

Important Concepts . . .

Preview Review



Science

Grade 8 TEACHER KEY

***W2 - Lesson 1: The Role of Cells within
Living Things, Cells-Tissue-Organ System***

Important Concepts of Grade 8 Science

Materials Required

W1 - Lesson 1	Mass, Volume, and Density
W1 - Lesson 2	Solubility and Saturation Points
W1 - Lesson 3A.....	Viscosity, Flow Rate, and Buoyancy
W1 - Lesson 3B.....	Simple Machines
W1 - Lesson 4	Gears, Mechanical Advantage, Speed Ratios, and Efficiency
W1 - Lesson 5	Hydraulics and Pneumatics
W1- Quiz	
W2 - Lesson 1	The Role of Cells within Living Things, Cells-Tissue-Organ System
W2 - Lesson 2	The Microscope
W2 - Lesson 3	Body Systems Part 1
W2 - Lesson 4	Body Systems Part 2
W2 - Lesson 5	Problems Associated with Body Systems
W2 - Quiz	
W3 - Lesson 1	Transmission and Absorption of Light
W3 - Lesson 2	Reflection and Refraction of Light
W3 - Lesson 3A.....	Vision and Lenses
W3 - Lesson 3B..	Water in its Various States Affects Earth's Landforms and Climate
W3 - Lesson 4	Adaptations to Aquatic Ecosystems
W3 - Lesson 5	Water Quality
W3 - Quiz	

Textbook:
*Science in
Action 8*

Science Grade 8

Version 5

Preview/Review W2 - Lesson 1 TEACHER KEY

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Preview/Review Concepts for Grade Eight Science

TEACHER KEY



***W2 - Lesson 1:
The Role of Cells within Living Things,
Cells-Tissue-Organ System***

OBJECTIVES

By the end of this lesson, you should

- explain features common to living organisms
- explain a cell and describe its basic parts
- explain the differences between unicellular and multicellular organisms
- explain how substances move into and out of cells
- explain the differences between cells, tissues, organs, and systems

GLOSSARY

cell - the basic unit of living organisms

diffusion - the natural movement of particles from an area of higher concentration to an area of lower concentration

organ - a group of tissues working together to perform a specific function

organelle - structures in cells that carry out particular functions

osmosis - the diffusion of water through a semi-permeable membrane

response - the activity of an organism when stimulated

stimulus - something that causes an organism to respond

system - a group of organs working together to perform a function

tissue - a group of cells working together to perform a specific function

Introductory Information for Teachers

Preview/Review courses are aimed mainly at students who have complete the regular course but who need to review before beginning the next grade. Other students may find Preview/Review courses useful in preparing for the new materials they will study in their next grade. No Preview/Review course is intended to replace the regular course because all cover only some important concepts from the Program of Studies for each grade.

Preview/Review materials are intended for use by teachers in one-subject and one-grade classrooms.

This Preview/Review course contains fifteen lessons in three sections. Each section has five lessons with homework. A short quiz is provided at the end of each section to test student's knowledge of the material studied. In a classroom, the course will likely be completed in three weeks.

Students may attend one, two, or all three sections. Because Science has five units per grade and does not divide into three sections, Sections 1 and 2 cover two units each and Section 3 covers the final unit.

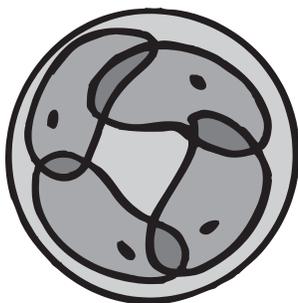
In Science, textbooks are central to Preview/Review. That is, the textbook must be read and used to complete the activities proficiently.

Textbooks required:

- Grade 7: *Science in Action 7*
- Grade 8: *Science in Action 8*
- Grade 9: *Science in Action 9*

W2 - Lesson 1: The Role of Cells within Living Things, Cells-Tissue-Organ System

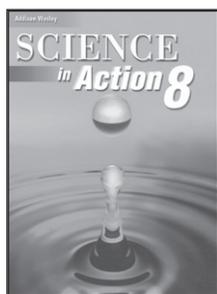
Welcome to W2 - Lesson 1. This lesson is designed to teach you about cells. Every living thing has cells. Knowing their role and how they work is important. This lesson should take about 1.5 hours to complete, and you will have a small homework assignment at the end.



What do all living things (organisms) have in common? All living things require nourishment - food and water. They all grow, move, and reproduce. A one-celled organism, such as an amoeba, needs food and water to grow and reproduce just as larger organisms do.

