Activity Preparation for Chapter 10

Activity/Investigation	Advance Preparation	Time Required	Other Considerations
Find Out: How Breathing Works (page 193) (TR page 229)	• 3 to 4 days before – Gather the required apparatus and materials. • 2 days before – Stretch and inflate the small balloons. Leave them inflated for a day. Before giving them to students, deflate the balloons. • 1 day before – Organize materials into small containers. – Photocopy **BLM 10–1 How Breathing Works** and **Assessment Master 16 Oral Presentation Rubric**.	• 45 min	• Some students may have difficulties understanding how the model is put together. **BLM 10–1 How Breathing Works** breaks down the steps for building the model.
Find Out: Exercise and Breathing (page 194) (TR page 230)	• 1 month before – Order bromothymol blue solution from a supplier. • 1 week before – Gather the required apparatus and materials.	• 45 min	• This is a teacher-led demonstration. • Caution volunteers not to suck any bromothymol solution into their mouth. Be careful when pouring bromothymol solution since it stains hands and clothes.
Find Out: How Does Exercise Affect Blood Pressure? (page 200) (TR page 236)	• 1 day before – Gather materials and equipment. – Read instructions supplied with equipment. – Do a test reading to familiarize yourself with equipment. – Photocopy **Assessment Master 1 Co-operative Group Work Checklist** and **Assessment Master 2 Co-operative Group Work Rubric**, and **BLM 10-2 Exercise and Blood Pressure** and **Master 1 Centimetre Grid Paper** (optional). • Day of – Demonstrate equipment for students.	• 45 min	• You may decide to do the activity as a teacher-led demonstration and ask volunteers to participate. • Find out if any students have conditions that prevent them from participating in physical exercise. Assign such students to roles such as taking readings or timekeeping.
Test It! Recovery Time! (page 202) (TR page 238)	• 1 to 2 days before – Organize any sports equipment supplied by you or the Phys. Ed. dept., or brought from students' homes. – Obtain electronic monitors (if possible). • 1 day before – Photocopy **Assessment Master 13 Fair Test Checklist** and **Assessment Master 14 Fair Test Rubric**, and **BLM 10–3 Recovery Time Data Table** and **Master 1 Centimetre Grid Paper** (optional).	• 45–60 min (time to brainstorm, plan, conduct, and do the wrap-up for the investigation)	• Find out if any students have conditions that prevent them from participating in physical exercise. Assign such students to roles such as taking pulse readings or timekeeping.
Try This! (page 205) (TR page 242)	• 2 to 3 days before – Check that no students are allergic to the ingredients in soda crackers. – Buy unsalted soda crackers. • 1 day before – Book a room where eating food is permitted. • Day of – Double check that no students are allergic to ingredients in soda crackers.	• 15–20 min	• If students have allergies to ingredients in wheat crackers, consider using other starchy foods such as rice cakes.

Materials Needed for Chapter 10

Activity/Investigation	Apparatus	Materials	Blackline Masters
Find Out: How Breathing Works (page 193) (TR page 229)	• scissors (1 per group)	• 500 mL plastic cups (1 per group) • drinking straws (2 per group) • small balloons (2 per group) • small elastic bands (2 per group) • modelling clay • large balloons (1 per group) • large elastic bands (1 per group)	**Recommended** BLM 10–1 How Breathing Works Assessment Master 16 Oral Presentation Rubric
Find Out: Exercise and Breathing (page 194) (TR page 230)	• stopwatch • small test tube	• bromothymol blue solution (approximately 5 mL for each test) • 2 drinking straws	
Find Out: How Does Exercise Affect Blood Pressure? (page 200) (TR page 236)	• digital blood pressure cuff • skipping rope (optional) • manual blood pressure cuff (optional) • stethoscope (optional)	• chart paper (optional)	**Recommended** Assessment Master 1 Co-operative Group Work Checklist Assessment Master 2 Co-operative Group Work Rubric **Optional** Master 1 Centimetre Grid Paper BLM 10-2 Exercise and Blood Pressure
Test It! Recovery Time (page 202) (TR page 238)	• sports equipment supplied by you, Phys. Ed. dept., or students • method of taking pulse (e.g., stopwatch, electronic heart monitor if available)	• chart paper (optional)	**Recommended** Assessment Master 13 Fair Test Checklist Assessment Master 14 Fair Test Rubric **Optional** BLM 10–3 Recovery Time Data Table Master 1 Centimetre Grid Paper
Try This! (page 205) (TR page 242)		• unsalted soda crackers (2 per student)	

CHAPTER 10 Human Body Systems (page 190)

SUGGESTED TIMING
20–25 min

BLACKLINE MASTERS
OHT 14 Health and Safety Practices

Overall Expectations

BSAV.01 – explain the systems and processes required by simple and complex organisms to sustain life
BSAV.03 – analyze how personal health and safety in everyday life and in the workplace are protected through the proper use of equipment and safety practices

Reading Icon Answers (page 190)

1. Answers may vary. Accept reasonable safety practices related to each picture.

a) nurse; Wear a mask to protect from breathing in germs.

b) lifeguard; Wear a mask and protective gloves when handling pool chemicals.

c) food worker; Always store meat in a refrigerator to protect against spoilage.

Accommodations

- Provide students who need more space to record the answer to question 1 with a photocopy of **OHT 14 Health and Safety Practices**. Remind students to put their name on it.

Activity Planning Notes

As a class, read the first paragraph. Ask students if they can name the three body systems referred to (i.e., respiratory system, circulatory system, digestive system).

Have students identify the job shown in each picture on page 190, and record on the chalkboard. Allow students to work in pairs and discuss the safety practice each worker is demonstrating. As a class, share the answers before asking students to make connections between each safety practice and the body system it protects.

Consider using the following overhead transparency:
- **OHT 14 Health and Safety Practices**

Technology Links

- For information about human body systems, go to **www.mcgrawhill.ca/books/Se9** and follow the links to Virtual Human Body.

Alternative Activity

- Have students brainstorm social activities in which teens engage that can affect health (e.g., smoking, drinking, using drugs, spray-painting). Ask about the body systems affected by each activity.

10.1 How Your Body Is Organized

(page 191)

SUGGESTED TIMING	MATERIALS
20–25 min	• chart paper and markers

Specific Expectations

BSA1.02 – relate structures involved in life-sustaining processes to their function
BSA2.04 – extract and interpret information from a variety of sources

Key Terms Teaching Strategies

Have students complete some or all of the following activities to help them learn and remember the key terms:

- Write definitions for these terms in their Science Log. You may wish to have students keep a glossary at the back of their Science Log.
- Write a paragraph that contains the five key terms.

Help students remember the key terms by posting them on a science word wall.

Reading Icon Answer (page 191)

2. Students should highlight cells, tissues, organs, and systems.

Activity Planning Notes

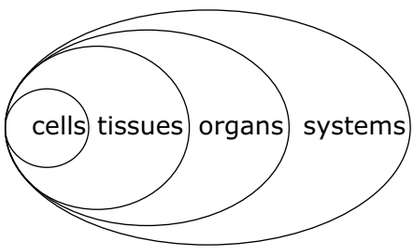
After reading and discussing the answer to question 2 on page 191, help students understand the connection between the four structures by using an analogy. Using chart paper, you might compare the organization of a community and the human body.

Community	Body
• You and your family members make a family.	• Cells join together to make tissues.
• Families living in the same area make a neighbourhood.	• Tissues join together to make an organ.
• Several neighbourhoods make a community.	• Organs work together in a system.

