

Summary

ESSENTIAL QUESTION

How are life processes affected by our interactions with microbes and other living things?



TOPIC 1.1:

What are the characteristics of living things?

- Living things are made of cells, take in nutrients, use energy, and produce waste.
- Living things respond to stimuli, grow, and reproduce.

Key Terms

cell



TOPIC 1.2:

Where do living things come from?

- Living things come only from other living things.
- Scientists debate about whether viruses are living things or not.

Key Terms

cell theory

virus



TOPIC 1.3:

How are cells different from one another?

- Scientists classify cells into two types based on the presence or absence of a nucleus.
- Bacteria are prokaryotic cells.
- Plant cells and animal cells are eukaryotic cells.

Key Terms

prokaryotic cell	eukaryotic cell
photosynthesis	cellular respiration



TOPIC 1.4:

What interactions occur between humans and micro-organisms?

- A micro-organism is an organism that can only be seen with a microscope.
- Humans have both negative and positive interactions with microbes.

Key Terms

micro-organism	microbe	pathogen
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TOPIC 1.5:

How does the body protect us from pathogens?

- The immune system helps protect us from pathogens and infection.
- Outbreaks of disease can have an impact on populations.

Key Terms

immune system	inflammation
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TOPIC 1.6:

What medicines help protect us from microbes that make us sick?

- Traditional First Peoples medicines and treatments come from resources in nature.
- Vaccines can help us prevent infections.
- Antibiotics can treat bacterial infections.

Key Terms

vaccine	antibiotic
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Review

What Do You Know? Connecting to Concepts

Visualizing Ideas

1. Write a paragraph or use a T-chart to compare the parts and functions of a cell to one of the choices below.



Amusement park



School

Using Key Terms

2. Create a quiz-style game to assess understanding of these terms:
 - cell theory
 - cellular respiration
 - eukaryotic
 - immune system
 - pathogen
 - photosynthesis
 - prokaryotic
 - vaccine

Communicating Concepts

3. Explain how the human immune system defends your body against pathogens.
4. List the characteristics of living things, and given one example for each.

5. How does a unicellular differ from a multicellular organism?
6. Is a fallen, decomposing tree in a forest a living thing or a non-living thing? Use scientific understandings to justify your answer.
7. How can bacteria develop resistance to an antibiotic?
8. Describe the process of inflammation.
9. You sweat to remove heat from your body. What is another role of sweat?
10. Your mouth contains a thriving community of bacteria. Give four examples of relationships that bacteria have with humans.
11. What is a vaccine?
12. Think about the concepts you have learned about in this unit. Give at least three examples that show how you depend on energy from the Sun.
13. You have a sore throat from a viral disease. A friend suggests you get a prescription for an antibiotic. What would you say, and why?
14. Agree or disagree with this statement, and give your reasons: A pathogen is a microbe, but not all microbes are pathogens.
15. Many people mistakenly believe that plants perform photosynthesis but not cellular respiration. Explain how you know that plants must perform cellular respiration.
16. Would you expect to observe chloroplasts in the cells of the roots of a Columbia lily plant? Why or why not?

What Can You Do?

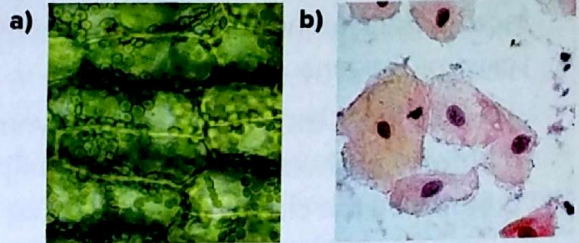
Connecting to Competencies

Developing Skills

17. The pharmacy section of a store has a fact sheet with the title "Use Antibiotics Safely." The fact sheet has three headings: Frequently Asked Questions, Read the Label, and Take Drugs Properly.
- Write a brief paragraph of three or four sentences to go with each of these headings. Keep in mind that this is a fact sheet, so the information you write must be accurate and clearly expressed.
 - What extra information would you have liked in part a) of this question to help you develop your answer? Explain why you think this extra information would have helped.
18. Imagine your teacher asks you to work with three other students to design a scientific experiment to investigate the effects of a stimulus on a multicellular organism.
- Create an outline that shows the steps of the inquiry process your group will follow.
 - Decide on an organism that you will use, and explain why you selected it as opposed to another organism.
 - State a hypothesis for your experiment.
 - Write the steps of a procedure that you would follow to test your hypothesis.

Thinking Critically and Creatively

19. Identify the type of cells shown in the photos of the microscope slides below. Demonstrate your understanding by providing some evidence as you explain your reasoning in each case.



20. In order to study micro-organisms, scientists face some unique challenges.
- They have to figure out how to grow the micro-organisms under artificial conditions in the laboratory.
 - The very small size of micro-organisms means that they are not visible to the unaided eye.
 - Many micro-organisms are dangerous and can be pathogens. Special precautions must be taken when working with them.
- Use your scientific understanding to identify three things that you think scientists do to overcome these challenges.
21. What would happen to other organisms if most or all plant life disappeared? Explain your answer in terms of the life processes of cells and the life processes of multicellular organisms such as you and other animals.
22. Mitochondria are the organelles that enable a cell to carry out cellular respiration. Which do you think has more mitochondria: a skin cell or a muscle cell? Explain your reasoning.

