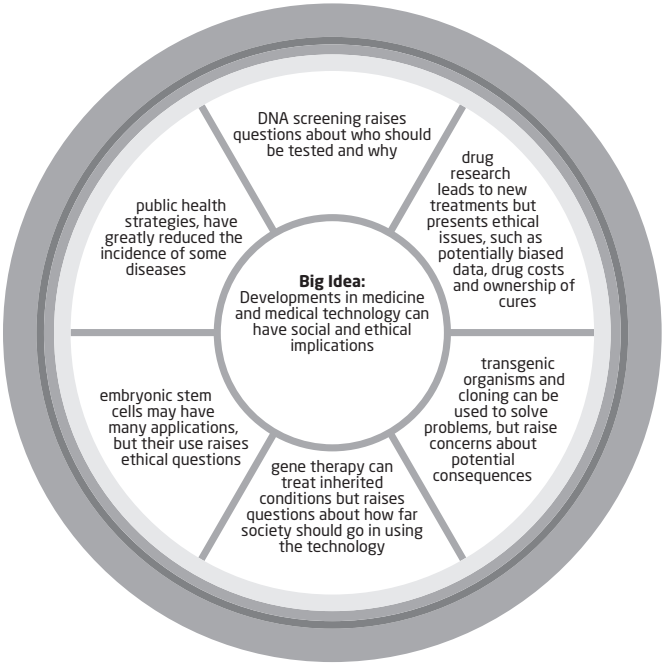
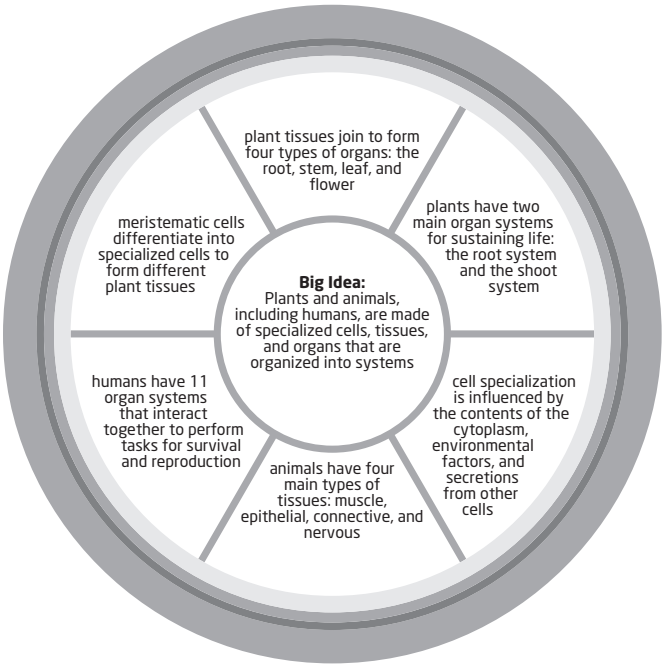
Unit 1 Review Answers (Student textbook pages 128 to 131)

Connect to the Big Ideas

Connect to the Big Ideas answers are also available as a Blackline master on the accompanying CD.





Knowledge and Understanding

1. d.

2. d.

3. c.

4. c.

5. b.

6. Daughter cells are two cells that are identical to each other and to a parent cell (they contain identical genes). One parent cell that divides to make two daughter cells.

7. DNA screening is a valuable tool because it can help people make important life decisions. For example, a person who tests positive for Huntington's disease may choose not to have children so they do not risk passing the gene to their offspring. Screening raises ethical issues because it is sometimes done when no cure is available for the disease being screened (e.g., Huntington's disease) or it may lead to people who test positive being treated differently or discriminated against.

8. Transgenic means genetic information has been altered with the insertion of genes from a different species.

9. **a.** cytokinesis
b. DNA replication
c. interphase
d. continued growth and preparation
e. mitosis

10. Cancer occurs when cells lose the normal constraints on their rate of division and begin to divide much more often and uncontrollably.

11. Cell division is the process by which plants and animals replace lost or damaged cells and by which they become organisms from a single cell. Cell specialization involves cells differentiating to provide different functions for an organism.

12. Early embryonic cells differ from adult cells because they are totipotent, which means they can become any type of specialized human body tissue. Adult cells are already specialized and cannot be transformed into other types of cells.