You might have students develop a different analogy, such as the organization of players on sports teams (e.g., player, team, division, league) or the organization of a paragraph (e.g., letters, words, sentences, paragraph), before having them complete and then discuss question 3 on page 191.

Accommodations

- Consider using visuals or manipulatives for ESL and LD Learners. For example, you might draw nesting ovals to show the organization of the human body.



Or, write each term on a piece of paper and have students arrange them from the smallest to largest structure.

Check Your Understanding Answer (page 191)

3. Cell, tissue, organ, system

Ongoing Assessment

- Use analogies generated by students as a formative assessment of their understanding of structures.

Alternative Activities

- Show students pictures or slides of different types of cells and tissues, such as blood cells, skin cells, muscle tissue, and lung tissue.
- Show a video about cells and organ systems in the body called *The Human Body: The Ultimate Machine* (Bio Essentials, 100% Educational Videos).

10.2 The Respiratory System (page 192)

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
45 min 45 min for Find Out How Breathing Works 45 min for Find Out Exercise and Breathing	• class set of yellow and red coloured pencils	BLM 10–1 How Breathing Works OHT 15 Respiratory System Assessment Master 5 Applet Checklist Assessment Master 6 Applet Rubric Assessment Master 16 Oral Presentation Rubric

Specific Expectations

BSA1.01 – describe the basic life-sustaining processes of organisms, including single-celled and complex organisms, using appropriate scientific vocabulary
BSA1.02 – relate structures involved in life-sustaining processes to their function
BSA2.04 – extract and interpret information from a variety of sources
BSA2.05 – communicate observations, interpretation of results, and information through appropriate formats
BSA3.01 – analyze how specific equipment and safe practices are used to protect personal health and safety at home and in the workplace
SIL2.03 – conduct investigations safely, using appropriate lab equipment
SIL2.04 – observe and record data, using a variety of formats, including the use of SI units, where appropriate
SIL2.05 – assess data to make inferences and conclusions and to answer questions and refine procedures
SIL2.06 – communicate plans, observations, and results using a variety of oral, written, and graphic representations, and including the use of SI units, where appropriate
SIL3.01 – develop and investigate research questions about an everyday science-related topic of personal interest

Science Background

Space suits and scuba gear are worn to support the respiratory system. Both consist of gas stored under pressure in a container.

Astronauts wear space suits consisting of the upper torso, lower torso, and portable life-support system. The portable life-support system is a backpack strapped to the space suit. The system supports the oxygen and carbon dioxide exchange that takes place in the respiratory system. Astronauts breathe in pure oxygen from one canister and breathe out carbon dioxide into the other canister.

Scuba divers breathe either compressed air or an oxygen-enriched, nitrogen-oxygen combination called Nitrox. The aqualung, or SCUBA (**s**elf-**c**ontained **u**nderwater **b**reathing **a**pparatus) is a cylinder of gas carried on the diver's back. The cylinder, typically made of aluminium, weighs about 14 kg empty and holds a volume of gas that weighs about 3.2 kg.

Divers can't breathe directly out of a cylinder because the high pressure would damage their lungs. Each cylinder is fitted with a regulator that supplies air on-demand, and reduces pressure from the tank to a safe level.

Key Terms Teaching Strategies

Have students complete some or all of the following activities to help them learn and remember the key terms:

- Write definitions for these terms in their Science Log. You may wish to have students keep a glossary at the back of their Science Log.
- Write a paragraph that contains the six key terms.

Help students remember the key terms by posting them on a science word wall.

Activity Planning Notes

In the discussion of the parts of the respiratory system, you might mention that food may enter the windpipe instead of the esophagus and cause choking.

Explain that people inhale oxygen and exhale carbon dioxide. Oxygen is necessary to provide muscles and tissues with energy. Tell students they will learn more about how oxygen and carbon dioxide exchange in the lungs when they study the circulatory system.

Have students complete and then discuss the questions on page 192. You might ask students who take shop courses to share what they know about safety practices for welders.

During the Science and Literacy Link (page 195) discussion of life-support systems to help people breathe in oxygen-deprived environments, discuss astronauts and scuba divers.

Accommodations

- ESL and LD Learners could be paired with students who have stronger language skills.

Consider using the following blackline master and overhead transparency:

- **BLM 10–1 How Breathing Works**
- **OHT 15 Respiratory System**

Making Connections Answers (page 192)

1. Oxygen and carbon dioxide
2. Answers will vary, but should mention wearing a mask and using ventilation.

Check Your Understanding Answer (page 195)

1. Oxygen; carbon dioxide

Find Out Activity (page 193)

How Breathing Works

Purpose

- Students build a model of the respiratory system and test it to find out how the diaphragm works.

Science Background

The model that students build simulates how the respiratory system works. During inhalation, when the diaphragm moves downward and the chest muscles move the ribs upward and outward, the air pressure inside the enlarged chest cavity lowers, which allows outside air to enter and expand the lungs. During exhalation, the diaphragm relaxes to its normal position and the chest muscles squeeze the ribs, which forces air out of the lungs.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
3 to 4 days before	• Gather the required apparatus and materials.
2 days before	• Stretch and inflate the small balloons. Leave them inflated for a day. Before giving them to students, deflate the balloons.
1 day before	• Organize materials into small containers. • Photocopy **BLM 10–1 How Breathing Works** and **Assessment Master 16 Oral Presentation Rubric**.

APPARATUS	MATERIALS
• scissors (1 per group)	• 500 mL plastic cup (1 per group) • drinking straws (2 per group) • small balloons (2 per group) • small elastic bands (2 per group) • modelling clay • large balloon (1 per group) • large elastic band (1 per group)

Suggested Timing

45 min

Safety Precautions

- Caution students to be careful when handling scissors.
- Have students clean up the work area and wash their hands thoroughly at the end of the activity.

Activity Planning Notes

Note that the small balloons need to be well stretched before assembling the model. The amount of pressure generated when pulling down on the large piece of balloon won't be strong enough to inflate the small balloons if they have not been stretched out beforehand.

Begin by reading through the directions and making sure that everyone understands what to do. Explain that the diaphragm is the muscle under the lungs. Have students place their hands just below their chest cavity and take a breath. When they inhale, does the diaphragm move up or down (down)? When they exhale, does the diaphragm move up or down (up)? Explain that building a model will help students understand how the diaphragm helps them breathe.

After students have had an opportunity to manipulate their model, discuss the parts of the model that represent parts in their body (i.e., large balloon represents diaphragm, cup represents chest cavity, smaller balloons represent lungs).

Accommodations

- Some students may have difficulties understanding how the model is put together. **BLM 10–1 How Breathing Works** breaks down the steps for building the model. Use the questions to help check students' understanding.
- Students with dexterity problems could be teamed with those without such difficulties.

What Did You Observe? Answers (page 193)

3. The small balloons inflated.

4. The small balloons deflated.

What Did You Discover? Answer (page 193)

5. Answers will vary. Make sure the explanation includes the following ideas.
- Pulling on the large balloon forces air into the small balloons. This is similar to the diaphragm moving downward, which makes the chest cavity bigger and forces air into the lungs.
- Letting go of the large balloon forces air back out of the small balloons. This is similar to the diaphragm moving upward, which makes the chest cavity smaller and forces air out of the lungs.

Activity Wrap-up

- After students have tested the model, have them complete and then discuss the questions on page 193.
- Have students demonstrate the working model of the respiratory system and explain the respiratory process using appropriate terminology.

