UNIT OVERVIEW

This unit allows the student to study the topic of cells in an exciting, yet integrated, fashion. The unit begins with a look at what cells are, followed by a study of the differences between one-celled and multi-celled organisms. Characteristics and functions of the cell are then studied, as well as an investigation of both plant and animal cells. The concluding lessons look at the topics of tissues, organs, organ systems, diffusion/ osmosis, and cancer cells.

The use of the microscope is an important part of this unit and information on the proper use of this instrument is included.

STUDENT ASSIGNMENT AND ACTIVITIES

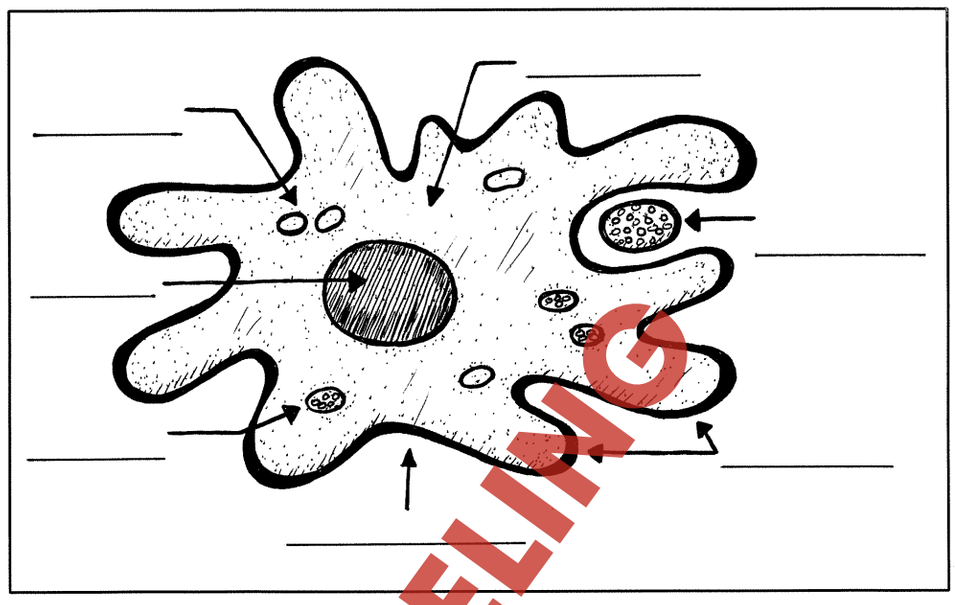
1. **What Are Cells** - Introductory Word Search
2. **Single-celled Organisms** - *The Amoeba* Labeling Exercise
3. **Multicellular Organisms** - Worksheet plus Bonus Activities
4. **Parts of a Cell** - Labeling Exercise
5. **What Cells Do** - Activity Sheet
6. **Cell Reproduction** - Crossword Puzzle
7. **Plant Cells** - Comprehension Questions
8. **Animal Cells** - Matching Exercise
9. **Tissues, Organs, and Organ Systems** - Comparison Activity and Cloze Exercise
10. **Diffusion and Osmosis** - Comprehension Activity plus Two Experiments
11. **Cancer - The Bizarre Cells** - Comprehension Questions

OVERHEAD NOTES

The overhead notes provide a framework of knowledge and concepts upon which the activities of the unit are based. The student notes work best when photocopied onto overhead transparencies but can be written on the board, dictated, or handed out as photocopies, depending on time circumstances.

ISBN: 978-1-55319-190-2

THE AMOEBA



cell membrane - the thin layer of _____ and fat that surrounds the amoeba; it allows some substances to pass into the cell, and blocks other substances.

contractile vacuole - a cavity within the amoeba that excretes excess _____ and waste.

cytoplasm - a jelly-like material that fills most of the cell; the _____ (like the nucleus) are surrounded by cytoplasm.

food vacuole - a cavity within the amoeba in which food is _____.

food being engulfed by pseudopods - the amoeba "eats" by surrounding bits of food with _____ that form around the food.

nucleus - the major organelle of the amoeba, located centrally; it controls _____ (contains chromosomes) and other important functions (including eating and growth).

pseudopods - temporary "_____" that the amoeba uses to move around and to engulf food.

MULTICELLULAR ORGANISMS WORKSHEET

Answer the following questions from the information provided in the article on *Multicellular Organisms*:

1. Most plants and animals are formed by a single cell. T or F
2. At the centre of the cell is the **nucleus**. T or F
3. The **organelles** contain the cell's DNA - its genetic code. T or F
4. Of the two basic cell types, the **prokaryotes** are the simpler type. T or F
5. Four examples of organelles are _____, _____, _____, and _____.
6. Most forms of life that can be seen with the naked eye are unicellular. T or F
7. Multicellular organisms are generally more complex than unicellular organisms. T or F
8. In multicellular organisms, cells are organized into groups that do different things. T or F
9. Groups of cells working together are called _____.
10. Groups of tissues working together are called _____.

