CELLS

Complete Unit

Topics include:

- ✅ Cell Theory
- ✅ Prokaryotic vs Eukaryotic Cells
- ✅ Cell Organelles
- ✅ Plant vs. Animal Cells



biology roots

Best for high school or middle school

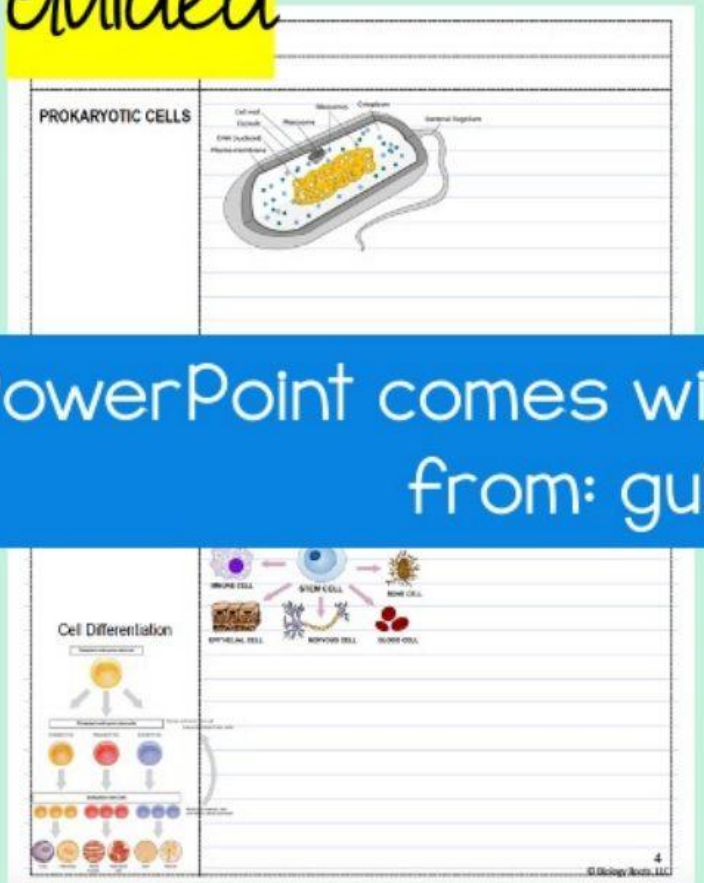
Editable, digital options, answer keys included!

Editable Cells PowerPoint Presentation

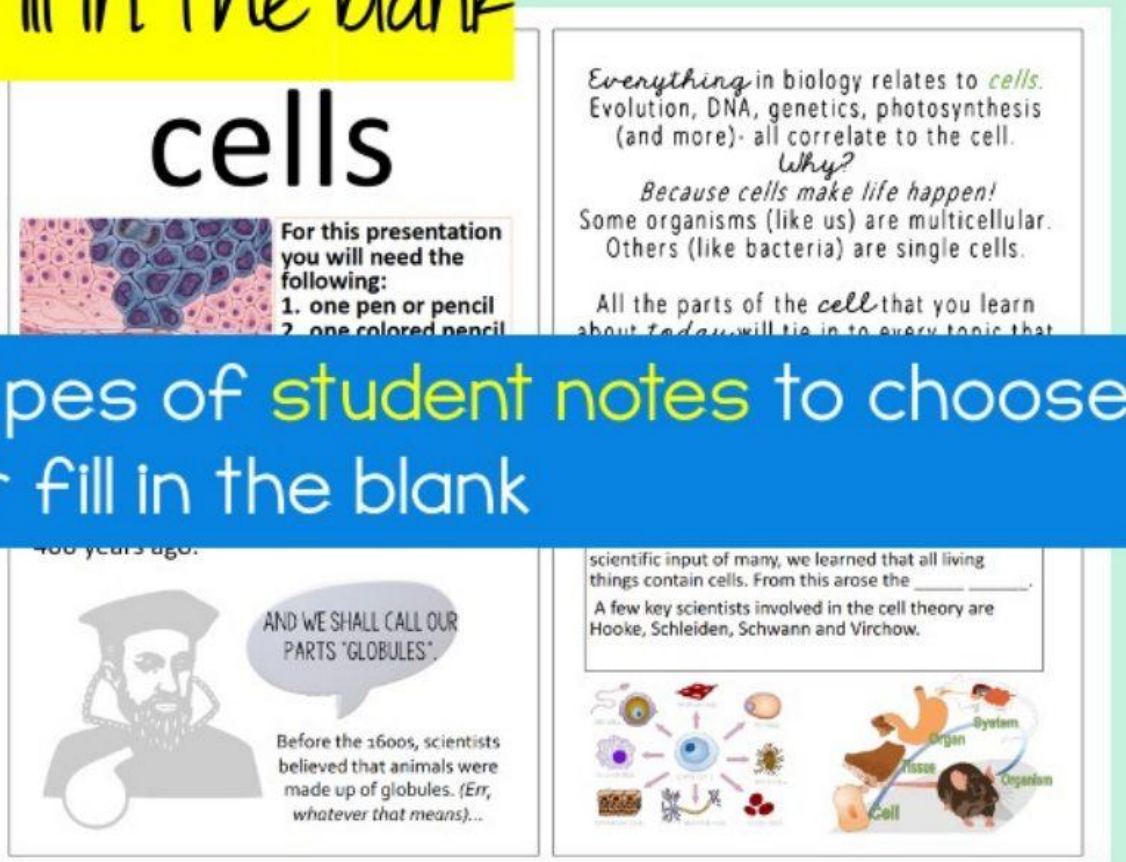
40 slides cover cell theory, prokaryotic cells, eukaryotic cells, cell differentiation

The PowerPoint comes with 2 types of student notes to choose from: guided or fill in the blank

Guided



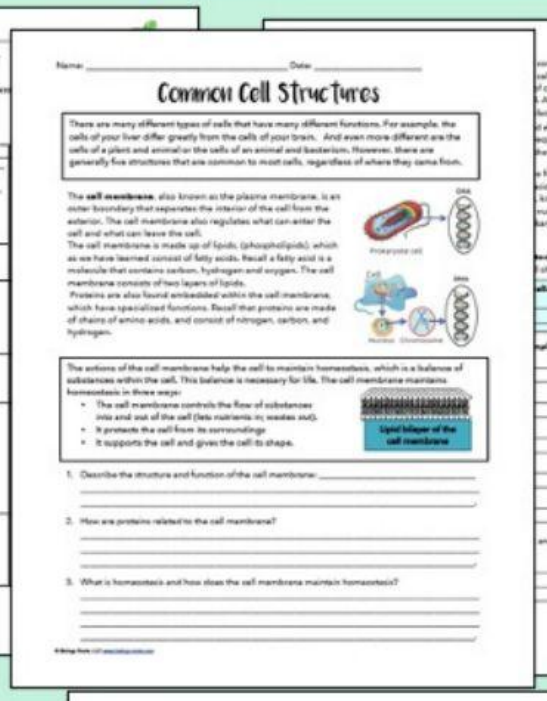
Fill in the blank

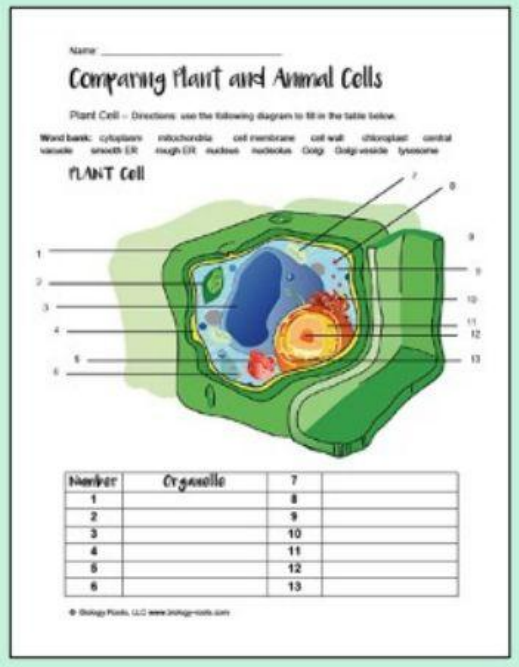


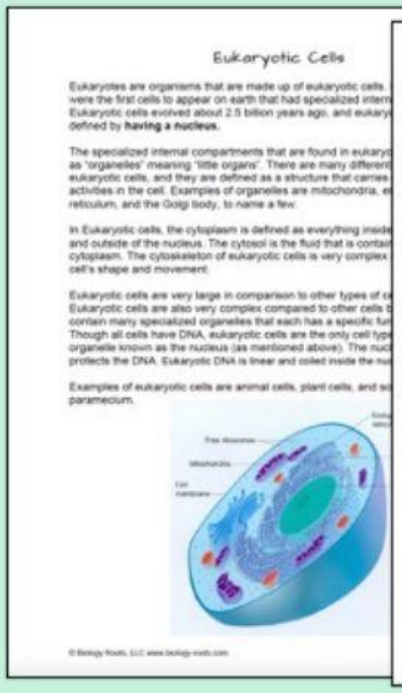
CLASSWORK (editable); answer keys always included.