Find Out Activity (page 194)

Exercise and Breathing

Purpose

- Students conduct a test to determine how exercise affects breathing rate and the amount of carbon dioxide exhaled.

Science Background

Bromothymol blue is sensitive to changes in carbon dioxide concentration. The presence of carbon dioxide in exhaled air is detected by bromothymol blue solution. When carbon dioxide is exhaled into a solution containing bromothymol blue, the blue solution changes to yellow.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
1 month before	• Order bromothymol blue solution from a supplier.
1 week before	• Gather the required apparatus and materials.

APPARATUS	MATERIALS
• stopwatch • small test tube • 2 drinking straws	• bromothymol blue solution (approximately 5 mL for each test)

Suggested Timing

45 min

Safety Precautions

- Caution volunteers not to suck any bromothymol solution into their mouth and to wear safety goggles. Be careful when pouring bromothymol solution since it stains hands and clothes.
- Have students clean up the work area and wash their hands thoroughly at the end of the activity.
- Caution students not to overexert themselves when exercising.
- Choose volunteers who are allowed to participate in Physical Education class.

Activity Planning Notes

Note that this is a teacher-led demonstration. Ask a volunteer to help you conduct the demonstration.

As a class, begin by reading through the directions and making sure that everyone understands what to do.

Review with students that breathing rate is the rate at which you breathe. It is measured in breaths per minute (breaths/min). A breath means breathing in and out one time. Remind students to record the units. Note that at rest, a healthy person breathes in and out approximately 16 times per minute.

After recording the breathing rate before exercise, have the volunteer use the straw to blow deep into the bromothymol solution gently about ten times. Ensure that all exhaled air goes into the solution. Reduce the chances of exhaled air escaping into the air by using an adequate volume of bromothymol solution. Have another volunteer use the stopwatch to record the time it takes for the solution to turn yellow.

Accommodations

- Students with physical disabilities could be teamed with those without disabilities. Some students might substitute the jumping jacks activity with one that uses a muscle group of their choice.

What Did You Observe? Answers (page 195)

8. Breathing rate increased after exercise.

9. The solution changed colour more quickly after exercise.

What Did You Discover? Answer (page 195)

10. Answers will vary but should indicate that the body produces more carbon dioxide during exercise. The explanation should include the fact that the bromothymol solution turned colour more quickly because it was easier to detect the carbon dioxide (since there was more of it).

Activity Wrap-up

- Have students complete and then discuss the questions on page 195. Discuss that during exercise, the body needs more oxygen to supply its muscles with energy, and subsequently produces more carbon dioxide.
- Consider having students design a follow-up investigation to test if there is a relationship between the duration of exercise and the amount of carbon dioxide produced. Have students develop and write the research question. For example, does doing two minutes of jumping jacks produce twice as much carbon dioxide? You might ask students to develop the steps for conducting the investigation.

Technology Links

- For an activity in which students determine their respiratory rate and explore factors that affect breathing rate, go to **www.mcgrawhill.ca/books/Se9** and follow the links to Breathing Rate.

Alternative Activities

- Obtain a set of lungs from a local butcher to demonstrate the respiratory system.
- Have students determine their own lung capacity. You will need an empty 4 L plastic milk jug, a half-filled basin of water and a 60 cm length of plastic tubing.

Ongoing Assessment

- Use the What Did You Discover? question on page 193 to assess students' understanding of how the respiratory system works.
- Use **Assessment Master 16 Oral Presentation Rubric** to assess students' oral presentations in Find Out Activity How Breathing Works.

Technology Links

- For an interactive activity in which students build a skeleton, stretch muscles, and organize organs in a body, go to **www.mcgrawhill.ca/books/Se9** and follow the links to Interactive Body.
  You may wish to use **Assessment Master 5 Applet Checklist** or **Assessment Master 6 Applet Rubric** while working with this material.

  – Fill the milk jug with water in 200 mL intervals, using a marker to mark off the intervals on the plastic jug.
  – Using one hand to cover the mouth of the jug, use the other hand to turn the jug upside down, and sit it on the bottom of the basin of water. Slowly remove the submerged hand that is covering the jug's mouth; all of the water should remain in the inverted jug.
  – Carefully, insert one end of the plastic tubing into the mouth of the jug.
  – Take a deep breath and slowly exhale completely into the other end of the tube. The air that is exhaled into the jug will force the water out.
  – Use the markings on the jug to determine lung capacity in litres.
  Students can take turns to find out their own lung capacity. You might have students graph and analyze the results.
- Show a video called *Respiration*, Bill Nye, The Science Guy (Magic Lantern Communication Ltd.).

10.3 The Circulatory System (page 196)

SUGGESTED TIMING

45–60 min
45 min for Find Out How Does Exercise Affect Blood Pressure?
45–60 min for Test It! Recovery Time

MATERIALS

- class set of pink, red, and blue coloured pencils
- 3-D model of the heart (optional)
- digital blood pressure cuff (optional)

BLACKLINE MASTERS

Master 1 Centimetre Grid Paper
BLM 10–2 Exercise and Blood Pressure
BLM 10–3 Recovery Time Data Table
BLM 10–4 Circulatory and Respiratory System Word Search
OHT 16 Circulatory System
OHT 17 Heart and Lungs
Assessment Master 1 Co-operative Group Work Checklist
Assessment Master 2 Co-operative Group Work Rubric
Assessment Master 4 Lab Report Rubric
Assessment Master 13 Fair Test Checklist
Assessment Master 14 Fair Test Rubric

Specific Expectations

BSA1.01 – describe the basic life-sustaining processes of organisms, including single-celled and complex organisms, using appropriate scientific vocabulary
BSA1.02 – relate structures involved in life-sustaining processes to their function
BSA2.04 – extract and interpret information from a variety of sources
BSA2.05 – communicate observations, interpretation of results, and information through appropriate formats
BSA3.01 – analyze how specific equipment and safe practices are used to protect personal health and safety at home and in the workplace
SIL1.01 – describe how the procedures, skills, and tools employed in different areas of science are also evident in daily life
SIL1.02 – explain the importance of a "fair test" for troubleshooting and testing everyday science problems
SIL2.01 – formulate questions about problems or issues that can be scientifically tested
SIL2.02 – plan, conduct, and refine simple investigations to answer student-generated questions
SIL2.03 – conduct investigations safely, using appropriate lab equipment
SIL2.04 – observe and record data, using a variety of formats, including the use of SI units, where appropriate
SIL2.05 – assess data to make inferences and conclusions and to answer questions and refine procedures
SIL2.06 – communicate plans, observations, and results using a variety of oral, written, and graphic representations, and including the use of SI units, where appropriate

Science Background

The heart consists of four chambers: left atrium, right atrium, left ventricle, and right ventricle. Veins from the lungs bring oxygen-rich blood into the left atrium. The blood flows through the main artery, called the aorta, to other arteries in the

body. Oxygen-poor blood returns through veins to the right atrium. The blood flows through the pulmonary artery to the lungs to pick up a fresh supply of oxygen.

There is no consensus about why veins look blue. Some argue that venous blood is blue, due to its deoxygenated state, and the "blue blood" shows where veins are near the surface of the skin. Others argue that deoxygenated blood is not blue but dark red; the veins' blue colour comes either from the structure of the veins themselves, or as a result of light refracting off the skin. Although both camps agree that hemoglobin, the oxygen-carrying substance that gives blood its colour, turns bright red when loaded with oxygen, they differ on its colour when deoxygenated (dark red or bluish-purple).

