiny particles from smoke (from forest fires, volcanoes, or heavy industry) or from automobile/truck exhaust.
9. You need to squeeze the bottle several times to force the invisible particles of water vapour to condense.

Skill Builder

10. Students will draw and label several illustrations to indicate the steps in this activity. Each drawing should indicate the matching step in the procedure.

Forming Conclusions

11. Some students may find this to be a challenging question. In the bottle, water vapour condensed as the pressure dropped (during the squeezing). A similar process occurs in the atmosphere. Clouds can form when air pressure goes down. Clouds can also form when air is rising to a higher altitude, where it cools and condenses. Interesting discussions and illustrations regarding this topic are available at ScienceSource.ca.
12. More clouds will form in the atmosphere when there are cool temperatures, high humidity, and small particles (such as dust or pollution) on which the water vapour can condense.

Assess the Activity

- This activity is listed in the student book as a teacher demonstration. If students perform the activity, you can provide marks for student participation. Either way, you can ask students to submit the answers to questions 7–12 for assessment.

D27 Inquiry Activity: Be a Water Quality Inspector

Grade 8 Student Book page 28

Use the grade 8 Inquiry Activity as a whole-class demonstration, or have both grades complete the activity together. If you have students complete the activity, pair grade 7 students with grade 8 students. Alternatively, ask the grade 7 students to work independently on the Check and Reflect questions while you work with the grade 8 students to complete the activity.

Grade 7/8

**D27 Inquiry Activity: Be a Water Quality Inspector**

Student Book page 322

**Anchor Activity**

This activity is suited to a range of learners.

Purpose

To have students measure the pH and salt and chlorine content of four sources of water

Safety Precautions

- Tell students not to taste any of the water samples and to follow your instructions for handling and disposing of chemicals.
- Remind students that silver nitrate is poisonous and will turn clothing black. It must not be spilled onto the skin.
- Ensure that students have clear work areas in which to carry out the experiment, tuck their chairs in, are wearing closed-toe shoes, and are standing up when doing this investigation.

Activity Notes

- Before beginning this investigation, students need to make an observation chart. It must contain a column for the water type and a column for each test performed. Students also need to write a hypothesis for each of the three tests on each of the four samples. **Note: The hypothesis can be whether the test will be + or – [for salt test and chlorine test] and which sample will have the highest or lowest value for the pH test.** You may wish to use Skills Worksheet LM 1 Observing and Skills Worksheet LM 7 Developing Hypotheses to help students.
- Ensure that students understand the pH test. (See Science Background for this section.)
- Organize students into groups of three. Ask them to number themselves as student 1, student 2, and student 3. Tasks will be assigned to each student number for the distribution and clean-up of materials.
- Organize all materials ahead of time as follows:
 - Place pH test strips, pipettes, and microscope slides in separate marked containers at the front of the room.
 - Set up the light station in another area of the room.
 - Place four test tubes in a test tube rack, one rack for each group of three students.
 - Depending on your level of comfort with your students, you may wish to keep the silver nitrate bottle (you need only one) on your person or at your desk area so that you have control of it. This is the *recommended procedure*. Students must then demonstrate that they are prepared to use the silver nitrate solution carefully and responsibly before you give it to them. If only one dropper bottle is available, it is easy to keep track of which group is using it.
 - Organize the water samples by type, with one beaker of each sample for every group of three students.
 - At a clean-up station, set up one dish pan of soapy water and one of clean rinse water, along with some test tube brushes.

Grouping: whole class or groups of three or four

Time: 60 min

Skills: observing, measuring, developing hypotheses, interpreting data

Materials & Equipment: (per group)

- | | |
|---|--|
| • chart for recording test results | • silver nitrate (1% weight per volume solution) |
| • water-soluble marking pen | • apron for each student |
| • four 250-mL containers | • gloves for each student |
| • 4 water samples: tap water, rainwater, bottled water, and water from a river, stream, or pond | • safety goggles for each student |
| • 4 pH test strips | • clean-up materials (dish pans, brushes, soap) |
| • clock or watch that reads seconds | |
| • 4 microscope slides | |
| • four 1-mL dropper pipettes | |
| • light source | |
| • 4 test tubes | |

Continued ➔

Section 11.2 69

- Since there are three parts to this investigation, assign a numbered student responsibility for getting and returning the materials for each part. (For example, student 1 is responsible for Part 1.) The student assigned to each part is also responsible for washing the equipment for that part and returning it to the front of the room.
- Instruct students to pour the water from the test tubes containing the silver nitrate into a separate, labelled storage container for proper disposal. It must not be poured down the drain. Follow your school board's or community's instructions for disposal.

Answers to Questions

Analyzing and Interpreting

9 and 10. Expected or predicted results:

pH: Tap water and bottled water should have similar pH values; rainwater may be slightly acidic; the water from the stream will vary in pH value.

Salt: Salt could be identified in tap water (depending on the source, since there are some groundwater sources with naturally occurring salt concentrations in rural areas). It is not likely to be detectable in the other samples.

Chlorine: Chlorine should be detectable in the tap water if the water comes from a treatment process that adds chlorine. Chlorine should not be detectable in the other samples. However, it could be detected in the pond water if the water contains salt in the form of sodium chloride.

Skill Builder

11. Adding the same amount of silver nitrate to each test tube allows it to be a controlled variable.

Forming Conclusions

- 12. (a)** No, you would not expect salt to be found in rainwater because salt is left behind in the evaporation process of the water cycle.
- (b)** A source of salt in a pond water sample would be surface run-off containing road salt.

Assess the Activity

- As students work on this activity, look for evidence that they are using apparatus and materials safely. Collect students' observation charts and answers to the questions to assess their ability to test water samples. You may wish to use Assessment Rubric LM 2 Investigation/Inquiry Activity to help you record student progress.

