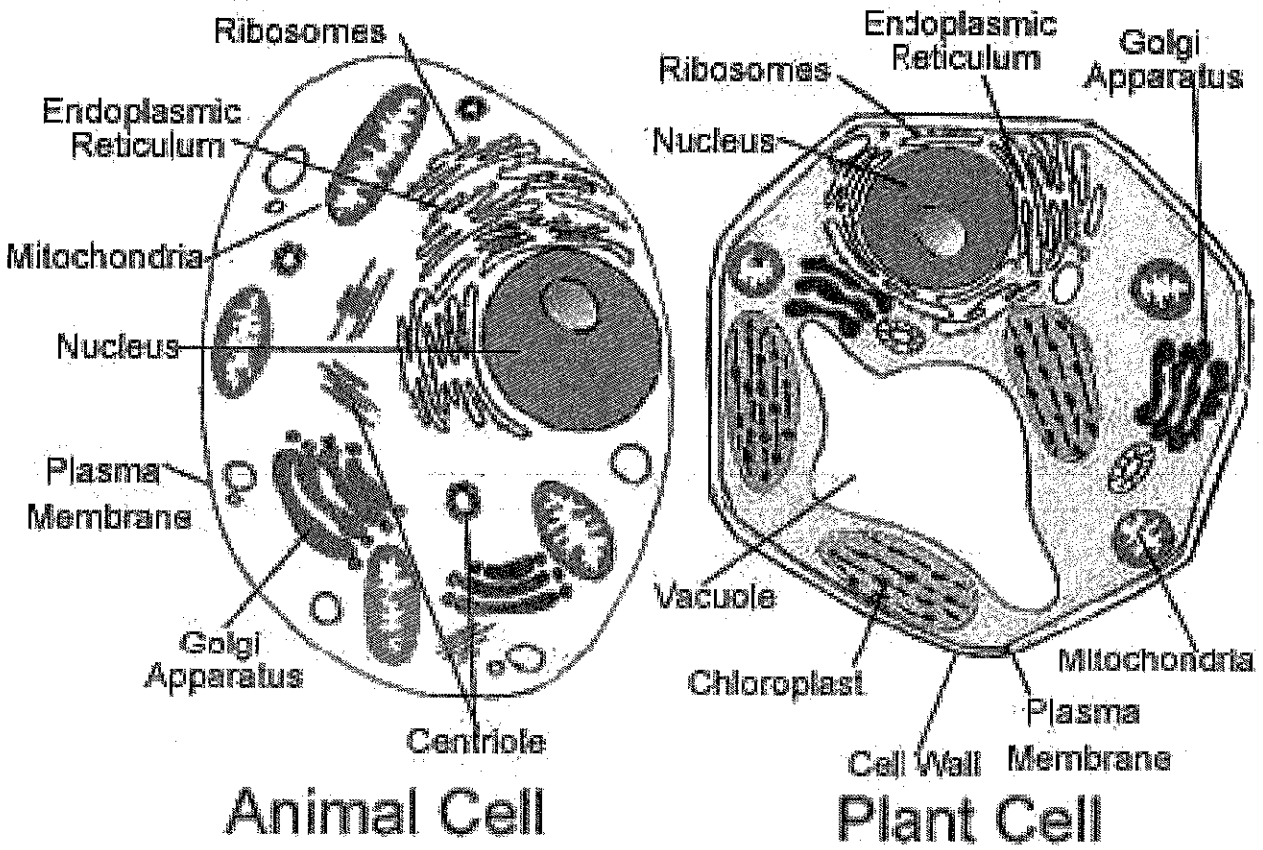
Name:_____

Period:_____ Teacher:_____



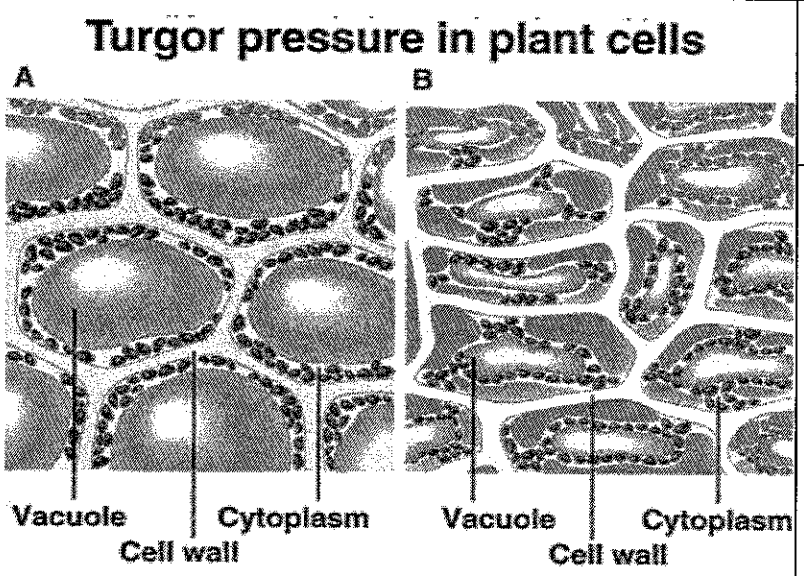
Levels of Organization & Cells Workbook

7th Grade Science

Unit 6: Cells/Levels of Organization

TEKS Analysis

TEKS 7.7B- **demonstrate** and **illustrate** *forces that affect motion* in organisms such as turgor pressure



Use arrows to illustrate the movement of water in both diagrams.

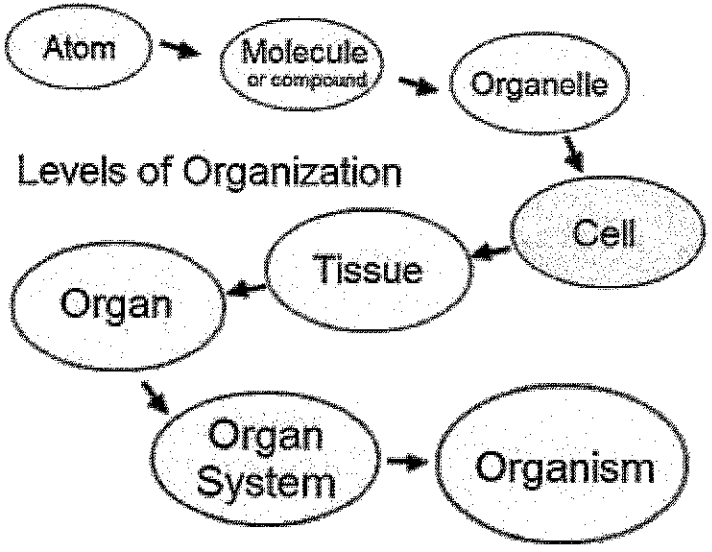
What is turgor pressure?

Which of the diagrams on the left (A or B) shows cells with turgor pressure? Justify your answer.

Essential Questions

How do forces in living systems affect motion?

TEKS 7.12C- **recognize** levels of organization in plants and animals, including cells, tissues, organs, organ systems, and organisms



Use the diagram and word bank to organize each example in the correct level.

