

# Grade 5 Science





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Grade 5

# **Cluster 1: Maintaining a Healthy Body**

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## **Overview**

The study of the human body at Grade 5 focuses on the maintenance of good health. Students learn about the role that nutrients play, and how to plan balanced and nutritious meals using *Canada's Food Guide to Healthy Eating*. Students gain experience in interpreting nutritional information on food labels, and in evaluating images presented by the media. A study of the major body systems and their role in the healthy functioning of the human body helps students to appreciate the nature and function of each, and the interrelationships that exist between systems. Students explore how lifestyle choices and environmental factors can affect personal health.

**PRESCRIBED LEARNING OUTCOMES**

**SUGGESTIONS FOR INSTRUCTION**

*Students will...*

**5-1-01** Use appropriate vocabulary related to their investigations of human health.

Include: nutrients; carbohydrates; proteins; fats; vitamins; minerals; *Canada's Food Guide to Healthy Eating*; food group; serving size; terms related to the digestive, skeletal, muscular, nervous, integumentary, respiratory, and circulatory systems.

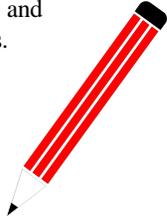
GLO: B3, C6, D1

**Teacher Notes**

**Prior Knowledge**

Students have had previous experiences related to this cluster in Grade 3, Cluster 2: Materials and Structures; in Grade 2, Cluster 1: Growth and Changes in Animals; in Grade 1, Cluster 1: Characteristics and Needs of Living Things; and in Grade 1, Cluster 2: The Senses.

Refer to *Kindergarten to Senior 4 Physical Education/Health Education: Manitoba Curriculum Framework of Outcomes for Active Healthy Lifestyles* for related learning outcomes and teacher support.



➤ Introduce, explain, use, and reinforce vocabulary throughout this cluster.

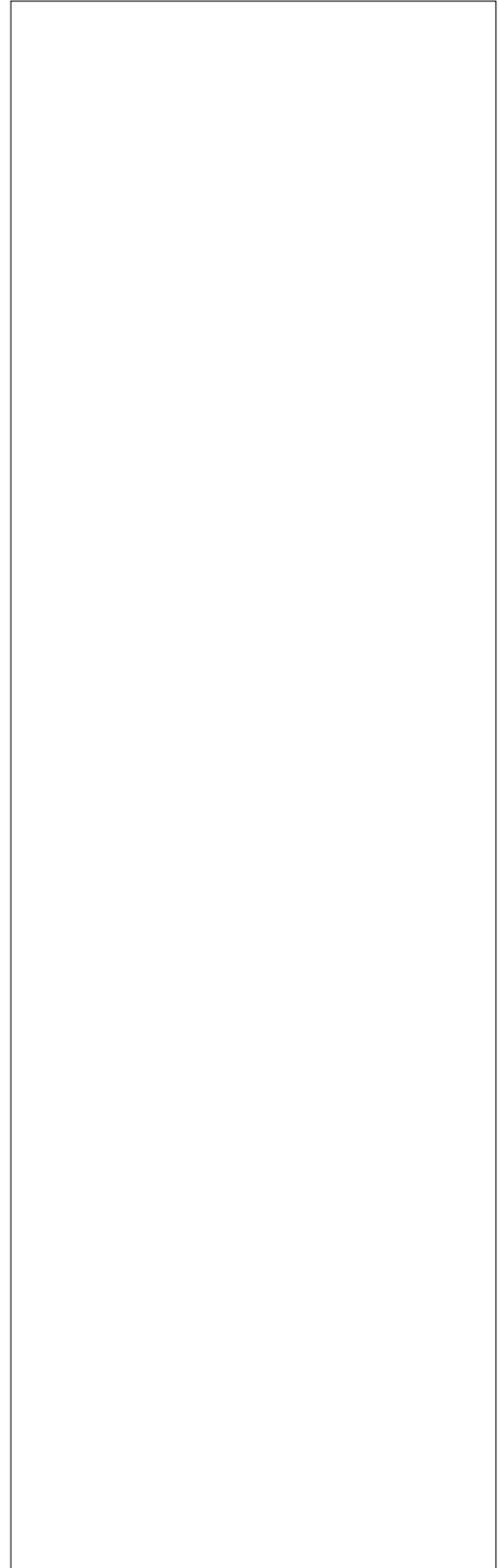
➤ **Sort and Predict**

Provide students with a set of words. Have them work in groups to predict the meaning of the words and sort them into categories. Have groups share their categories with the class. As a class, identify words for which students need more information to be able to categorize them with clarity. Post these words and clarify them as the study of the human body progresses.

(For a BLM of a Sort and Predict think sheet, see *SYSTH*, Attachment 10.3, or *Success*, p. 6.100.)

**SUGGESTIONS FOR ASSESSMENT**

**SUGGESTED LEARNING RESOURCES**

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PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-02</b> Interpret nutritional information found on food labels.</p> <p><i>Examples: ingredient proportions, identification of potential allergens, information related to energy content and nutrients...</i></p> <p>GLO: B3, C4, C5, C8</p>
<p><b>5-0-2a</b> Access information using a variety of sources. <i>Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet...</i></p> <p>GLO: C6 (ELA Grade 5, 3.2.3; Math: SP-II.3.1)</p> <p><b>5-0-4c</b> Work cooperatively with group members to carry out a plan, and troubleshoot problems as they arise. GLO: C7 (ELA Grade 5, 5.2.2)</p> <p><b>5-0-5f</b> Record and organize observations in a variety of ways. <i>Examples: point-form notes, sentences, labelled diagrams, charts, ordered lists of data, frequency diagrams, spread sheets...</i> GLO: C2, C6 (ELA Grade 5, 3.3.1; Math: SP-III.2.5)</p>

**SUGGESTIONS FOR INSTRUCTION**

➤ **Investigating Food Labels**

Bring to class a variety of foodstuff boxes/cans that provide nutritional information on the labels. Have students

- look at the information provided
- list the information that the labels have in common
- identify the differences that they see
- give reasons for the information provided

Example:

**Nutrient Content**

Information	Cereal	Crackers	Soup
Proportion/Serving Size			
Energy/Calories			
Protein			
Fat			
Carbohydrates			
Sugars			
Starch			
Dietary Fibre			
Sodium			
Potassium			
Vitamin List			
Ingredient List			

➤ **Interpreting Nutritional Information**

Have students bring to class a collection of foodstuff boxes/cans and sort them according to product (e.g., cereal, crackers). Have small groups of students each take one set of boxes and order them in different ways.

Examples:

- Order the boxes from the greatest to the smallest quantity of calories/energy per serving.
- Order the boxes from the lowest to the highest fibre content.
- Order the boxes from the lowest to the highest sugar content.

**Math Link:** The boxes can also be used to determine perimeter, area, and volume.

## SUGGESTIONS FOR ASSESSMENT

## SUGGESTED LEARNING RESOURCES

**Extended Response**

Provide students with the following:

**Food Product Analysis**

Nutrition Information Per 28 g Serving

Energy	150 cal/620 kj
Protein	2.0 g
Fat	9.1 g
Cholesterol	0 mg
Carbohydrates	15 g
Dietary Fibre	3.8 g
Sodium	178 mg
Potassium	386 mg

Percentage of Recommended Daily Intake

Vitamin E	23%
Vitamin C	15%
Thiamine	3%
Riboflavin	2%
Niacin	10%
Vitamin B6	1%
Calcium	1%
Iron	3%
Zinc	3%

Review the nutrition information above. What can you tell about the product that it came from?

Look for:

- low serving size
- high calorie and fat content
- high potassium content
- relatively high fibre content
- very few vitamins or minerals

Pan Canadian Science Place 5: *Body Works* (Lesson 3)

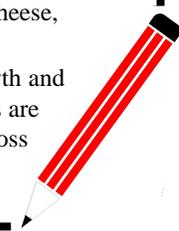
PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-03</b> Describe the types of nutrients in foods and their function in maintaining a healthy body.</p> <p>Include: carbohydrates, proteins, fats, vitamins, minerals.</p> <p>GLO: B3, D1</p>
<p><b>5-0-2a</b> Access information using a variety of sources. <i>Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet...</i> GLO: C6 (ELA Grade 5, 3.2.3; Math: SP-II.3.1)</p> <p><b>5-0-2b</b> Review information to determine its usefulness, using predetermined criteria. GLO: C6, C8</p> <p><b>5-0-2c</b> Record information in own words and reference sources appropriately. GLO: C6 (ELA Grade 5, 3.3.2)</p> <p><b>5-0-4d</b> Assume various roles and share responsibilities as group members. GLO: C7 (ELA Grade 5, 5.2.2)</p> <p><b>5-0-6a</b> Construct graphs to display data, and interpret and evaluate these and other graphs. <i>Examples: bar graphs, frequency tallies, line plots, broken line graphs...</i> GLO: C2, C6 (ELA Grade 5, 3.3.1; Math: SP-II.1.5, SP-III.2.5, SP-IV.1.5; TFS: 4.2.2-4.2.6)</p>

SUGGESTIONS FOR INSTRUCTION

Teacher Notes

Background Information

- *Carbohydrates* are the body’s main source of energy. There are two types of carbohydrates: simple and complex.
  - *Simple carbohydrates* are sugars. They are naturally found in foods such as milk and fruit. They are also added to foods such as candy, cake, and ice cream.
  - *Complex carbohydrates* are starches and cellulose. They are found in foods such as potatoes, bread, vegetables, and rice.
- *Proteins* are the building blocks needed for growth and maintenance of the body. They are found in meat, dried beans, grains, and vegetables.
- *Fats* are a high-calorie source of energy needed for growth and maintaining healthy skin. They are found in meat, nuts, cheese, butter, margarine, oil, and milk.
- *Vitamins and minerals* are important to the body for growth and nourishment. Milk products and raw vegetables and fruits are good sources of these nutrients. Food processing causes loss of vitamins and minerals.