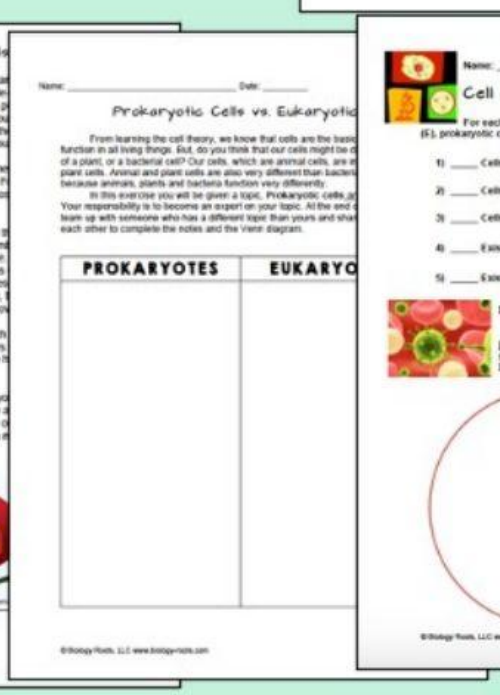


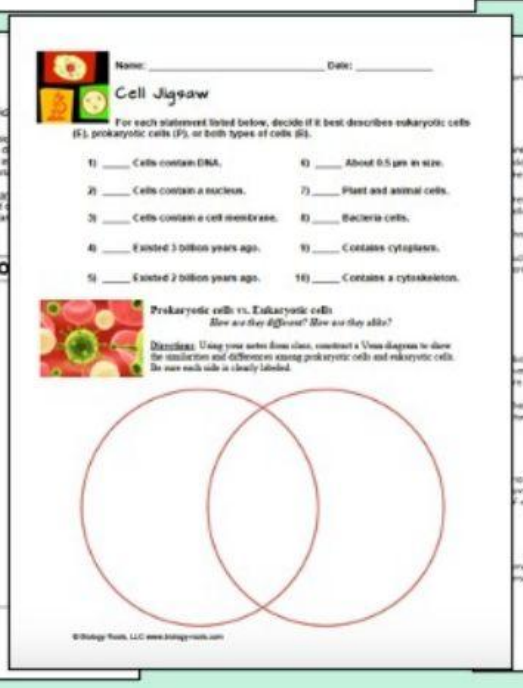




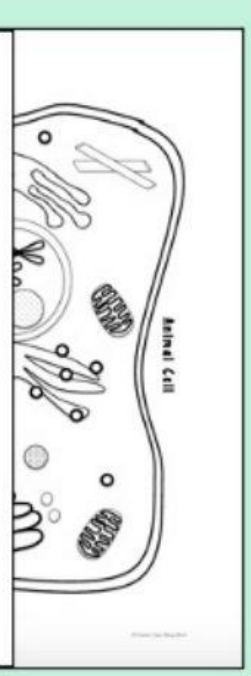


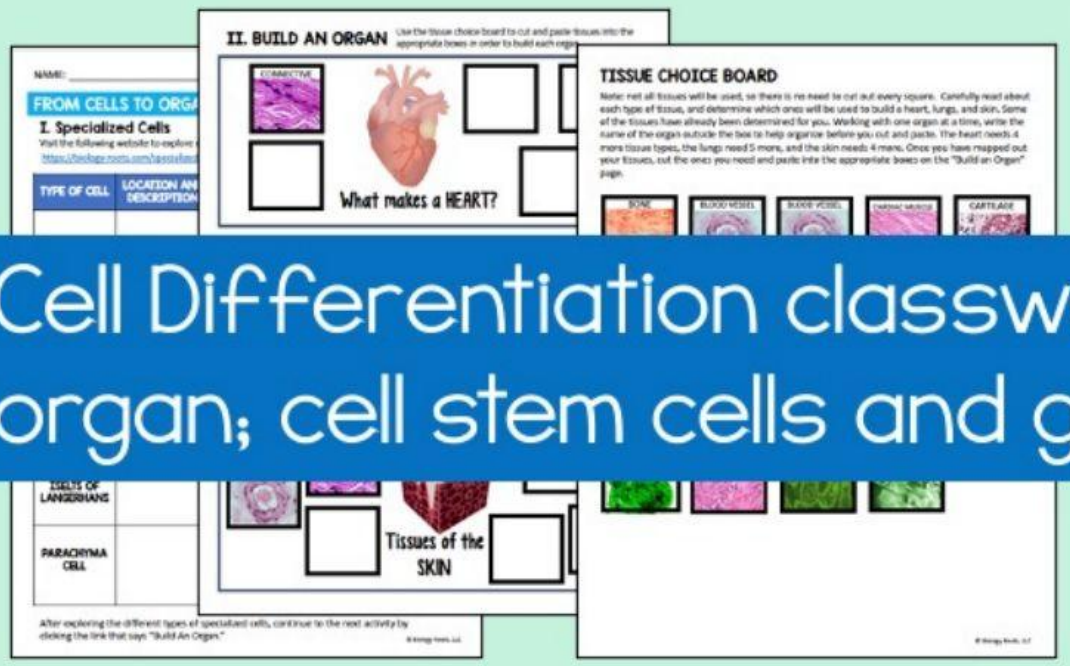


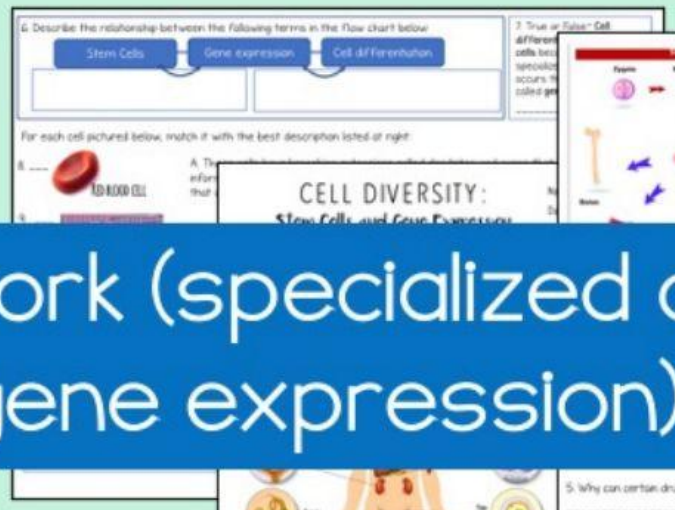


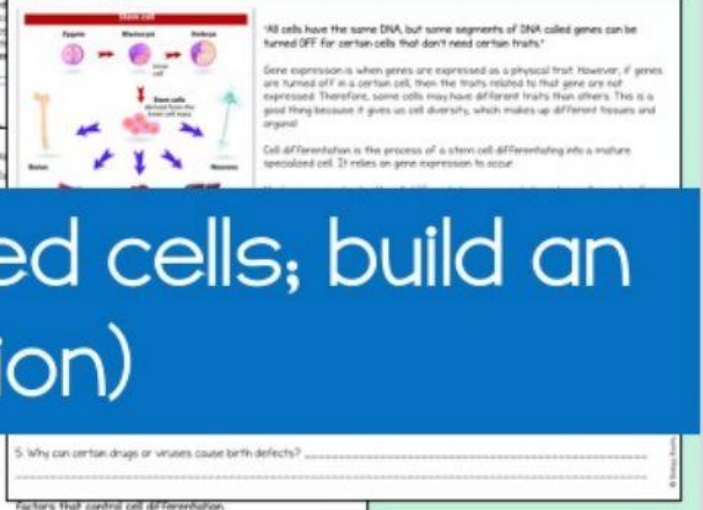












Cell Differentiation classwork (specialized cells; build an organ; cell stem cells and gene expression)