13. The arrangement of the organs in the human digestive system allows the orderly mechanical and chemical breakdown of food, and the absorption of nutrient molecules that result form the breakdown. Mechanical breakdown begins in the first part of the system (mouth) and is followed by chemical breakdown by saliva in the mouth and by gastric juices in the stomach. The stomach's muscle tissue contracts to also mechanically mix the food. When the food is fully mixed, it passes to the small intestine, where more digestion occurs. Nutrients are absorbed into the body from the small intestine. The final organ in the system, the large intestine, absorbs water, vitamins and salt from the digested food and helps eliminate waste.

14. An example of a public health strategy is the use of vaccinations to control the spread of infectious diseases. This strategy has virtually eliminated some infectious diseases.

Thinking and Investigation

15. a. Chemicals that prevent the organization of spindle fibres might cause problems to occur when the chromosomes are separated, resulting in new cells receiving the wrong number of chromosomes after cell division.

b. Answers will vary. Example: Treat some tissue with chemical and have control tissue that is not treated. View cells from each tissue under a microscope to determine if organization of spindle fibres was prevented. Screen samples of cells from each tissue to determine number of chromosomes.

16. a. leaf; cell wall present; cells appear to be packed with chloroplasts, which are used for photosynthesis

b. embryo; magnification very high; evidence of cell division, spindle fibres

c. cardiac muscle; nuclei appear to be between cells; cells are branched, unevenly striated

d. small intestine; villi or microvilli

17. Evening. Procedures will vary. Example: Have two groups of the same types of plants. Ensure that conditions for each group are the same, except for the time of day when watering occurs. Water one group in the morning for a period of several weeks, depending on the type of plant used. Water the other group in the evening during the same period. Ensure that the same amount of water is given to each plant. Look for evidence of one set of plants thriving and one set of plants dying. This experiment works best outdoors, as it pertains to sunlight, heat and evaporation.

18. Plants require water, but not excessive amounts. Excessive water can prevent roots from performing gas exchange with the soil, something plants need to survive. The wilted leaves are a sign that the root cells died and could no longer take in and transport water to the leaves. To prevent this, you could have someone come in and moderately water your plants, or you could purchase and install a time-release watering device in the soil near the plant.

19. The amoeba has a better chance of survival, because the pond is a natural habitat for the amoeba. The amoeba is a single-celled protist. On the other hand, removing a cell from a multi-cellular organism and isolating it in a pond would result in cell death because a cell from a multi-cellular organism depends on other cells to support all of its life-sustaining processes.

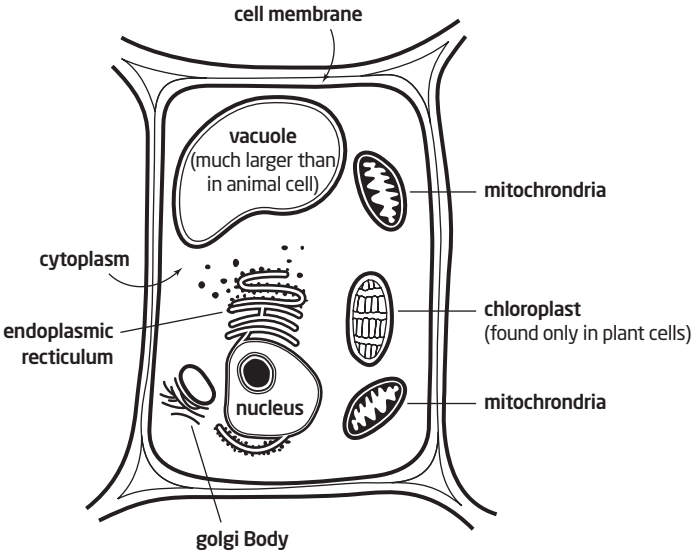
20. 65 536

21. Answers will vary. Example: I will study the effects of exercise on the incidence of heart disease in teenagers. I will collect data to determine the pre-study health status of the teenagers, including the presence of heart disease or factors that can contribute to heart disease. I will also determine the status at the end of the five years. I will determine the exercise habits of the teens over the five-year study (how much, the regularity of the exercise, the type of activity). I will obtain the data by asking the students to keep a record, and by conducting interviews before, during and after the study period. My hypothesis will be that the incidence of heart disease will be lower in students who exercise intensely on a regular basis over the five-year study period. My analysis will control for diet and smoking, to better determine the effect of exercise.