AFTER

11.2 Answers to Check and Reflect

Grade 7 Student Book page 328

Key Concept Review

1. The name "water cycle" is suitable for describing the movement of water on Earth because there is a continuous movement of water in nature as solid, liquid, and gas.
2. Heat causes ocean currents through convection. In convection, fluids (liquids and gases) move from a region of higher temperature (as the fluid expands) to a region of lower temperature. Since different regions and levels (depths) of Earth's oceans are at different temperatures, there is a continuous movement of water. This movement is comparable to wind in the atmosphere being caused by differences in temperature in the atmosphere.
3. Oceans near the equator are warmer than oceans closer to Earth's poles because Earth receives more energy per unit area from the Sun at the equator. Near the equator, the Sun's rays fall directly onto the land and ocean. They are strong rays (you can easily get a harsh sunburn at these latitudes). Farther away from the equator, the Sun's rays strike Earth at a larger angle and are therefore less intense. The differences in temperature in the air, on land, and in the oceans caused by the different angles of the Sun's rays set up convection currents.

Connect Your Understanding

4. Human activity influences the water cycle in several ways. Some examples are as follows: humans drain marshes, use lake water for irrigation or for drinking water (lowering the level of the lake), destroy forests to create farmland or cities, create artificial lakes, add pollution to the air, and add heat to Earth's environment through manufacturing and transportation.

5. Students' answers will vary. Sample answer: The water cycle is like people climbing a mountain because both are complete circuits. Just as water goes into the atmosphere and then falls again as rain, people climb a mountain and then return to the bottom. The water particles are like the mountain climbers because they move from place to place. Water particles spread apart when they become water vapour, and people spread apart as they climb the mountain paths.

Practise Your Skills

6. Students will design, draw, and label their own illustrations. Alternatively, a student may plan an action activity to represent the water cycle. You could consider allowing one student or a group of students to perform an action activity (e.g., a skit) in front of the class.
7. Ocean currents depend on the following:
- wind
 - the minerals dissolved in the water
 - the shape of the ocean floor on different locations
 - heat from the Sun
 - the pull of the Moon's gravity
 - Earth's rotation (spin)
- Students should illustrate each of the above factors. Sample answers: Students could illustrate wind with a drawing of clouds blowing around. Students could illustrate dissolved minerals by showing small dots in ocean water. A drawing of different shapes of ocean (sea) floor and a drawing of the Sun beaming down on Earth are two more factors. A drawing of the Moon, perhaps showing "lines of gravity" or tides, will illustrate the pull of the Moon's gravity. The final drawing could show Earth spinning on its axis (at an angle of approximately 23.5°).

11.2 Answers to Check and Reflect

Grade 8 Student Book page 323

Key Concept Review

1. Sample answers: groundwater sources (aquifers, private wells, municipally operated wells, springs); aboveground water sources (lakes, rivers, oceans, reservoir); bottled water.
2. Water treatment refers to the processes that drinking water undergoes to ensure that it is safe to consume.
3. (a) The contents of water are categorized by their biological, chemical, and physical components.
(b) Those contents are of concern when their presence is a health hazard or when they are in concentrations that are harmful to human health.

Connect Your Understanding

4. Students' answers may vary but could include the following:
- Water is able to dissolve numerous substances. This means that a large number of substances can be in our drinking water.
 - Because it is an excellent solvent, water is used in many manufacturing processes. Often it is returned to the environment after this use in a contaminated state.

Practise Your Skills

5. (a) Run-off from a golf course containing dissolved fertilizer is classified as a chemical contaminant.
(b) A gasoline spill would stay on the water's surface and be classified as a physical contaminant.
(c) Lawn clippings are a physical contaminant since they do not dissolve.
(d) Dog waste could be classified as both a biological contaminant, for the micro-organisms it contains, and a physical contaminant, for its insoluble components.
(e) Industrial smoke is classified as a chemical contaminant because many of its components are soluble in rainwater.
(f) Chlorine bleach is a chemical contaminant because it is soluble in water.

Reteaching Strategy

Grade 7

To reteach the concepts and vocabulary in this section, you can provide students with a set of paper tags that each have a concept, a vocabulary term, a definition, or an explanation. At their desks, students can match each concept or vocabulary tag with a definition or explanation tag. Alternatively, you can create a one-page matching exercise for students.

Grade 8

Consider using LM 8D-11 Answers to Obtaining Water Quality: Fill in the Blanks as a reteaching tool. Go over the answers with students, and point out diagrams in the student book that help to explain concepts further.

Assessment for Learning

What to Look For	Grade 7	What to Do
Students understand the water cycle.		Students are able to correctly draw and label the water cycle.
Students understand how the Sun's light shines differently on different regions of Earth.		Students are able to correctly draw and label Earth in a way similar to Figure 11.13.
Students can relate heat transfer through convection to Earth's systems.		Students can describe ocean currents and their effect on climate. Students can name and describe two spinning air systems, hurricanes and tornadoes.
Grade 8		
Students follow established safety procedures for the use of apparatus and chemicals.		<ul style="list-style-type: none"> • Circulate among the students when they are working on D27 Inquiry Activity: Be a Water Quality Inspector. Look for evidence of them meeting the expectation when they are using the pH test strips and the microscope slides.
Students test water samples for chemical characteristics (pH, salinity, presence of chlorine).		<ul style="list-style-type: none"> • Circulate among the students when they are working on D27 Inquiry Activity: Be a Water Quality Inspector. Look for evidence of them meeting the expectation. • Collect the students' observation charts for D27 Inquiry Activity: Be a Water Quality Inspector. Assess their answers to questions 10 and 12 on student book page 322.