CELLS ATLAS Activities

(Analyzing and Thinking Like A Scientist)

Name: _____

Model It: Explore Cells

Part I: Explore an Animal Cell https://askabiologist.asu.edu/cell-viewer-game/play.html *Choose explore
A cell is single unit of life that contains many organelles. The organelles work together to function, similar to your body systems working together to breathe, move, digest, etc. The model contains an animal cell with organelles. Discover the ones listed below by writing a description/function and creating a sketch of each:

Organelle	Description/Function (summarized)	Sketch
Golgi	The organelle that _____ and _____ the_____ produced in the ER. This organelle was named after an Italian physician – Camillo Golgi. He was the first person to describe this organelle in the cell.	
Mitochondrion	Mitochondria are the cell's powerhouses. These organelles package the _____ of _____ into _____ molecules. Every type of cell has a different amount of mitochondria.	
Cell Membrane		
Smooth Endoplasmic Reticulum	Smooth ER has _____. The smooth endoplasmic reticulum _____ in the cell. The smooth ER also helps to process or detoxify harmful substances found in the cell. *Lipids include steroids, fats, and cholesterol	

p. 6

Organelle	Description/Function (summarized)	Sketch
Ribosomes	Most ribosomes are attached to the endoplasmic reticulum (ER); ribosomes use a form of DNA instructions _____. They also make proteins that may be _____ from the cell for work in other parts of the organism.	
Lysosomes		

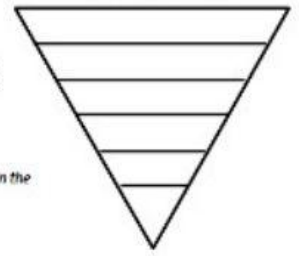
A group of specialized cells that work together for a combined function make up _____. Example: _____

Tissues make up _____. Example: _____

Organs work together to make up an _____ system. Can you give examples of multiple organs that make up the digestive system?

Be sure to write all the biological levels from bottom to top in the triangle, including the final level.

BIOLOGICAL LEVELS



Part IV: Quick Mitochondrial Video:
https://www.youtube.com/watch?v=1wL7r7fVa2M&t=17s
Mitochondria are examples of a cell organelle, they provide energy for a cell to _____, _____, do all the things! The folds inside the mitochondria contain proteins that carry out chemical reactions to create _____. ATP is a _____.

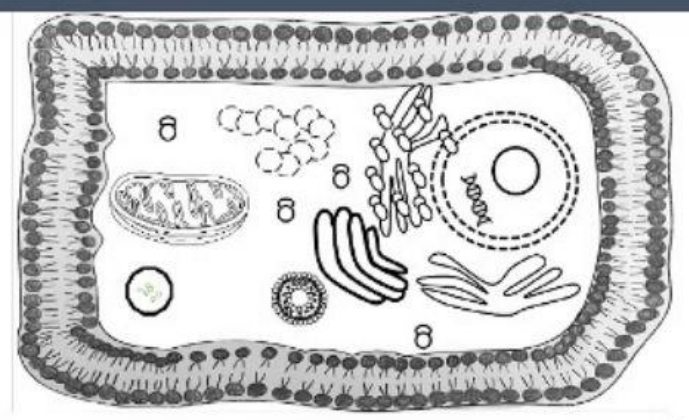
p. 7

Name: _____ Date: _____

Apply It: Making Connections

Part I: Matching
Using your table on page 6, work with your group to match the cells with the following organelles based on the description: *peroxisomes; smooth endoplasmic reticulum; lysosomes; mitochondria*

1. Liver cells contain more of this organelle to help filter and break down toxic substances from the blood: _____



p. 8

Name: _____ Date: _____

Apply It: From Cells to Organs

I. Specialized Cells
Visit the following website to explore different specialized cells:

TYPE OF CELL	LOCATION AND DESCRIPTION	HOW ARE ITS ORGANELLES ADAPTED FOR THE CELL'S FUNCTION?
OSTEOBLAST		
CARDIAC MYOCYTE		

Name: _____ Date: _____

Explore It- MYSTERY ORGANELLE CASE STUDIES

Each part of the cell has a specialized role. The organelles and other cell parts rely on proteins that build their structure, or enzymes that help them to function. If these proteins are altered due to a mutation (change in structure), the organelle may not be able to function properly.

Case Study: Ella

Background: Ella was born a healthy baby at a normal birth weight, with no complications. However, during a routine doctor checkup at 18 months, the doctor noticed that she was falling below the growth [illegible], and that Ella did not seem to have the amount of fat that a healthy 18 month old should have. [illegible] of fat [illegible] the doctor to observe a small, underdeveloped [illegible]; she also noted that [illegible] were present. The doctor ordered some routine tests and everything came back normal. Ella's parents said that she was eating a healthy amount, and they were perplexed as to why Ella was not gaining weight. The doctor suspected that Ella may have a disease called ***HGPS, short for Hutchinson-Gilford progeria syndrome***, and referred them for genetic testing.



Diagnosis: Genetic testing for HGPS is recently available. Not long ago, doctors would need to rely on facial features alone to diagnosis patients: thin, beaked nose, thin lips, protruding eyes, and loss of subcutaneous fat. These features typically show up in the first or second year of the patient's life. Ella's test came back positive for HGPS.

[illegible] form of DNA, [illegible] has a different, malformed structure, it [illegible] with [illegible] ity [illegible] e. [illegible] cause progerin affects the organelle that [illegible] its [illegible] DNA [illegible] ch is [illegible] sential fo[illegible]ing [illegible]ple: [illegible] healthy new cells (cell division). Cell division is needed for growth and repair. If the organelle does not have the correct proteins to maintain its shape, it cannot protect the DNA or successfully divide, therefore new cells will not be able to form properly. With HGPS, many cells die prematurely. This is why patients with HGPS typically look much older than they actually are.

Progerin causes the arteries to stiffen in what is known as fibrosis: excess fibrous connective tissue that can lead to hardening or scarring of tissue. This is because the mutated progerin interferes with the ability for vascular tissue to make more of itself, and cells are not able to repair or divide as quickly as they might in healthy individuals.