Blood travels in one direction through the system. The force used by the heart to push the blood through the arteries makes the arteries beat as well. This is the pulse. Since blood flow in the thumb is very strong, the index and middle fingers are usually used when taking a pulse.

Key Terms Teaching Strategies

Have students complete some or all of the following activities to help them learn and remember the key terms:

- Write definitions for these terms in their Science Log. You may wish to have students keep a glossary at the back of their Science Log.
- Write the key words in sentences that show understanding of the meaning.

Help students remember the key terms by posting them on a science word wall.

Reading Icon Answers (page 198)

1. Students should select two of the following key words. Accept any reasonable explanation of the meaning. For example,
   - heart rate — rate at which the heart beats. It is measured in beats per minute.
   - blood pressure — force the heart uses to pump blood through the body
   - systolic pressure — when the blood pressure rises as the heart squeezes to pump blood
   - diastolic pressure — when the blood pressure drops as the heart relaxes
2. Students should highlight squeezing and relaxing.

Activity Planning Notes

For the diagram on page 197, explain that oxygen-poor blood is not actually blue. It is coloured blue on the diagram to distinguish it from the oxygen-rich blood in the arteries. The oxygen carried by the blood cells makes arteries look red. Discuss why blood vessels under the skin look blue.

Consider using a 3-D model of the heart to show its chambers and the route that blood takes through it. Remembering the names of the chambers is not the emphasis; rather, focus on the route of the blood through the circulatory system.

Make a connection between question 6 on page 197 and the Exercise and Breathing activity on page 194. Ask students why heart rate increases when they exercise, leading to a discussion that increased circulation helps oxygen and carbon dioxide exchange more rapidly. For question 7, discuss how wearing protective gloves might protect the circulatory system. Explain that the circulatory system transports germs to all parts of the body, which might result in illness.

Consider using a digital blood pressure cuff to help explain systolic and diastolic pressure.

You might use **BLM 10–4 Circulatory and Respiratory System Word Search** to reinforce key terms for sections 10.2 and 10.3.

Consider using the following blackline master and overhead transparencies:
- **BLM 10–4 Circulatory and Respiratory System Word Search**
- **OHT 16 Circulatory System**
- **OHT 17 Heart and Lungs**

Accommodations

- Consider using large posters or a 3-D model of the heart to demonstrate blood flow through the heart to the rest of the body.
- ESL and LD Learners could be paired with students who have stronger language skills.

Check Your Understanding Answers (page 196)

1. • heart — muscle that pumps blood
   • arteries — blood vessels that carry blood away from the heart to the body cells
   • veins — blood vessels that carry blood back to the heart
2. Arteries
3. Veins

Check Your Understanding Answers (page 197)

4. Arteries get oxygen-rich blood from the lungs.
5. Veins get carbon dioxide from the body cells.

Making Connections Answers (page 197)

6. Answers will vary, but should indicate that the heart rate increases to speed up circulation, which means a faster exchange of oxygen and carbon dioxide.
7. Answers will vary, but look for the idea that Tori wears protective gloves.

Check Your Understanding Answers (pages 198–199)

3. 140 — systolic pressure; 90 — diastolic pressure
4. Blood pressure drops.
5. Blood pressure rises.
6. Look for a circle around 110/78.

Making Connections Answers (page 199)

7. **a)** 125

   b) 75

   c) Average blood pressure rises.

Find Out Activity (page 200)

How Does Exercise Affect Blood Pressure?

Purpose

- Students determine the effect of exercise on blood pressure.

Science Background

Blood pressure measures the force of the blood pushing against the walls of the arteries. It is measured in mmHg (millimetres of mercury). In a blood pressure reading, the upper number is the systolic pressure, which measures the blood pressure when the left ventricle contracts to pump blood out of the heart. During this time, blood pressure rises sharply. The lower number is the diastolic pressure, which measures the blood pressure when the left ventricle relaxes as it fills with oxygenated blood from the lungs. During this time, the blood pressure is at its lowest.

If possible for the activity, use a digital blood pressure cuff. The digital gauges give readings very quickly — a class could share one digital cuff to do this activity. They are much easier to use than a manual cuff, which requires the user to co-ordinate listening and observing. Because students do not have the skills to use the manual cuff, it usually takes them a long time to get data. Digital cuffs are easy to use — simply place around the arm and press the button to get blood pressure data.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
1 day before	• Gather materials and equipment. • Read instructions supplied with equipment. • Do a test reading to familiarize yourself with equipment.
	• Photocopy **Assessment Master 1 Co-operative Group Work Checklist**, and **BLM 10-2 Exercise and Blood Pressure** and **Master 1 Centimetre Grid Paper** (optional).
Day of	• Demonstrate equipment for students.

APPARATUS	MATERIALS
• digital blood pressure cuff • skipping rope (optional) • manual blood pressure cuff (optional) • stethoscope (optional)	• chart paper (optional)

Suggested Timing

45 min

Safety Precautions

- Caution students not to overexert themselves when exercising.
- Find out if any students have conditions that prevent them from participating in physical exercise. Assign such students to roles such as taking readings or timekeeping.
- Most digital cuffs inflate and deflate automatically. If the model you are using requires manual inflation, advise students to be careful when inflating the cuff. They should not inflate it so much that it causes bruising.

Activity Planning Notes

You may decide to do the activity as a teacher-led demonstration and ask two student volunteers to participate.

Begin by reading through the directions together and making sure that everyone understands what to do. If you have not done so, demonstrate how to use the blood pressure cuff. If possible, use a manual blood

pressure cuff even if you are using a digital device for the activity. Students are likely familiar with the manual cuff, and may find the digital device easier to comprehend if it is introduced after the older version.

Show students where to attach the cuff to the arm at heart level. Review the location of the heart (slightly lower than armpit, just left of mid-chest). Advise students not to talk or move while their blood pressure reading is being taken. If a digital monitor displays an error message, place the cuff on the other arm and try again.

Since students do not need the monitor for the entire time, it can be shared. Remind students that they must remain quiet when taking their blood pressure because the device is sensitive to sound and movement. You might designate an area for the exercise portion of the activity, or use an adjacent hallway if possible.

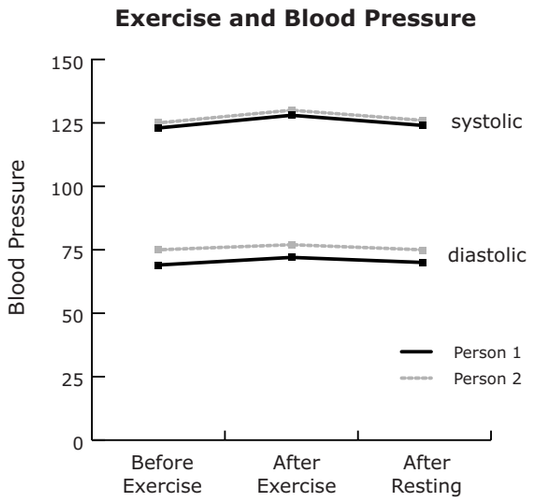
Step 6 asks students to rest for ten minutes. You might suggest that students begin work on the graph on page 201.

Accommodations

- Students with physical disabilities could be teamed with those without disabilities. Or, have students modify the type of exercise and its duration according to their abilities; even extremely mild activity can produce satisfactory results. If it is inadvisable for students to have their blood pressure taken, encourage them to participate in timing and recording.
- Students with visual impairments could be teamed with other students to read blood pressure.
- Provide students who need more space to record their graph with **Master 1 Centimetre Grid Paper**. Provide support to students who have difficulty making the graph. You might refer them to the graph on page 199 for a way to record data for systolic and diastolic pressure.