Word Bank

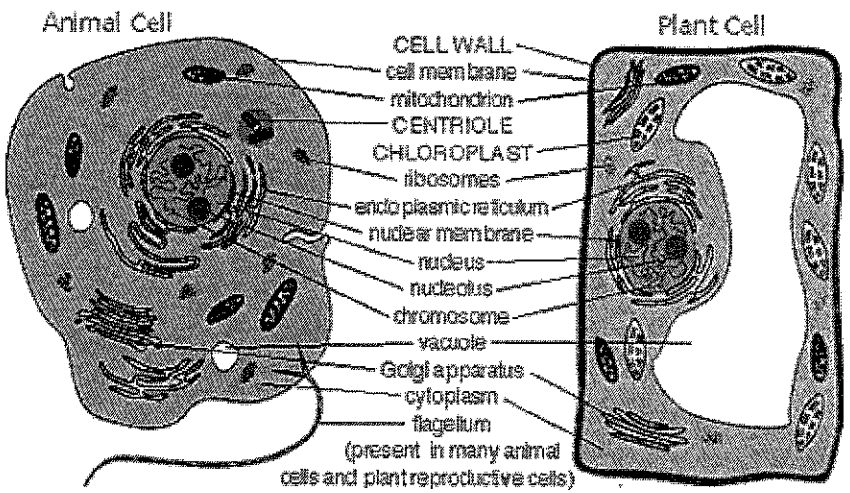
eukaryote	dog	stomach
carbon	digestive	glucose
muscle	nucleus	

_____ Atom
_____ Molecule
_____ Organelle
_____ Cell
_____ Tissue
_____ Organ
_____ System
_____ Organism

Essential Question

What are the levels of organization in plants and animals?

TEKS 7.12D- **differentiate** *between structure and function* in plant and animal cell organelles, including cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast, and vacuole [supporting standard]



What structures do animal cells have that plant cells do not?

What structures do plant cells have that animal cells do not?

Essential Question

How do the structure and function of plant and animal cell organelles compare and differ?

TEKS 7.12F- **recognize** the components of cell theory.

The cell theory states that all living organisms have a basic unit of structure and function, which is the cell. This was a biologically significant statement because it suggested that all living things have a common denominator. Almost 200 years of research by many different scientists led to this conclusion.

The initial discovery of cells was done by Robert Hooke, an English scientist, in 1665. Hooke designed one of the first microscopes and used it to look at plant material. One specimen he examined was thinly sliced pieces of cork. By looking at the cork through the microscope, he discovered that it was made up of many small units. Hooke named these units *cells* and, without realizing it, he had discovered the basis of all living matter.

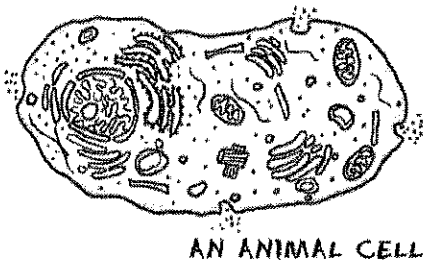
Hooke and other scientists observed other samples of plant material and discovered that they were also made up of cells. As more and more material was examined, scientists began to recognize a pattern. It wasn't until 1838, however, that German scientist Matthias Schleiden stated that all plant material was made up of cells. The following year, Theodor Schwann came to the same conclusion about animals. Their findings are what have become known as the cell theory.

With this new information, Rudolf Virchow, a German physician, proposed an adjustment to the cell theory. In 1858, he suggested that the theory be changed to include that all cells come from pre-existing cells. This was new information to most scientists and had not been understood before. Schwann, for example, thought that new cells arose from particles in the fluid surrounding them.
(http://www.wisegeek.org/what-is-the-cell-theory.htm)

Essential Question

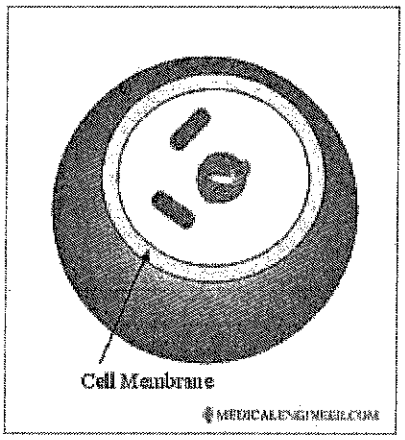
What does cell theory claim about organisms and cells?

1. **cell:**



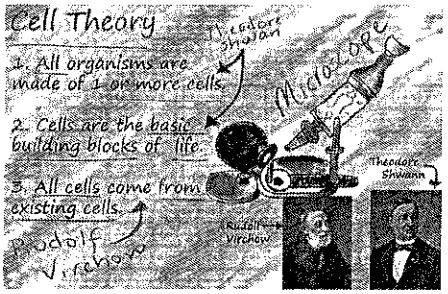
Basic unit of life

2. **cell membrane:**



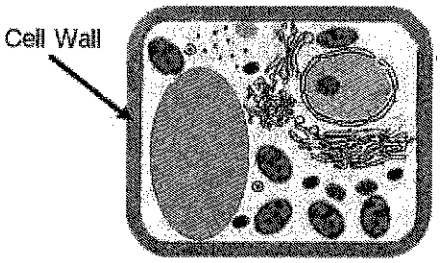
A thin, flexible barrier around a cell; regulates what enters and leaves the cell

3. **cell theory:**



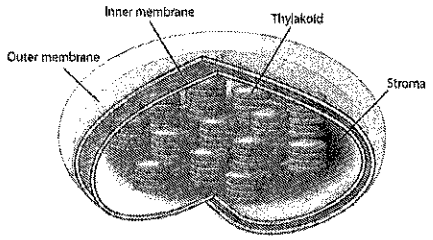
all organisms are composed of cells and cells carry on similar functions

4. **cell wall:**



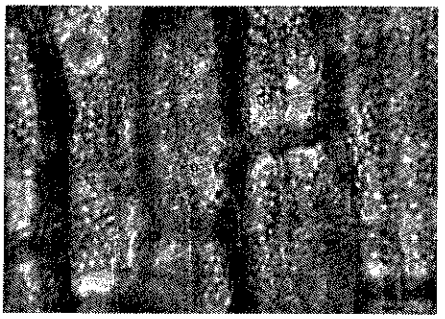
The stiff outer layer of nonliving material that surrounds the cells of plants and some other organisms.

5. **chloroplast:**



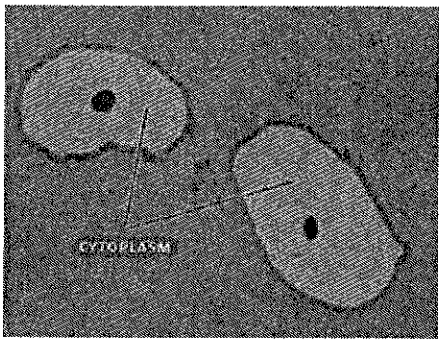
a structure in the cells of plants and some other organisms that captures energy from light and uses it to produce food

6. **clorophyll:**



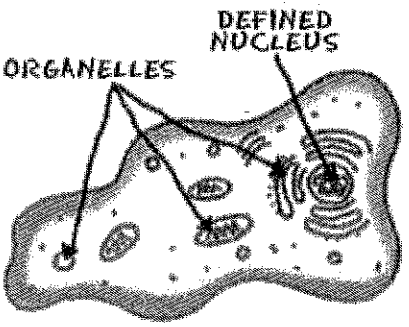
a green pigment found in the chloroplasts of plants,algea, and some compounds

7. **cytoplasm:**



A jellylike fluid inside the cell which contains the organelles

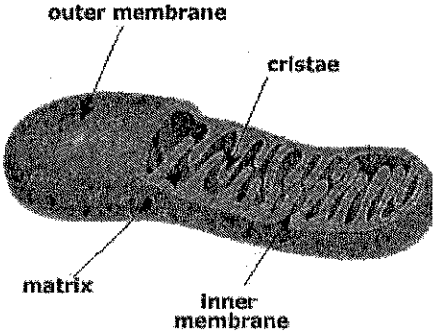
8. **eukaryote:**



A cell that contains a nucleus and membrane bound organelles.