All organisms respond to their environments. A **stimulus** is anything that causes a response in an organism. A **response** is the reaction to a stimulus. For example, someone shining a bright light at your eyes is a stimulus. The usual reaction or response is to get out of the way of the bright light, to decrease your pupil size, or to close your eyes.

All organisms are made of cells. *Science in Action 8* defines **cell** as the **basic unit of life**. This is not to be confused with molecules and atoms that are the smallest parts of matter. The cell is the smallest **living** unit. Organisms can be one cell in size, such as amoebas and diatoms, or they can have trillions of cells such as an elephant or a palm tree.



Activity 1

Read and understand pages 86 and 87 in *Science in Action 8*. Then, answer the following questions.

1. What is known as the basic unit of life?

The cell

2. What is the difference between living and non-living cells?

Living cells require nourishment, are growing, and reproduce. Non-living cells may have been alive at one time (i.e., piece of drift wood) but no longer grow, reproduce or require nourishment.

3. In a few paragraphs, explain everything that you did today, since you got out of bed, that required energy.

Answers will vary. List may include got up, got out of bed, brushed my teeth, ate breakfast, played playstation 2, got a ride to school, etc.

4. According to the textbook, what are nutrients?

Nutrients are substances that provide the energy and materials that organisms need to grow, develop, and reproduce.

5. What is metabolism?

Metabolism is the sum of all the different processes that happen in an organism. Organisms demand nutrients at certain rates to carry out growth and reproduction.

6. In your own words, give an example of a stimulus-and-response scenario.

Answers will vary. i.e., A stimulus is touching a hot stove top and a response would be to quickly remove your hand from the heat source. If you were batting in a baseball game and you saw the pitcher throw the ball right at your head, your response would be to try and get out of the way before the ball hits you.

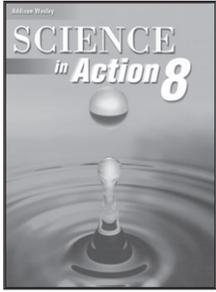
7. The textbook on page 87 gives an example of all the stages that a tadpole goes through to turn into a frog. This is the process of growth and development. Can you think of another example of an organism going through stages to end up at maturity?

Answers will vary. Humans go through stages such as baby, infant, toddler, “tween”, adolescent, adult.

Structure of the Cell

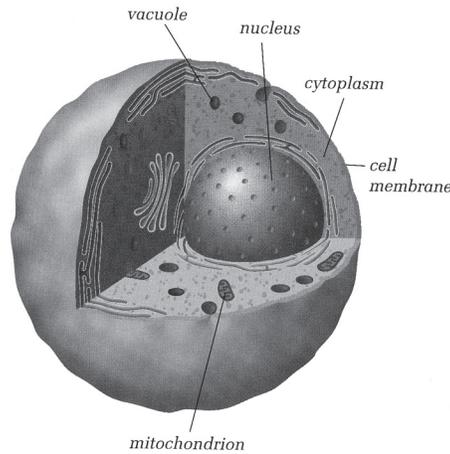
Cells have smaller parts called **organelles**. Organelles are the parts of the cell that do specific things. The **nucleus** is to a cell as your brain is to you. It is the command centre, and controls movement, growth, and other life functions. It also contains all the genetic instructions. The **mitochondria** provide the power or energy. The **cell membrane** controls which materials enter and leave the cell. **Vacuoles** are the food storage “rooms”. **Cytoplasm** is the “liquid” that all the organelles are floating in. The **cell wall**, which is found only in plant cells, provides strength and support. The **chloroplasts**, which are also found only in plant cells, turn plants green and collect light for the process of photosynthesis so plants can make their own food. These are just some of the many cell organelles.



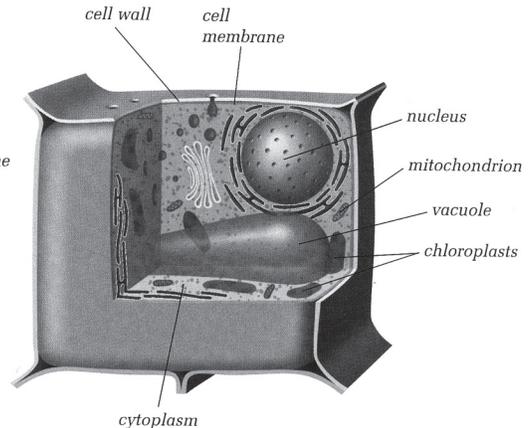


Activity 2

Read and understand pages 108 to 109 in *Science in Action 8*. Then, draw and label a plant and an animal cell in the space below. Be sure to note the function of each organelle.