What to Do Answer (page 201)

7. Students' systolic and diastolic readings will vary. The graph should be titled and labelled, and there should be a scale. For example,



What Did You Observe? Answers (page 201)

8. Blood pressure readings rose after exercise.

9. Blood pressure returned to normal.

What Did You Discover? Answer (page 201)

10. Answers will vary but should indicate that regular exercise will help maintain a healthy blood pressure. Blood pressure will return to normal levels more quickly after exercise. It will also likely be lower when the body is at rest.

Activity Wrap-up

- Have students complete and then discuss the questions on page 201. Have students recall how exercise affected carbon dioxide levels. Ask students what that might mean about the relationship between heart rate and carbon dioxide levels.

- Compile a chart of students' results on the chalkboard.
  - Compare the class data from all three phases of the activity. Discuss possible reasons for the range among students (e.g., active/non-active people, smokers/non-smokers).
  - Calculate the average blood pressure before exercise, after exercise, and after rest. Discuss why average blood pressure is not easy to calculate. Blood pressure is a combination of two readings, systolic and diastolic, that together form a ratio.
  - Consider having students plot the average of students' blood pressure before, during, and after exercise on their own graph, and compare the readings to their own results.
- Have students complete **Assessment Master 1 Co-operative Group Work Checklist** to help assess how well they worked together. Have students discuss how to improve group work.

Alternative Activity

- If you are unable to access a blood pressure cuff, consider asking students to analyze hypothetical data for 25 students. Have them use **BLM 10-2 Exercise and Blood Pressure**. In order to calculate average blood pressure, students need to find the average systolic pressure and the average diastolic pressure for each level of activity. Provide students who need more space to record their graph with **Master 1 Centimetre Grid Paper**.

Test It! Activity (page 202)

Recovery Time

Purpose

- Students design an investigation to find out how long it takes for the heart to recover after exercise.
- Students assess whether they have developed a fair test.

Science Background

Heart rate increases when people increase their level of activity. When people decrease their level of activity, their heart rate slows down. The time it takes for the heart to return to its normal resting rate after activity is called recovery rate.

Factors that affect recovery rate include amount and frequency of exercise; condition of the arteries; disease or condition of the body; aging; smoking; and drug use.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
1 to 2 days before	• Organize any sports equipment supplied by you or the Phys. Ed. dept., or brought from students' homes. • Obtain electronic monitors (if possible).
1 day before	• Photocopy **Assessment Master 13 Fair Test Checklist**, and **BLM 10–3 Recovery Time Data Table** and **Master 1 Centimetre Grid Paper** (optional).

APPARATUS	MATERIALS
• sports equipment supplied by you, Phys. Ed. dept., or students • method of taking pulse (e.g., stopwatch, electronic heart monitor if available)	• chart paper (optional)

Suggested Timing

45–60 min (time to brainstorm, plan, conduct, and do the wrap-up for the investigation)

Safety Precautions

- Caution students not to overexert themselves when exercising.
- Find out if any students have conditions that prevent them from participating in physical exercise. Assign these students to roles such as taking pulse readings or timekeeping.

Activity Planning Notes

Have students discuss what information they need to develop the investigation.

Explain how to take pulse readings. If using a stopwatch, provide instructions for taking a pulse reading.

- Press the index finger and one or two other fingers on your wrist.
- Count the number of pulses in 15 s. Multiply by 4 to get beats/min.

Have students brainstorm activities that vary in intensity and classify them as light or heavy (e.g., walking, sitting, lying down, sprinting, doing jumping jacks). You might suggest that five minutes is a reasonable length of time to do each activity.

Ask students to complete Steps 1 to 4 on page 202. Pay attention to Step 4, the steps they plan to follow to do a fair test. Review what makes a fair test before telling students to write their own steps on a separate piece of paper that they hand in. Review the student steps and help them identify errors in the design.

For Step 5, have students prepare a method for recording and organizing the data they collect. If this will not fit in the space provided, have them use a separate piece of paper.

Accommodations

- Students with physical disabilities could be teamed with those without disabilities, or do this activity by using a muscle group of their choice.
- Some students may have difficulty putting steps in order. Suggest they write the steps on one side of a piece of paper and then cut out the steps. They can manipulate the steps until they are in logical order before gluing the steps in order on the page.
  Or, you might scaffold the checklist as follows:
  1. Take your partner's pulse before exercise. Record the data. Switch places.
  2. Do light exercise for five minutes.
  3. After light exercise, take a pulse reading. Record the data.
  4. Then, take a reading every minute until the heart rate is back to what it was before the activity.

  Ask students to complete the checklist for heavy exercise.
- Consider providing students who have difficulties recording data with a table from **BLM 10–3 Recovery Time Data Table**. They can glue the table in the space provided for question 5.

Test It! Answers (pages 202–203)

1. How long does it take for the heart to recover after light and heavy exercise?
2. Wording will vary. For example,
   - If I do light exercise, then my heart will recover faster.
   - If I do heavy exercise, then my heart will recover more slowly.
3. Answers will vary.

   a) and **b)** Accept any reasonable activity for light and heavy exercise.

   c) Accept a reasonable time such as 5 min.
4. The wording of steps may vary, but should indicate a logical order of the task. For example,
   - Take your partner's pulse before exercise. Record the data. Switch places.
   - Do light exercise for five minutes.

- After light exercise, take a pulse reading. Record the data.
- Then, take a reading every minute until the heart rate is back to what it was before the activity.
- Do heavy exercise for five minutes.
- After heavy exercise, take a pulse reading. Record the data.
- Then, take a reading every minute until the heart rate recovers.

5. Data tables may vary. Make sure the table includes the following data:
- heart rate at rest
- heart rate after light exercise
- recovery time after light exercise
- heart rate after heavy exercise
- recovery time after heavy exercise

7. a) How long does it take for the heart to recover after light and heavy exercise?

b) Wording will vary. Make sure that the information includes heart rate at rest; heart rate after light and heavy exercise; and recovery time after light and heavy exercise.

8. a) Yes or no.

b) Answers will vary, depending on whether it was a fair test. If the test was fair, students should indicate that the intensity of exercise was the manipulated variable. An investigation with more than one manipulated variable is not a fair test.

If the test was not fair, students should explain how to improve it. For example,
- manipulate only one variable
- take accurate readings of blood pressure
- make and record detailed observations

Activity Wrap-up

- Consider having students make a bar graph using the collected data and **Master 1 Centimetre Grid Paper**.
- Have students complete and then discuss question 7 on page 203.
- Have students use **Assessment Master 13 Fair Test Checklist** to help assess whether they developed a fair test. Use the checklist to review the aspects of a fair test. Before students complete question 8, discuss what changes might make the investigation unfair.

Technology Links

- For more information on the heart, go to **www.mcgrawhill.ca/books/Se9** and follow the links to The Heart.

Ongoing Assessment

- Use **Assessment Master 2 Co-operative Group Work Rubric** to assess how well students worked together during Find Out Activity How Does Exercise Affect Blood Pressure?
- Use **Assessment Master 14 Fair Test Rubric** to assess student ability to design a fair test for Test It! Recovery Time. You might use **Assessment Master 4 Lab Report Rubric** to assess the quality of student reports.

Technology Links

- For an interactive site in which students explore the heart and review how organ systems are organized, go to **www.mcgrawhill.ca/books/Se9** and follow the links to The Virtual Body. You may wish to refer students to this site again after they have studied the digestive system in Section 10.4.