CASE STUDY: Hutchinson-Gilford Progeria Syndrome
SCIENTIFIC NOTES:

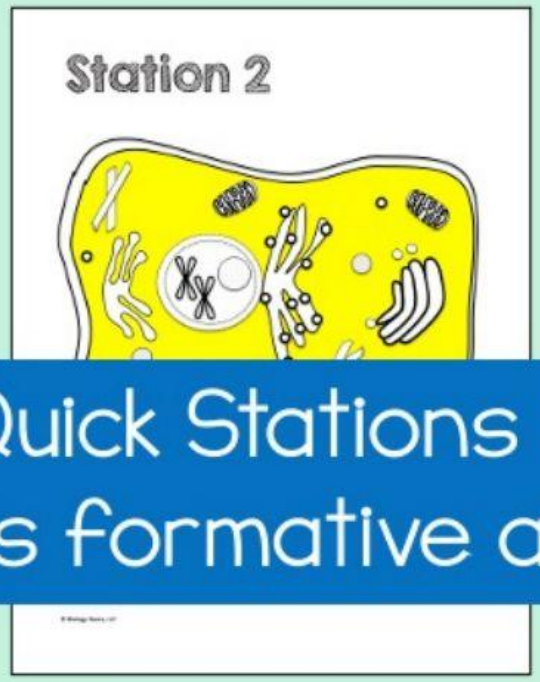
1. Patient Name: _____
2. Symptoms (list them all):
   _____
   _____
   _____
   _____

preview

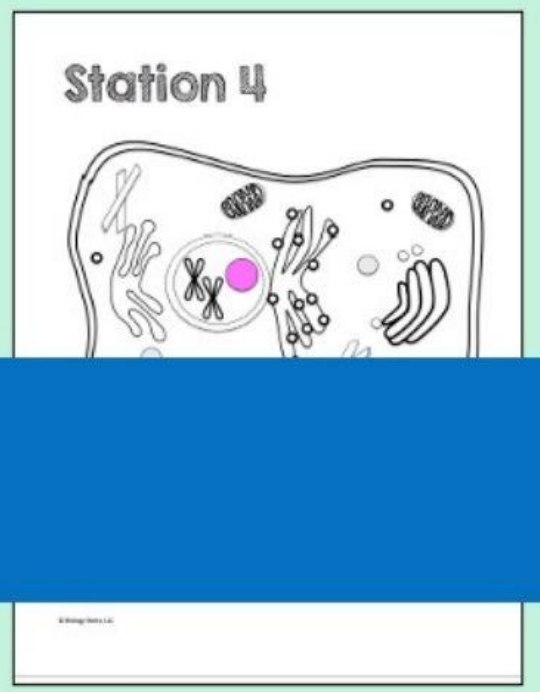
Optional and can be used in one of two ways:

1. As student-lead guided inquiry done in groups before teacher-lead instruction.
2. Or you can use what you'd like during traditional teacher-lead instruction.

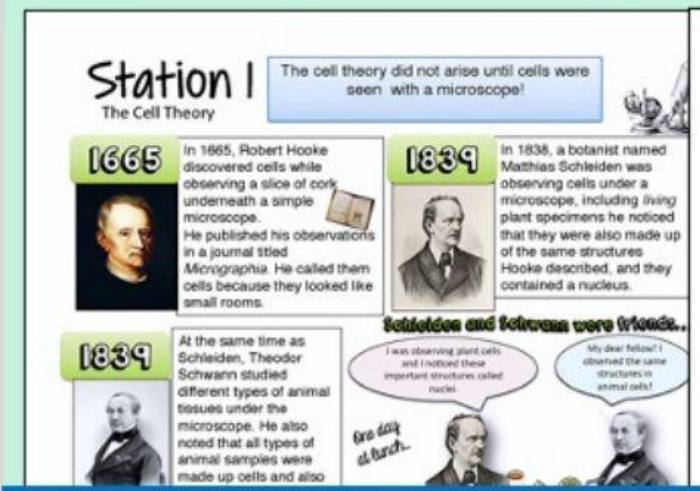


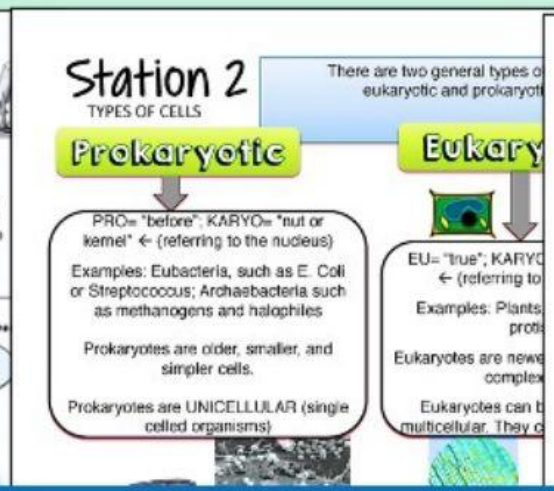


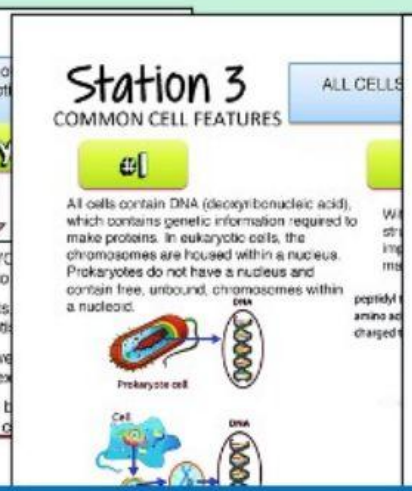


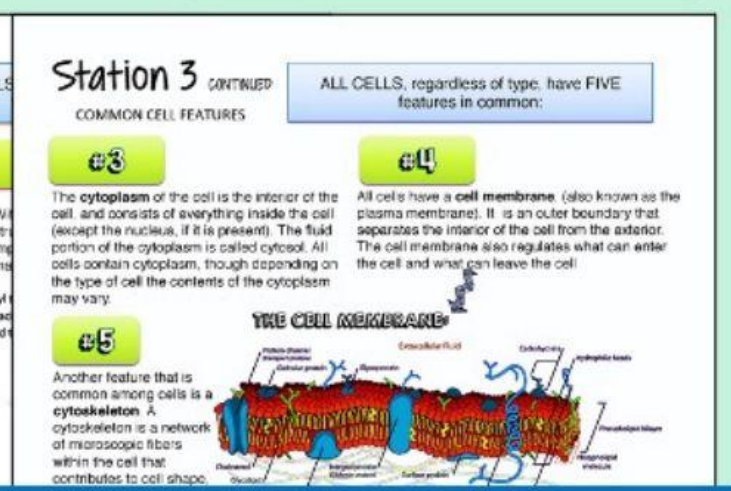


Cell Organelle Quick Stations
(can be used as formative assessment)