Model of an animal cell



Model of a plant cell

Nucleus to a cell is like your brain is to you. It is the command centre and controls movement, growth, and other life functions. It also contains all the genetic blueprints.

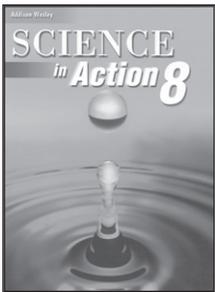
Mitochondria is the organelle that provides the power or energy. The Cell Membrane allows for materials to enter and leave. Vacuoles are the food storage rooms. Cytoplasm is the “liquid” that all the organelles are floating in; it contains all the nutrients required by the cell. The Cell Wall, which is found only in plant cells but not animal cells, provides the strength and support to plants. Chloroplasts, which are found only in plant cells, turn plants green and collect light for the process of photosynthesis so that plants can make their own food.

Single-Celled Vs. Multi-Celled Organisms

Unicellular organisms are made up of one cell. **Multicellular** organisms are made up of many cells. Multicellular organisms can be plants, animals or fungi. The one cell in a unicellular organism is responsible for everything including movement, eating, and reproducing. In a multicellular organism, cells do not perform every life function. These organisms have developed **specialized cells** where groups of cells have specific functions and leave other functions to other cells.

Multicellular organisms can become larger than unicellular organisms. They can carry out more functions, and they have better thinking abilities. They have more cells devoted to those areas. You will see in the next activities of this lesson the functions of specialized cells.

Activity 3



Read and understand pages 110 - 111 and page 114 in *Science in Action 8*. Then, answer the following questions.

1. What is your favorite multicellular animal? What are some of the physical activities it performs to carry out its life processes such as eating?

Answers will vary. i.e., an Elephant. This is a big animal and it uses its trunk to browse for leaves on trees and it uses it to collect and consume water.

2. How does an amoeba (a unicellular organism) gather and process food?

The ends of the pseudopods fuse together and create a vacuole around the food particle. The food in the vacuole is digested and absorbed into the cytoplasm.

3. What is one advantage that a multicellular organism has over a unicellular organism?

Multicellular organisms have specialized cells allowing for more diverse ways to carry out life processes. They can also grow larger than unicellular organisms.

How Substances Move Into and Out of Cells

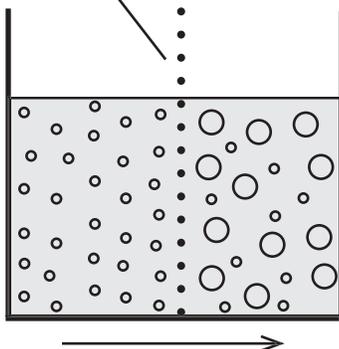
All cells must be able to move water, gases, and food into themselves. At the same time, waste and certain cell products must be moved out. Each cell must do this to remain alive.

One process the cell uses to move particles in or out is called **diffusion**. This is the movement of particles from an area of high concentration to an area of low concentration until there is an even amount of particles in the entire area. An example is spraying some perfume in one corner of a closed room without a breeze. Over time, without help, the perfume becomes evenly distributed throughout the room.

The **cell membrane** allows the diffusion of many particles such as oxygen and carbon dioxide. When carbon dioxide builds up inside the cell, it can diffuse out. At the same time, the concentration of oxygen is low, so it can diffuse into the cell.

A special kind of diffusion is **osmosis**. That is the diffusion of water through a semipermeable membrane; it is very important to cells.

selectively permeable membrane

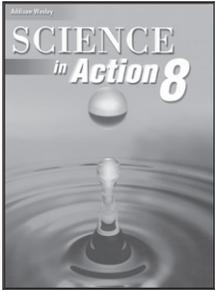


water moves from where it is in the higher concentration to where it is lower

Key

- water particles
- solute particles

Particles that must get through the cell membrane but cannot move through diffusion or osmosis are moved in another way. They are transported by special molecules that need additional energy to work. This process is called **active transport**, but we will not discuss it in detail.



Activity 4

Read and understand pages 115 to 119 in *Science in Action 8*. Then, answer the following questions.

