

## Unit Review Answers (Student textbook pages 100-102)

### Connect to the Big Ideas

- Answers will vary depending on organ system chosen.  
For example:
  - The digestive system breaks down food, absorbs nutrients, and eliminates wastes. The nutrients are absorbed into the bloodstream and then delivered to the cells.
  - The organs and body parts include: salivary glands, esophagus, tongue, stomach, pancreas, small intestine, rectum, liver, gall bladder, large intestine, anus.
  - The stomach has smooth muscle tissue that is composed of specialized cells that taper at both ends to form parallel lines. The stomach lining has epithelial tissue that is composed of specialized cells that are columnar.
  - Frog teeth are smaller in proportion and the tongue is curved at the end with specialized structures for catching flying prey. Organs may be similar but are smaller in size and small blood vessels connect the small intestine and the circulatory system.
- Letters should describe health risks of a technology, and ways to reduce those risks. They should also include a plan for using the technology safely.

### Knowledge and Understanding

- Diagrams should resemble Figure 1.1 on page 14, with labels showing the cell membrane, nucleus, nuclear membrane, and cytoplasm.
- Although all cells begin the same, complex organisms such as animals need specialized cells to perform unique functions. Cell differentiation allows complex organisms to have specialized cells to perform different functions.
- The diagram illustrates diffusion.
  - Diffusion is the movement of particles from an area of high concentration to an area of low concentration and the particles are shown moving in the diagram. Diffusion can occur through a membrane, as shown.
- A: metaphase, B: anaphase, C: telophase
  - Sketch should resemble prophase diagram in Figure 1.10 on page 29.
  - Sketch should resemble cytokinesis diagram in Figure 1.10 on page 29.
- In metaphase, fibres in the cytoplasm push the chromosomes together, lining them up in the middle of the cell.

In anaphase, the points where the two copies of DNA were attached in each chromosome split apart, separating the identical copies of DNA. Each part is now called a chromosome. The new chromosomes are pulled apart and drawn to each end of the cell.

In telophase, membranes begin to form around the two new nuclei. Each nucleus has a complete set of chromosomes that contain a complete copy of the cell's DNA. The chromosomes begin to uncoil. Eventually, the chromatin will no longer be visible under the microscope.

- In the hierarchy, cells form tissues that become organs and organs then form organ systems as they perform unique functions.
- Spider maps should include the following points.

Heart: The muscular organ that drives the circulatory system. It pumps blood to the cells and then back to the heart.

Arteries: Thick-walled, elastic blood vessels that carry blood away from the heart. The arteries get narrower the farther they are from the heart.

Veins: Thin-walled, inelastic blood vessels. They have valves that keep blood from backing up as it is carried toward the heart.

Capillaries: The smallest blood vessels. They are one-cell thick. Oxygen and nutrients, plus carbon dioxide and other wastes, diffuse easily through the thin capillary walls.
- The respiratory system is responsible for the exchange of carbon dioxide and oxygen.
  - Diagrams should resemble Figure 1.20 on page 59. The single-celled walls of the alveoli and the capillaries allow the exchange of gases between the air and the blood. Once the air enters the capillaries, oxygen diffuses through the walls of the alveoli, through the capillary walls, and into the red blood cells, which transport gases in the bloodstream. The blood also releases carbon dioxide into the lungs. Carbon dioxide diffuses from the blood through the capillary walls, through the walls of the alveoli, and into the alveoli. Once in the lungs, the carbon dioxide is exhaled with the next breath.
- The respiratory system carries oxygen to the blood and removes carbon dioxide from the blood. The exchange of gases occurs in the alveoli of the lungs. Alveoli are surrounded by capillaries that move the gases to and from the red blood cells.

- 12.** The digestive system breaks food down and dissolves it. The small intestine has many small capillaries where the nutrients pass from the digestive system to the circulatory system. The circulatory system carries the nutrients to the cells of the body. In addition, the circulatory system provides oxygen and nutrients to the digestive system so that it can obtain energy to do its work. Diagrams should illustrate this process.
- 13.** Answers may vary. For example: PET scans are used to view soft tissues and to diagnose cancer or to track cancer treatments. Endoscopy is used to view internal body parts without surgery and to diagnose diseases and take tissue samples.
- 14.** Answers may vary. For example:
- Cellphone use can impair health by causing brain damage and cancer. CT scans can emit radiation that may be harmful to pregnant women.
  - Pesticides can cause skin, eye, and lung irritations. Second-hand smoke increases the risk of lung, heart, throat, and mouth disease.
  - Overexposure to UV rays can result in skin cancer. Air pollution may irritate eyes, throat, and lungs.
- 15.** Muscle cells have a greater demand for energy because of the work our muscles do. The increased energy demand can be accommodated by more mitochondria in the cells.
- 16.** The respiratory system and the circulatory system.
- 17.** The cell with long finger-like extensions is a nerve cell and the cell that is round and disk-like is a blood cell. The nervous system is responsible for this coordination.