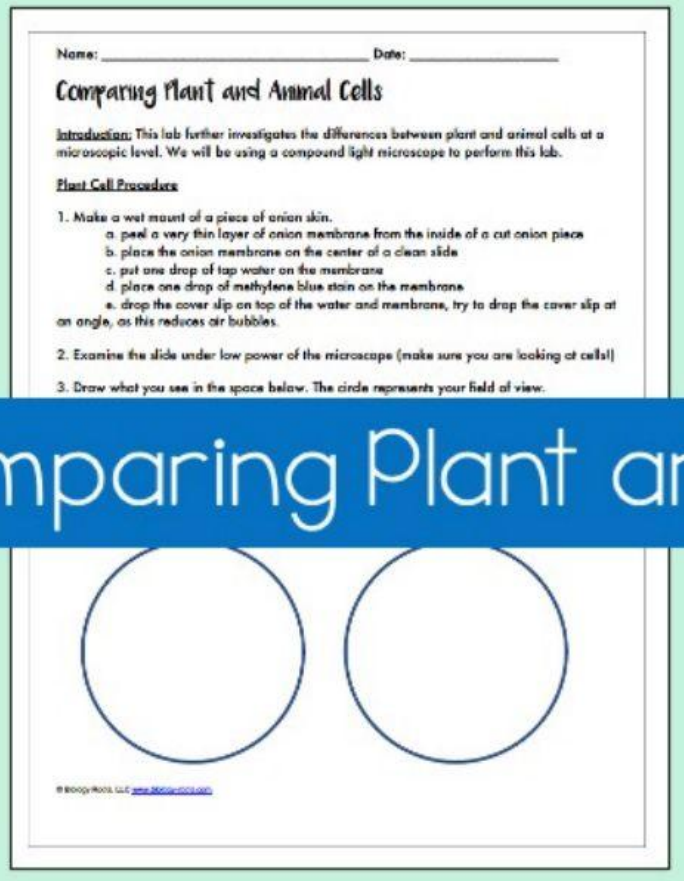








Cells Exhibition Stations

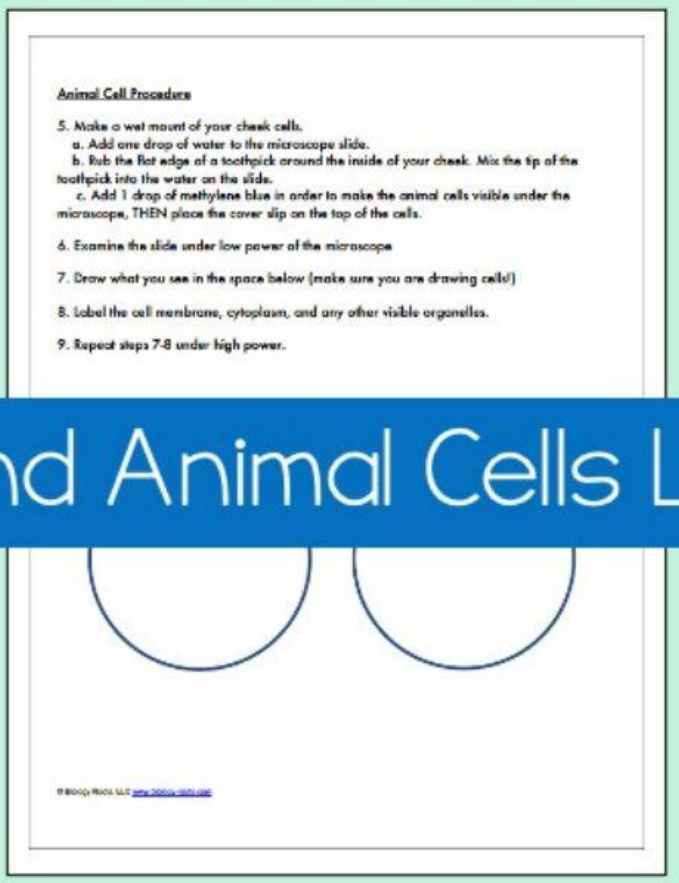

Name: _____ Date: _____

Comparing Plant and Animal Cells

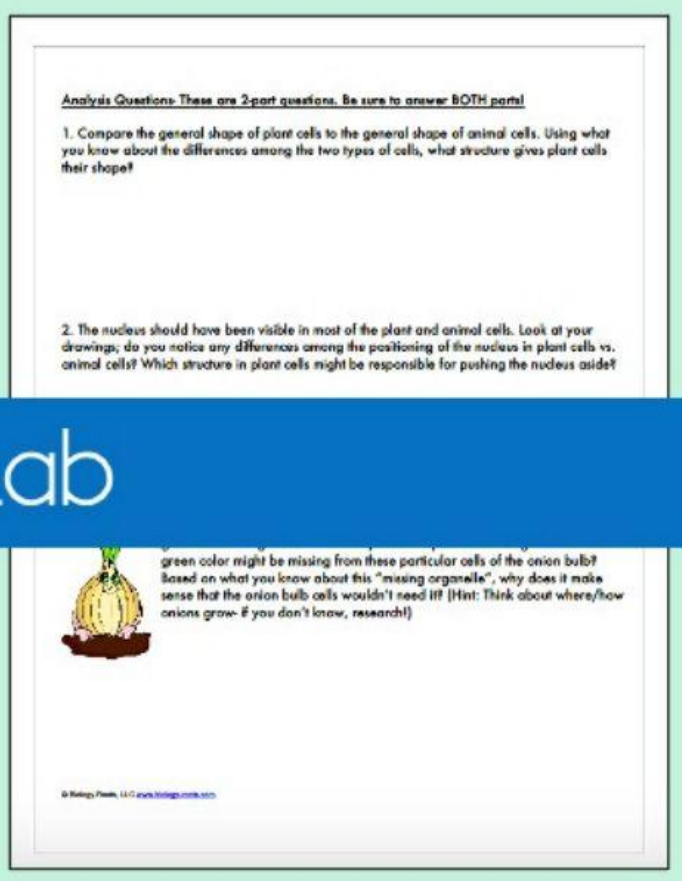
Introduction: This lab further investigates the differences between plant and animal cells at a microscopic level. We will be using a compound light microscope to perform this lab.

Plant Cell Procedure

1. Make a wet mount of a piece of onion skin.
   a. peel a very thin layer of onion membrane from the inside of a cut onion piece
   b. place the onion membrane on the center of a clean slide
   c. put one drop of tap water on the membrane
   d. place one drop of methylene blue stain on the membrane
   e. drop the cover slip on top of the water and membrane, try to drop the cover slip at an angle, as this reduces air bubbles.
2. Examine the slide under low power of the microscope (make sure you are looking at cells!)
3. Draw what you see in the space below. The circle represents your field of view.


Animal Cell Procedure

5. Make a wet mount of your cheek cells.
   a. Add one drop of water to the microscope slide.
   b. Rub the flat edge of a toothpick around the inside of your cheek. Mix the tip of the toothpick into the water on the slide.
   c. Add 1 drop of methylene blue in order to make the animal cells visible under the microscope, THEN place the cover slip on the top of the cells.
6. Examine the slide under low power of the microscope
7. Draw what you see in the space below (make sure you are drawing cells!)
8. Label the cell membrane, cytoplasm, and any other visible organelles.
9. Repeat steps 7-8 under high power.


Analysis Questions- These are 2-part questions. Be sure to answer BOTH parts!

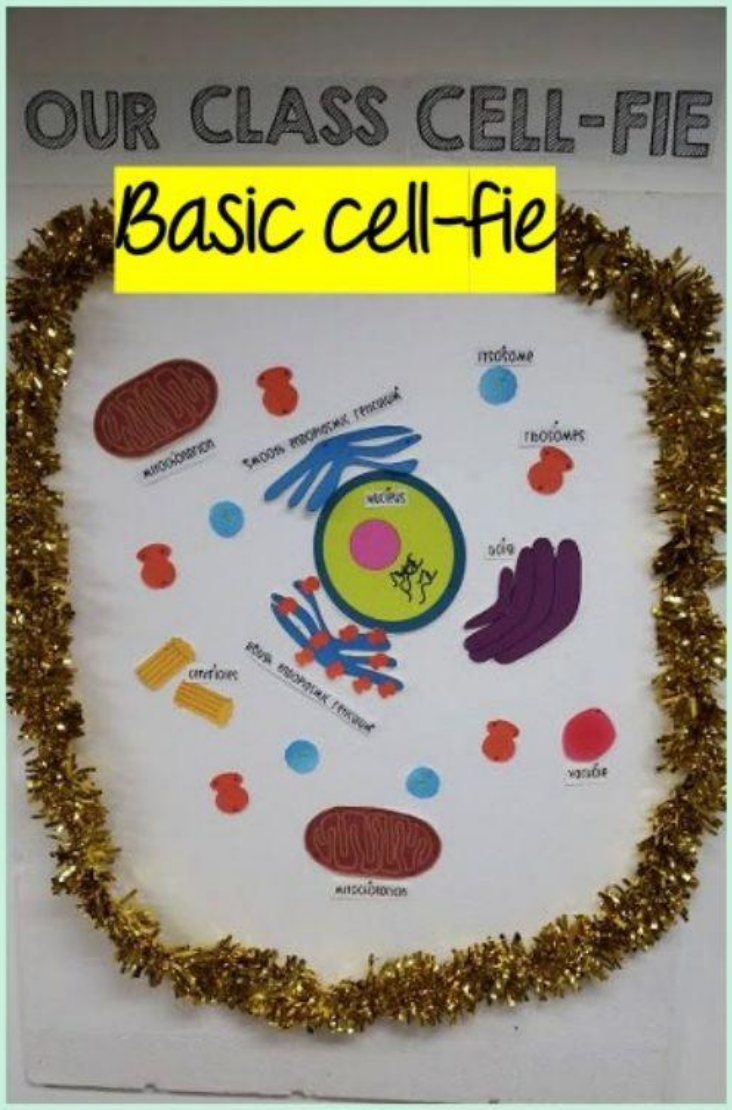
1. Compare the general shape of plant cells to the general shape of animal cells. Using what you know about the differences among the two types of cells, what structure gives plant cells their shape?