22. It cannot be concluded that asthma is declining in Ontario because the graph only shows the rates of hospitalization due to asthma and not the actual number of cases. The graph shows that the rates of hospitalization due to asthma in Ontario have declined, but this may mean a number of different things (for example, fewer people are being admitted to hospital for their asthma symptoms; more people are being treated for asthma at home) and not necessarily that asthma declined.

Communication

23.



24. Answers will vary. Example: This analogy works because gases (oxygen and carbon dioxide) are moved and cycled around the entire planet and a cell; energy is transformed (many different transformations occur on Earth and inside a cell); most of Earth's surface and most of a cell are made of water. The structure of a cell can be almost any shape, but cells do have an upper size limit. Cells contain parts that share materials (matter) and work together to transform energy to sustain life.

25. Answers will vary. Example: A poster on the use of stem cells in research might promote the benefit of finding ways to induce adult stem cells to become pluripotent so that the use of embryonic stem cells is not required.

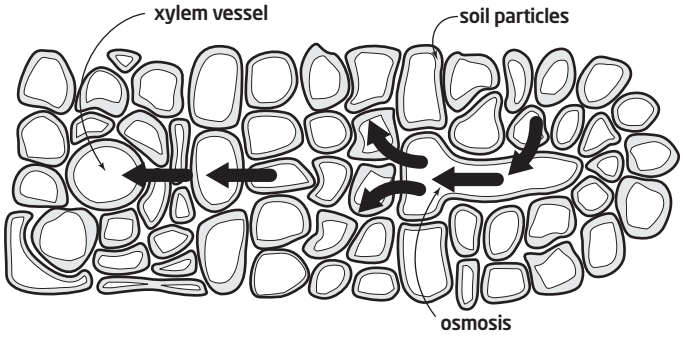
26. If the top of the plant is cut off, the lower side branches will begin to grow, making the plant less spindly. The terminal bud produces the hormone auxin, which inhibits the meristematic growth in the lateral buds.

27.

Tissue	Main Function
Epithelial	• skin epithelia acts as semi-permeable barrier between outside and inside of body • columnar epithelia line small intestine, stomach and glands; secretes mucus, absorbs materials
Muscle	• skeletal attaches to bone, making movement possible • smooth muscle contracts to help blood vessels and some organs function • cardiac muscle contracts so heart can pump
Nervous	• relays signals, coordinate body actions, detect information
Connective	• bone needed for movement, support and protection • fat needed for energy storage, padding and insulation • blood transports nutrients and oxygen, clots, and attacks invaders

28. In animals, the digestive system's function is to physically and chemically break down food to supply the body's cells with molecules (sugar) to produce energy. It cannot perform this function alone. It works with the circulatory system to transport molecules to all the cells. Without this interaction, there would be no way to effectively input energy molecules and transport them to where they are needed. Without energy, the organism dies. In plants, two systems, the root and the shoot, must work together to transport required materials in saps, such as water and sugar. Without the interaction and shared duty of transporting water, plant cells could not perform photosynthesis and the organism would die.

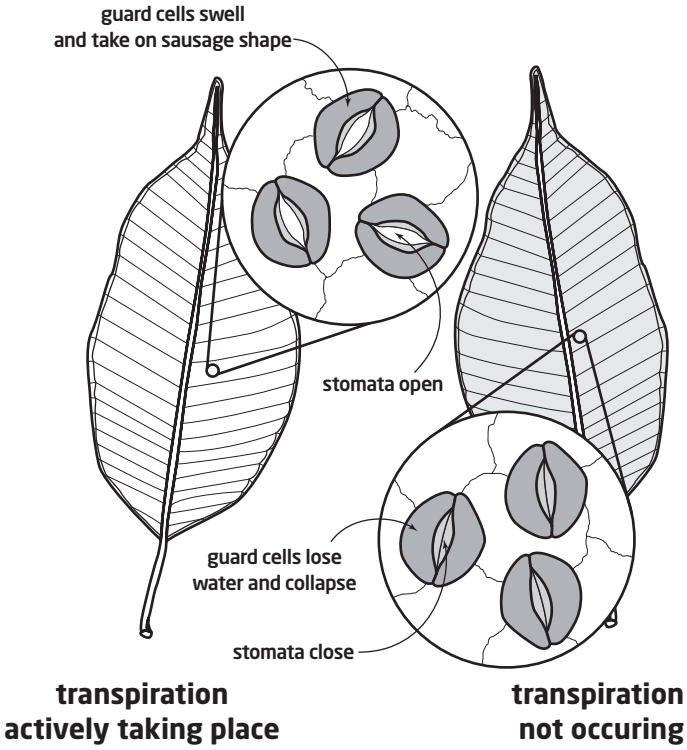
29.