Alternative Activities

- Show the video *Blood and Circulation*, Bill Nye, The Science Guy (Magic Lantern Communication Ltd.).
- Show the video *Fantastic Voyage*, an adventure story in which a team of human beings shrunk to microscopic size enter the human body through the circulatory system.

10.4 The Digestive System (page 204)

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
45 min 15–20 min for Try This!	• class set of green and yellow coloured pencils	BLM 10–5 The Digestive System OHT 18 Digestive System

Specific Expectations

BSA1.01 – describe the basic life-sustaining processes of organisms, including single-celled and complex organisms, using appropriate scientific vocabulary
BSA1.02 – relate structures involved in life-sustaining processes to their function
BSA2.04 – extract and interpret information from a variety of sources
BSA3.01 – analyze how specific equipment and safe practices are used to protect personal health and safety at home and in the workplace
SIL2.04 – observe and record data, using a variety of formats, including the use of SI units, where appropriate

Science Background

Saliva moistens and holds food together for ease in swallowing; cleans the mouth; and helps kill harmful bacteria.

The stomach completes mechanical digestion by continuing to break down food (through peristalsis) and mixing food with gastric juices to form a pasty fluid called chyme. It then continues chemical digestion by starting to digest proteins.

The small intestine uses digestive fluids (pancreatic fluids, intestinal juices, and bile from the liver) to neutralize gastric acids and act on food matter to complete chemical digestion.

Vitamins, minerals, and water are absorbed into the bloodstream from the large intestine. Waste materials stored in the form of feces are eliminated through the anus.

Key Terms Teaching Strategies

Have students complete some or all of the following activities to help them learn and remember the key terms:

- Write definitions for these terms in their Science Log. You may wish to have students keep a glossary at the back of their Science Log.
- Use the key terms by labelling and writing point-form notes on a visual of the digestive system.

Help students remember the key terms by posting them on a science word wall.

Activity Planning Notes

After reading about how the digestive system works, have students complete and then discuss the answers to the Check Your Understanding questions.

Use **BLM 10–5 The Digestive System** to help students review organs in the digestive system, the digestive processes, and what happens in each organ.

Afterward, have students explain the statement, "You are what you eat." Highlight the idea that food provides nutrients the body needs to function. Discuss what happens when people eat a diet of nutrient-poor foods.

Accommodations

- ESL and LD Learners could be paired with students who have stronger language skills.

Consider using the following blackline master and overhead transparency:

- **BLM 10–5 The Digestive System**
- **OHT 18 Digestive System**

Check Your Understanding Answers (page 205)

1. The mouth and stomach should be coloured green; the mouth, stomach, and small intestine should be circled; and the small and large intestines should be coloured yellow.
2. Flowcharts should flow as follows: mouth, esophagus, stomach, small intestine, large intestine, and anus.

Making Connections Answer (page 205)

3. Wording may vary. Before eating, it is important to wash hands using soap and water.

Try This! Activity (page 205)

Purpose

- Students discover what enzymes in saliva do.

Science Background

The enzyme in saliva responsible for converting starch to glucose is called salivary amylase.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
2 to 3 days before	• Check that no students are allergic to the ingredients in soda crackers. • Buy unsalted soda crackers.
1 day before	• Book a room where eating food is permitted.
Day of	• Double check that no students are allergic to ingredients in soda crackers.

APPARATUS	MATERIALS
	• unsalted soda crackers (2 per student)

Suggested Timing

15–20 min

Safety Precautions

- Caution students to avoid choking when chewing soda crackers.
- Check with students about food allergies. If students have allergies to wheat starch, consider using other starchy foods such as rice cakes.
- Have students wash their hands and clean up the work area at the end of the activity.

Activity Planning Notes

As a class, read the information. Provide each student with two soda crackers. Have them chew the crackers for two minutes. Afterward, ask students to describe how the taste of the cracker changed as they chewed it. Consider having students repeat the experiment to check their results.

Explain that crackers are made of starch and that an enzyme in the mouth begins to digest the crackers by converting the starch into a sugar.

Accommodations

- Students with allergies to wheat starch could be given an alternate starchy food such as rice cakes. Or, they might record other students' results using a tally chart with two columns: salty and sweet.

Activity Wrap-up

- Have students complete and then discuss the Making Connections question on page 205. Discuss how washing hands protects the digestive system. Explain that germs taken in along with food can be transported by the digestive system to the body, which might result in illness.

Alternative Activities

- Obtain organs of the digestive system such as the stomach from a local butcher and demonstrate parts of the digestive system.
- Have students develop and perform a skit of the journey of a soda cracker through the digestive system, with stops along the way to explain what is happening in each organ.
- Show the video *Digestion*, Bill Nye, The Science Guy (Magic Lantern Communication Ltd.).
- Use some or all of the activities in the following Chemistry *ActiveFolders*: Chemical and Physical Changes.

Ongoing Assessment

- Use the Check Your Understanding questions on page 205 to assess students' understanding of how the digestive system works. Check that students have coded the diagram on page 204 correctly.

10.5 How Body Systems Work Together (page 206)

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
45 min	• class set of green, red, and yellow coloured pencils	OHT C–7 The Circulatory System and Respiratory System Connect OHT C–8 The Circulatory System and Digestive System Connect

Specific Expectations

BSA1.01 – describe the basic life-sustaining processes of organisms, including single-celled and complex organisms, using appropriate scientific vocabulary
BSA1.02 – relate structures involved in life-sustaining processes to their function
BSA1.03 – outline how a complex organism functions through the basic interactions between organ systems
BSA2.04 – extract and interpret information from a variety of sources

Key Terms Teaching Strategies

Have students complete some or all of the following activities to help them learn and remember the key terms:
- Write definitions for these terms in their Science Log. You may wish to have students keep a glossary at the back of their Science Log.
- Write a paragraph that contains the three key terms.

Help students remember the key terms by posting them on a science word wall.

Activity Planning Notes

As a class, present the information about the connections between body systems. You might do question 1 on page 206 together. Make sure students colour the key parts of each bubble as follows:
- In the first bubble, colour the alveoli green and the capillaries red.
- In the second bubble, colour the alveolus and its cell membrane green, and colour the capillary membranes and the blood cells containing oxygen red.
- Shade the arrows showing oxygen moving into blood cells green.
- Shade the arrows showing carbon dioxide moving out of blood cells red.

Consider using the following overhead transparencies:
- **OHT C–7 The Circulatory System and Respiratory System Connect**
- **OHT C–8 The Circulatory System and Digestive System Connect**

Accommodations
- ESL and LD Learners could be paired with students who have stronger language skills.

Check Your Understanding Answers (page 206)

1. The lungs should be coloured green; the capillaries should be red.

In the first bubble, the alveoli should be coloured green and the capillaries red.

In the second bubble, the alveolus and its cell membrane should be green, and the capillary membranes and the blood cells containing oxygen should be red.

The arrows showing oxygen moving into blood cells should be green.

The arrows showing carbon dioxide moving out of blood cells should be red.

2. a) capillaries

b) alveoli

Check Your Understanding Answers (page 207)

3. The esophagus, stomach, and small and large intestine should be coloured yellow; the heart should be red. In the bubble, the villi should be coloured yellow and the capillaries red.

4. Answers may vary, but should indicate that nutrients pass through the villi into the capillaries.

Making Connections Answer (page 207)

5. Answers may vary. For example,
- Both the alveoli and villi are involved in exchanging materials with the circulatory system.
- The alveoli exchange oxygen and carbon dioxide with the capillaries. The villi exchange nutrients and wastes with the capillaries.