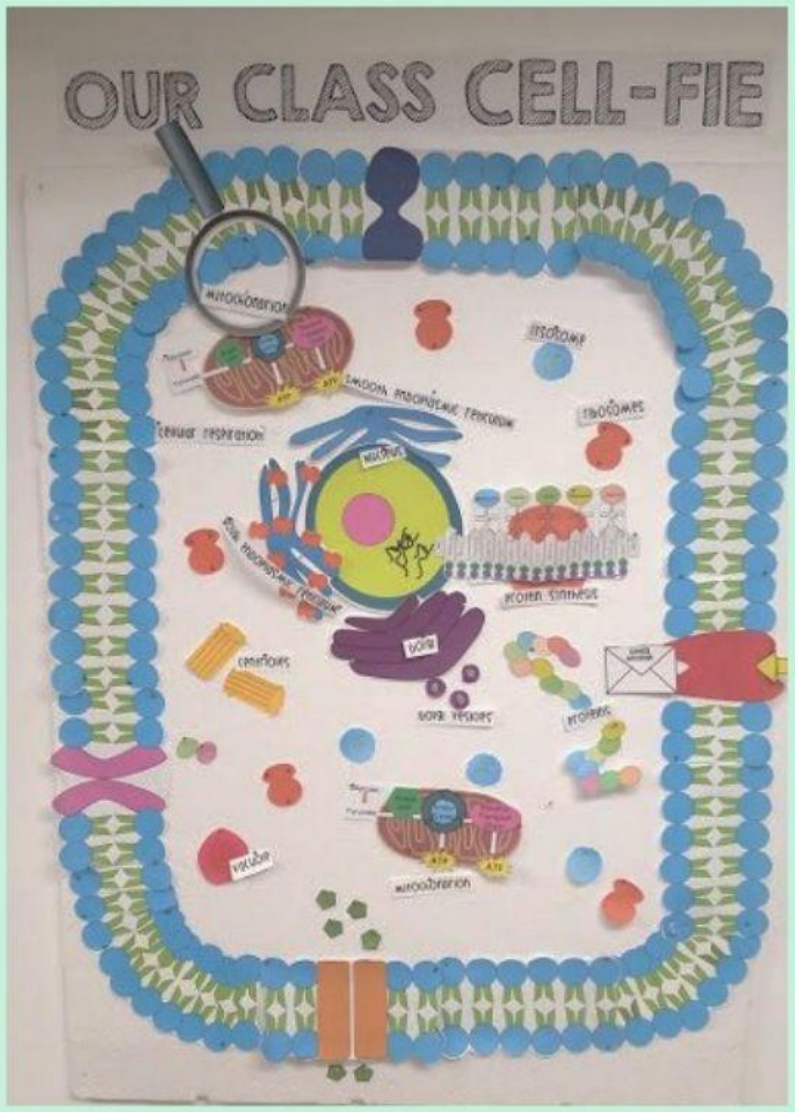
2. The nucleus should have been visible in most of the plant and animal cells. Look at your drawings; do you notice any differences among the positioning of the nucleus in plant cells vs. animal cells? Which structure in plant cells might be responsible for pushing the nucleus aside?

green color might be missing from these particular cells of the onion bulb? Based on what you know about this "missing organelle", why does it make sense that the onion bulb cells wouldn't need it? (Hint: Think about where/how onions grow- if you don't know, research!)

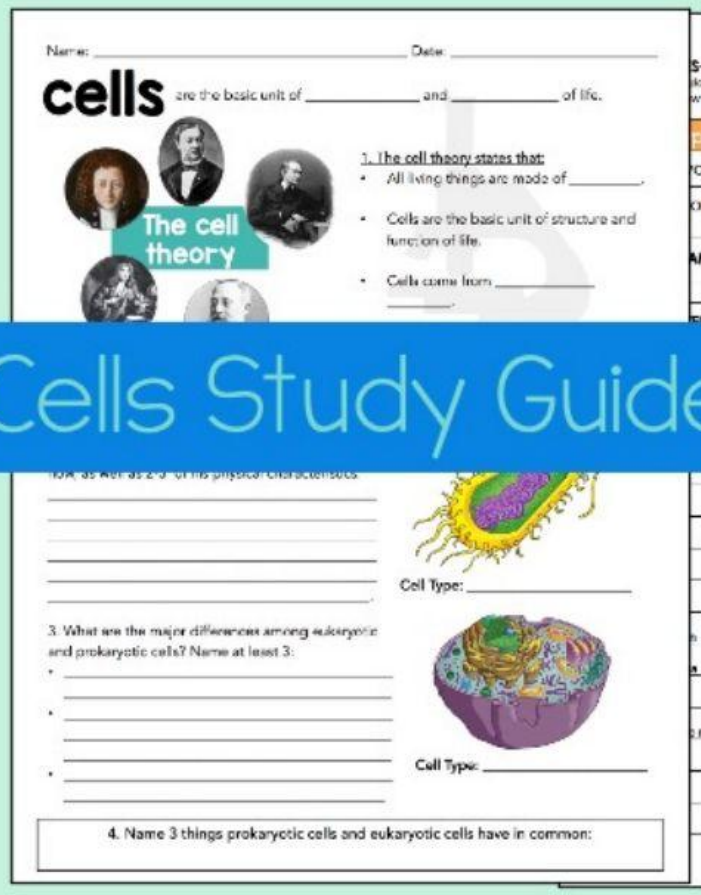
Comparing Plant and Animal Cells Lab

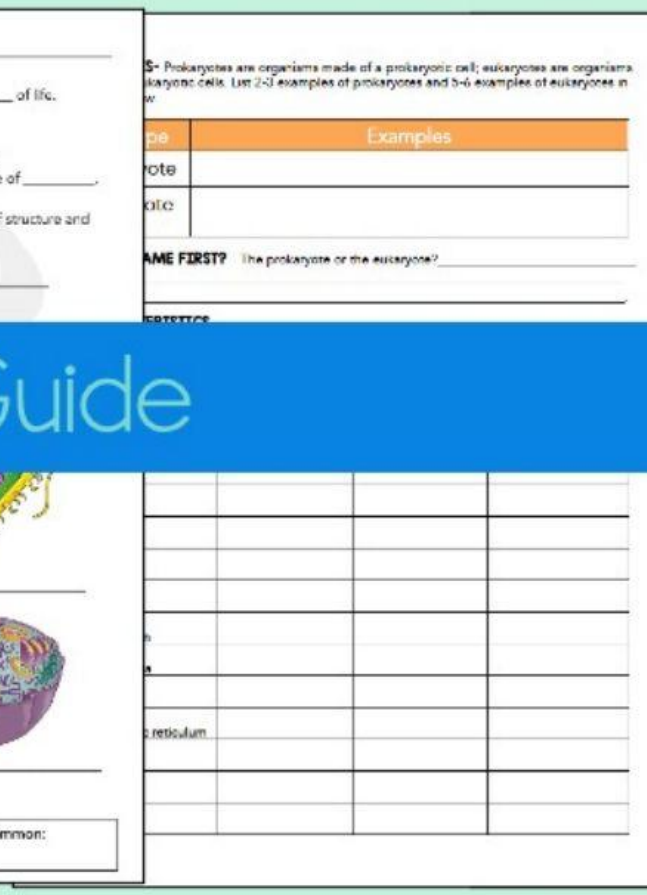
Cell Scaffolded Model (optional: as students learn about cell processes they build upon it)