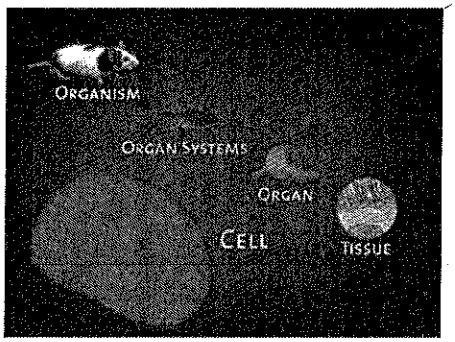
9. **extract:** to obtain from a source

10. **mitochondria:**



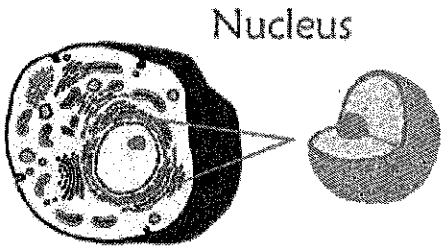
A provider of energy for a cell. It breaks down glucose for energy.

11. **multicellular:**



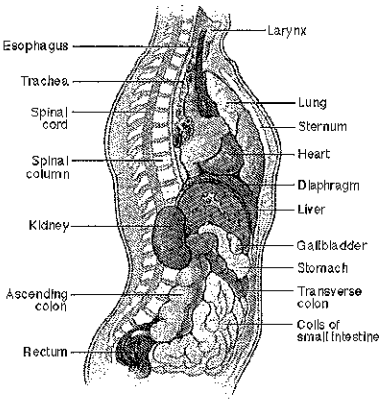
Made up of more than one cell.

12. **nucleus:**



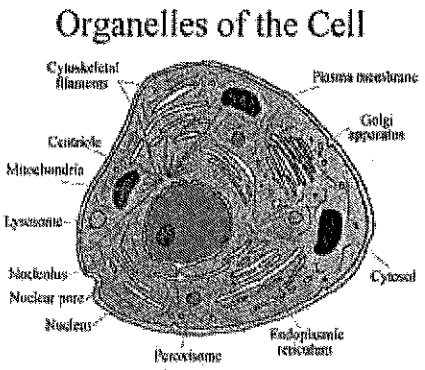
Control center of the cell; contains DNA

13. **organ:**



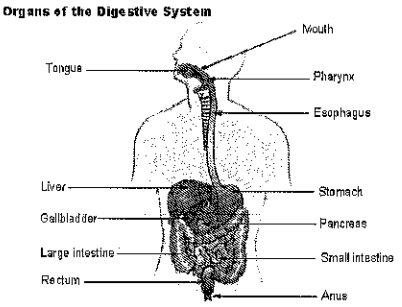
A collection of tissues that carry out a specialized function of the body

14. **organelle:**



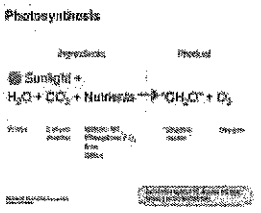
A tiny cell structure that carries out a specific function within the cell

15. **organ system:**



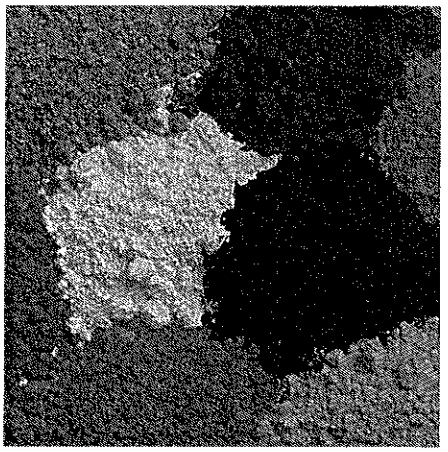
A group of organs that work together in performing vital body functions.

16. **photosynthesis:**



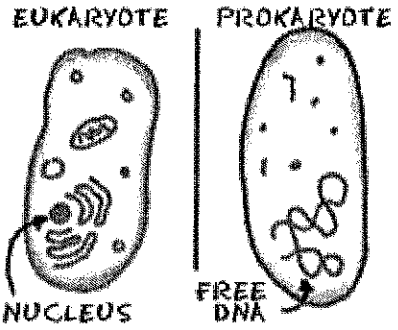
the process by which plants and some other organisms capture light energy and use it to make food from carbon dioxide and water

17. **pigment:**



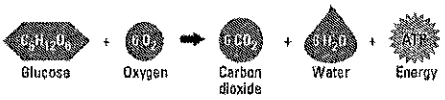
a colored compound that absorbs light; pigments are used to color other materials

18. **prokaryote:**



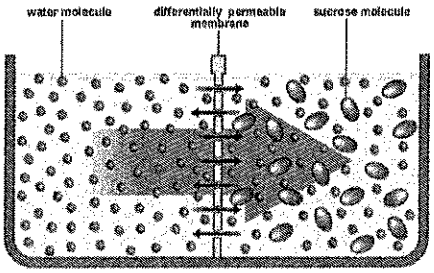
A unicellular organism that lacks a nucleus and membrane bound organelles

19. **respiration:**



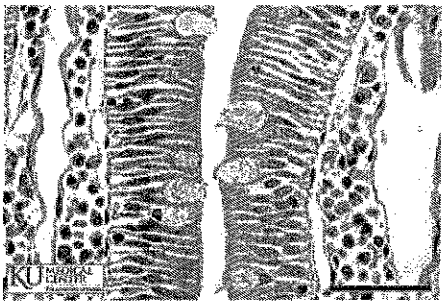
the process by which cells break down simple food molecules to release the energy they contain

20. **semi-permeable:**



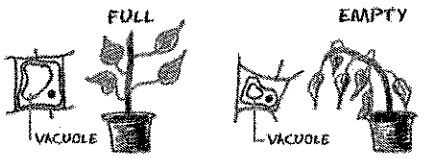
Membranes that allow some substances through but not others.

21. **tissue:**



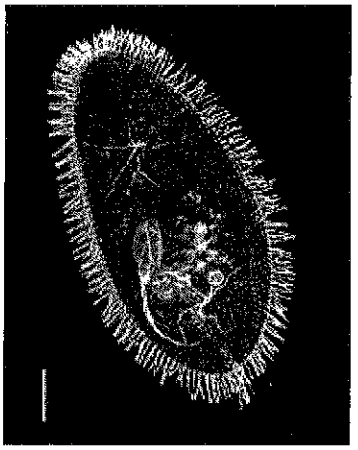
A group of similar cells that perform the same function.