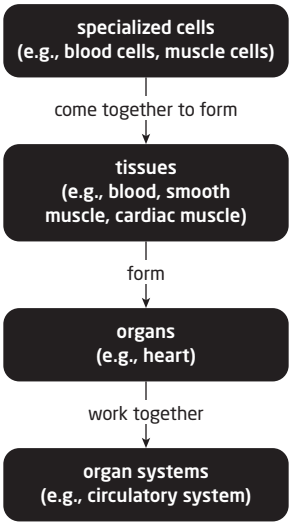
30. Nasal cavity → pharynx → larynx → trachea → bronchus → bronchiole → alveolus → across lung cell membrane and into cell → across capillary cell membrane and into cell → across capillary cell membrane and into bloodstream → across finger cell membrane and into finger cell

31. Answers that support either position are acceptable as long as they include justification. Example: I believe strongly that the public health-care system should continue to pay for individuals who acquire smoking-related illnesses, because I believe that smoking is an addiction and therefore it is a condition that should be supported by public health-care. If public health-care stopped covering illnesses that are related to lifestyle, we would need to rethink care for many different diseases and conditions. However, it is important that healthy lifestyles are also promoted through public health strategies. This will reduce the rate of smoking and other lifestyle-related illnesses.

32.



33.



Application

34. Mitochondria are the sites of energy transformation in the cell. A mitochondrion has the structure and capacity to absorb glucose and break it down to release the energy stored in it. A mitochondrion has the ability to then capture this released energy and make it available in a useable form to all other organelles. The other organelles carry out other life-sustaining functions with this energy; if energy is not available because the mitochondria has malfunctioned due to poison, all reactions stop and the cells and organism die.

35. Most of these tests are detecting the presence or absence of specific proteins. Proteins are coded for by DNA; DNA's function is to code for proteins that then have functional jobs within a cell. So, by investigating the proteins an organism is making, you can determine what DNA code, or gene, is present.

36. Xylem cells must have 'pores,' or access points, for water to enter them so the water can then be transported within the vessel to other parts of the plant. If the xylem cells are plugged, then the plant cannot absorb water into the vessels and cannot transport the water. The tree cannot perform photosynthesis in its leaves and dies.

37. Chemotherapy or radiation is indiscriminate—these treatments do not target cancer cells and they can harm normal cells. They are chosen as treatments because they have the ability to mutate cells. Treatment can cause a mutation in a cell cycle gene of a normal cell and cause uncontrollable cell division.

38. Answers will vary. Pros include: the eradication of mosquitoes and the protection of people and animals from infection with a disease that can be fatal or can cause serious complications, particularly in high-risk individuals. Cons include: the virus can lay dormant for some time; mosquitoes can mutate enough that the pesticides no longer work and the mosquitoes continue to carry the virus; pesticides are harmful to ecosystems, organisms and humans. Other methods of prevention include: reducing mosquito populations by eliminating standing water that serves as breeding ground, and reducing the chances of being bitten by using repellant or covering skin as alternatives to pesticides.

Literacy Test Prep

Multiple Choice

39. a.

40. c.

41. b.

42. c.

43. a.

Written Answer

44. Example: The best cure for a heart attack is prevention. A heart attack causes heart cells to die, so "curing" heart tissue or a heart attack is not possible after the heart attack has occurred. Heart attacks can also be fatal. Treatment focuses on breaking up blockages or opening clogged arteries to limit the number of cells that are damaged.