

# Unit 1 Summary

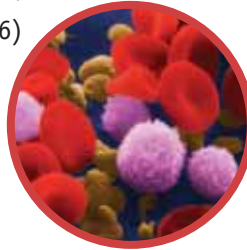
## Topic 1.1: Why are cells important?

### Key Concepts

- Studying cells helps us understand how organisms function.
- Cellular organelles work together to carry out life functions.
- Cellular processes enable organisms to meet their basic needs.

### Key Terms

- organelle (page 12)
- diffusion (page 16)
- concentration (page 16)
- osmosis (page 17)



### Big Ideas

- All animals are made of specialized cells, tissues, and organs that are organized into systems.

## Topic 1.2: Why do animal cells divide and what happens when they do?

### Key Concepts

- Cells must divide for an organism to survive.
- Hereditary material is passed on during cell division.
- Animal cells have a life cycle that includes both growth and division.
- New animal cells are created during the cell cycle.
- Uncontrolled, rapid division of animal cells can be cancer.

### Key Terms

- cell cycle (page 26)
- interphase (page 26)
- mitosis (page 26)
- cytokinesis (page 26)
- regeneration (page 27)
- prophase (page 28)
- metaphase (page 28)
- anaphase (page 28)
- telophase (page 28)

### Big Ideas

- All animals are made of specialized cells, tissues, and organs that are organized into systems.



## Topic 1.3: How do cells work together in the human body?

### Key Concepts

- All cells begin alike and differentiate into specialized cells.
- Specialized cells have different structures that allow them to perform unique functions.
- Groups of cells working together form tissues.
- Groups of tissues working together form organs, which work together in systems.

### Key Terms

- cell specialization (page 41)
- cell differentiation (page 41)
- tissue (page 44)
- organ (page 46)
- organ system (page 47)

### Big Ideas

- All animals are made of specialized cells, tissues, and organs that are organized into systems.



## Topic 1.4: How do systems work together in the human body?

### Key Concepts

- The respiratory system carries oxygen to and removes carbon dioxide from the blood.
- The circulatory system transports dissolved gases and nutrients through the body.
- The digestive system breaks down food, absorbs nutrients, and eliminates solid waste.
- Organ systems working together carry out important tasks in the body.

### Key Terms

- gas exchange (page 58, 59)
- alveoli (page 59)
- capillaries (page 59)
- red blood cells (page 59)
- absorption (page 62)



### Big Ideas

- All animals are made of specialized cells, tissues, and organs that are organized into systems.

## Topic 1.5: How do technology, substances, and environmental factors affect human health?

### Key Concepts

- Medical imaging technologies are used to explore, diagnose, and treat the human body.
- Exposure to various technologies, substances, and environmental factors can impair health.
- Technology will affect human health in new ways in the future.

### Key Terms

- medical imaging technology (page 78)



### Big Ideas

- All animals are made of specialized cells, tissues, and organs that are organized into systems.
- Although technology and chemicals can be used to improve human health, they can also constitute a health hazard.

# Unit 1 Project

## Inquiry Investigation: How Disease Affects Organs

Some diseases affect the function of tissues and organs and cause health problems that affect organ systems. Examples include asthma, diabetes, arthritis, allergies, atherosclerosis, sickle-cell anemia, Crohn's disease, hepatitis B, and cirrhosis.

### Investigate Question

What health problems result when disease affects a person's tissues, organs, and organ systems?

### Initiate and Plan

1. Choose one disease to research.
2. Plan by writing at least 10 questions to answer the inquiry question. For example:
  - Which organ or system does the disease affect?
  - How does the organ become diseased?
  - What health problems does a person affected by this disease have?
  - What are signs and symptoms of this disease?
  - What are possible treatments?

### Perform and Record

3. Use electronic, print, and human sources to find answers to your questions. Include a picture or diagram of a healthy organ and of a diseased organ.
4. Use the diagrams of the healthy organ and the diseased organ to create a model of each.

### Analyze and Interpret

1. Use a graphic organizer to compare the healthy organ and the diseased organ.
2. If the disease can be prevented, use the information you have gathered to describe how.
3. How might the diseased organ affect other organs or systems in the body?

### Communicate your Findings

4. Create a pamphlet to outline the information you have discovered. Use appropriate scientific language to communicate your findings.

### Assessment Criteria

Review your project. Did you ...