22. **turgor pressure:**



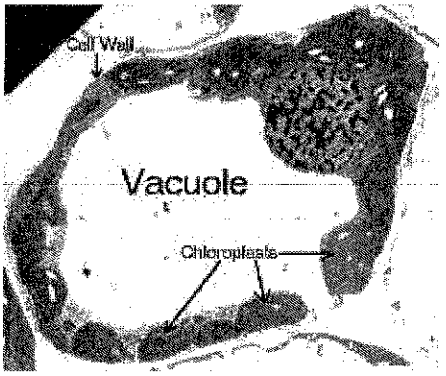
The pressure that water molecules exert against the cell wall

23. **unicellular:**



Made of a single cell

24. **vacuole:**



A sac inside a cell that acts as a storage area

Daily Work

	A	B	C	D	E
1	A structure in the cells of plants and some other organisms that captures energy from light and uses it to produce food _____ (vocabulary term)	A thin, flexible barrier around a cell; regulates what enters and leaves the cell _____ _____ (vocabulary term)	All organisms are composed of cells and cells carry on similar functions _____ _____ (theory)	The process by which plants and some other organisms capture light energy and use it to make food from carbon dioxide and water _____ (vocabulary term)	The stiff outer layer of nonliving material that surrounds the cells of plants and some other organisms _____ _____ (vocabulary term)
2	A jellylike fluid inside the cell which contains the organelles _____ (vocabulary term)	A provider of energy for a cell. It breaks down glucose for energy _____ (vocabulary term)	Control center of the cell, contains DNA _____ (vocabulary term)	A colored compound that absorbs light; _____ (vocabulary term)	A green pigment found in the chloroplasts of plants, algae, and some compounds _____ (vocabulary term)
3	A cell that contains a nucleus and membrane bound organelles: _____ (vocabulary term) A unicellular organism that lacks a nucleus and membrane bound organelles: _____ (vocabulary term)		Explain is the difference between unicellular and multicellular. _____ _____ _____		A sac inside a cell that acts as a storage area _____ (vocabulary term) Do both plant and animal cells have this organelle? _____
4	Dog, mushroom, human, tree, spiders, fish, rose bushes, birds, frogs, bacteria. All of the items in this list are _____ Sun, water, rocks, air, soil. All of the items in this list are _____		What types of cells extract energy from glucose (food), because it is essential for their survival? Justify your answer...include the organelle in your explanation! _____ _____ _____ _____ _____ _____		In a plant, what is the structural level of a leaf? _____ In an animal, what is the structural level of the lung? _____

5

Cell theory has 3 parts to it. Which of the following statements it part of cell theory?

A. Not all cells are able to grow and develop
B. All cells have chloroplasts and cell walls
C. Cells are produced from other cells
D. All living things are not composed of cells

Explain the other parts of cell theory.

Which of the following structures can help differentiate between a plant cell and an animal cell? Please justify your answer.

a. Mitochondria

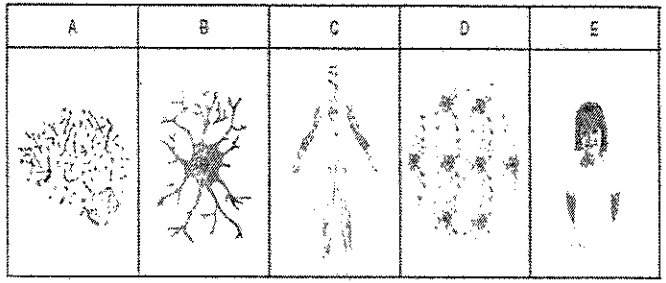
b. Nucleus

c. Chloroplast

d. Cell membrane

L

6



Which of the following correctly sequences the drawings from the simplest to most complex levels of organization?

a. D, A, B, C, E

b. E, C, A, D, B

c. B, A, D, E, C

d. B, D, A, C, E

Draw a picture of a plant cells with high turgor pressure and one with low turgor pressure. Please label the organelles in your diagram.

Name_____ Microscope Diagram Prezi Activity http://prezi.com/zb3p6ll0rezz/microscope/

Label the microscope.

A. _____ - where you place your eye.

B. _____ - the rotating device that holds the objectives (lenses).

C. _____ - lenses with magnifying power.

D. _____ - the platform on which a slide is placed.

E. _____ - metal clips that hold a slide securely onto the stage.

F. _____ - an adjustable opening under the stage, allowing different amounts of light onto the stage.

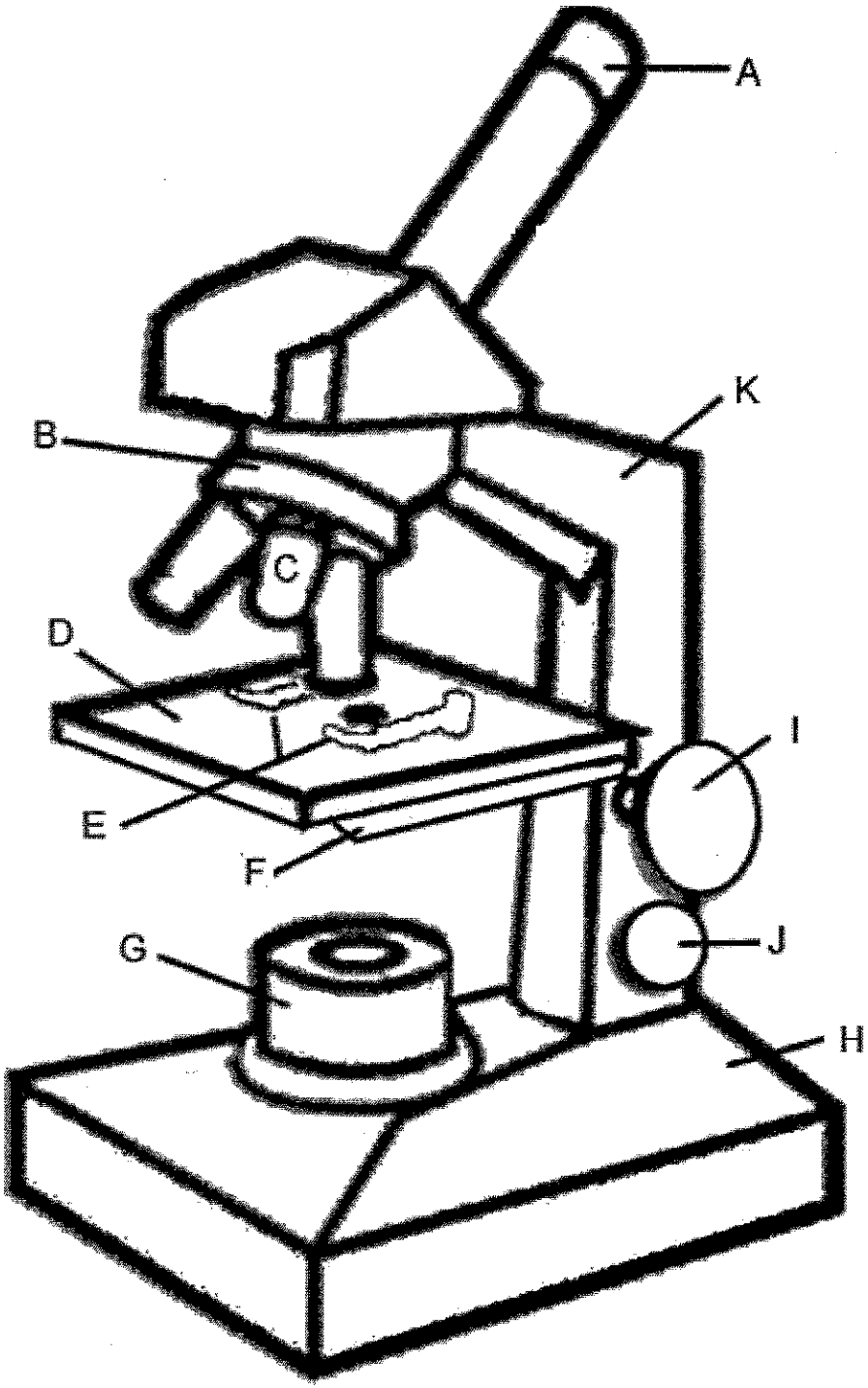
G. _____ - this directs light upwards onto the slide.