➤ Nutrient Research

Use the Jigsaw technique (Aronson et al, 1978) to have students research each of the five nutrients: carbohydrates, proteins, fats, vitamins, and minerals. Divide the class into home groups of four members. Have each home group member select one of the nutrients to research. Individuals from each home group then meet with members of other home groups who are assigned the same nutrient, to form expert groups. Each expert group researches its own nutrient to determine what it is, where it is found, and what function it serves in maintaining a healthy body. Finally, each group expert member shares findings with the home group.

(For strategies to aid students in recording information in their own words and referencing sources, refer to 5-8 ELA, Grade 5, learning outcome 3.3.2, pp. 262-268.)

➤ Graphing Nutrient Content

Give each student one of the foodstuff boxes/cans that the class has contributed. Have students graph the nutrient content. Instead of having students put the name of the food on the graph, have them put it on the back of the page. Suggest that students look at the graphs and predict which food is being represented.

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



**Extended Response**

Provide students with the following:

**Nutrients**



In your science notebook, explain how each of the following types of nutrients helps you maintain a healthy body.

1. carbohydrates
2. proteins
3. fats
4. vitamins
5. minerals



**Extended Response**

Provide students with the following:

**Diets: Healthy or Not Healthy?**



Many different diets are available for people who want to lose or gain weight. Explain why each of the following diets is either healthy or not healthy.

1. the Low or No Carbohydrate Diet
2. the High Protein Diet
3. the No Fat Diet

Pan Canadian Science Place 5: *Body Works* (Lesson 2)

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-04</b> Evaluate a daily menu plan and suggest changes to make it align more closely with <i>Canada's Food Guide to Healthy Eating</i>.</p> <p>Include: serving size recommendations according to age for each food group.</p> <p>GLO: B3, C3, C4, C8</p>
<p><b>5-0-5f</b> Record and organize observations in a variety of ways. <i>Examples: point-form notes, sentences, labelled diagrams, charts, ordered lists of data, frequency diagrams, spread sheets...</i> GLO: C2, C6 (ELA Grade 5, 3.3.1; Math: SP-III.2.5)</p> <p><b>5-0-6a</b> Construct graphs to display data, and interpret and evaluate these and other graphs. <i>Examples: bar graphs, frequency tallies, line plots, broken line graphs...</i> GLO: C2, C6 (ELA Grade 5, 3.3.1; Math: SP-II.1.5, SP-III.2.5, SP-IV.1.5; TFS: 4.2.2–4.2.6)</p> <p><b>5-0-6c</b> Identify and suggest explanations for patterns and discrepancies in data. GLO: A1, A2, C2, C5</p> <p><b>5-0-7a</b> Draw, with guidance, a conclusion that explains investigation results. Include: explaining patterns in data; supporting or rejecting a prediction/hypothesis. GLO: A1, A2, C2 (ELA Grade 5, 3.3.4)</p> <p><b>5-0-7g</b> Communicate methods, results, conclusions, and new knowledge in a variety of ways. <i>Examples: oral, written, multimedia presentations...</i> GLO: C6 (ELA Grade 5, 4.4.1; TFS: 3.2.2, 3.2.3)</p> <p><b>5-0-7h</b> Identify, with guidance, potential applications of investigation results. GLO: C4</p>

SUGGESTIONS FOR INSTRUCTION

Teacher Notes

**Prior Knowledge**

Students have worked with *Canada's Food Guide to Healthy Eating* in Grade 2, Cluster 1: Growth and Changes in Animals. They have used the guide to plan a balanced menu for a day.



➤ **Daily Menu Evaluation**

Provide students with a sample menu for a day. Ensure that the menu includes both the food type and the serving size. Have students use their prior knowledge to evaluate the menu plan and record their findings.

Distribute copies of *Canada's Food Guide to Healthy Eating* and have students re-evaluate their findings. How accurate were they? What changes needed to be made?

(*Canada's Food Guide to Healthy Eating* is distributed by Health Canada, telephone (204) 983-2508, or (613) 954-5995. It is also available online at <[www.hc-sc.gc.ca](http://www.hc-sc.gc.ca)>.)

➤ **Personal Food Diary**

Have students record what they eat for two or three days, including the serving size for each item. Have them evaluate their own diet and make recommendations for change. (This should be done individually and privately so that students' diets are not being judged by their peers.)

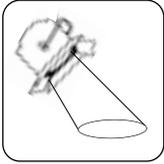
➤ **How's Lunch?**

Have students conduct a lunch-bag study that involves looking at their own lunches or the lunches of students from other grades and classes to identify what food groups are represented. Have them prepare a report with the data organized and displayed in a meaningful way, along with conclusions and recommendations. Perhaps the findings of the investigation could be published in the school newsletter and sent home to parents/guardians. If this is done, students could undertake another investigation a few weeks later to determine whether changes were made.

(For strategies and assessment suggestions to aid students in understanding the data collection process, grouping data, displaying data, and drawing conclusions from data, refer to 5-8 *Math, Statistics and Probability*, pp. C-3 to C-15.)

## SUGGESTIONS FOR ASSESSMENT

## SUGGESTED LEARNING RESOURCES

**Menu Evaluation**

Provide students with the following:

**Menu Evaluation: Sam's Daily Menu****Breakfast:**

Frosted cereal  
Milk

**Lunch:**

Soda pop  
French fries  
Chicken fingers  
Chocolate brownie

**Supper:**

Potatoes  
Steak  
Mixed vegetables  
Pudding

**Snack:**

Potato chips  
Soda pop

Look at Sam's menu for the day.

- Is this a healthy diet?
- If not, what changes would you recommend? Explain your thinking.

Look for:

- Sam's breakfast is not balanced. He needs to have something from each food group.
- Sam's lunch has too many high-fat foods. He needs to add vegetables and dairy products.
- Sam's supper is balanced.
- Sam's snack is not nutritional. He needs to substitute fruit and milk or something comparable.

Pan Canadian Science Place 5: *Body Works* (Lesson 3)

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-05</b> Evaluate prepared food products using the design process.  <i>Examples: frozen pizza, snack foods, beverages...</i>                      GLO: B3, C3, C4, C8</p>
<p><b>5-0-1c</b> Identify practical problems to solve.  <i>Examples: How can I determine the mass of air? Which prepared pizza should I buy?... GLO: C3</i></p> <p><b>5-0-3d</b> Develop criteria to evaluate a prototype or consumer product. Include: function, aesthetics, use of recycled materials, cost, reliability. GLO: C3</p> <p><b>5-0-5b</b> Test a prototype or consumer product, using predetermined criteria. GLO: C3, C5</p> <p><b>5-0-6e</b> Evaluate the strengths and weaknesses of a consumer product, based on predetermined criteria. GLO: C3, C4</p> <p><b>5-0-7d</b> Propose and justify a solution to the initial problem. GLO: C3</p> <p><b>5-0-7g</b> Communicate methods, results, conclusions, and new knowledge in a variety of ways. <i>Examples: oral, written, multimedia presentations...</i> GLO: C6 (ELA Grade 5, 4.4.1; TFS: 3.2.2, 3.2.3)</p>
<p>(continued)</p>

SUGGESTIONS FOR INSTRUCTION

➤ **Product Evaluation: Microwave Popcorn**

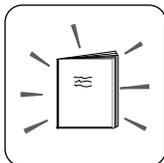
The following is an example of how a product evaluation could take place using the design process. Teachers may choose to demonstrate it as a model for students to follow when they select their own food product for evaluation. Refer to page 20 of this document for a description of the stages of the design process for evaluating consumer products.

1. Identify the problem. For example: What is the “best” butter-flavoured microwave popcorn? Once the problem has been identified, obtain samples of the popcorn to test, ensuring that all are of the same type (all butter-flavoured), with the only variable being different brands.
2. As a class, discuss what “best” means and identify criteria to test, such as
  - a. quantity of popcorn produced (flakes/popped corn) versus unpopped kernels)
  - b. cost per serving
  - c. taste
  - d. nutrient value related to grams of fat and energy/calories per serving
  - e. packaging related to appearance and use of recycled materials
3. Either as a class or in small groups, determine the method needed to test the popcorn according to each criterion identified. Groups of students may then be assigned to carry out the different tests.
4. Test the products using the predetermined criteria. For example:
  - a. Pop each brand. Measure the volume of popcorn produced and count the unpopped kernels.
  - b. Calculate the cost per serving by dividing the cost of the whole package by the number of bags in the package. Now, calculate the number of servings in an individual bag (based on the data collected in part “a” and the serving size suggested on the package).
  - c. Conduct a taste test. This could be done with other classrooms. (Results are more reliable when students are asked to mark a ballot.) Represent the results in a graph form.
  - d. Compare the number of grams of fat and the energy/calories per serving.