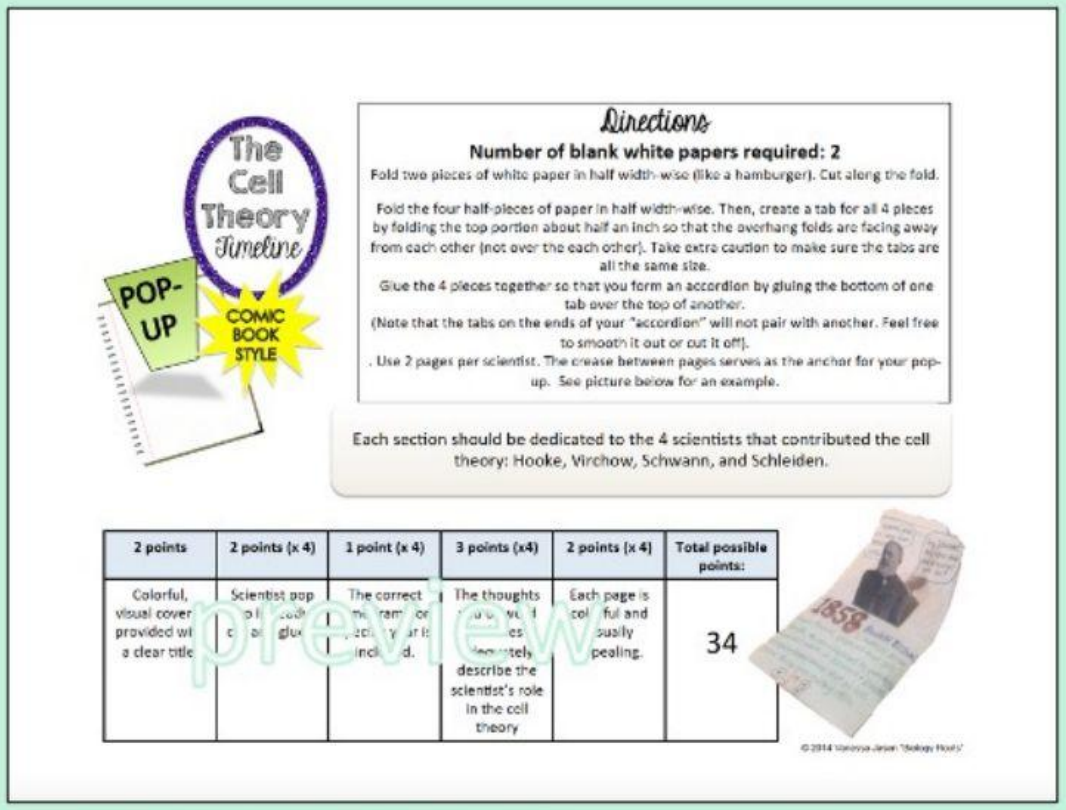


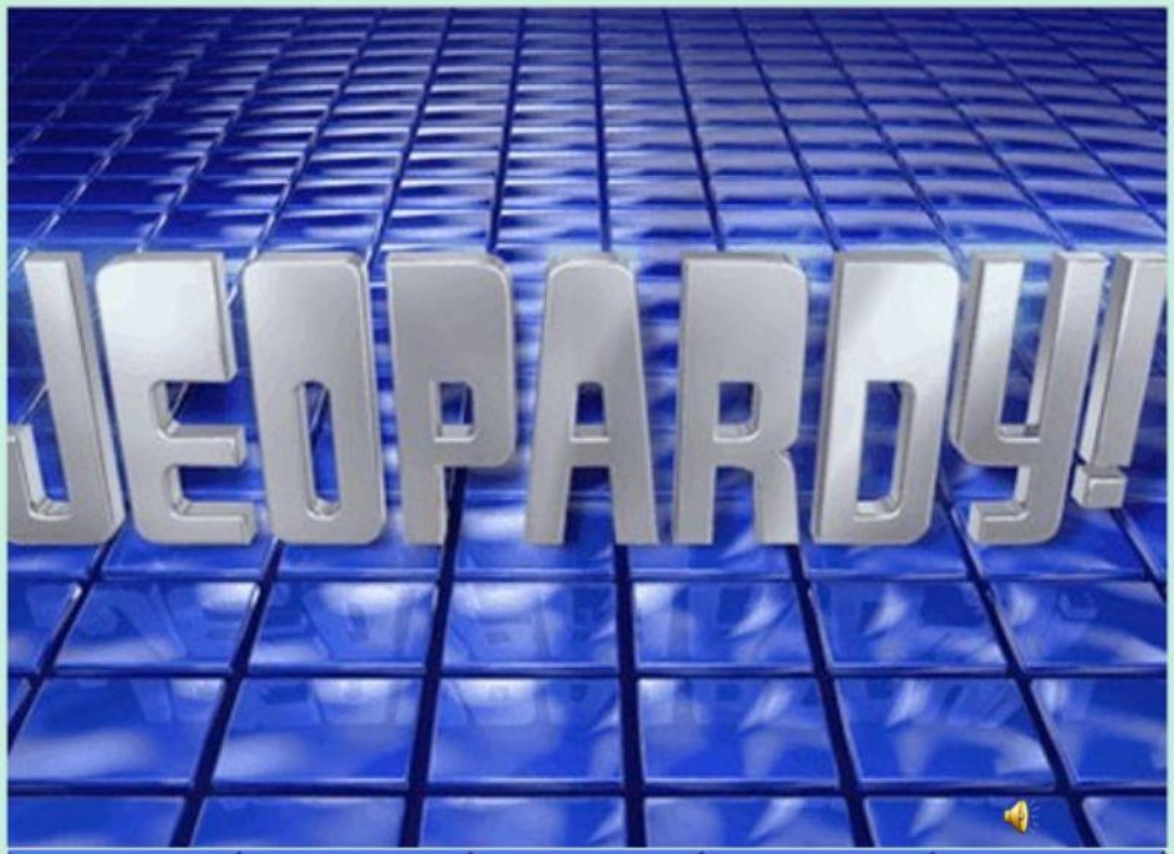




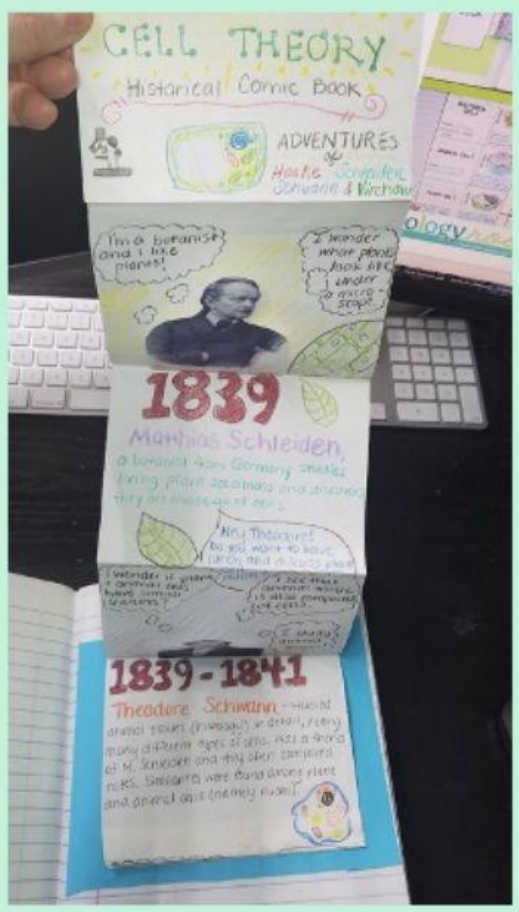
Cells Study Guide

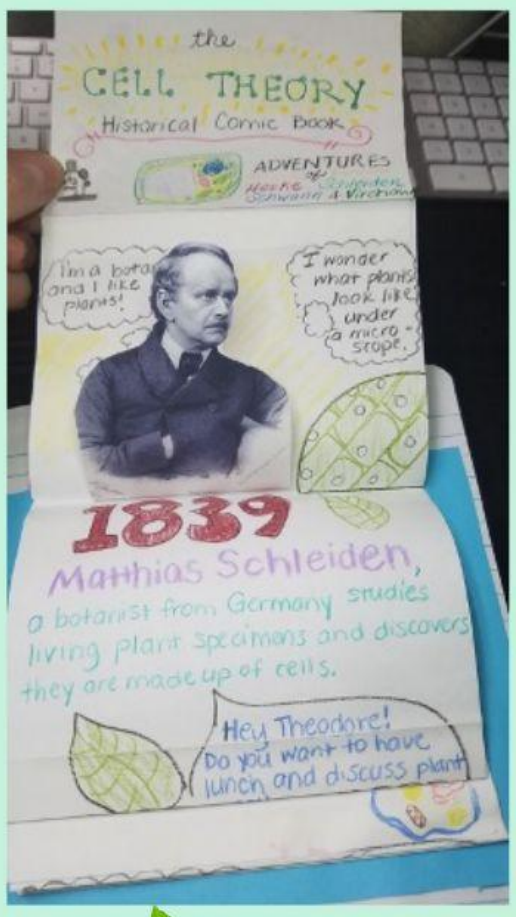
Additional items: cell theory timeline; cell jeopardy review; cell story book rubric (optional)