I. _____ - this supports the microscope.

J. _____ - a knob that makes large adjustments to the focus.

K. _____ - a knob that makes small adjustments to the focus (it is often smaller than the coarse focus knob).

L. _____ - this attaches the eyepiece and body tube to the base.



What Do You Think? Anticipation Guide

- Read each of the following statements. If you agree with the statement, circle *A* in the *Before Learning* column. If you disagree with the statement, circle *D* in the *Before Learning* column.

- At the end of the lesson, you will revisit this anticipation guide and complete the last column.

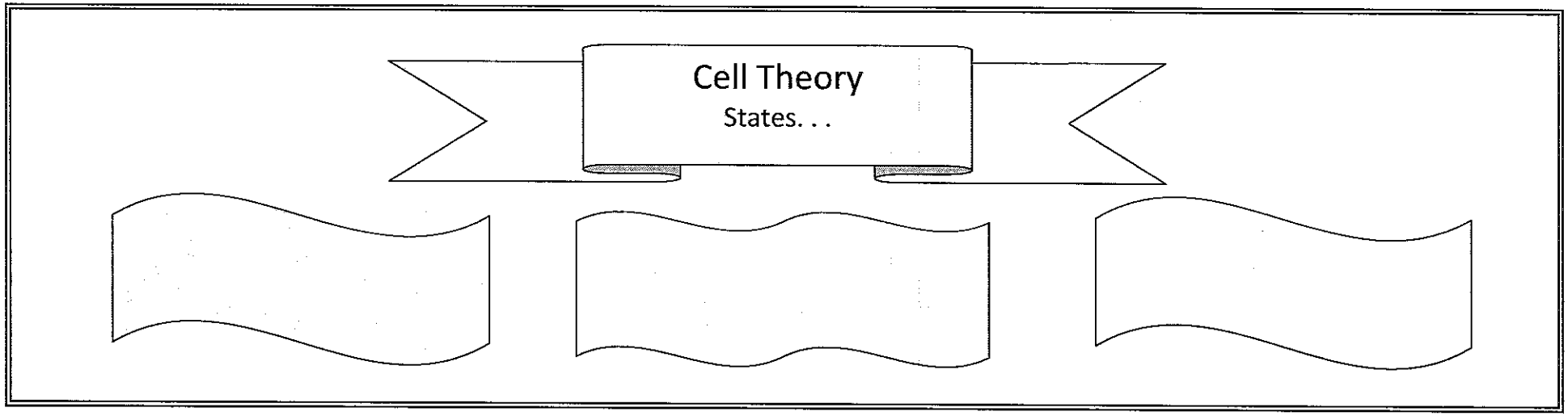
Before Learning	Statements	After Learning
A or D	All living things are made of cells.	A or D
A or D	Cells were first identified in the early 1400s.	A or D
A or D	The invention of the hand lens helped scientists discover cells.	A or D
A or D	Cells have similar functions such as extracting energy from food, growing, reproducing, and responding to their environment.	A or D
A or D	One characteristic of any organism is that it must be composed of at least one cell.	A or D
A or D	Cells are considered the building blocks of life.	A or D

Cells—Necessary for Life?

Cell Features	
Organelles	**Function**
cell membrane	
vacuole	
nucleus	
mitochondria	
chloroplast	

Tools used to discover cells

Cell Theory Components	Scientist Involved in the Development of the Cell Theory



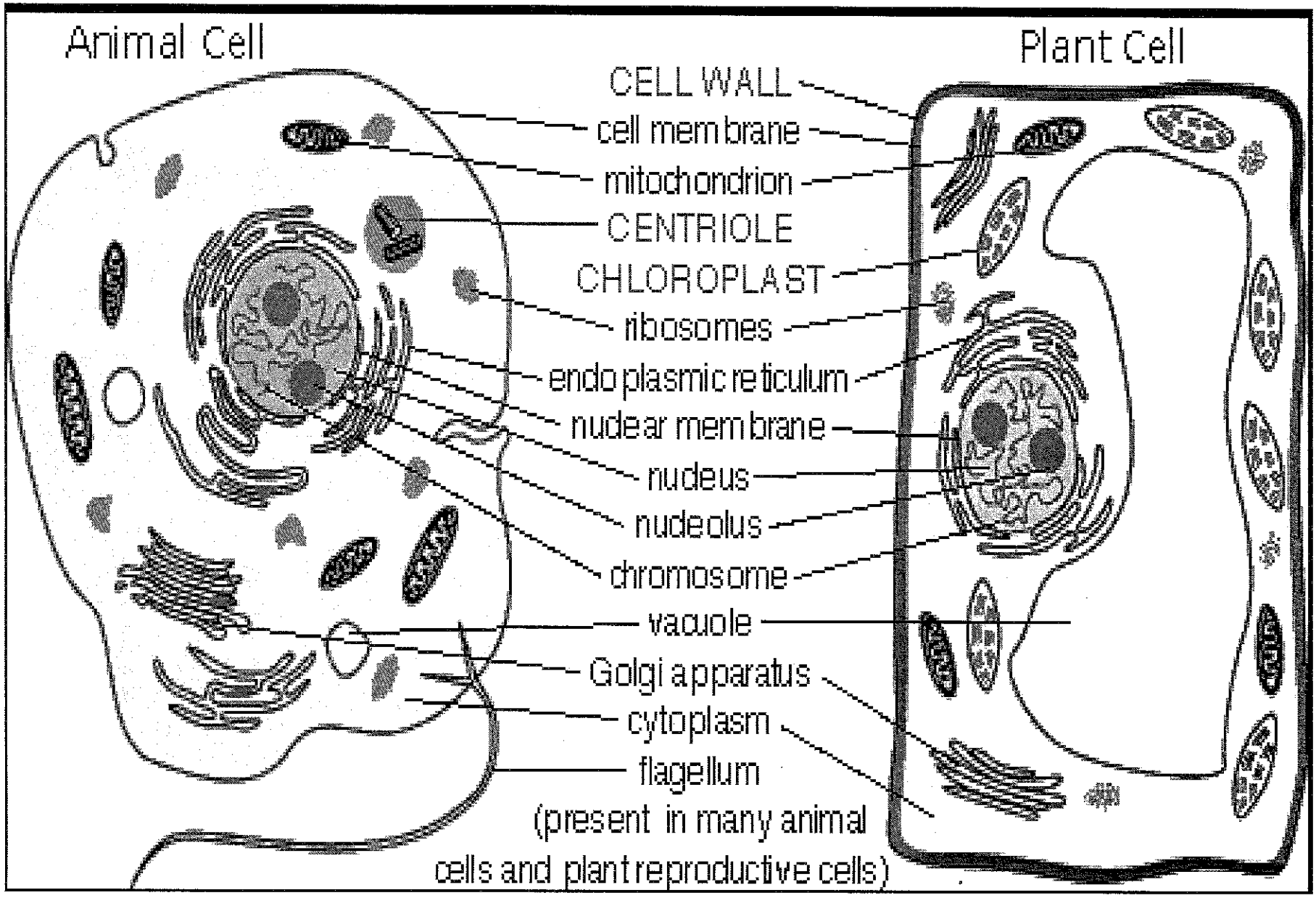
How did the following scientists help provide evidence and information for the development of the cell theory?

Anton Van Leeuwenhoek	Robert Hooke	Matthias Schleiden	Theodore Schwann	Rudolph Virchow

Complete the following sentence.

The cell theory is important because_____

_____


Animal Cell
Plant Cell
CELL WALL
cell membrane
mitochondrion
CENTRIOLE
CHLOROPLAST
ribosomes
endoplasmic reticulum
nuclear membrane
nucleus
nucleolus
chromosome
vacuole
Golgi apparatus
cytoplasm
flagellum
(present in many animal
cells and plant reproductive cells)

Cells & Organelles Name _____

Directions: Match the function cards and memory items by gluing them into the correct locations in the chart below.