(continued)

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



**Checklist: Product Evaluation**

During the Product Evaluation: Microwave Popcorn learning activity, look for indications of the following in student work:

Checklist:

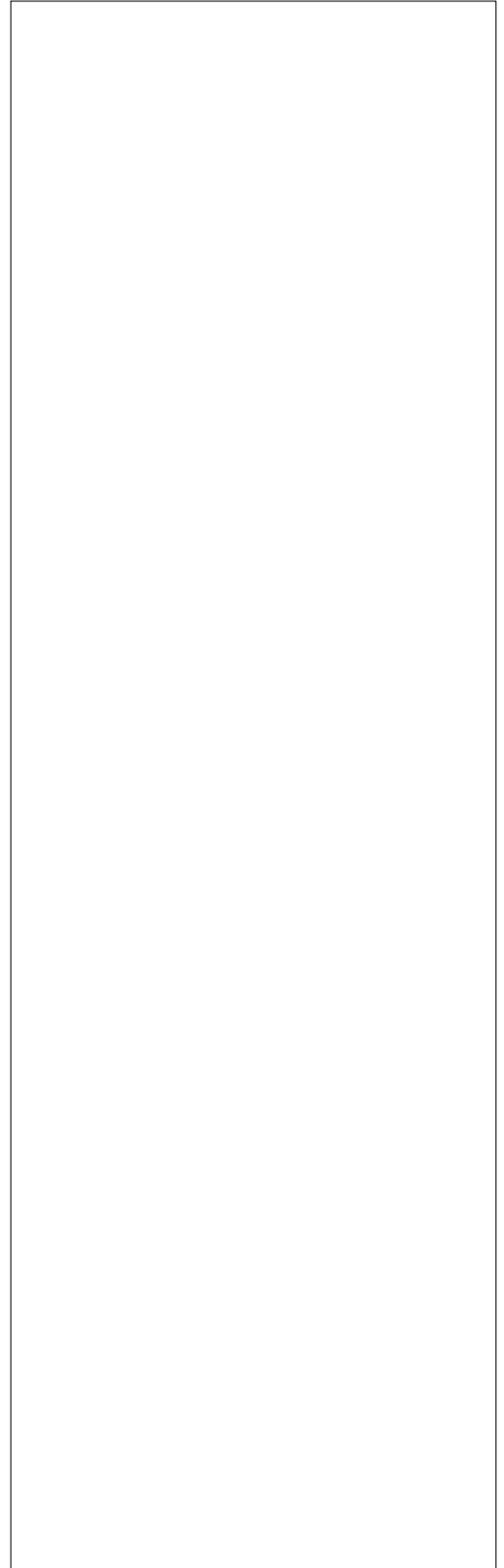
- identifies the problem
- identifies the criteria
- determines the method/procedure for conducting the test
- tests the product using predetermined criteria
- analyzes the data
- arrives at a conclusion

Pan Canadian Science Place 5: *Body Works* (Lesson 3)

PRESCRIBED LEARNING OUTCOMES	SUGGESTIONS FOR INSTRUCTION
<i>Students will...</i>	
<b>5-1-05</b> <i>(continued)</i>	<i>(continued)</i> <ul style="list-style-type: none"><li>e. Look at the packaging to determine whether it is aesthetically pleasing and whether it is made from recycled materials.</li></ul> <p>5. Have groups analyze their own data, as well as the data gathered by other groups, and prepare a report providing a conclusion (which popcorn was best). Have each group share their report. As a class, discuss why groups may have come to different conclusions when they used the same data (one group may have thought taste was most important, another group may have thought cost was most important).</p>

**SUGGESTIONS FOR ASSESSMENT**

**SUGGESTED LEARNING RESOURCES**

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PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-06</b> Identify the major components of the digestive system, and describe its role in the human body.</p> <p>Include: teeth, mouth, esophagus, stomach, and intestines break down food.</p> <p>GLO: D1, E2</p>
<p><b>5-0-4c</b> Work cooperatively with group members to carry out a plan, and troubleshoot problems as they arise. GLO: C7 (ELA Grade 5, 5.2.2)</p> <p><b>5-0-5f</b> Record and organize observations in a variety of ways. <i>Examples: point-form notes, sentences, labelled diagrams, charts, ordered lists of data, frequency diagrams, spread sheets...</i> GLO: C2, C6 (ELA Grade 5, 3.3.1; Math: SP-III.2.5)</p>

**SUGGESTIONS FOR INSTRUCTION**

➤ **Digestive Tract Model**

Have students form small groups. Ask one member of each group to lie on a large piece of paper. Have the other group members trace around the person and then cut out the tracing. Have students use the following dimensions to calculate the length of the traced figure’s digestive tract:

**Digestive System**

Parts	Length
mouth	10 cm
esophagus	25 cm
stomach	15 cm
small intestine	3 times the person’s height
large intestine	the person’s height + 15 cm

Provide each group with a roll of crepe paper streamers and have each group follow these steps:

- Cut a piece the length of the traced figure’s digestive tract.
- Glue the strip onto the paper cut-out.
- Add to the model a stomach made from construction paper.
- Label all parts.

Have students fill in the “Function” column of the “Body Systems Chart” (BLM 5-A) as they complete the learning activities that follow.

➤ **How the Esophagus Works**

To demonstrate the function of the esophagus, provide pairs of students with a long, thin balloon, cooking oil, and a slice of soft bread. Have students complete the following:

- Cut the closed end off the balloon so that it makes a long, flexible tube.
- Pour one teaspoon of oil into the balloon.
- Take a small piece of bread from the centre of the slice and roll it into a ball about the size of a marble.
- Put the bread in one end of the balloon.
- Squeeze the balloon behind the “bread ball” with one hand. Keeping that hand still, cross the other hand over the first hand and squeeze the balloon. Continue to squeeze, hand over hand.
- Observe what happens. (The bread ball moves down the tube until it comes out the other end.)

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## SUGGESTIONS FOR ASSESSMENT

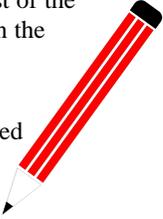
## SUGGESTED LEARNING RESOURCES

## Teacher Notes

While students are not expected to gain an in-depth knowledge of the body systems through the study of this cluster, they should be aware of the main components listed in the “Include” section of the systems-related specific learning outcomes, be able to locate them generally in the body, and state their function. Have students fill in their own summary chart listing the components and functions of each body system as they study the different systems (see BLM 5-A).

**Background Information**

The *digestive system* helps the body break down food so it can be used for growth and repair.

- The *teeth* tear and grind food into smaller parts.
  - *Saliva*, an enzyme produced by glands in the mouth, helps break down the food.
  - The *tongue* flips food to the back of the mouth.
  - The *esophagus* is a 25 cm tube that leads to the *stomach*. The muscles in the esophagus move the food down into the stomach.
  - The *stomach* muscles shake and churn the food while adding a strong acid to help break it up. The stomach sends food into the intestines.
  - The *small intestine* is a coiled tube about 6.5 m long. Most of the digestion takes place here. Any food that is not digested in the small intestine moves into the large intestine.
  - The *large intestine* is about 1.5 m long. The undigested material is passed through the large intestine and is excreted from the body.
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Pan Canadian Science Place 5: *Body Works* (Lesson 4)

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-06</b> <i>(continued)</i></p>

**SUGGESTIONS FOR INSTRUCTION**

*(continued)*

➤ **Mouth and Stomach Demonstration**

To demonstrate the function of the stomach, bring to class a blender, put a slice of bread and a little water into the blender, and mix. Have students observe what happens. Try the same thing with large and small pieces of apple and observe the differences. (Large pieces take longer to break down.)

Put small pieces of luncheon meat into one container with vinegar and a large piece into a second container. Observe what happens. (The acid in the vinegar breaks down the meat in both containers but it takes longer for the larger piece.)

Ask students why the teeth and mouth are important for digestion. (They break food into smaller pieces, making them easier to digest.)

➤ **Working Intestines**

To demonstrate the function of the small intestine, provide students with coffee filters and muddy water. Have students pass the water through a system of filters and observe what happens. (Cleaner water escapes through the filter while the mud remains.)

To demonstrate the function of the large intestine, place the remaining mud from the filter onto several paper towels. (The large intestine—paper towel—removes the remaining liquid, leaving solid waste to be expelled from the body.)

➤ **Function**

Ask students to refer to the Digestive Tract Model learning activity in conjunction with learning outcome 5-1-06 and the learning activities above. Have them fill in the appropriate section of the “Body Systems Chart” (BLM 5-A).

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES

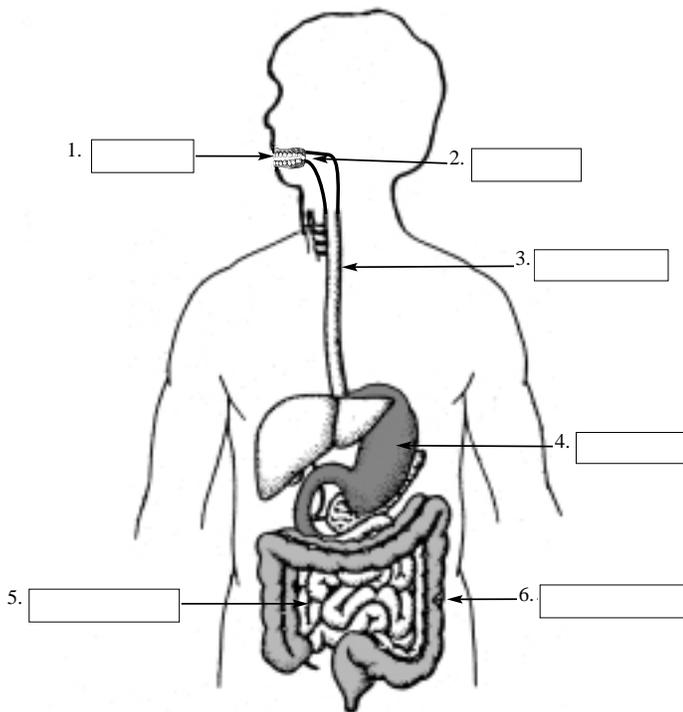


**Restricted Response**

Provide students with the following:

**Digestive System**

Label the major parts of the digestive system and explain what they do.