Unit 1 Review *(continued)*

Understanding Big Ideas

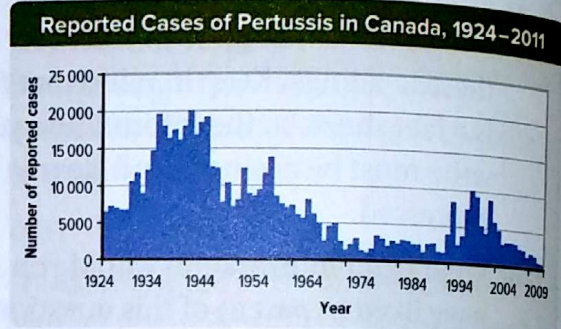
Making New Connections

Applying Your Understanding

- 23.** Reflect on what you have learned about factors that can help the immune system resist pathogens.
- List at least three practices that you think you should adopt now to help improve the chances of your being and staying healthy as you continue on your life journey into adulthood.
 - Honestly evaluate the likelihood that you will adopt and maintain the practices you listed in part a) of this question. Explain why you think you will or won't adopt and maintain them. What are some challenges that you might face in adopting and implementing these practices?
- 24.** There is a lot of information about the health benefits of microbes in certain kinds of food products. One example is probiotics, which are microbes (mainly bacteria) found in foods such as yogurt, miso, sourdough, soft cheeses, and all kinds of pickles. The Internet is an especially rich source of this kind of information. Some of it is accurate, some is false, and some is misleading and/or incomplete.
- How can you tell a reputable, reliable information source from one that is not? Use two examples to support your answer.
 - In what ways can misleading and/or incomplete information be harmful? Justify your opinion.

Thinking Critically and Creatively

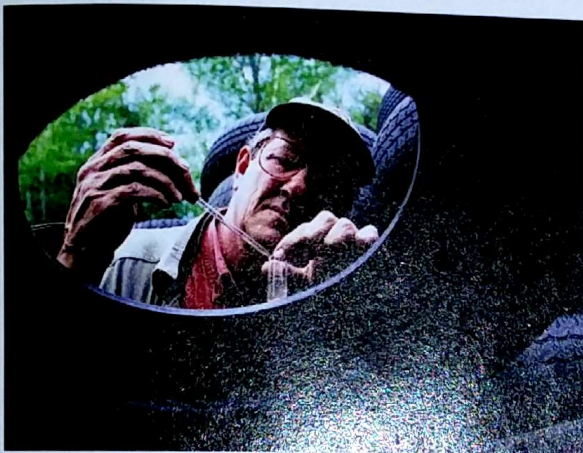
- 25.** Pertussis, also known as whooping cough, is a communicable disease in humans. It is caused by bacteria that affect the lungs, sending an infected person into bouts of intense, repeated coughing. The number of cases of pertussis that were reported in Canada between 1924 and 2011 is represented in the bar graph below. There is a vaccine for this disease.



- Based on the graph, in what year do you think a vaccine became available in Canada? Explain how you arrived at your answer.
 - Scientists discovered that the vaccine that was given to children between the 1980s and 1997 was not very effective. In 2003 a booster vaccination was given to those affected. How is this reflected in the graph data?
- 26.** Viruses have several uses in biotechnology and medicine. In many cases, the viruses are used as “vehicles” to deliver and insert specific materials into cells. The viruses are altered so that they should not be active or cause infection.
- Why do you think viruses make good “delivery vehicles” of material to cells?
 - What could be a serious disadvantage of using viruses in this way? Explain your answer.

Connecting to Self and Society

27. You are a judge at an elementary school science fair. One student has made models to compare plant cells and animal cells. Develop a set of criteria to help you evaluate these models.
28. The researcher in the photo is collecting mosquito larvae in water that has collected in tires during an outbreak of West Nile Virus. This virus is carried by mosquitoes and very rarely causes a disease that is fatal.



One response to the risk of West Nile Virus is to spray pesticides in and around water sources that contain mosquitoes or in which they lay their eggs. Some of these pesticides can cause cancer. Outline your opinions of the pros and cons of this response. Consider social, ethical, and environmental implications of this response and your opinions of it.

29. The phrase “all my relations” is commonly used in connection with First Peoples ceremonies and practices. What does this phrase mean to you? Who are the relations that it acknowledges? What lessons can we learn from the meaning and significance of “all my relations?”



30. How can people with no science background beyond high school solve problems that baffle scientists? Ask the gamers who play Foldit, an online game for predicting the folded structure of protein molecules. Competing, as well as collaborating, a group of players took just three weeks to solve the structure of a protein called retroviral protease. HIV (the virus that leads to AIDS) uses this protein to reproduce. Knowing the structure can help scientists design new ways to keep the virus from replicating. Games like Foldit cost a lot of money to code and keep online. And solving protein structures does not guarantee a successful disease treatment. Do you think spending money on games like Foldit is an effective way to help people who are sick? If not, how could the money be better spent? Use scientific understandings to support and justify your opinions.

31. Reflect on how this unit has helped you learn about yourself, about your community, and about ideas that interest you.

- What have you done, or what could you do, to make a difference at a personal level?
- What have you done, or what could you do, to make a difference in your community, province, or beyond?

Share your own story in words, pictures, song, dance, or in another way you wish to communicate. Inspire yourself. Inspire others!