Organelle	Function/Description	How can I remember it?
Cell Membrane		
Cell Wall		
Cytoplasm		
Mitochondria		
Lysosomes		
Vacuoles		
Golgi Bodies		
Chloroplasts		
Endoplasmic Reticulum		
Ribosomes		
Nucleus		
Nucleolus		
Chromatin		

Cells QR Activity

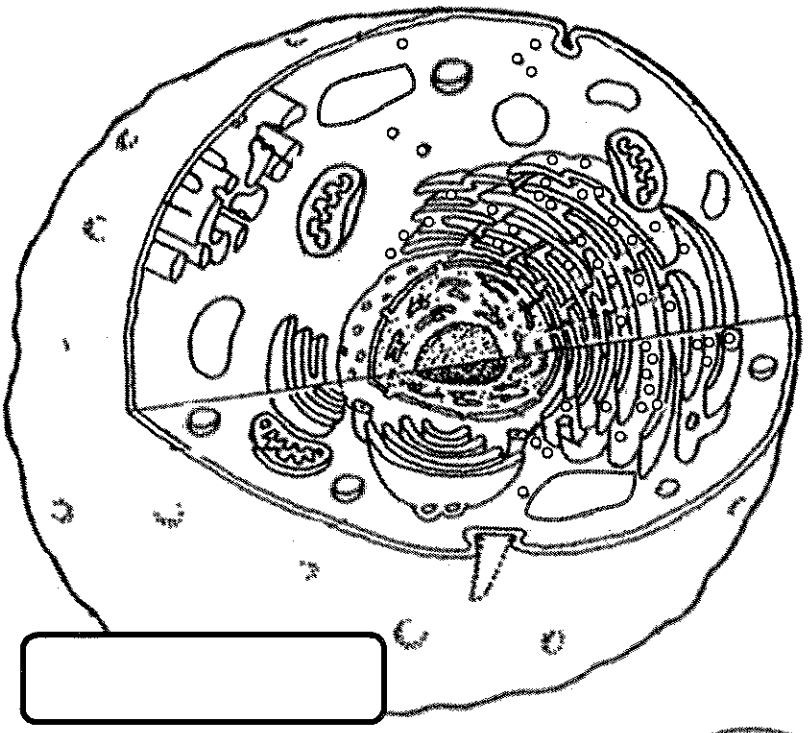
Directions: Take out the puzzle pieces. Separate all of the "Pictures" from the rest of the pieces. Find the correct "Function/Description" and "Cell Organelle or Cell Type" piece that match each "Picture". Match the three pieces of each puzzle. To check if you are correct you will scan the QR code that the three pieces make (try to line-up the pieces of the QR code as closely as you can). If word(s) shows on your device you are CORRECT; if nothing shows you will need to reevaluate your pieces to be sure they best paired.

When your word or words comes up to show you are CORRECT then record the word(s) that comes up next to the "Cell Organelle or Type" that it is associated with.

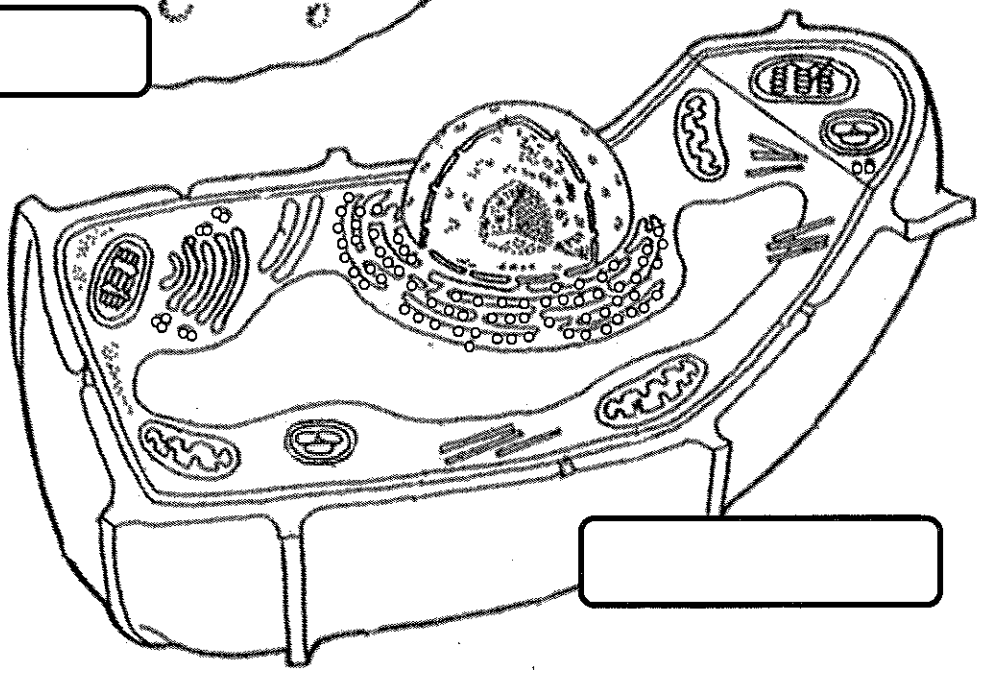
Cell Organelle or Cell Type	Word or Words in QR Code	Explain Relationship Between Cell Organelle/Type and QR Word/words
Cell Membrane		
Cell Wall		
Chloroplast		
Cytoplasm		
Mitochondria		
Nucleus		
Vacuole		

Plant & Animal Cells Name _____

1 - Label each cell using plant cell or animal cell.
2 - Use colored pencils to shade each organelle and the corresponding box in the key.



KEY:
- ☐ Cell Membrane
- ☐ Cell Wall
- ☐ Cytoplasm
- ☐ Endoplasmic Reticulum
- ☐ Golgi Bodies
- ☐ Lysosomes
- ☐ Mitochondria
- ☐ Vacuoles
- ☐ Nucleus
- ☐ Nucleolus
- ☐ Nuclear Membrane
- ☐ Chromatin
- ☐ Chloroplasts
- ☐ Ribosome



Which organelles were only found in the plant cell? _____

Lab 4. Cell Structure: What Type of Cell Is on the Unknown Slides?

Introduction

Scientists who study living organisms deal with a lot of different types of life forms, from trees to tadpoles and bacteria to birds. As they investigate how life happens on the planet, they rely on several scientific theories that have developed over time. These theories combine different types of evidence to support a big idea that explains some aspect of life or the natural world. One of the major theories that scientists rely on when studying living things is the *cell theory*. This theory includes three major ideas that have been supported over the years as new life forms continue to be discovered:

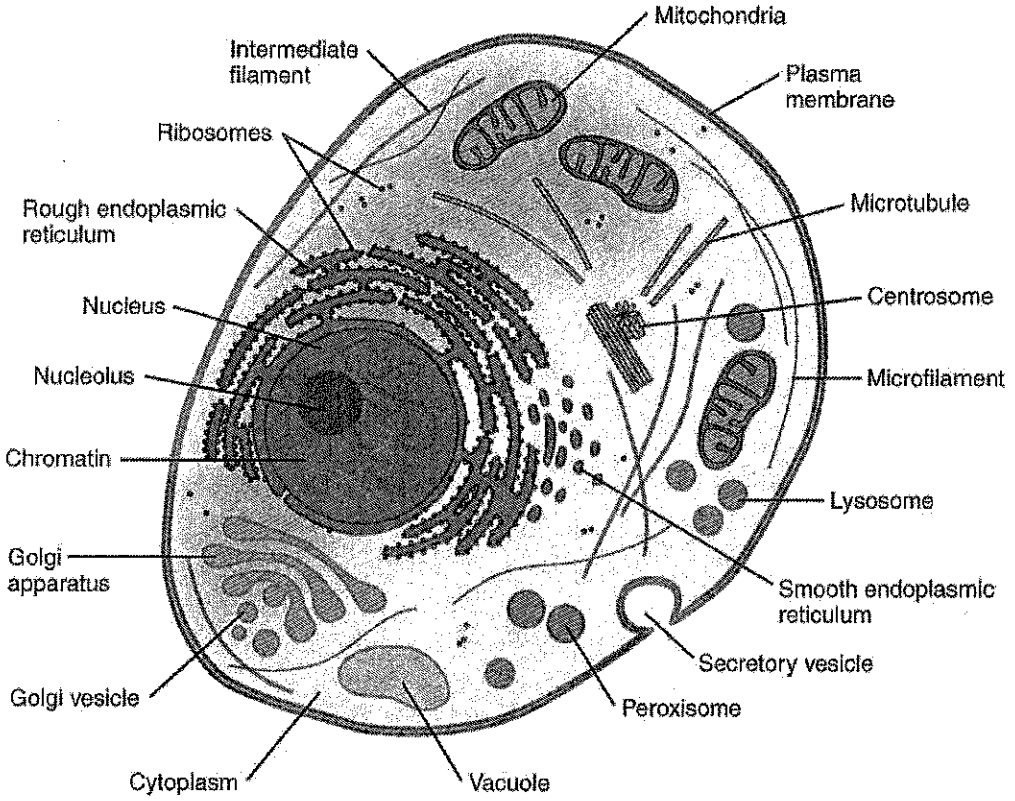
1. All living organisms are made up of one or more cells.
2. The cell is the basic unit of life.
3. All new cells come from cells that are already alive.

Just as there are many types of organisms, including plants and animals, there are also many types of cells. However, there are several features found in all cells. The most common features are the presence of DNA and the presence of a *cell membrane*. DNA is a molecule that contains information that cells need to live. The cell membrane is the sheet of molecules that separates the inside of the cell from the rest of the environment. You can think of the cell membrane as a cell's "skin." More complex cells, like those found in animals and plants, have other structures in common, known as *organelles*. Organelles are special structures found inside cells that serve different functions. Those functions include helping the cell get energy, making the materials it needs to continue growing, and storing the information (like DNA) to make new cells. The organelles present in a cell will also influence what activities that cell can perform.

Figure L4.1

Plant and animal cells have many organelles in common, including the nucleus, the endoplasmic reticulum, Golgi bodies, ribosomes, the cell membrane, and mitochondria (Figure L4.1). Some organelles found in plant cells, however, are not found in animal cells, and vice versa. For example, animal cells have

Animal Cell Diagram



(which organize division cells), but do not. have an centrioles help cell in animal plant cells Plant cells extra layer

surrounding them called a cell wall. Cell walls are stiff membranes that sit outside of the cell membrane and help keep plant cells in a specific shape. The differences in types of organelles can be used to distinguish between cells that come from a plant and cells that come from an animal. However, not all organelles can be seen using microscopes we use in school.

Your Task

Using what you learn from observations of several slides of cells using a microscope, with some slides labeled as plant cells and others as animal cells, determine what types of cells are on the slides labeled as "unknown." The guiding question of this investigation is, **What type of cell is on the unknown slides?**

Materials

You may use any of the following materials during your investigation:

- Known slide A (plant cells)
- Known slide B (plant cells)
- Known slide C (animal cells)
- Known slide D (animal cells)
- Unknown slide E
- Unknown slide F
- Unknown slide G
- Unknown slide H
- Compound light microscope
- Slide wipes
- Sanitized indirectly vented chemical-splash goggles
- Chemical-resistant apron
- Gloves

Safety Precautions

Follow all normal lab safety rules. In addition, take the following safety precautions:

1. Put on sanitized indirectly vented chemical-splash goggles and laboratory apron and gloves before starting the lab activity.
2. Handle all glassware with care to avoid breakage. Sharp edges can cut skin!
3. Follow all safety rules that apply when working with electrical equipment, and use only GFCI-protected electrical receptacles.
4. Wash hands with soap and water after completing the lab activity.

Getting Started

Investigation Proposal Required? ☐ Yes ☐ No

To determine the difference between a plant cell and animal cell, you and your group will need to explore what cell structures you can see with a compound light microscope. To answer the guiding question, you must first determine what type of data you need to collect, how you will collect it, and how you will analyze it.

To determine ***what type of data you need to collect,*** think about the following questions:

- What type of measurements or observations will you need to make during your investigation?
- How will you quantify any differences or similarities you observe in the different cells?

To determine ***how you will collect your data,*** think about the following questions:

- How will you make sure that your data are of high quality (i.e., how will you reduce error)?
- How will you keep track of the data you collect and how will you organize it?

To determine ***how you will analyze your data,*** think about the following question:

- How will you define the different categories of cells (e.g., what makes a plant cell a plant cell, what makes an animal cell an animal cell)?

Connections to Crosscutting Concepts, the Nature of Science, and the Nature of Scientific Inquiry

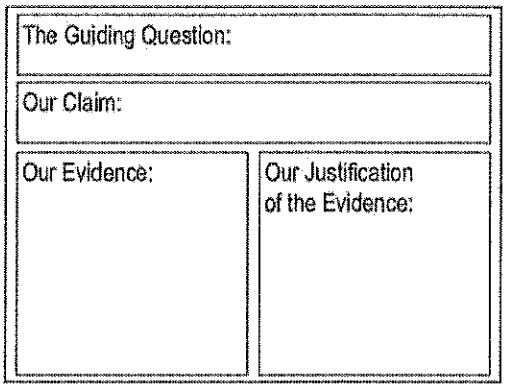
- As you work through your investigation, be sure to think about
- how scientists look for patterns across different living things,
- how the structure of an organelle or cell is related to the function it performs,
- the difference between observations and inferences, and
- how science knowledge changes over time as new evidence is discovered and technology is created.

Initial Argument

Once your group has finished collecting and analyzing your data, you will need to develop an initial argument. Your argument must include a claim, evidence to support your claim, and a justification of the evidence. The claim is your group's answer to the guiding question. The evidence is an analysis and interpretation of your data. Finally, the justification of the evidence is why your group thinks the evidence matters. The justification of the evidence is important because scientists can use different kinds of evidence to support their claims. Your group will create your initial argument on a whiteboard. Your whiteboard should include all the information shown in Figure L4.2.

FIGURE L4.2

Argument presentation on a whiteboard



Argumentation Session

The argumentation session allows all of the groups to share their arguments. One member of each group will stay at the lab station to share that group's argument, while the other members of the group go to the other lab stations one at a time to listen to and critique the arguments developed by their classmates. This is similar to how scientists present their arguments to other scientists at conferences. If you are responsible for critiquing your classmates' arguments, your goal is to look for mistakes so these mistakes can be fixed and they can make their argument better. The argumentation session is also a good time to think about ways you can make your initial argument better. Scientists must share and critique arguments like this to develop new ideas.

- What did your group do to collect the data? Why do you think that way is the best way to do it?
- What did your group do to analyze the data? Why did your group decide to analyze it that way?
- What other ways of analyzing and interpreting the data did your group talk about?
- What did your group do to make sure that these calculations are correct?
- Why did your group decide to present your evidence in that way?
- What other claims did your group discuss before you decided on that one? Why did your group abandon those other ideas?
- How sure are you that your group's claim is accurate? What could you do to be more certain?