Look for:

- 1. teeth
- 2. mouth
- 3. esophagus
- 4. stomach
- 5. small intestines
- 6. large intestines

Empty rectangular box for student response.

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-07</b> Identify the major components of the skeletal, muscular, and nervous systems, and describe the role of each system in the human body.</p> <p>Include: the skeleton provides protection and support; muscles, tendons, and ligaments enable movement; brain, spinal cord, and nerves receive sensory input, process information, and send out signals.</p> <p>GLO: D1, E2</p>
<p><b>5-0-2a</b> Access information using a variety of sources. <i>Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet...</i> GLO: C6 (ELA Grade 5, 3.2.3; Math: SP-II.3.1)</p> <p><b>5-0-2c</b> Record information in own words and reference sources appropriately. GLO: C6 (ELA Grade 5, 3.3.2)</p> <p><b>5-0-5a</b> Make observations that are relevant to a specific question. GLO: A1, A2, C2</p> <p><b>5-0-7a</b> Draw, with guidance, a conclusion that explains investigation results. Include: explaining patterns in data; supporting or rejecting a prediction/hypothesis. GLO: A1, A2, C2 (ELA Grade 5, 3.3.4)</p>
<p><i>(continued)</i></p>

SUGGESTIONS FOR INSTRUCTION

➤ **Body Systems**

Have students brainstorm and record in the K (Know) section of a K-W-L Chart (Ogle, 1986) what they know about the three systems. Have them work in pairs to complete the W (Want to Know) section.

(For a BLM of a K-W-L Chart, see *SYSTH*, Attachment 9.1, or *Success*, p. 6.94.)

➤ **What System Is It?**

Bring to class a collection of household items (e.g., a bicycle helmet, coat hanger, remote control, elastic band). Ask students to indicate what system each item represents and to give reasons for their answers (e.g., bicycle helmet and coat hanger—skeleton; remote control—nervous system; elastic band—muscular system).

➤ **Skeletal System**

Use an inexpensive small model of a skeleton to show the different types of bones in the body. Have students observe the skeleton and make notes of their observations. If possible, obtain an X-ray of a hand or a foot so that students can see the many small bones that make up these body parts. (Over half the 206 bones in an adult human are found in the hands and feet.) Have students suggest the functions of the skeletal system. (It provides protection for internal organs, and, along with the muscles, it provides support and strength, allowing us to move and to stand.)

➤ **Strong Bones**

To demonstrate the strength of bones, have students perform the following steps:

- Place a roll of paper towels or toilet paper on its side and place a heavy book on top of it. Observe what happens. (The tube will flatten.)
- Now, place the roll on end and place the book on top of it. Observe. Try placing more than one book on the roll. (The cylinder will hold up the book. Refer to students’ understanding of the strength of various shapes from their study of structures in Grade 3, Cluster 2: Materials and Structures.)
- Explain why strong bones are necessary in the body.

*(continued)*

SUGGESTIONS FOR ASSESSMENT

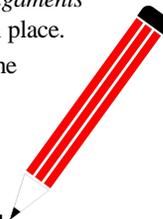
SUGGESTED LEARNING RESOURCES

Teacher Notes

**Background Information**

The *skeletal system* or *skeleton* is the body's hard, tough framework made of bones. It protects the softer inside parts of the body and works together with the *muscular system* to allow us to sit, stand, or move. The *muscles* also help us control organs inside the body. *Tendons* are tough, cord-like bands of tissue that bind the muscles to the bones. *Ligaments* are strong bands of tissue that connect bones or hold organs in place.

The *brain* and the *nervous system* control all body systems. The nervous system enables the body to sense changes in the environment and to adjust to them. Working with the nervous system, the brain tells the other systems what to do.



Pan Canadian Science Place 5: *Body Works* (Lessons 10-12)

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p data-bbox="110 327 310 359"><b>5-1-07</b> <i>(continued)</i></p> <p data-bbox="440 1871 553 1898"><i>(continued)</i></p>

SUGGESTIONS FOR INSTRUCTION

*(continued)*

➤ **Observing Tendons**

Have each student form one hand into a claw and then wiggle the index finger. They will be able to see the tendon move over the knuckle and slide over the back of the hand.

➤ **Muscles and Bones Working Together**

Have students try the following investigations:

1. *Muscle Contractions*: Provide students with a thin ruler and a hairpin or a bent piece of wire. Have students do the following:

- Balance the pin/wire on the ruler and then stand in front of a table.
- Hold the ruler in one hand so that the tip of the pin is just touching the table. The arm should not be touching the table nor be braced in any way. Try to keep the wire and the ruler still.

(Inside the muscle, some fibres are always contracting, while others are relaxing. When the fibres switch roles, they cause the muscle to twitch. It is therefore impossible to hold the arm perfectly still.)

2. *Tired Muscles*: Provide students with clothespins and a stopwatch. Have students see how many times they can squeeze open the clothespin in 30 seconds. Take a 10-second break and then repeat, then another 10-second break and repeat. Ask students to record what they observe. Was there a change? Why do you think this happened? (Muscles become fatigued when they make the same movement over and over again.)

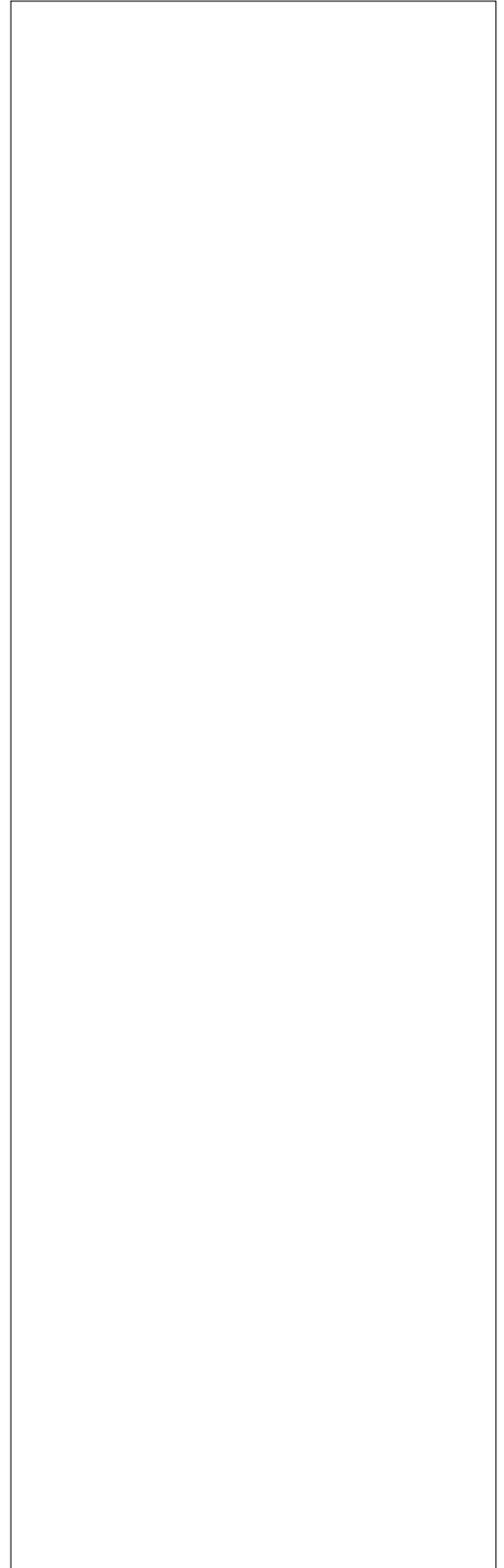
3. *Model Arm*: Provide students with cardboard, adhesive tape, paper clips, scissors, and long balloons. Have students follow these steps:

- Cut three cardboard squares equal to the length of their arm—one from shoulder to elbow, and two from elbow to wrist.
- Roll each square into a cylinder and tape it in place.
- Connect all three cylinders (representing bones) by straightening a paper clip, punching a hole through each “bone,” and then putting the paper clip through all three “bones” and bending the ends to keep it in place.
- Tape the two smaller cylinders together at the end.

*(continued)*

**SUGGESTIONS FOR ASSESSMENT**

**SUGGESTED LEARNING RESOURCES**

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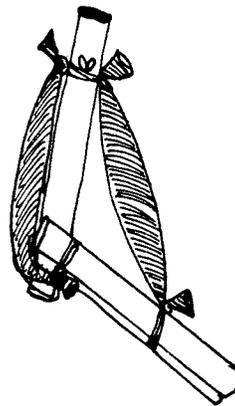
PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-07</b> <i>(continued)</i></p> <p style="text-align: right;"><i>(continued)</i></p>

**SUGGESTIONS FOR INSTRUCTION**

*(continued)*

- Slightly inflate the balloon (representing muscles) and tie the ends.
- Connect the balloon by tying it onto the cylinders.
- Move the arm model and observe what happens to the balloon “muscles.” (They stretch and contract, depending on the movement.)

