The Cell Theory

1. All living things are composed of one or more cells.

2. Cells are the basic unit of structure and function of any organism.

3. All cells come from pre-existing cells

4. The activity of an organism as a whole depends on the total activity of all its cells.

Cell Theory/Technological Innovations Time Line

In the 14th century, Italian monks developed the art of grinding lenses; these lenses were made into spectacles to improve the monks' failing eyesight.

In 1590, Hans and Zacharias Janssen (father and son Dutch lens grinders) mounted 2 lenses in a tube to produce the first compound microscope (one with 2 main lenses).

In 1665, Robert Hooke, an English scientist, used a crude compound microscope to observe thin slices of cork cells from 'cork oak' trees. He observed tiny, hollow, room-like structures and called these structures 'cells' because they reminded him of the rooms that monks lived in. He only saw the outer walls (cell walls) because cork cells are not alive. Cork is the very fast growing bark of the tree. The bark can be periodically stripped from a tree and used to build ships as it is a very durable wood that resists rotting from water and mold when wood is constantly wet. Hooke may have studied cork because it was economically very valuable to the English and their ship-building industry.

Around the same time as Hooke, Anton van Leeuwenhoek used a simple microscope (1 lens) to look at blood, rainwater, teeth scrapings, etc. A Light microscope - is a compound microscope that uses mirrors or a light source to better view a specimen.

Anton van Leeuwenhoek (around the same time as Hooke; 1680?), a Dutch fabric merchant and amateur scientist, looked at blood, rainwater, scrapings from teeth through a simple light microscope (1 lens and mirrors or a light source). He observed living cells and called some 'animalcules'. Some of these small 'animalcules' are now called bacteria.

In 1838 Matthias Schleiden, a German botanist, viewed plant parts under a microscope and discovered that plant parts are made of cells.

In 1839 Theodor Schwann, a German zoologist, viewed animal parts under a microscope and discovered that animal parts are made of cells.

In 1855 Rudolph Virchow, a German physician, stated that all living cells come only from other living cells.

The transmission electron microscope was invented in the 1930's. It forms an image by electrons passing through a specimen. It is capable of higher resolution than the scanning electron microscope. The transmission electron microscope gives two-dimensional images, good for cross sections. The scanning electron microscope was developed later than transmission electron microscope. It forms a three-dimensional surface image by having electrons bombard the surface of the specimen and allowing the secondary (lower energy) electrons to be emitted.

In 1857 Kolliker described the mitochondria in muscle cells.

In 1898 Golgi stained cells with silver nitrate and discovers golgi bodies.

In 1931 Ruska built the first transmission electron microscope.

Levels of Organization

In unicellular (single-celled) organisms, the single cell performs all life functions. It functions independently.

However, multicellular (many celled) organisms have various levels of organization within them. Individual cells may perform specific functions (causing a division of labour) and work together for the good of the entire organism. The cells become dependent on one another. Multicellular organisms have the following 5 levels of organization (ranging from simplest to most complex):

1. **Cells** are the basic units of structure and function in living things. Each cell may serve a specific function within the organism. Examples – blood cells, nerve cells, bone cells, etc.

2. **Tissues** are made up of cells that are similar in structure and function and which work together to perform a specific activity. Examples - blood, nervous, bone, etc. (Human have 4 basic tissues - connective, epithelial, muscle, nerve).

3. **Organs** are made up of tissues that work together to perform a specific activity. Examples - heart, brain, skin, etc.

4. **Organ Systems** are groups of two or more tissues that work together to perform a specific function for the organism. The Human body has 11 organ systems - circulatory, digestive, endocrine, excretory (urinary), immune (lymphatic), integumentary, muscular, nervous, reproductive, respiratory, and skeletal.