PLANT CELLS ACTIVITY

Answer the following questions from the Information Sheet, **"Plant Cells"**:

1. What is one obvious difference between plant and animal cells?

_____

2. How does the cell wall limit the cell?

_____

_____

3a. Describe the vacuole.

_____

_____

3b. What is its purpose?

_____

3c. What do some vacuoles contain that serves to protect the plant?

_____

4a. What is the function of the plastid?

_____

4b. What is a common type of plastid?

_____

5. Why are the chloroplasts green?

_____

6. What are the names of two other organelles contained in plant cells?

_____

ANIMAL CELLS ACTIVITY

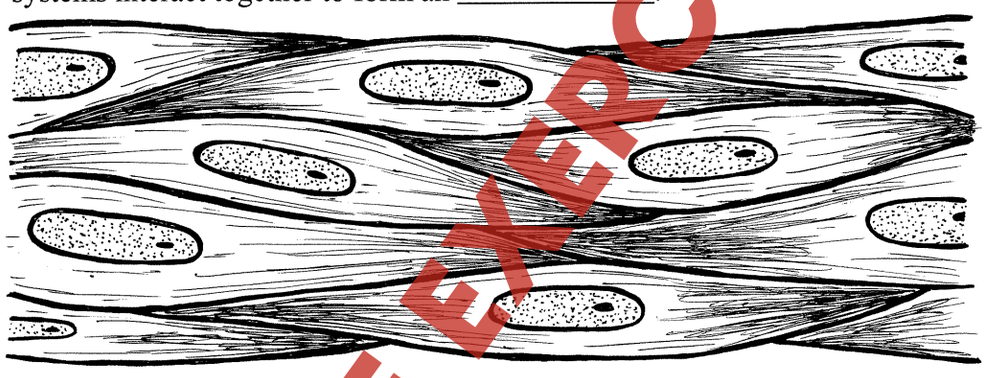
Match each characteristic or function with the correct cell part:

a) _____thin layer surrounding cell
b) _____where microtubules are made
c) _____jelly-like material outside nucleus
d) _____packages proteins and carbohydrates
e) _____where digestion of cell nutrients takes place
f) _____converts the energy stored into ATP
g) _____organelle within nucleus
h) _____controls many cell functions and contains DNA
i) _____site of protein synthesis
j) _____fills with food being digested

1. Golgi body
2. mitochondrion
3. cell membrane
4. cytoplasm
5. nucleolus
6. centrosome
7. lysosome
8. vacuole
9. ribosome
10. nucleus

CLOZE EXERCISE

The smallest unit of life is at the _____ level. A group of cells that performs a specific function is a _____. Several tissues functioning together for a specific purpose is called an _____. The different organ systems interact together to form an _____.



The four primary tissue types are _____, _____, _____, and _____. The outer layer of _____ is an example of an epithelial tissue. Muscle tissues contain the proteins _____ and _____. Nerve tissues contain two types of cells: _____ and _____ cells. Electrical signals are transmitted down the _____ cord.

THE RAW EGG MYSTERY

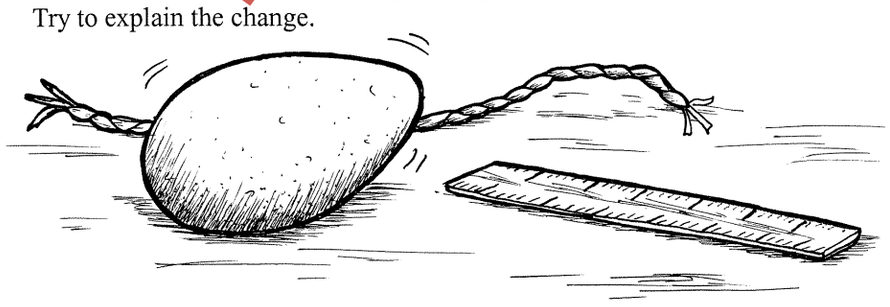
OSMOSIS AND DIFFUSION

Time: 15 minutes for setting up, 3 to 5 days for observation

Materials: raw egg, vinegar, tape measure, jar large enough to hold an egg, water

Procedure:

1. You will need one raw hen's egg in its shell.
2. Measure the long and short circumferences of the egg (i.e. the long way around + the short way around) with a tape measure or a string and ruler. Enter your results on the data table alongside day 1.
3. Place the egg in a jar, cover with vinegar, then screw on the jar lid to prevent evaporation.
4. On day 2, observe the egg without removing it from the jar. Record your observations.
5. On day 3, carefully remove the egg from the vinegar, and rinse it with tap water. Observe how the egg looks and feels. Record your observations. Measure the long and short circumferences, and record these measurements.
6. Remove the vinegar from the jar, thoroughly rinse it out, then place the egg inside.
7. Immerse the egg in tap water, then screw on the lid to prevent evaporation.
8. On day 4, observe the egg and record your observations.
9. On day 5, remove the egg from the jar. Measure and record the long and short circumferences. Observe and record how the egg looks and feels.
10. How did the egg look and feel on day 3? Try to explain what had happened to the shell of the egg.
11. How did the measurements on day 3 compare with the measurements on day 1? Try to explain the change.
12. How did the measurements on day 5 compare with the measurements on day 3? Try to explain the change.



DIFFUSION AND OSMOSIS

All living things have certain requirements they must satisfy in order to remain alive. These include exchanging gases (usually CO_2 and O_2), eliminating wastes, and taking in water, minerals, and food. These tasks usually occur at the *cellular level*, requiring molecules to move through the **membrane** surrounding the cell.

Molecules move through the membrane in two different ways: by *passive transport* and *active transport*. **Active transport** requires that the cell use energy that it has obtained from food to move the molecules through the cell membrane. **Passive transport** does not require the expenditure of energy, and occurs spontaneously.

The principle means of passive transport is **diffusion**. Diffusion is the movement of molecules from a region in which they are highly concentrated to a region in which they are less concentrated and randomly distributed throughout the system (equilibrium).

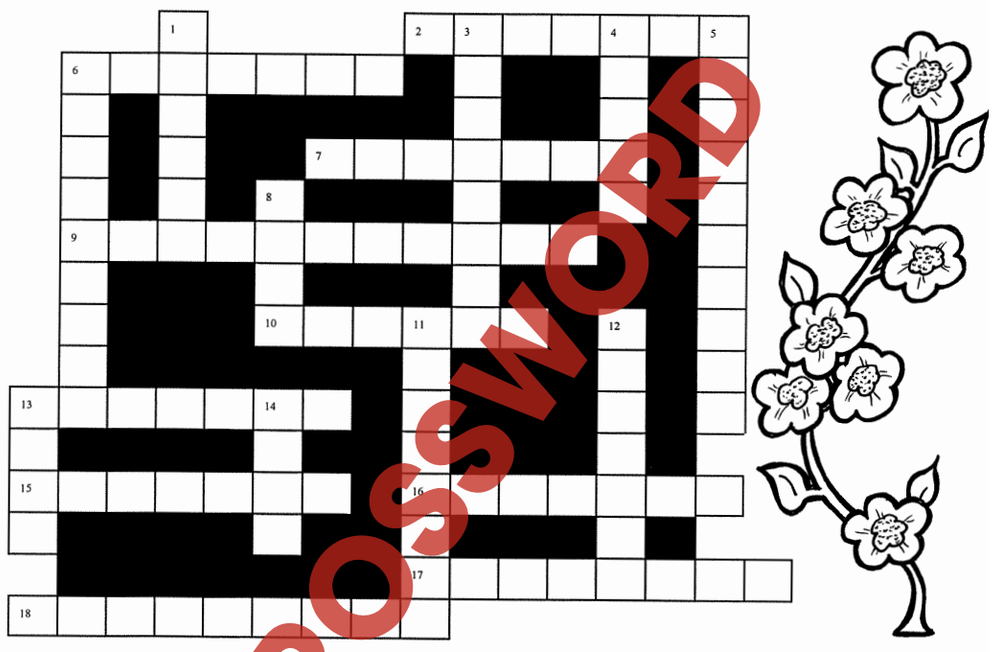
An example of diffusion is when you place a drop of ink into a glass of water. At first, all of the ink molecules are in a small space and are moving around randomly. Most of the molecules continue to move away from the original center of the drop in all different directions until they find the wall of the glass. More and more molecules bounce off the glass and start moving back toward the center. Eventually, the number of molecules moving away from the center equals the number moving toward the center, and equilibrium is established. At this point, the molecules are evenly spread throughout the water, and diffusion stops.

Diffusion can occur through a cell membrane. The membrane allows small molecules like water (H_2O), oxygen (O_2), and carbon dioxide (CO_2) to pass through easily. It is said to be *permeable* to these molecules.