Example:



➤ **Nervous System**

Show a video about the nervous system and ask students to jot notes on what they see. Have them use this information to fill in the appropriate section of the “Body Systems Chart” (BLM 5-A).

➤ **Working Together**

Have students conduct a demonstration of how the brain, nerves, and muscles work together, following these steps:

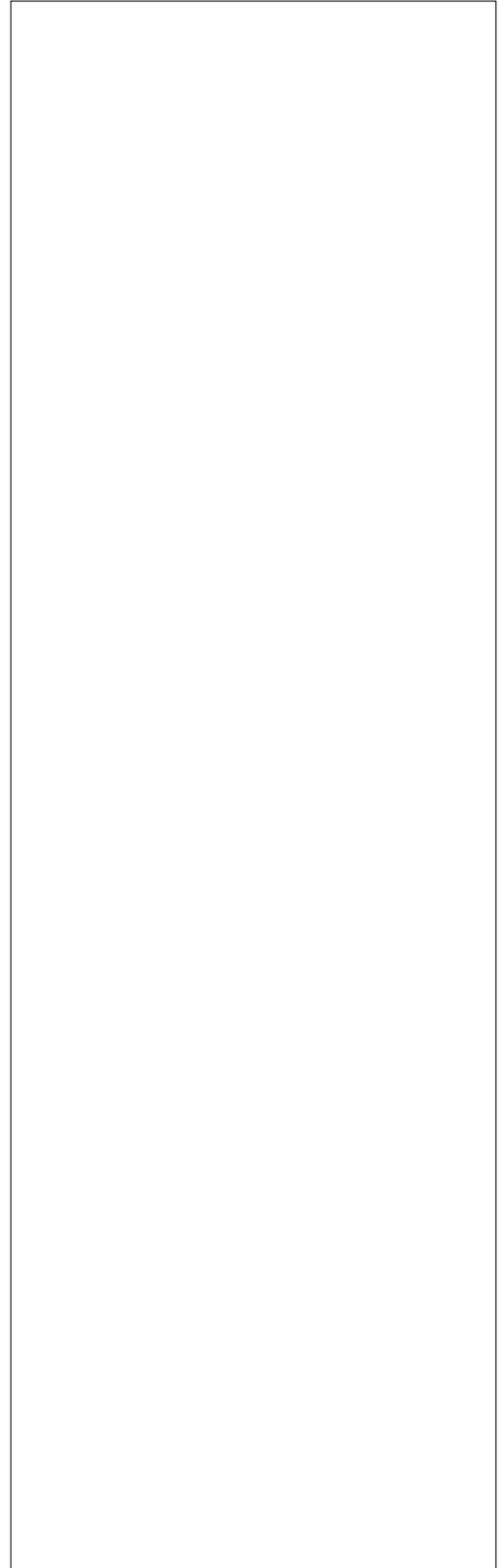
- Take turns standing in a doorway, lifting both arms until the backs of the hands are touching the door frame on either side.
- Push against the door frame as hard as possible and slowly count to 30.
- Move away from the door frame and let the arms hang loose.
- Observe what happens. (The arms will rise.)
- Predict why this occurs. (While the students’ hands are pushing against the door frame the brain is sending messages along the nerves telling the muscles to lift the arms. When the student steps away from the door frame, messages are still on their way to the muscles. The arms rise when the messages get to the muscles.)

*(continued)*

*(continued)*

**SUGGESTIONS FOR ASSESSMENT**

**SUGGESTED LEARNING RESOURCES**

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PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<b>5-1-07</b> <i>(continued)</i>

SUGGESTIONS FOR INSTRUCTION

*(continued)*

➤ **Testing Reflexes**

Have Student A hold a ruler (with the lower numbers facing downward) just above a partner’s thumb and index finger (held slightly apart). Have Student A drop the ruler without letting Student B know when this will happen. Record the number at which Student B caught the ruler. Repeat several times. Ask students if they think this practice will improve their reaction time. Have students test their prediction. (This is an example of voluntary reflexes.)

➤ **Putting It Together**

Have students refer to the Testing Reflexes learning activity and describe in as much detail as possible the role that the skeletal, muscular, and nervous systems played in accomplishing this task.

➤ **Continuing the Body Systems Chart**

Have students add to their “Body Systems Chart” (BLM 5-A).

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



**Restricted Response**

Provide students with the following:

**Skeletal, Muscular, and Nervous Systems**

Fill in the blanks using the words below.

brain            skeleton            muscles            ligaments  
tendons            spinal cord            nerves

1. \_\_\_\_\_ are strong bands of tissue that connect bones.
2. The \_\_\_\_\_ works with the nervous system to control the body systems.
3. The \_\_\_\_\_ is made up of 206 bones.
4. \_\_\_\_\_ are tough, cordlike bands of tissue that bind muscles to bones.
5. \_\_\_\_\_ help us to sit, stand, and move.
6. Messages travel back and forth through the \_\_\_\_\_.
7. Another name for the \_\_\_\_\_ is backbone.

Look for:

1. ligaments
2. brain
3. skeleton
4. tendons
5. muscles
6. nerves
7. spinal cord

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-08</b> Identify skin as the major component of the integumentary system, and describe its role in protecting and supporting the human body.</p> <p>GLO: D1, E2</p>
<p><b>5-0-3a</b> Formulate, with guidance, a prediction/hypothesis that identifies a cause and effect relationship. GLO: A2, C2 (Math: SP-I.1.5)</p> <p><b>5-0-5a</b> Make observations that are relevant to a specific question. GLO: A1, A2, C2</p>

SUGGESTIONS FOR INSTRUCTION

Teacher Notes

**Background Information**

The skin’s main role is to keep the internal body parts from drying up. Skin also protects the body from bacteria, dirt, and the Sun’s rays. In addition, skin plays a role in controlling the body’s temperature. Sweating, goose bumps, and simple heat loss from the skin all help keep the internal temperature comfortable. The skin also contains thousands of nerve endings that help provide the brain with information about the environment outside the body.



➤ **The Role of the Skin**

Perform the following class demonstration:

- Prepare a bowl of gelatin/jelly. Hold a pointed pencil above the bowl and drop it into the gelatin. Observe what happens. (The pencil penetrates the gelatin.)
- Have a student place a sheet of paper over the bowl. Drop the pencil again. Add another sheet of paper and drop the pencil again. Observe what happens. (The paper prevents the pencil from penetrating the gelatin.)
- Put several sheets of paper over the bowl. Tip the bowl upside-down onto the paper. Observe what happens. (The paper prevents the gelatin from falling onto the table.)

Have students make predictions about the role of the skin based on the demonstration.

➤ **Keeping out Bacteria**

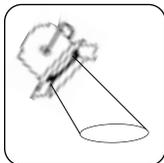
Use two apples to demonstrate how an apple’s skin helps to protect it. Leave one apple as it is. In the other apple, cut various sizes of “wounds.” Observe the apples over a period of days.

➤ **Continuing the Body Systems Chart**

Have students add to their “Body Systems Chart” (BLM 5-A).

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



**The Importance of Skin**

Provide students with the following:



**The Importance of Skin**

- Imagine what it would be like if you had no skin.
- What problems would you have?
- Explain.

Look for:

- internal organs would dry up
- internal organs would not stay in place
- bacteria and dirt would enter the body
- the Sun’s rays would damage internal organs
- the body would overheat
- the sense of touch would disappear

Pan Canadian Science Place 5: *Body Works* (Lesson 10)

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-09</b> Identify components of the human body’s defenses against infections, and describe their role in defending the body against infection.                      Include: tears, skin, white blood cells.                      GLO: D1, E2</p>
<p><b>5-0-4c</b> Work cooperatively with group members to carry out a plan, and troubleshoot problems as they arise. GLO: C7 (ELA Grade 5, 5.2.2)  <b>5-0-9e</b> Be sensitive to and develop a sense of responsibility for the welfare of other humans, other living things, and the environment.                      GLO: B5</p>
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SUGGESTIONS FOR INSTRUCTION

➤ **White Blood Cells**

Present students with factual information about the function of white blood cells in the body. Example: “Here and there a white blood cell was busy destroying disease germs. ‘White blood cells are like soldiers protecting your body from enemies’” (Cole, 1989). Have students answer the question: Who is the enemy?

Students will not have studied the *cell* but should be able to use the term in this context. Formal study of the cell occurs in Grade 8, Cluster 1: Cells and Systems.

➤ **Body Defenses Game**

Have students invent a game, to be played in the gymnasium or outdoors, in which certain students represent germs/bacteria that have to get through the body’s defenses to the bloodstream. The game should include: tears, skin, and white blood cells.

Students should already be familiar with tears from the study of the senses in Grade 1, Cluster 2: The Senses. They should also be familiar with the defensive function of the skin from their study of that system in an instructional strategy suggested for learning outcome 5-1-08.

➤ **Bacteria Blues**

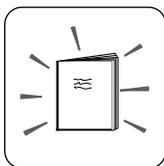
Have students write a short story or create a rap about a harmful bacterium and how it tries to infect someone. The bacterium can try to enter through the eye, the mouth, the skin, and then through the bloodstream.

➤ **Prevention Poster**

Have students design educational posters for younger students on how to keep germs/bacteria at bay (for example, hand washing, proper care of cuts).

SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



**Checklist: Bacteria Blues**

When assessing students' Bacteria Blues story or rap, look for indications of the following:

Checklist:

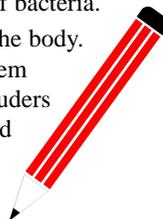
- identifies the main components of the human body's defense system
  - tears
  - skin
  - white blood cells
- shows the function of each defense
- is well-sequenced and clearly written

**Teacher Notes**

**Background Information**

The body has many defenses against infection, but they do not make up one body system.

- *Tears* are a salty fluid that prevents germs from entering the eye.
- *Skin* helps protect the internal body parts from the entry of bacteria.
- *White blood cells* reproduce quickly when bacteria enter the body. Then they get rid of the bacteria either by "swallowing them up" or by making antibodies that label the bacteria as intruders and lead to their destruction by other elements in the blood system.



Pan Canadian Science Place 5: *Body Works* (Lesson 14)

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-10</b> Identify the major components of the respiratory and circulatory systems, and describe the role of each system in the human body.</p> <p>Include: the nose, trachea, and lungs take in oxygen and expel carbon dioxide; the heart, blood vessels, and blood transport oxygen, nutrients, and waste products such as carbon dioxide.</p> <p>GLO: D1, E2</p>
<p><b>5-0-1a</b> Formulate, with guidance, specific questions that lead to investigations. Include: rephrase questions to a testable form, focus research questions. GLO: A1, C2 (ELA Grade 5, 3.1.1; Math: SP-I.1.5)</p> <p><b>5-0-1b</b> Identify various methods for finding the answer to a specific question and, with guidance, select one to implement. <i>Examples: generating experimental data; accessing information from a variety of sources...</i> GLO: C2 (ELA Grade 5, 3.2.2; Math: SP-II.1.5)</p> <p><b>5-0-3a</b> Formulate, with guidance, a prediction/hypothesis that identifies a cause and effect relationship. GLO: A2, C2 (Math: SP-I.1.5)</p> <p><b>5-0-3b</b> Identify variables that might have an impact on their experiments and, with guidance, variables to hold constant to ensure a fair test. GLO: A2, C2</p> <p><b>5-0-3c</b> Create a written plan to answer a specific question. Include: apparatus, materials, safety considerations, steps to follow. GLO: C2 (ELA Grade 5, 3.1.4)</p> <p><b>5-0-4a</b> Carry out, with guidance, procedures that comprise a fair test. Include: controlling variables, repeating measurements to increase accuracy and reliability. GLO: C2</p> <p><b>5-0-4e</b> Use tools and materials in a manner that ensures personal safety and the safety of others. Include: keeping an uncluttered workspace; putting equipment away after its use; handling glassware with care. GLO: C1</p> <p><b>5-0-5a</b> Make observations that are relevant to a specific question. GLO: A1, A2, C2</p> <p><b>5-0-5c</b> Select and use tools and instruments to observe, measure, and construct. Include: balance, thermometer, spring scale, weather instruments. GLO: C2, C3, C5</p> <p style="text-align: right;"><i>(continued)</i></p>

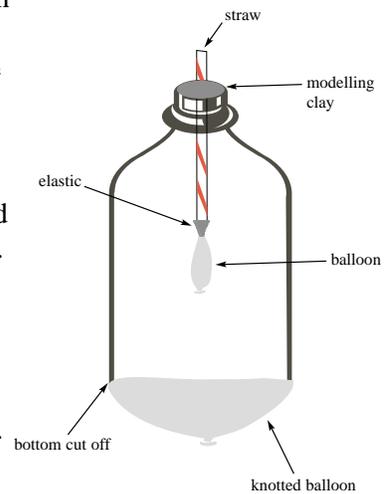
## SUGGESTIONS FOR INSTRUCTION

### ➤ Respiratory System Model

Provide small groups of students with the following materials: one clear two-litre soft drink bottle (with bottom cut off), two balloons, modelling clay, one plastic drinking straw, and one elastic band.

Have students follow these directions to make a model of the respiratory system:

1. Tie a knot in one end of a balloon and then cut a small piece off the other end of the balloon. Stretch the hole of the balloon over the bottom of the bottle. (The knot will serve as a handle.)
2. Insert the drinking straw into the opening of the other balloon, using the elastic to attach it.
3. Push the straw and the balloon through the opening (pour spout) of the bottle so that the balloon hangs down in the bottle and part of the straw remains outside.
4. Seal the bottle opening around the straw with modelling clay. Make sure the opening is airtight.
5. Push up on the balloon covering the bottom of the bottle. Observe what happens. (The deflated balloon inside collapses.)
6. Pull down on the balloon at the bottom of the bottle. Observe what happens. (The deflated balloon inside inflates.)
7. Hold the straw near your face. What do you feel as you repeat steps 5 and 6? Why?  
(In step 5 air is blown out; in step 6 air is drawn in. The bottle represents the chest and the balloon stretched across the bottom is like the diaphragm. The balloon in the bottle is like a lung. The straw represents one of the bronchial tubes leading to the lung. When the balloon is pushed up, the balloon shrinks and air comes out of the straw. This is what happens when we breathe out. When the balloon is pulled down, air is sucked into the “lung” and fills it. This is what happens when we breathe in.)
8. Explain the function of the parts of the respiratory system.



*(continued)*

## SUGGESTIONS FOR ASSESSMENT

## SUGGESTED LEARNING RESOURCES

## Teacher Notes

**Background Information**

**The Respiratory System:** This system helps provide the body with oxygen and helps remove carbon dioxide (a waste product).

- The *nose* takes in air. Inside the nose, the air is warmed and moistened. Dust particles and harmful bacteria are trapped by the hairs inside the nose or by a sticky fluid called *mucus* in the nasal passage.
- The *trachea*, also known as the *windpipe*, is the tube that leads to the lungs. It forks into two main *bronchi*, or tubes, one tube leading to each lung. The trachea has mucus to trap harmful bacteria or dust. It also has millions of tiny hairlike *cilia* that sweep back and forth, driving anything harmful back to the throat.
- The *lungs* are spongy masses of tissue that are sealed inside the ribs. The chest muscles pull the ribs to help the chest cavity expand and contract.
- Another set of muscles, the *diaphragm*, moves up and down like an elevator to draw air into the lungs as the chest expands and to force air out of the lungs as the chest contracts.
- Oxygen passes from the lungs into the bloodstream through tiny air sacs or *alveoli* at the same time that carbon dioxide goes in the other direction, from the blood to the lungs, to be breathed out.

**The Circulatory System:** This system transports oxygen, nutrients, and waste products.

- The *heart* is a two-pump system. One pump controls the flow of blood from the heart to the lungs, where carbon dioxide waste is exchanged for fresh oxygen. The other pump sends the blood to cells throughout the body.
- There are three types of *blood vessels*:
  - The *arteries* carry the blood out and away from the heart. They are large with thick elastic walls.
  - *Capillaries* are the smallest vessels. They are so small that blood cells can only pass singly through them. This allows for the in-and-out filtering of nutrients and waste products.
  - *Veins* return the blood to the heart and lungs. They appear blue under the skin because they are carrying carbon dioxide. Mature red blood cells carry oxygen in the blood.

Pan Canadian Science Place 5: *Body Works* (Lessons 6-7)

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-10</b> <i>(continued)</i></p> <p><b>5-0-5d</b> Evaluate the appropriateness of units and measuring tools in practical contexts. GLO: C2, C5 (Math: SS-I.1.5)</p> <p><b>5-0-5e</b> Estimate and measure mass/weight, length, volume, and temperature using SI and other standard units. GLO: C2, C5 (Math: SS-IV.1.5, SS-III.1.5, SS-I.1.5, SS-VIII.4.3)</p> <p><b>5-0-5f</b> Record and organize observations in a variety of ways. <i>Examples: point-form notes, sentences, labelled diagrams, charts, ordered lists of data, frequency diagrams, spread sheets...</i> GLO: C2, C6 (ELA Grade 5, 3.3.1; Math: SP-III.2.5)</p> <p><b>5-0-6a</b> Construct graphs to display data, and interpret and evaluate these and other graphs. <i>Examples: bar graphs, frequency tallies, line plots, broken line graphs...</i> GLO: C2, C6 (ELA Grade 5, 3.3.1; Math: SP-II.1.5, SP-III.2.5, SP-IV.1.5; TFS: 4.2.2–4.2.6)</p> <p><b>5-0-6c</b> Identify and suggest explanations for patterns and discrepancies in data. GLO: A1, A2, C2, C5</p> <p><b>5-0-6f</b> Evaluate the methods used to answer a question or solve a problem. GLO: C2, C3 (ELA Grade 5, 3.3.4)</p> <p><b>5-0-7a</b> Draw, with guidance, a conclusion that explains investigation results. Include: explaining patterns in data; supporting or rejecting a prediction/hypothesis. GLO: A1, A2, C2 (ELA Grade 5, 3.3.4)</p> <p><b>5-0-7b</b> Base conclusions on evidence rather than preconceived ideas or hunches. GLO: C2, C4</p> <p><b>5-0-7c</b> Identify, with guidance, a new prediction/hypothesis, based on investigation results. GLO: A1, C2 (ELA Grade 5, 3.3.4)</p> <p><b>5-0-7g</b> Communicate methods, results, conclusions, and new knowledge in a variety of ways. <i>Examples: oral, written, multimedia presentations...</i> GLO: C6 (ELA Grade 5, 4.4.1; TFS: 3.2.2, 3.2.3)</p> <p><b>5-0-7h</b> Identify, with guidance, potential applications of investigation results. GLO: C4</p> <p><b>5-0-9c</b> Demonstrate confidence in their ability to carry out investigations. GLO: C5</p> <p><b>5-0-9d</b> Appreciate the importance of creativity, accuracy, honesty, and perseverance as scientific and technological habits of mind. GLO: C5</p>

SUGGESTIONS FOR INSTRUCTION

*(continued)*

➤ **Function of the Circulatory System**

Provide students with the information about the circulatory system presented below. Ask them to use this information to add to their “Body Systems Chart” (BLM 5-A).