Alternative Activities

- Invite a doctor or nurse to discuss the respiratory, digestive, and circulatory systems and how they work together to keep the body healthy and functioning.
- Have students create a travel brochure of the digestive, circulatory, and respiratory body systems. For each system, they should highlight activities, imports and exports, and any dangers or special precautions that tourists might encounter.
- Have students create a flowchart that shows how the respiratory, digestive, and circulatory systems are connected.

Ongoing Assessment

- Use the Making Connections question to assess how well students understand the role of alveoli and villi as sites of exchange.
- Have students explain how the circulatory system functions like a transportation system in the human body. They should refer to the digestive and respiratory systems in their answers. Use your observations to assess understanding of the connections between body systems and how materials move through the body.

Technology Links

- For information about a project in which students design a tour through the human body systems, go to **www.mcgrawhill.ca/books/Se9** and follow the links to Body Systems.

10.6 Protecting Your Body Systems

(page 208)

SUGGESTED TIMING

45–60 min (including the Science and Literacy Link Case Study, but not the Science and Literacy Link Write a Report)

MATERIALS

- latex, non-latex, and chemical gloves (1 pair of each)

BLACKLINE MASTERS

BLM 10–6 Chapter 10 Word Puzzle
OHT C–9 Prevent Food Poisoning Checklist
OHT C–10 Why Is It Hazardous?
Assessment Master 7 Scientific Communication Checklist
Assessment Master 8 Scientific Communication Rubric

Specific Expectations

BSA1.02 – relate structures involved in life-sustaining processes to their function
BSA2.04 – extract and interpret information from a variety of sources
BSA2.05 – communicate observations, interpretation of results, and information through appropriate formats
BSA3.01 – analyze how specific equipment and safe practices are used to protect personal health and safety at home and in the workplace
BSA3.02 – examine case studies of common workplace environments to develop a checklist of safety practices necessary to sustain systems and processes critical to life

Science Background

Food Poisoning: Food poisoning is caused by pathogens that enter the body through food or drink. The diseases spread because of poor handling, poor storage, and lack of personal hygiene.

Many cases of food poisoning go unreported. People may not know they have food poisoning for several reasons. Most food poisoning pathogens are tasteless, colourless, and odourless. People don't usually get sick immediately after eating or drinking something contaminated. Symptoms can appear from 30 minutes to 72 hours after eating contaminated food. People often mistake food poisoning for the flu, which shares many of the same symptoms: stomach cramps, fever, diarrhea, vomiting, nausea.

Staphylococcal food poisoning, which is caused by *Staphylococcus aureus* bacteria, is commonly found on the skin and in the nose and mouth of healthy people; it is also found in meat and poultry dishes, egg products, mayonnaise-based salads, and cream or custard desserts.

Bacteria *E. coli 0157* causes serious illness in humans. It is found in undercooked ground beef and in raw milk. Alfalfa sprouts, radish sprouts, and lettuce have become contaminated when watered or grown in contaminated water. Swimming in or drinking contaminated water can also cause disease.

Food Preparation, Handling and Storage: These practices should be followed in the food industry as well as at home:

- Wash hands, work area, and utensils with soap and hot water. After touching raw meat, seafood, or produce, wash hands by soaping hands for at least 20 seconds and then rinsing.
- Avoid cross contamination (the transfer of harmful bacteria from one food to another). Harmful bacteria can transfer from food to food, from hands to food, or from cutting surface or utensil to food. For example, a cutting board can become contaminated with bacteria from raw food such as chicken. If the board is used to prepare other foods without first being washed thoroughly, the other foods could become contaminated with bacteria from the raw chicken. To avoid this, use a separate cutting board for raw meats.
- Wash fruits and vegetables.
- Do not thaw meat and poultry on the counter.
- Keep hot foods hot and cold foods cold.
- In very hot weather, food should never sit out for over an hour. At cooler temperatures, do not let food sit out for more than two hours.

Spray Paint: These paints often contains hazardous substances, which during spraying can form a mist that contaminates the air. Without effective ventilation, these substances may be inhaled or absorbed through the skin. The health effects may include damage to the central nervous system, digestive system, and reproductive system. Manual handling of the toxic substances used in spray-painting may be a serious hazard as well. Experts recommend using paints that contain less toxic ingredients and painting in well-designed and maintained spray booths.

Key Terms Teaching Strategies

Have students complete some or all of the following activities to help them learn and remember the key terms:

- Write definitions for these terms in their Science Log. You may wish to have students keep a glossary at the back of their Science Log.
- Write the key words in sentences that show understanding of the meaning.

Help students remember the key terms by posting them on a science word wall.

Reading Icon Answer (page 209)

2. Many students will underline each safety practice on the checklist. Some students might underline only those practices that prevent the incubation of bacteria (i.e., warm conditions). In this case, they might underline 1, 3, and 7.

Activity Planning Notes

Read the information about tattoo artists before asking students to share their observations about other safety practices that body art workers follow.
Use the discussion as a lead-in to other safety practices in the workplace, such as

wearing protective gloves. If possible, show samples of latex, non-latex, and chemical gloves. Brainstorm situations in which people should wear protective gloves.

Read the introductory paragraph before having students answer the Reading Icon question about practices that reduce the spread of bacteria. Afterward, have students discuss how fast foods and eating out have increased the risks of food poisoning. Have them brainstorm scenarios where food poisoning could happen. Guide the discussion to causes: improper preparation, handling, and storage of food.

Briefly review how bacteria cause food poisoning.

Ask students to share experiences working in the food industry and the practices they use to prevent bacteria from growing (e.g., employees must cover open cuts on their hands and arms with a waterproof bandage).

Discuss each safety practice on the checklist. Point out that cold temperatures prevent bacteria from growing. Explain how dishcloths might contain a lot of bacteria. Many people use dishcloths to clean up areas where someone might have worked with meat. After minimal rinsing, they use the same dishcloth to clean other kitchen areas, thus spreading bacteria from the meat.

Have students complete and then discuss the chart on page 210.

Read the Science and Literacy Link on page 210 together. Review the criteria for the written report. Discuss how students might gather information (e.g., books, Internet, interviews). In advance, gather text references and book the computer lab. Allow time for students to do research before writing a report.

Using **Assessment Master 7 Scientific Communication Checklist**, have students assess whether or not their report is complete. Use the checklist to review the criteria for the report and discuss what changes might improve it.

As a class, read the case study on page 211 before having students complete and then discuss the questions. Highlight the following safety practices for spray-painting:
- Wear gloves, coveralls, and a mask. Change the filters on the mask often.
- Read the labels on spray cans to find less toxic paints.
- Do not paint indoors. If you must paint indoors, make sure there is good ventilation, a way to supply fresh air.

Consider using the following blackline masters and overhead transparencies:
- **BLM 10–6 Chapter 10 Word Puzzle**
- **OHT C–9 Prevent Food Poisoning Checklist**
- **OHT C–10 Why Is It Hazardous?**
- **Assessment Master 7 Scientific Communication Checklist**

You might use **BLM 10–6 Chapter 10 Word Puzzle** to review key terms.

Accommodations

- ESL and LD Learners could be paired with students who have stronger language skills.
- Provide students who need more space to record the answer to the chart on page 210 with a photocopy of **OHT C–10 Why Is It Hazardous?** Remind students to put their name on it.
- Allow students some choice in presenting findings for the Science and Literacy Link on page 210 (e.g., oral report).