Cell Theory	Basic Cell Structures	Eukaryotic Cell Organelles	Prokaryotic Cells	Cell Connections
1pt	1pt	1pt	1pt	1pt
2 pt	2 pt	2 pt	2 pt	2 pt
3 pt	3 pt	3 pt	3 pt	3 pt
4 pt	4 pt	4 pt	4 pt	4 pt
5 pt	5 pt	5 pt	5 pt	5 pt





biology roots

CELLS UNIT BUNDLE ~50 MINUTE BLOCKS

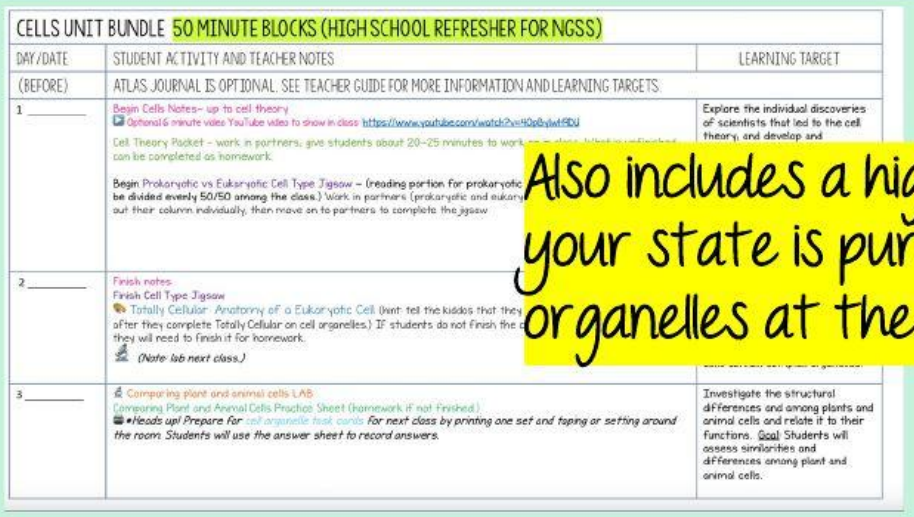
DAY/DATE	STUDENT ACTIVITY AND TEACHER NOTES	LEARNING TARGET
(BEFORE)	ATLAS JOURNAL IS OPTIONAL. SEE TEACHER GUIDE FOR MORE INFORMATION AND LEARNING TARGETS.	
1 _____	Begin Cells Notes– up to cell theory Optional 6 minute video YouTube video to show in class: https://www.youtube.com/watch?v=40pBylwH9DU Begin Cell Theory Timeline– fold paper and prepare (if your students need more guidance, see "Cell Theory Pop Up Timeline" folder, differentiated version. You can print the fill-in for them, ***or use the digital version for a quick version***. Give students about 10–15 minutes to work on it, the goal is to get the paper folded, glued, and dried; save content for next class. Begin Cell Theory Packet – finish for homework	Explore the individual discoveries of scientists that led to the cell theory; and develop and understanding of the cell as a basic unit of life. Goal: Students will understand the three parts of the cell theory.
2 _____	Finish Cell Theory Timeline. Give students up to 20 minutes, depending. Set a timer if you'd like. Finish for homework. Due tomorrow. Finish notes (if you need a few more minutes to finish tomorrow, no sweat!) *Print/ prepare for Prokaryotic vs Eukaryotic Cell Type Jigsaw tomorrow– (reading portion for prokaryotic cells and eukaryotic cells should be divided evenly 50/50 among the class.)	Conceptualize how the cell theory was developed over time. Goal: Students will understand the three parts of the cell theory.
3 _____	Collect timelines. Take a few minutes to finish up notes if needed. Briefly discuss Cell Project and handout rubric. Feel free to offer other choices besides a story book. DUE DATE: _____ Cell Type Jigsaw– work in partners (prokaryotic and eukaryotic)– Have students read and fill out their column individually, then move on to partners to complete the jigsaw. ***Heads up! Prepare for cell organelle stations for next class by printing one set and taping or setting around the room.***	Compare and contrast prokaryotic and eukaryotic cells, and distinguish their similarities and differences. Goal: students will be able to identify prokaryotes and eukaryotes
4 _____	Totally Cellular: Anatomy of a Eukaryotic Cell (hint: tell the kiddos that they are going to have a "mock quiz" after they complete Totally Cellular on cell organelles.) If students do not finish the coloring with 15 minutes remaining, they will need to finish it for homework. Last 15 minutes of class have students complete cell organelle stations– you can time then (about 30 seconds per station).	Analyze the organelles of the eukaryotic cell and identify their functions. Goal: Students will have a general

A pacing guide with learning targets is provided to guide you with lesson planning throughout the entire unit.

Includes both 50 and 90 minute blocks.

Covers both learning targets and learning goals.

Adaptable - use it as is, or make your own!



CELLS UNIT BUNDLE 50 MINUTE BLOCKS (HIGH SCHOOL REFRESHER FOR NGSS)

DAY/DATE	STUDENT ACTIVITY AND TEACHER NOTES	LEARNING TARGET
(BEFORE)	ATLAS JOURNAL IS OPTIONAL. SEE TEACHER GUIDE FOR MORE INFORMATION AND LEARNING TARGETS.	
1 _____	Begin Cells Notes– up to cell theory Optional 6 minute video YouTube video to show in class https://www.youtube.com/watch?v=40pBylwH9DU Cell Theory Packet – work in partners, give students about 20–25 minutes to work on in class, what is unfinished can be completed as homework. Begin Prokaryotic vs Eukaryotic Cell Type Jigsaw – (reading portion for prokaryotic cells and eukaryotic cells should be divided evenly 50/50 among the class.) Work in partners (prokaryotic and eukaryotic) to fill out their column individually, then move on to partners to complete the jigsaw	Explore the individual discoveries of scientists that led to the cell theory; and develop and
2 _____	Finish notes Finish Cell Type Jigsaw Totally Cellular: Anatomy of a Eukaryotic Cell (hint: tell the kiddos that they are going to have a "mock quiz" after they complete Totally Cellular on cell organelles.) If students do not finish the coloring with 15 minutes remaining, they will need to finish it for homework. *(Note: lab next class.)*	
3 _____	Comparing plant and animal cells LAB Comparing Plant and Animal Cells Practice Sheet (homework if not finished.) ***Heads up! Prepare for cell organelle task cards for next class by printing one set and taping or setting around the room. Students will use the answer sheet to record answers.***	Investigate the structural differences and among plants and animal cells and relate it to their functions. Goal: Students will assess similarities and differences among plant and animal cells.

Also includes a high school NGSS refresher if your state is purely NGSS and does not cover organelles at the high school level.

More information:

Digital versions are hosted on Google Slides.

Supports NGSS (ATLAS activities particularly).

Tests and quizzes included (not pictured).

RL

Rhonda L.

Jun 7, 2021

★★★★★ **Extremely satisfied**

This unit did not disappoint!. I ordered it after using other Biology Roots material. The unit is everything you need. The prep is low and the student engagement is high.

Still not sure if you need this resource?

This unit is for any teacher who is looking for a truly no-prep cells unit from start to finish, or simply a large bank of cell lessons to use in the classroom! If your school is using an online curriculum (such as OpenSciEd), and you are finding that your students need something more, my unit bundles are compatible as supplemental material and really help prevent student burn out – because I what sparks students! I also update my material to keep it modern and fresh.

Reach out with questions :)

biology roots