**The Circulatory System:** The circulatory system supports all body systems. The heart pumps blood to all parts of the body through blood vessels, arteries, and capillaries. The circulatory system

- helps the digestive system by carrying nutrients in the blood to all parts of the body
- helps the respiratory system by carrying oxygen from the lungs to the body and removing carbon dioxide
- works with the brain and nervous system by carrying messages to muscles in all parts of the body
- helps defend the body by transporting white blood cells in blood
- helps transport waste materials from the body

Without the circulatory system our body systems would not be able to function.

➤ **Observing the Heartbeat**

Have students use a small piece of modelling clay and a toothpick to make a pulse meter, following these steps:

- Stick the toothpick into the modelling clay and then place the meter on the wrist.
- Move it around until the spot with the strongest pulse is found.
- Count the number of times the toothpick bobs up and down in one minute.

➤ **Effects of Exercise Experiment/Investigation**

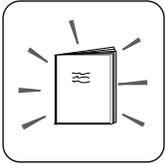
Have students design an experiment/investigation to determine the effect of exercise on pulse rate. Instruct students to

- make a prediction or formulate an hypothesis identifying cause and effect relationships
- conduct a fair test (controlling variables)
- repeat their measurements to ensure accuracy
- graph the results of several trials or graph class data
- write up the experiment/investigation
- present findings to the class

Students may use “Experiment Report” (BLM 5-K) to record their work.

**SUGGESTIONS FOR ASSESSMENT**

**SUGGESTED LEARNING RESOURCES**



When assessing the Effects of Exercise Experiment/Investigation, refer to “Experiment Report: Assessment” (BLM 5-L).

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PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-11</b> Describe how the human body gets rid of waste.</p> <p>Include: kidneys filter blood and dispose of waste as urine; lungs give off waste carbon dioxide; the rectum collects and expels undigested food matter.</p> <p>GLO: D1, E2</p>
<p><b>5-0-7f</b> Use prior knowledge and experiences selectively to make sense of new information in a variety of contexts. GLO: A2, C4 (ELA Grade 5, 1.2.1)</p>

SUGGESTIONS FOR INSTRUCTION

➤ **Body Waste**

Have students brainstorm ways in which the body gets rid of waste material. They should recall that carbon dioxide goes out through the lungs and that solid waste leaves the body through the rectum. If students mention the kidneys, ask them to list what they know about them. As a class, summarize the role of the kidneys, lungs, and rectum in disposing waste products.

➤ **Making Connections**

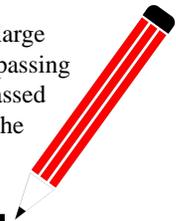
Have students make connections between the body’s methods of getting rid of waste and the ways in which a city/town manages waste (e.g., use of garbage trucks for solid waste, a water treatment plant for liquid waste, and air pollution controls for gaseous waste).

Teacher Notes

**Background Information**

The body uses many methods to eliminate waste, not all of which are part of the excretory system.

- The *kidneys*, located near the spine in the middle of the back (waist level), filter blood and dispose of waste as urine. When food is burned in the cells for energy, carbon dioxide gas is produced. Ammonia, which is a poison to the body, is also produced. It is changed in the *liver* to a harmless chemical called urea, which is then passed in the blood to the kidneys where it is filtered out. Useful materials and the cleaned-up liquid (about 99%) are returned into the bloodstream. The remaining liquid, called urine, travels down tubes called *ureters*, to the *bladder*. The urine is stored in the bladder until it is eliminated through the *urethra*.
- The *lungs* give off carbon dioxide gas.
- The *rectum* is the final part of the large intestine. In the large intestine the water from undigested food is removed by passing through its walls into the blood. What remains is then passed into the rectum and stays there until it is removed from the body through the *anus*.



SUGGESTIONS FOR ASSESSMENT

SUGGESTED LEARNING RESOURCES



**Extended Response**

Have students describe, in point form, how the human body gets rid of waste.

Look for:

- identifies the main components of the body's means of getting rid of waste
  - kidneys
  - lungs
  - rectum
- identifies the function of each component
  - kidneys filter blood and dispose of waste as urine
  - lungs give off waste carbon dioxide
  - rectum collects and expels undigested food

Pan Canadian Science Place 5: *Body Works* (Lesson 9)

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-12</b> Give examples of how systems of the human body work together.</p> <p><i>Examples: the circulatory system transports nutrients from the digestive system and oxygen from the respiratory system to the muscular system...</i></p> <p>GLO: D1, E2</p>
<p><b>5-0-4c</b> Work cooperatively with group members to carry out a plan, and troubleshoot problems as they arise. GLO: C7 (ELA Grade 5, 5.2.2)</p>
<p><b>5-1-13</b> Identify and describe factors necessary to maintain a healthy body.</p> <p>Include: daily physical activity, a balanced diet, fluid replacement, adequate sleep, appropriate hygiene practices, regular check-ups.</p> <p>GLO: B3, C4, D1</p>
<p><b>5-0-9f</b> Frequently and thoughtfully evaluate the potential consequences of their actions.</p> <p>GLO: B5, C4</p>

SUGGESTIONS FOR INSTRUCTION

➤ **Linking Systems**

Have students refer to the student information about the circulatory system provided in relation to learning outcome 5-1-10 and identify the ways in which this system works with other body systems.

Prepare chain-like links and write one body system on each link. Distribute the links among groups of four or five students. Have students link up two or more pieces and have them explain how they are connected. Give a bingo chip to a group each time they make a correct link. These chips can be placed on a letter in the word SYSTEMS. The group that covers the most letters could present their best links either first or last.

➤ **Health Factors**

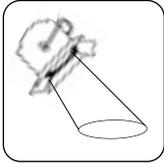
Brainstorm with the class the factors required to maintain a healthy body, including the following: daily physical activity, a balanced diet, fluid replacement, adequate sleep, appropriate hygiene practices, and regular check-ups.

➤ **Necessary or Unnecessary?**

Prepare a list of statements, or have students contribute 15 different statements, that describe factors that are necessary to maintain a healthy body and factors that are not necessary (e.g., Limit time spent watching television and playing video games. Drink at least eight glasses of water a day.). Have students work with a partner to determine whether the statements belong in the necessary category or the unnecessary category. Ask each pair to discuss their findings with another pair and try to reach a consensus.

**SUGGESTIONS FOR ASSESSMENT**

**SUGGESTED LEARNING RESOURCES**



**Analogy**

Provide students with the following:

**Your Body As a House**

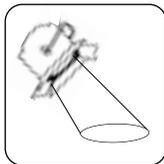
Complete *one* of the following tasks:

1. Imagine that your body is like a house. Write a descriptive paragraph explaining what parts of the house would represent a body system, and how the systems work together.

OR

2. Imagine that your body is like a house. Draw and label a picture indicating where the body systems are in the house and how they work together.

Pan Canadian Science Place 5: *Body Works* (Lesson 14)



**Newspaper Article**

Provide students with the following:

**Maintaining a Healthy Body**

You have been asked to write an article for the school newspaper entitled “How to Maintain a Healthy Body.” Your article should contain at least five key points and an explanation for each point.

Scoring Rubric	
Score	Criteria
4	The student identifies five or more factors and gives a clear explanation for each.
3	The student identifies four factors and gives a clear explanation for each.
2	The student identifies three factors and gives an explanation for each.
1	The student identifies four or more factors with no explanation.
	The student identifies two factors and gives an explanation for each.

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-14</b> Evaluate information related to body image and health from media sources for science content and bias.</p> <p><i>Examples: glamorization of smoking in movies, promotion of unrealistic role models in magazines, trivialization of scientific information on television...</i></p> <p>GLO: B3, C4, C5, C8</p>
<p><b>5-0-2a</b> Access information using a variety of sources. <i>Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet...</i></p> <p>GLO: C6 (ELA Grade 5, 3.2.3; Math: SP-II.3.1)</p> <p><b>5-0-9e</b> Be sensitive to and develop a sense of responsibility for the welfare of other humans, other living things, and the environment.</p> <p>GLO: B5</p> <p><b>5-0-9f</b> Frequently and thoughtfully evaluate the potential consequences of their actions.</p> <p>GLO: B5, C4</p>
<p>(continued)</p>

SUGGESTIONS FOR INSTRUCTION

➤ **Media Images**

Bring to class texts such as newspapers, flyers, teen magazines, and so on. Have students look at the advertisements and make notes of how they are alike and how they are different (e.g., consider gender, body type, racial groups).

➤ **Advertising Strategies**

Have students use the advertisements from the previous Media Images learning activity, as well as viewing additional examples from television, radio, and print, to identify and describe different advertising strategies used.