### Thinking and Investigation

- 18.** Criteria could include the following questions.
- Would muscle tissue enable body parts to move or to exert force?
  - Would epithelial tissue fully cover internal and external body surfaces?
  - Would connective tissue strengthen and support other cells?
  - Would nervous tissue sense, conduct, and transmit information?
- 19.** The model would need to show that the wall of each alveolus is a single layer of cells and that the alveoli are surrounded by capillaries.
- 20. a)** A benefit of achieving the goal of growing specialized cells in the laboratory would be to assist burn victims with skin replacement.
- b)** This goal has not yet been achieved because of the necessary nervous connections required to ensure the success of the treatment.

- 21.** The bodies of many-celled organisms contain water, nutrients, and gases, like an aquatic ecosystem. So, single-celled organisms could survive in both environments.
- 22.** Graphs should show exponential growth.
- 23. a)** interphase, prophase, metaphase, anaphase, and telophase
- b)** The observed cells spent 79 percent of their time in interphase because this is where growth and replication occur.

### Communication

- 24.** Diagrams should resemble Figure 1.3 on page 16. Diffusion is the movement of particles of a substance from an area of high concentration to an area of low concentration until all the particles are evenly distributed.
- 25.** Graphic organizer should include the following steps. Food is chewed in the mouth and travels through the esophagus. Food breaks down to release glucose in the stomach. From the stomach, the glucose enters the small intestine. It is absorbed from the small intestine into the capillaries of the circulatory system. The circulatory system carries it to the body cells, where it enters the cells. Body cells use glucose and oxygen to produce energy.
- 26.** A monster bacterium that is unicellular is not realistic because the distance between the cell wall and the organelles would be too great to transport substances efficiently. Waste materials would accumulate and nutrients would not reach the organelles.
- 27. Pros:** The pesticide will kill the mosquitoes that carry the West Nile virus and prevent infections and possible deaths.  
**Cons:** Other organisms will be killed or harmed by the pesticide, including humans. The pesticide is an irritant to eyes and lungs; it may also affect nervous and reproductive systems.  
Other methods of prevention may include removing objects where water can accumulate and produce breeding grounds for mosquitoes.
- 28.** Puzzles will vary but should include the key terms listed on pages 96 and 97.

29.

Factory	Function	Cell
computer	control	nucleus
washroom or garbage	waste	vacuole
power supply	energy	mitochondria
doors, keys	access	cell membrane
packaging	packaging	Golgi body
building	construction, support	ribosomes, cytoplasm, and cell wall
shipping	transport	endoplasmic reticulum

### Application

- 30.** After you run up a flight of stairs your heart is pounding because your cells are using more energy, and need more oxygen delivered in your blood so that they can obtain more energy. The heart beats faster to pump more blood through your lungs and to your muscle cells. Together these two demands account for the recovery time required for the body to begin to relax and for the heart to return to its normal resting rate.
- 31.** The diagnosis and treatment of lung cancer can be assisted by the use of PET scans, ultrasound, and MRI scans. Since the lungs are composed of soft tissues these technologies are appropriate.
- 32.** Forest firefighters wear kerchiefs around their mouth and nose to prevent ash from entering their lungs and damaging the alveoli, making them unable to exchange gases efficiently.
- 33.** Lack of air. The body can survive for long periods without food and water since it has reserves of both but will quickly run out of oxygen.
- 34.** The treatment of cancer with chemotherapy or radiation can cause surrounding normal cells to become cancerous because the chemicals and radiation not only damage cancer cells, but damage normal cells as well. Radiation can cause mutations, which can lead to tumours.
- 35.** Two consequences could be that the body cells do not get enough oxygen and carbon dioxide is not efficiently removed from the body.

## Literacy Test Prep

### Multiple Choice

36. d)

37. c)

38. a)

39. b)

### Written Answer

**40.** It is difficult to know if a food has been exposed to nuts or not. Sabrina Shannon died because she ate French fries, which normally do not contain any dairy products and seemed to be safe. Nut allergies are often life threatening so there is no safe level of exposure for some people. A nut-free policy will protect students with nut allergies by ensuring they will not be exposed to a deadly allergen at school.