CELLS CROSSWORD

Using the words in the Wordbox, complete the following Crossword Puzzle using the clues provided:

lipids	**vesicle**	**meiosis**	**membranes**	**respiration**
acid	**eukaryotic**	**clues**	**glucose**	**bias**
exocrine	**stamen**	**asexual**	**alga**	**genetic**
molecule	**lysosome**	cytosol	**osmosis**	**organelle**



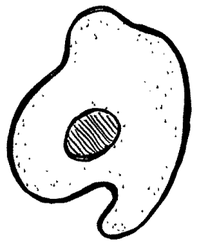
Across	Down
2. Tiny membrane sac used for transporting proteins within a cell 6. Cell division is sexually reproducing organisms 7. Simple sugar-organisms store food as ___ 9. Way you breathe in oxygen 10. An organ of the flower 13. A means of reproduction where a single organism produces identical copies of itself 15. Relating to the origin of something 16. Jelly-like part of the cytoplasm 17. Small membrane-bound structures within cells that contain powerful digestive enzymes 18. Structure within cells that carries out a specific task	1. Oily substances produced by cells 3. ___ gland - group of cells that makes and secretes a substance via a duct 4. A microscope has unveiled many of the cell's _____ 5. ____ cells are multi-cellular organisms 6. A thin sheet of tissue 8. Prejudiced 11. Tiny molecules of a substance 12. Way in which fluid and chemicals pass from one cell to another 13. One-celled plant 14. Ribonucleic ___ (RNA)

CELLS WORD SEARCH

Find the 20 words from the **Wordbox** in the Puzzle. Remember the words are all in a straight line, but can be horizontal, vertical or diagonal - and even backwards!

WORDBOX

AMOEBA	*MICROSCOPE*	*ORGANELLE*	*CILIA*
MITOSIS	*MEIOSIS*	*RIBOSOME*	*DIFFUSION*
OSMOSIS	*CENTRIOLES*	*PROTOZOA*	*GOLGI*
CELL	*VACUOLE*	*TISSUE*	*SYSTEM*
NUCLEUS	*LYSOSOME*	*ASEXUAL*	*BINARY*



A	M	O	E	B	A	B	N	M	Y	U	I	O	P	M
A	I	L	I	C	E	R	E	M	O	S	O	B	I	R
O	C	E	L	L	E	R	T	Q	S	Y	S	T	E	M
A	R	S	D	D	I	F	F	U	S	I	O	N	N	M
B	O	G	S	A	E	M	O	S	O	S	Y	L	B	N
I	S	C	A	V	B	N	M	E	I	O	S	I	S	P
N	C	G	H	N	D	D	S	S	A	S	Q	W	E	R
A	O	G	A	S	E	X	U	A	L	M	T	Y	U	O
R	P	H	J	G	O	L	G	I	J	O	I	U	Y	T
Y	E	Z	X	C	V	B	L	N	M	S	H	J	K	O
F	G	V	A	C	U	O	L	E	G	I	H	J	K	Z
T	I	S	S	U	E	D	F	G	H	S	G	H	J	O
D	F	G	H	J	K	L	S	U	E	L	C	U	N	A
C	E	N	T	R	I	O	L	E	S	C	V	B	N	M

✏ Select any five words from the Puzzle and write complete definitions of each.

ISBN: 978-1-55319-190-2

#1 - WHAT ARE CELLS

Objectives and Activities

his lesson is designed to introduce students to the unit and provide students with an understanding what cells are.

udents complete notes from an overhead projector on the topic and complete a wordsearch tivity entitled, **"Cells Wordsearch"**.

d Teaching Strategies

egin the unit by presenting students with the following clues requiring them to guess the new unit pic:

1) If you break the law, you may end up in one of these.
2) A mobile phone.

f course the answer is "cells" - *the building block of all living things*.

ommence with the page of student notes, **"The Cell"**, which is designed to be copied onto an erhead transparency. Students copy the notes into their binders or notebooks. This gives them formational material necessary to complete assignments and for studying.

fter the notes have been completed, hand out copies of the assignment entitled **"Cells Wordsearch"**. The purpose of this assignment is to introduce students to some of the terms they ill be encountering during this unit, and it is a fun way to kick off the study of "cells".

nts are then required to select five of the words from the wordsearch and investigate their ss.

Answers - Word Search

A	M	O	E	B	A									M
A	I	L	I	C			E	M	O	S	O	B	I	R
O	C	E	L	L					S	Y	S	T	E	M
	R			D	I	F	F	U	S	I	O	N		
B	O	G			E	M	O	S	O	S	Y	L		
I	S		A				M	E	I	O	S	I	S	P
N	C			N				S		S				R
A	O		A	S	E	X	U	A	L	M				O
R	P			G	O	L	G	I		O				T
Y	E						L			S				O
		V	A	C	U	O	L	E		I				Z
T	I	S	S	U	E					S				O
							S	U	E	L	C	U	N	A
C	E	N	T	R	I	O	L	E	S					

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