Examples:

- showing the “ideal” child or family
- using a celebrity
- including a catchy tune/phrase
- omitting significant information

Have students share their findings through a Gallery Walk (Brownlie and Close, 1992). Ask students to note any scientific information presented in the advertisements, to reflect on why advertisers use these strategies, and to indicate how they can become “smart” consumers. (For a discussion of Gallery Walks, see *Success*, p. 6.80, or *5-8 ELA, Strategies*, p. 202.)

See <<http://www.media-awareness.ca>> for related learning activities.

➤ **Who’s Cool**

Have students brainstorm media images of being cool.

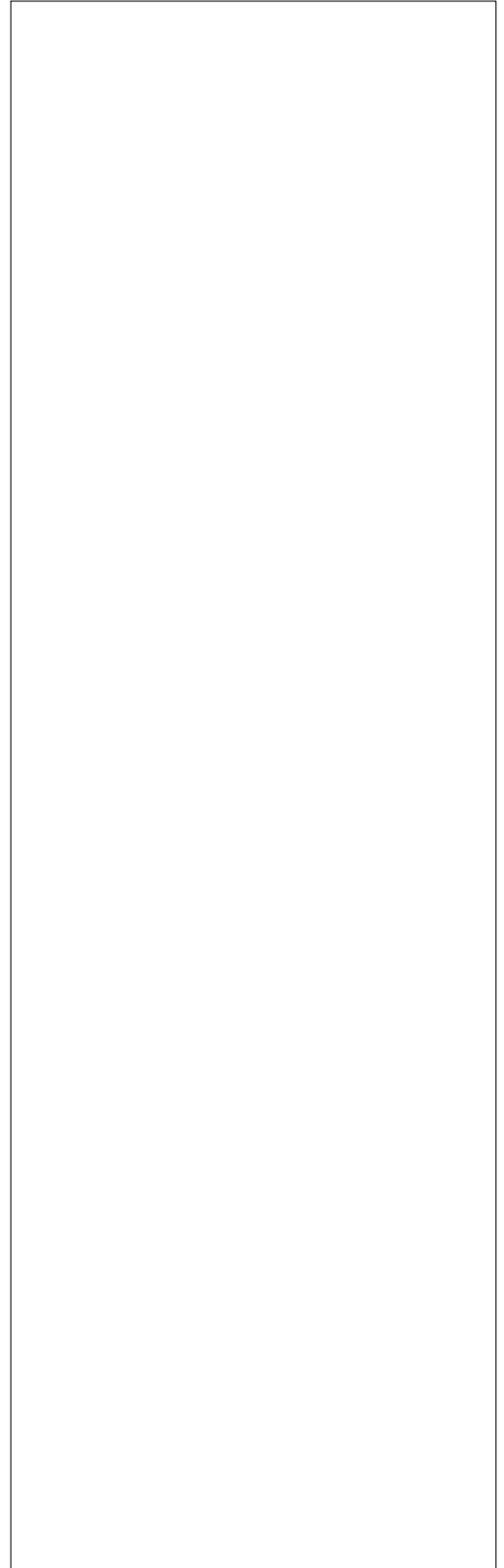
Ask:

- Who are the most influential people in determining what is cool? (e.g., television/movie characters, rock stars, models in magazines, athletes)
- Do we make assumptions about the lives of people whom we consider to be cool?
- How do you view what you are wearing and the way you look? (Did you buy a particular item of clothing because you considered it cool? Are you wearing your hair in a certain way because it is cool? Are you trying to lose or gain weight or muscle to fit a cool, popular image?)
- What do advertisers say we must have or be in order to be cool?

(continued)

**SUGGESTIONS FOR ASSESSMENT**

**SUGGESTED LEARNING RESOURCES**

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**PRESCRIBED LEARNING OUTCOMES**

**SUGGESTIONS FOR INSTRUCTION**

*Students will...*

**5-1-14** *(continued)*

*(continued)*

➤ **Analogy**

Statistically, the people we see in the media represent only 5% of the population. That means that 95% of the population is being told to look the way only a small number of people look. Demonstrate this using 95 multi-coloured candies to represent “regular people.” Toss in five candies of another colour not included in the 95, explaining that these five candies represent the people shown by the media.

Ask:

- Does it seem fair that only five of the 100 people (candies) are shown in advertisements on television, in magazines, etc.?
- How would it make you feel to be one of the 95 “regular people” who never see someone like them in the media?
- Does colour seem to be a good criterion to use to determine who is represented in the media?
- Who should be represented in the media?

➤ **Science in the Media**

Show the class print advertisements for cigarettes. What scientific information is given? What facts are missing?

Have students brainstorm other advertisements that overlook or downplay important scientific information that could have an impact on human health.

**SUGGESTIONS FOR ASSESSMENT**

**SUGGESTED LEARNING RESOURCES**



**Extended Response**

Provide students with the following:

**Media Images**



1. Describe four advertising strategies and explain how they work to attract customers.
2. How do the media influence beliefs about body image and health?
3. Describe the characteristics of a “cool” person and explain your reasoning.

A large empty rectangular box for writing or drawing.

PRESCRIBED LEARNING OUTCOMES
<i>Students will...</i>
<p><b>5-1-15</b> Explain how human health may be affected by lifestyle choices and natural- and human-caused environmental factors.</p> <p>Include: smoking and poor air quality may cause respiratory disorders; unhealthy eating and physical inactivity may lead to diabetes or heart disease; prolonged exposure to the Sun can cause skin cancer.</p> <p>GLO: B3, B5, C4, D1</p>
<p><b>5-0-1a</b> Formulate, with guidance, specific questions that lead to investigations. Include: rephrase questions to a testable form, focus research questions. GLO: A1, C2 (ELA Grade 5, 3.1.1; Math: SP-I.1.5)</p> <p><b>5-0-1b</b> Identify various methods for finding the answer to a specific question and, with guidance, select one to implement. <i>Examples: generating experimental data; accessing information from a variety of sources...</i> GLO: C2 (ELA Grade 5, 3.2.2; Math: SP-II.1.5)</p> <p><b>5-0-2a</b> Access information using a variety of sources. <i>Examples: libraries, magazines, community resource people, outdoor experiences, videos, CD-ROMs, Internet...</i> GLO: C6 (ELA Grade 5, 3.2.3; Math: SP-II.3.1)</p> <p><b>5-0-2b</b> Review information to determine its usefulness, using predetermined criteria. GLO: C6, C8</p> <p><b>5-0-7g</b> Communicate methods, results, conclusions, and new knowledge in a variety of ways. <i>Examples: oral, written, multimedia presentations...</i> GLO: C6 (ELA Grade 5, 4.4.1; TFS: 3.2.2, 3.2.3)</p> <p><b>5-0-8b</b> Identify examples of scientific knowledge that have developed as a result of the gradual accumulation of evidence. GLO: A2</p> <p><b>5-0-8e</b> Describe hobbies and careers related to science and technology. GLO: B4</p> <p><b>5-0-8g</b> Describe positive and negative effects of scientific and technological endeavours. Include: effects on themselves, society, the environment, and the economy. GLO: A1, B1, B3, B5</p> <p><b>5-0-9a</b> Appreciate that women and men of diverse cultural backgrounds can contribute equally to science. GLO: A4</p> <p><b>5-0-9b</b> Show interest in the activities of individuals working in scientific and technological fields. GLO: B4</p>

SUGGESTIONS FOR INSTRUCTION

➤ **Interview an Expert**

Have students do small-group projects to generate and find answers to questions concerning human health and lifestyle choices and environmental factors.

Examples:

- What causes respiratory problems?
- What is diabetes and how can it be prevented in later life?
- What environmental factors affect the skin?
- What is heart disease and how can it be prevented?

Have students proceed as follows:

- Make up a set of interview questions, including questions about how scientific and medical advances have improved the treatment and quality of life for people with given problems.
- Contact in person, on the Internet, or in writing a resource person to answer the interview questions, provide a brief autobiography, and describe what his or her job is. Once you have answers to the questions, prepare an oral class presentation (e.g., in the form of a mock interview with an “expert” or with a person living with one of these conditions).

➤ **Science in Practice**

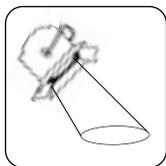
Invite a speaker (e.g., medical doctor, health care professional, research scientist) to the class. Ask the invited guest to speak about the following points:

- Describe what you do in your occupation.
- Describe what equipment you use and/or how this equipment has changed during your career.
- Talk about other related fields or specialties.
- Talk about the different people with whom you work (e.g., men and women, people of different cultures, other professionals).

**Note:** This is a good opportunity to highlight the range of science-related careers available, and the fact that men and women of diverse cultural backgrounds can contribute equally to science.

**SUGGESTIONS FOR ASSESSMENT**

**SUGGESTED LEARNING RESOURCES**



**Interview an Expert: Oral Presentation**

Look for indications of the following in student work:

Scoring Rubric	
Score	Criteria
3	<ul style="list-style-type: none"> <li>organization is logical and creative</li> <li>detailed preparation is evident</li> <li>material is relevant to topic</li> <li>highly creative elements exist</li> </ul>
2	<ul style="list-style-type: none"> <li>some organization is evident</li> <li>some preparation is evident</li> <li>most of the material is relevant to topic</li> <li>some creativity is evident</li> </ul>
1	<ul style="list-style-type: none"> <li>organization and structure are lacking</li> <li>minimal preparation is evident</li> <li>material is irrelevant or inappropriate</li> <li>creativity is lacking</li> </ul>

Pan Canadian Science Place 5: *Body Works* (Lesson 14)

**Notes**