- show knowledge of the disease and organ chosen? **K/U**
- create models of a healthy organ and a diseased organ? **T/I**
- create an information pamphlet that includes ways to prevent the disease? **C**
- use an appropriate format and terminology to communicate the information to your classmates? **C**
- explain which medical technology is used to diagnose and/or treat the disease? **A**
- discuss how other organs or organ systems in the body are affected by this disease? **A**



## An Issue to Analyze: Encouraging Healthy Lifestyles

Diseases may be caused by genetics, viruses, or bacteria. Many diseases, however, are the result of lifestyle choices. Unhealthy diet, lack of exercise, and the use of tobacco, alcohol, and other drugs can lead to chronic (long-term) diseases such as diabetes, heart disease, and lung disease.

### Issue

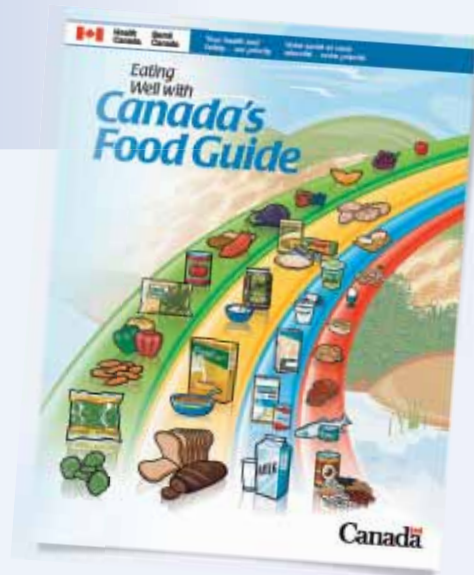
Chronic diseases linked to lifestyle choices are on the increase. This puts a strain on health-care systems and makes it hard for people to enjoy life. What kinds of resources and information can help Canadians learn about and make healthier choices?

### Initiate and Plan

1. Plan your research by writing at least 10 questions that will help you assess the issue. Here are some examples.
  - How can healthy and unhealthy diets affect our chances of developing chronic disease?
  - What factors affect the chances of developing a chronic disease?
  - How do factors in our environment affect our chances of developing chronic disease?
  - What percentage of health-care spending goes to treating chronic disease?
  - What government agencies and programs currently encourage Canadians to live healthier lives? What messages are they sending out?
2. Determine possible sources of information.
3. Choose a graphic organizer or other method to organize your findings.
4. Show your research plan to your teacher.

### Perform and Record

5. Gather and record the information to answer your questions.



### Analyze and Interpret

1. Use a PMI chart or a cost-benefit analysis to evaluate the effects that changing to a healthier lifestyle can have on the chances of developing chronic disease.
2. Find three public health messages about healthy lifestyles. Describe them. How effective are they?
3. Create a media plan to encourage Canadians (including your peers) to live a healthier lifestyle.

### Communicate your Findings

4. Your classmates are media buyers. Present your media plan to improve the health of Canadians. Use a slide show presentation, poster, or a written or oral report to present your plan.

### Assessment Checklist

Review your project. Did you ...

- research how diet, exercise, and environmental factors can affect the health of a person? **K/U**
- consult credible resources to determine what current government programs exist to educate the public? **T/I**
- use graphic organizers to record your research? **C**
- present your findings in a persuasive manner? **C**
- create a media plan that includes both a message and a delivery method? **A**

# Unit 1 Review

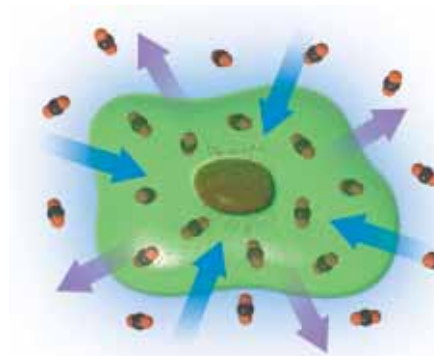
## Connect to the Big Ideas

1. All animals are made of specialized cells, tissues, and organs that are organized into systems. Organ systems have many parts that work together to perform a function. Choose one of the following organ systems: circulatory, digestive, respiratory. Use a series of drawings and words to do the following.
  - a) Describe the function of the organ system.
  - b) Name the organs that form the system. Identify and describe as many types of tissues that form one organ as you can.
  - c) Identify and describe the specialized cells that form each tissue.
  - d) Use a t-chart to compare the human system you chose and the same system in the frog.
2. Technology and chemicals can be used to improve human health. However, they also can be hazardous to health. Conduct research on a technology of your choice, such as microwave ovens or cell phones. Discover the health risks associated with the technology and how to reduce the risks. Develop an action plan for the safe use of the technology. Present your findings in a letter of concern to your school newspaper.

## Knowledge and Understanding K/U

3. Draw an oval to represent an animal cell. Add the following organelles and cell parts and label them: cell membrane, cytoplasm, nucleus, nuclear membrane.
4. What is the benefit of animal cells differentiating into specialized cells?
5. Examine the diagram at the top of the next column, which shows molecules of carbon dioxide outside a cell and inside a cell.
  - a) Identify the cellular process shown in the diagram.