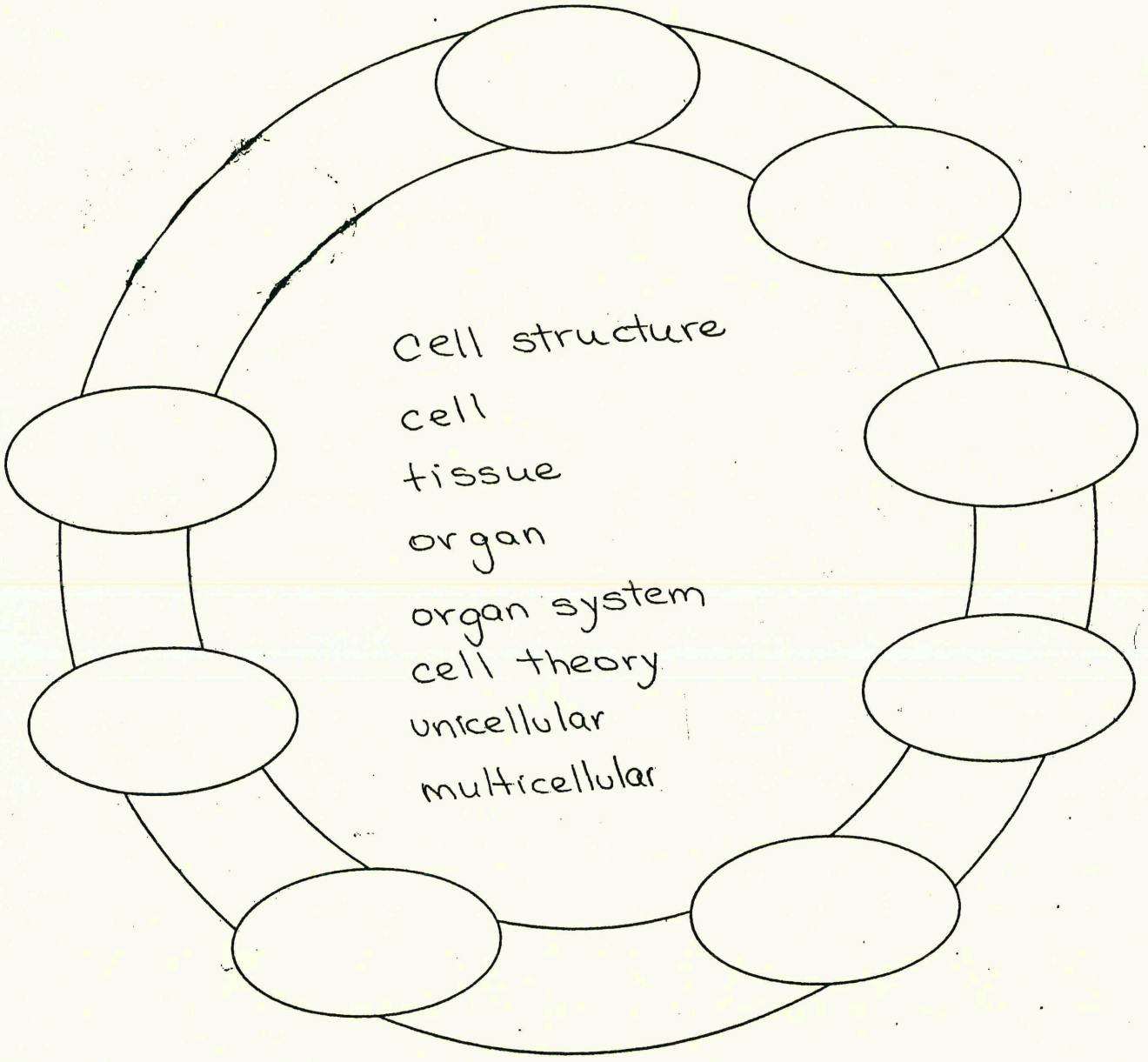
5. **Organisms** are entire living things that can carry out all basic life processes (take in materials, release energy from food, release wastes, grow, respond to the environment, and reproduce) and are usually made up of organ systems (but an organism may be made up of only one cell - e.g. bacteria, protist). Examples - bacteria, amoeba, mushroom, sunflower, human.

The levels of organization in the correct order then are:

cells --> tissues --> organs --> organ systems --> organisms

ATTACHMENT 7

Word Cycle



Directions:

Read the list of words in the circle above. Select one word and place it in any oval. In the next oval, place another word that is related to the first. They could be synonyms, antonyms, steps in a process, examples of something, and so on. Be prepared to finish the statement "Word A is related to word B because . . . ." Write a note on the band in between the words to remind yourself of the relationship. Continue this process until you have placed all the words. Plan ahead; the last few words will be tricky to place.

DATE: NAME: CLASS:

CHAPTER 1
REINFORCEMENT

BLM 1-17

Organelles and Their Functions

Goal • Use this page to review the functions of different organelles.

What to Do

- Look at the table below. The left column is a list of organelles. In the centre column, fill in the function of the corresponding organelle. In the right column, fill in whether the organelle is found in animal cells, plant cells, or in both types of cells. For assistance, see pages 28–29 of *SCIENCEPOWER™ 8*.