Making Connections Answer (page 208)

1. Accept any reasonable safety practice related to body art. For example,
- Make sure that needles are sterilized after each client.

Check Your Understanding Answers (page 209)

3. Answers may vary, but should include the idea that wearing protective gloves prevents chemicals from being absorbed through the skin and entering the blood.

4. Answers may vary, but should include the idea that eating food contaminated with bacteria causes food poisoning.

Making Connections Answer (page 209)

5. Chicken and potato salad

Why Is It Hazardous? Answers (page 210)

Answers may vary. For each picture, accept a reasonable explanation for what might happen and the name of a body system that could be affected.
- Cooking hamburgers — Meat that is not well cooked might contain bacteria that cause food poisoning; digestive system
- Applying hair dye — Ammonia and peroxide are irritants that can damage skin. Breathing in ammonia may damage lungs; respiratory system

Students should provide an example of a hazardous behaviour and state possible consequences. For example,
- Applying pesticides without wearing a mask — Pesticides contain chemicals that can cause respiratory problems and irritate the eyes and skin; respiratory system

Write a Report Answers (page 210)

a), **b)**, and **c)** Answers will vary. Students need to describe four health and safety practices in the food service industry; list the body system each practice protects; and explain what might happen if workers don't protect themselves. For example:

a)	b)	c)
Wash hands before and after handling food. Or, wear latex gloves.	circulatory system/ digestive system	You might take in bacteria on food and get sick.
Store meat in the refrigerator.	digestive system	You might get food poisoning from bacteria that grow on meat kept in warm conditions.
Wear gloves when using detergents and cleaning solutions.	circulatory system/ respiratory system/skin (integumentary system)	You might absorb hazardous chemicals that can make you sick. You might suffer from itching, swelling, and redness of the skin.
Always unplug electrical appliances before putting them in water for cleaning	circulatory system	You might get electrocuted.

Check Your Understanding Answers (page 211)

1. The chemicals in spray paint made Dylan sick.

2. Dylan stopped spraying and got some fresh air.

Making Connections Answers (page 211)

3. Answers will vary. Accept any reasonable safety practice related to spray-painting. For example,
- Wear gloves, coveralls, and a mask. Change the filters on the mask often.
- Read the labels on spray cans to find less toxic paints.

4. Answers will vary, but students should include a health and safety practice related to each warning symbol. For example,
- Extremely flammable — Keep spray-paint cans away from any equipment that produces sparks. Keep away from lit cigarettes.
- Vapour harmful — Do not paint indoors. If you must paint indoors, make sure there is good ventilation, a way to supply fresh air.
- Poison — Do *not* inhale spray paint. Wear gloves, coveralls, and a respirator or mask. Change the filters on the mask often.
- Container may explode if heated — Keep spray-paint cans away from heat.

Ongoing Assessment

- Use student work in Why Is It Hazardous? as a formative assessment for how well students understand risks to body systems.
- Use **Assessment Master 8 Scientific Communication Rubric** to assess students' reports.
- Use question 4 on page 211 to assess students' checklist of safety practices.

Technology Links

- For information about implementing a student-produced research report about body systems, including a rubric for assessment to help guide students, go to **www.mcgrawhill.ca/books/Se9** and follow the links to Research Body Systems.

Alternative Activities

- Take students on a series of mini field trips to a hair salon, body art business, automotive body shop, welding shop, and/or a restaurant. Give the worker in each business some lead time to develop a short talk about the role that health and safety plays in their work and what practices help protect health.
- Invite students who are comfortable doing so to share experiences preparing food and keeping it safe for customers in the fast-food industry. You might make a list of safe practices used by the food service industry.
- Have students write a letter to a local counsellor advising him or her of the hazards linked to the use of products such as spray paint or pesticides. Suggest what could be done to reduce the risk of these health hazards.

Chapter 10 Review (page 212)

SUGGESTED TIMING

75 min to complete and take-up the review, and then assign Practice Test

BLACKLINE MASTERS

Master 3 Certificate
Master 4 List of Skills
BLM 10–4 Circulatory and Respiratory System Word Search
BLM 10–6 Chapter 10 Word Puzzle
BLM 10–7 Chapter 10 Practice Test
BLM 10–8 Chapter 10 Test

Using the Chapter Review

Depending on your class, students should be able to work through the review at their own pace. In order to have success with the Chapter Review, some students may need to do it in chunks, by completing several questions and then taking them up before continuing. This process will prevent students from completing many questions incorrectly.

To provide additional reinforcement of key terms, have students complete **BLM 10–4 Circulatory and Respiratory System Word Search** and **BLM 10–6 Chapter 10 Word Puzzle**. Once the review is completed and taken up, assign the **BLM 10–7 Chapter 10 Practice Test** for students to answer individually. They may wish to use their completed review to help them.

Review Guide

Question	Section(s)	Refer to
1	10.1	Check Your Understanding (page 191)
2 to 9	10.2, 10.3	The Respiratory System (page 192) and The Circulatory System (page 196)
10	10.4	How Does the Digestive System Work? (page 205)
11	10.2, 10.3, 10.4	The Respiratory System (page 192); The Circulatory System (page 196); The Digestive System (page 204)
12	10.5	The Circulatory System and Digestive System Connect (page 207)
13	10.6	Why Is It Hazardous? (page 210)

Accommodations

- In advance, prepare organ and function flash cards of the key terms for Chapter 10. Provide the cards to students who struggle with vocabulary and spelling during review activities.
- Allow students to make a chapter summary page of the key ideas/skills from the chapter. The back of the student resource provides space to do this. Alternatively, you might develop a chapter summary as an entire class.
- If students have difficulty with a particular review question, use the Review Guide to identify the section they need to review.
- **BLM 10–7 Chapter 10 Practice Test** can be customized to produce extra reinforcement questions.

Chapter 10 Review Answers (pages 212–213)

1. cell, tissue, organ, system

2. alveoli

3. arteries

4. lungs

5. capillaries

6. veins

7. heart rate

8. heart

9. blood pressure

10. **a)** mechanical digestion

b) chemical digestion

c) absorption

11. **a)** digestive

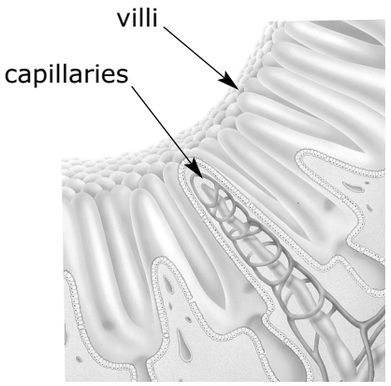
b) circulatory

c) respiratory

12. Wording will vary but should include the following points.

a) The nutrients pass through the villi into the capillaries, and then into the bloodstream.

b) Waste products from the body cells pass into the capillaries before the body gets rid of them.



13. Accept any reasonable health and safety practice related to the following jobs. For example,

a) Gardener using pesticides — Wear a mask, gloves, and protective clothing to protect from exposure to chemicals.

b) Auto worker spray-painting cars — Wear a mask and gloves. Paint in a spray booth with adequate ventilation.

Technology Links

- For an activity in which students review organ systems by creating an organ tree and making cards that describe each organ's function, go to **www.mcgrawhill.ca/books/Se9** and follow the links to Organ Tree.

Summative Assessment

- Have students complete **BLM 10–8 Chapter 10 Test** to assess individual skills.
- You may wish to develop **Master 3 Certificate** to show students what they have learned during this chapter. Cut and paste the related skills from **Master 4 List of Skills**.