- b) Describe the evidence that supports your answer to part a).



6. a) Identify the stages of the cell cycle shown in the three photos below. They are in the correct order.
  - b) Sketch the cell as it would appear before photo A.
  - c) Sketch the cell as it would appear after photo C.



7. Describe what is happening in each of the three photos in question 6.
8. Explain how cells, tissues, organs, and organ systems are related.
9. Draw a spider map to identify and describe the organ and vessels of the circulatory system.
10. a) Which organ system is responsible for the exchange of carbon dioxide and oxygen?
  - b) Use a diagram and words to explain what happens during this process.
11. Write a short paragraph (two or three sentences) to explain how the respiratory system and the circulatory system work together.

- 12.** Use a diagram and words to explain how the digestive and circulatory systems work together.
- 13.** Describe two examples of medical imaging technology that you learned about. Explain their purposes.
- 14. a)** Identify two technologies that can impair health, and explain how they can do so.  
**b)** Identify two substances that can impair health, and explain how they can do so.  
**c)** Identify two environmental factors that can impair health, and explain how they can do so.
- 15.** Cellular respiration takes place in the mitochondria of cells. Muscle cells have many more mitochondria than the cells of most other organs. Explain why this does or does not surprise you.
- 16.** Your teacher announces a surprise quiz. For some students in the class, their heart starts to beat faster and their rate of breathing increases. Which two body systems are interacting in this example?
- 17.** As you view slides of cells under a microscope, you observe a cell with long finger-like extensions and another cell that is round and disk-like. Use what you have learned to identify these cells and explain how each structure helps the cells perform their function. Which body system is responsible for controlling and coordinating this interaction?
- 19.** You are asked to create a model of alveoli and capillaries. List at least two design features you need to consider and explain your thinking.
- 20.** One goal of medical research is to grow specialized cells, tissues, and organs in the laboratory.  
**a)** Identify a benefit of achieving this goal.  
**b)** Explain why this is a challenging goal.
- 21.** State a hypothesis that could explain why single-celled organisms are found both in aquatic ecosystems and within the bodies of many-celled organisms.
- 22.** Sketch a line graph that shows how certain cells in a person's body are dividing if those cells are cancerous. Be sure to label the  $x$ -axis and the  $y$ -axis appropriately.
- 23.** A student observed a number of cells at different stages of the cell cycle. The student calculated the percentage of time that the cells spent during each of the stages. The table below shows the student's results.  
**a)** The stages of the cell cycle are listed in alphabetical order. List them, instead, based on their correct sequence, starting with the phase during which the nuclear membrane disappears.  
**b)** According to the table, the observed cells spent 79 percent of their time in interphase. Explain why this is a result you would expect.

Stage of Cell Cycle	Percentage of Time Spent in Each Stage
Anaphase	2 percent
Interphase	79 percent
Metaphase	2 percent
Prophase	13 percent
Teleophase	5 percent

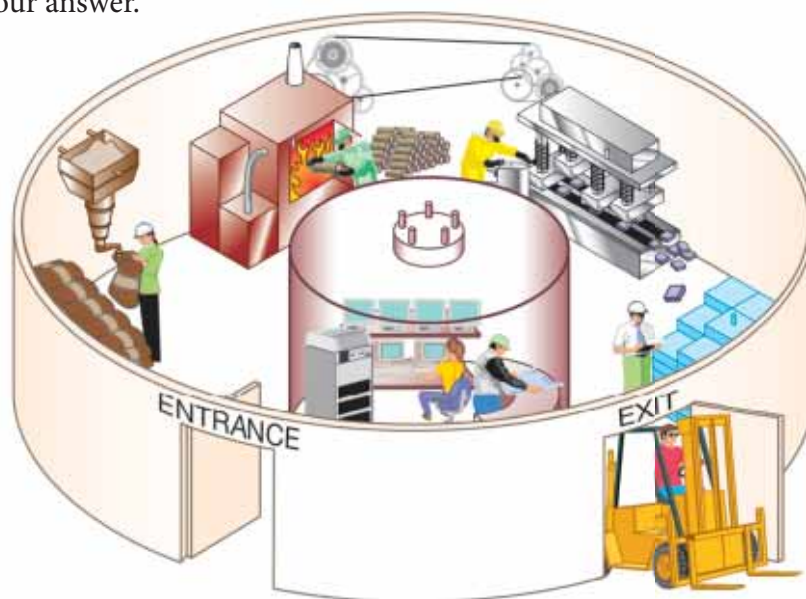
### Thinking and Investigation **T/I**

- 18.** You are judging at an elementary school science fair. One student has made models of the four types of tissues. Develop a set of criteria to help assess how well the design of each tissue model suits the function of each type of tissue.