Organelle	Function	Found in animal, plant, or both
cell membrane		
cytoplasm		
nucleus		
vacuole		
endoplasmic reticulum		
mitochondria		
cell wall		
chloroplasts		

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BLM 1-18

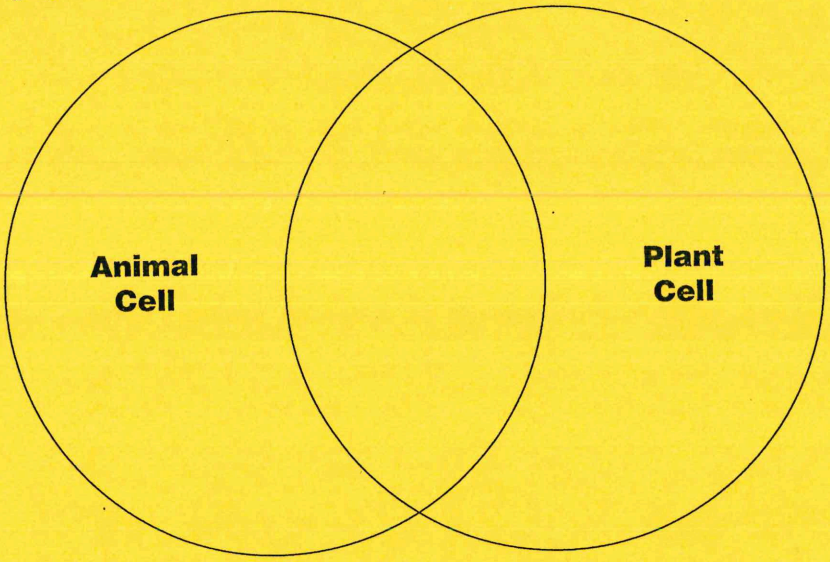
Comparing Plant and Animal Cells

al • Use this page to compare the organelles within plant and animal cells.

t to Do

Complete the Venn diagram below. In the left circle, write the names of organelles hat are found only in animal cells. In the right circle, write the names of organelles that are found only in plant cells. In the overlapping region of the two circles, write the names of organelles that are found in both animal and plant cells.

Use your completed Venn diagram to assist you in answering the questions at the bottom of the page.



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What are the two main types of cells?

What is an organelle?

What are the organelles common to both types of cells?

What are the organelles found only in plant cells?

Why do you think that scientists refer to cells as the "basic" unit of life?

DATE: NAME: CLASS:

CHAPTER 1
REINFORCEMENT

BLM 1-19

Cell-ebrating Cellular Organelles

Goal • Use this page to review your knowledge of organelles and their functions.

What to Do

1. Look at the table below. Each box in the left column describes a function carried out by one type of organelle. In the right column, fill in the name of the corresponding organelle.
2. Once you have completed the right column, circle the names of organelles found only in plant cells.
3. Draw a box around the names of organelles that are found only in animal cells.

Function	Organelle
controls the movement of materials into and out of a cell	
jellylike material that provides all the nutrients and materials for cell organelles	
system of tubes and canals used to transport materials throughout the cell	
serves as the cell's control centre	
collects and then releases substances from the cell	
site of photosynthesis	
the "powerhouse" of the cell	

DATE: NAME: CLASS:

BLM 1-20

CHAPTER 1 ASSESSMENT

The Organelles in Cells

Goal • This page assesses your knowledge of organelles and their functions.

What to Do

- Answer the questions as instructed for Parts A and B.

Part A

Beside each function on the left-hand side, place the letter representing the organelle on the right-hand side that best matches the function. (8 marks)

Function	Organelle
___ 1. a selectively permeable barrier	(a) mitochondria
___ 2. made of cellulose and helps provide rigidity	(b) cell membrane
___ 3. uses sugar to make energy in the cell	(c) vacuole
___ 4. responsible for directing all the cell's activities	(d) cell wall
___ 5. contains the green pigment needed for photosynthesis	(e) endoplasmic reticulum
___ 6. jellylike substance that surrounds all the organelles	(f) chloroplast
___ 7. may contain extra water or nutrients	(g) nucleus
___ 8. tubelike system that transports nutrients within cells	(h) cytoplasm

Part B

Answer the following questions in the spaces provided.

1. Why is it important for an organelle to "direct" a cell's activities? Which organelle performs this function? (2 marks)

_____

_____

2. What is meant by the term "selectively permeable"? (1 mark)

_____

3. Name two structures that are found only in plant cells. (2 marks)

_____

4. Think of hardworking, energy-burning muscle cells. Which organelle would you expect to see a lot of in muscle cells? Why? (2 marks)

_____

Total: /15