1. What is the key principle to diffusion? Give an example of something diffusing.

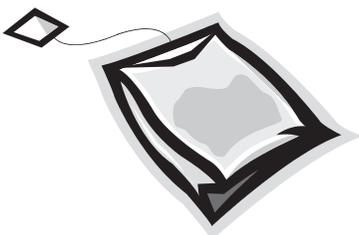
Diffusion is the movement of particles from an area where there are more of them to an area where there are fewer of them. In other words, diffusion moves particles from a more concentrated area to a less concentrated area. An example is a drop of food coloring in water that spreads into clear water until the concentration is equal in the entire solution.

2. What part of the cell acts like a filter with extremely tiny openings that allow some particles to pass through?

The cell membrane

3. Define the term “selectively permeable membrane”.

A membrane which allows some particles to pass through, but holds others back.



4. Define osmosis.

Osmosis is the diffusion of water particles through a selectively permeable membrane from a high concentration to a low concentration.

5. Under what condition can cells become depleted of water?

There could be a higher concentration of water inside the cell than outside. The water will naturally move to the outside.

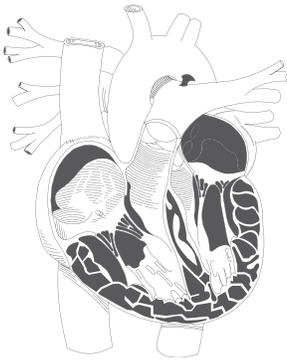
6. When you are in water, such as a swimming pool, for a long time your skin wrinkles. Why do you think this happens?

Through osmosis water moves into the skin giving it a wrinkled appearance.

7. Why does a blood cell placed in salt water develop a shrunken appearance?

The concentration of water was higher inside the cell than outside, so the water moved out of the cell by osmosis.

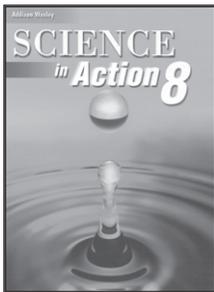
Cells-Tissues-Organ System



Multicellular organisms have developed specialized cells that serve different functions needed to support life. Red blood cells, for example, carry oxygen to all cells in your body and some carbon dioxide from the cells. They must be able to capture oxygen, and then travel to the cells that need it, and then carry back carbon dioxide. Without these cells, it would be difficult for animals to remain alive.

Within an organism, specialized cells can develop into **tissues**. Tissues can group together and form **organs**. Organs work together in **systems**. An example of this in humans is cardiac cells that form cardiac muscle (tissue) in the heart (organ), which is part of the circulatory system.

Every part of you—your skin, organs, even your finger nails—is made of cells that have specific functions that serve some purposes. It is the same with all multi-cellular organisms, including plants which have leaves to trap sunlight and perform photosynthesis. Some plants have developed thorns so that animals will not eat them. All these special features are made of cells.



Activity 5

Read pages 121 to 124 in *Science in Action 8*. Then, answer the following questions.

1. What are specialized cells?

Specialized cells perform specific functions to support life.

2. What are the four tissue types for animals?

connective, epithelial, nervous, and muscle tissues

3. What are the three tissue types for plants?

photosynthetic/storage, protective, and transport

4. In your own words, how would people be affected if no connective tissue type of cell existed?

We probably would just fall apart.

5. Give 3 examples of specialized cells in plants.

Answers may vary. Some create thorns, such as a

rosebush. An aspen tree creates a “fine powder” to

prevent itself from getting sunburned. Some create

flowers for insects to see for pollination so they protect

themselves from extinction. Venus flytrap has developed

leaves that trap flies; they are protecting themselves

from starvation or lack of certain nutrients. A coconut

tree protects its seeds from foragers by encasing them

in a wood-like substance. Pine trees encase their

seeds in pine cones, so if there is a fire the cone burns,

not the seeds. Deciduous trees lose their leaves in the fall

to conserve energy during the winter. Most

cactus are edible to some animals; they have developed

sharp spines to avoid destruction. A strawberry plant

sends out runners in an effort to start another

strawberry plant to avoid extinction.

You should now be able to meet all the objectives listed at the beginning of the lesson. Go through the list to see if there is anything you need to spend more time on.

Extended Activity (Homework)

Make a list of at least 10 body parts, both external and internal. Describe the function of each part. An example has been done for you.

Body Part	Body Part Function
Hair on the back of my hand	Some protection from the sun, wind, or rain; may keep the hand a little warmer.

If you have some time, check the following website:

<http://sun.menloschool.org/~birchler/cells/animals/nucleus/>