# Unit 1 Review

## Communication C

24. You are editing a wiki about cells. Use words and diagrams to clearly define the process of diffusion.
25. Use a graphic organizer to help explain to a Grade 4 class the path of a glucose molecule from dinner plate to body cell.
26. A recent movie portrays a monster bacterium that is unicellular and the size of King Kong. Explain to your friends why this is not realistic.
27. West Nile Virus is carried by mosquitoes and can cause a disease that is fatal to those who contract it. One response to the risk of West Nile Virus is to spray pesticides (some of which can cause cancers) in and around water sources that contain mosquitoes. Discuss the pros and cons of this response. Research and summarize other methods of prevention.
28. Make either a crossword puzzle or a word jumble puzzle using as many key terms from Unit 1 as you can. Trade your puzzle with a classmate who made a different kind of puzzle. Solve each other's puzzles.
29. Sometimes a living cell is compared with a factory. Write a paragraph or use a t-chart to compare the parts and functions of a cell with what happens in a factory. Use the diagram below to guide your answer.



## Application A

30. Explain why your heart is pounding after you run up a flight of stairs.
31. Describe how a variety of medical imaging technologies could be helpful in diagnosing and treating lung cancer.
32. Many forest firefighters wear kerchiefs around their mouth and nose when they are walking through ashes. Explain why this is important for their respiratory systems.
33. If you were in a mineshaft and the elevator broke, leaving you far below ground until it could be repaired, what would you worry about most—a lack of food, water, or air? Explain your answer.
34. Treatments for many types of cancer involve killing cells that divide rapidly using chemicals (chemotherapy) or radiation. These treatments often kill the cancer cells by causing mutations in them. Sometimes, however, the treatment of cancer can cause surrounding normal cells to become cancerous. Why might this occur?
35. An unknown disease is causing the number of red blood cells in a person's body to decrease. Identify at least two possible consequences of this.

## Literacy Test Prep

Read the selection below, and answer the questions that follow it.

In 2003, Sabrina Shannon, aged 13, died after eating cafeteria french fries that had come in contact with dairy products. Sabrina was allergic to dairy products. In Ontario, more than 42 000 teens have severe, life-threatening allergies to foods. A severe allergic reaction that affects all or most organ systems is called anaphylaxis. Common symptoms include

- flushed face, hives, swollen or itchy lips, tongue, or eyes
- tightness in the throat, mouth, or chest
- wheezing or coughing, difficulty breathing or swallowing
- choking, vomiting, nausea, diarrhea, stomach pains
- dizziness, unsteadiness, sudden fatigue, rapid heartbeat
- loss of consciousness

If left untreated, anaphylaxis can be fatal, so recognizing its symptoms and getting immediate treatment is crucial. People with severe allergies must learn how to avoid the things they are allergic to and be prepared to manage an unexpected reaction by always carrying an epinephrine auto-injector (EpiPen).

In 2006, Sabrina's Law came into effect in Ontario. It ensures that all schools have policies and procedures in place for students at risk of anaphylaxis. School staff are trained to recognize the signs and give medication if needed. Sabrina's Law helps all students be and feel safe at school and may prevent another student from Sabrina Shannon's fate.

## Multiple Choice

In your notebook, choose and record the best or most correct answer.

36. Death from anaphylaxis can be prevented by
- a) avoiding cafeteria french fries
  - b) carrying an epinephrine auto-injector
  - c) Sabrina's Law
  - d) recognizing symptoms and immediate treatment
37. The information in the bulleted list is used to
- a) compare and contrast ideas
  - b) describe the steps in a process
  - c) summarize ideas
  - d) provide details in order of importance
38. Which of the following symptoms of anaphylaxis are related to the respiratory system?
- a) tightness in the throat, mouth or chest, wheezing
  - b) choking, vomiting, nausea, diarrhea, stomach pains
  - c) dizziness, unsteadiness, sudden fatigue, rapid heartbeat
  - d) loss of consciousness
39. Sabrina's Law helps Ontario students be safe by
- a) banning potential allergic substances in schools
  - b) ensuring that people know what to do when a student has a severe allergic reaction
  - c) requiring students to carry epinephrine auto-injectors
  - d) not allowing students with severe allergies to eat cafeteria food

## Written Answer

40. Many people are allergic to nuts and nut products. Many schools have adopted a nut-free policy. Explain why this might be effective in keeping some students safe at school. Use specific details from the selection and your own ideas to support your answer.