Once the argumentation session is complete, you will have a chance to meet with your group and revise your initial argument. Your group might need to gather more data or design a way to test one or more alternative claims as part of this process. Remember, your goal at this stage of the investigation is to develop the most valid or acceptable answer to the research question!

Report

Once you have completed your research, you will need to prepare an investigation report that consists of three sections that provide answers to the following questions:

1. What question were you trying to answer and why?
2. What did you do during your investigation and why did you conduct your investigation in this way?
3. What is your argument?

Your report should answer these questions in two pages or less. The report must be typed and any diagrams, figures, or tables should be embedded into the document. Be sure to write in a persuasive style; you are trying to convince others that your claim is acceptable or valid!

ADI Laboratory Investigation Proposal B: Comparative or Experimental Study

The Guiding Question...

Hypothesis 1

IF...

Hypothesis 2

IF...

The Test

AND...

Procedure

What data will you collect?

How will you analyze the data?

What safety precautions will you follow?

Predicted Result if hypothesis 1 is valid

THEN...

Predicted Result if hypothesis 2 is valid

THEN...

I approve of this investigation.

Instructor's Signature

Date

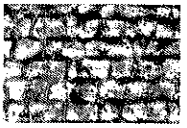
Your Actual Data

AND...

Your Analysis of the Data

The Claim you will Make

Name_____ Date Due_____ Period____



Plasmolysis in Elodea Plant Cells

Background: Elodea is an aquatic plant that attaches itself to the bottom in fresh water and grows up towards the sunlight at the surface. Being a plant, elodea contains some organelles that animal cells don't. These organelles help the plant store water and perform photosynthesis.

Problem: How are cells organelles affected by the presence of salt water?

Hypothesis: Write a hypothesis using the background and problem. Remember to use **If**...**Then**...

_____

_____

_____

Materials:

* Elodea Leaf * Microscope * Tap and Salt water * Slide * Pipette * Paper Towel

Procedure:

1- Prepare your Tap Water slide using instructions Plasmolysis in Elodea Plant Cells- preparation method provided.
2- Use proper microscope technique to focus on the ap twater elodea on power 40X and 100X and record observations in the data table below.
3- Repeat with the salt water elodea slide and record observations.
4- Clean and dry your area and turn off microscope.

Data Table: Fill in the data table while you observe the organelles.

Tap Water Observations (describe and draw)		Salt Water Observations (describe and draw)	
40X	100X	40X	100X

Analysis and Conclusion Questions:

1- What organelles do plants have that animals don't? _____

2- What do those organelles do (their function)? _____

_____

_____

3- Describe what happened to the vacuole and chloroplasts in the regular water? _____

_____

4- Describe what happened to the vacuole and chloroplasts in the salt water? _____

_____

5- Why was there a difference between the two (explain using concept of turgor pressure)?

_____

_____

_____

_____

Cell Organelle Photo Analogy

TEK 7.12E: differentiate between structure and function in plant and animal cell organelles, including cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast, and vacuole.

Materials:
Computer
Digital camera

Procedure:

1. Students research the function of each of the following organelles: cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast and vacuole. Students record their research in their science notebook using the table below as a template.

2. Students take photographs with a digital camera of places in their environment (home, and/or school) that have the same or similar function as that of each organelle. *(If students do not have access to a camera, they may stay after school and use a district camera.)*

3. Assignment can be differentiated for students with various needs. Students can draw pictures of places in their environment that have the same function as the assigned organelles. Students can present their drawings to a group or the class.

4. The student will put the pictures into a presentation format, using Power point, Movie Maker, Prezi, or some other teacher-approved program or website. In your presentation, include pictures of each area and pictures of the organelles with a description of how each organelle relates to the photo you took.

Organelle	Function within the cell	Area in your environment
Cell Membrane		
Cell Wall		
Nucleus		
Cytoplasm		
Mitochondria		
Chloroplasts		
Vacuole		

Name: _____ Period:_____

Cell Photo Analogy Rubric

Objective: Investigate function of assigned cell organelles and use each function to create an analogy with an item in their environment, differentiating between structure and function.

Category	4	3	2	1
Organelle Functions	Description is complete and shows mastery of objective	Description shows partial understanding of objective	Description shows little understanding of objective	Description shows no understanding of objective
Pictures	Each organelle has a picture and shows mastery of objective.	5 organelles have pictures showing partial understanding of objective	3 organelles have pictures showing little understanding of objective	1 organelle has a picture showing no understanding of objective.
Analogy	Includes all 7 analogies and is complete and shows mastery of objective	Includes 5 analogies and is partially complete showing partial understanding of objective	Includes 3 analogies and shows little understanding of objective	Includes 1 analogy is not complete and shows no understanding of objective
Presentation	Includes all pictures, organelle functions, analogies and is in presentation format, showing mastery of objective.	Includes 5 pictures, organelle functions, analogies and is in presentation format showing partial understanding of objective.	Information and or pictures for only 3 organelles are included. Presentation format is somewhat used showing little understanding of objective	Missing most information and pictures and is not in presentation format showing no understanding of objective.

TEKS	Unit 6:Cells/Levels of Organization DCA Analysis	Test Question (Shade # if correct)				My %	Class Mastery %	Campus Mastery %	My Unit Mastery Overall
7.7B	I can **demonstrate** and **illustrate** *forces that affect motion* in organisms such as turgor pressure	8							
7.12C	I can **recognize** levels of organization in plants and animals, including cells, tissues, organs, organ systems, and organisms	1	2						
7.12D	I can **differentiate** *between structure and function* in plant and animal cell organelles, including cell membrane, cell wall, nucleus, cytoplasm, mitochondria, chloroplast, and vacuole [supporting std]	6	7	9	10				
7.12F	I can **recognize** the components of cell theory.	3	4	5					% Y / N

Assigned: ☐ Enrichment ☐ Intervention

Date _____ Report to _____

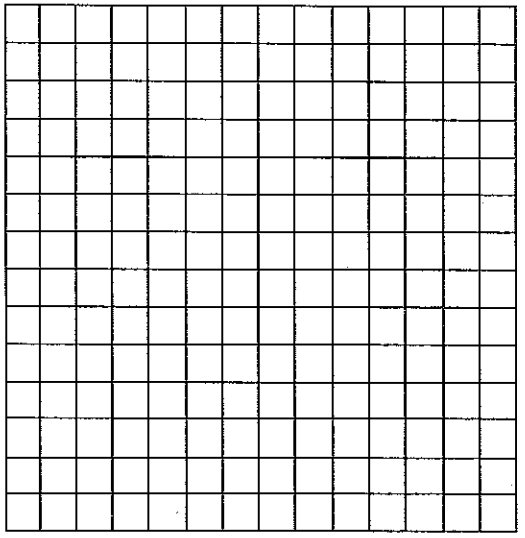
Answer the following Questions

1. Rate your confidence level on content knowledge: 10- High to 0- Low

   Before Test _____ After Test_____
2. After analyzing your test data, what concept(s) did you identify as challenging?

3. What resource or activity would or did assist you in understanding the concept(s) that challenged you?

Create a data table and graph using results from the Unit Test Analysis above. The data can be demonstrated in various ways. Select data you want emphasized. (Remember: TAILS and DRY MIX)



Corrections completed	Dates Attended Tutoring			Re-test Score	Enrichment Credit	Science Grade ___/___	___/___
Yes No				%		%	%