



Cells: Unit 1

Overview

Subject	Cells
Standards/Content and OST Alignment	Every cell is covered by a membrane that controls what can enter and leave the cell. In all but quite primitive cells, a complex network of proteins provides organization and shape. Within the cell are specialized parts for the transport of materials, energy transformation, protein building, waste disposal, information feedback and movement. In addition to these basic cellular functions, most cells in multicellular organisms perform some specific functions that others do not.
Key Vocabulary.	Animal Cell, Plant Cell, Prokaryotic, Eukaryotic, Organelle, Cytoskeleton, Golgi complex and endoplasmic reticulum
Teacher to Teacher	Note: The concept of the cell and its parts as a functioning system is more important than memorizing parts of the cell.

Unit Lesson

Plan	Cell foldable and 3-D Cell model will need extended time 50-75minutes
Pacing	10-15 minutes per day
Materials	<ul style="list-style-type: none">• LCD Projector and Screen (optional to go over answers together on white board)• Copy of POGIL - Prokaryotic and Eukaryotic Cells• Copy of two Released OST Questions pertaining to eukaryotic vs prokaryotic cell types• Coloring Pens, Pencils or Crayons• Class set of scissors• Gale Cengage 3D Cell Model• Copy of POGIL-Organelles in Eukaryotic Cells (pre-teach)

Activity/Teach

- Have students work in pairs on the POGIL - Prokaryotic and Eukaryotic Cells activity and answer questions 1-12. 10-15 minutes (Day 1)
- As a class have students share out their answers (1-12 from Day 1) while pointing out where they found the answers and/or how they knew/found the answer. 10-15 minutes (Day 2)
- Have students work in pairs on the POGIL - Prokaryotic and Eukaryotic Cells activity and answer questions 13-22. 10-15 minutes (Day 3)
- As a class have students share out their answers (13-22 from Day 2) while pointing out where they found the answers and/or how they knew/found the answer. 10-15 minutes (Day 4)
- Have students answer the two Released OST Questions pertaining to eukaryotic vs prokaryotic cell types. Collect and go over the answers. 10-15 minutes (Day 5)

Activities to Support Content Learning

1. POGIL - Organelles in Eukaryotic Cell
2. Animal and Plant Cell Foldable (you will need a class set of scissors, colored pencils, and blank paper)
3. Gale Cengage: Interactive Science 3D cell model

Outcomes and Assessments

Outcome

Students will be able to distinguish between eukaryotic and prokaryotic cells and between animal and plant cells

Assessment/Evidence of Activity

POGIL answers will be used as formative assessment. The two released OST questions that are one individually will be used as summative assessment.

Differentiation

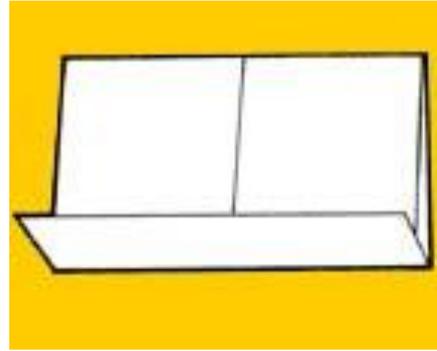
Differentiation for struggling learners including special needs and ELL

- Learners may need an intensive re-teaching of cell parts and function. POGIL: Organelles in Eukaryotic Cells
- Learners create a t-chart or Venn diagram to list the organelle and its function; they may also use these methods to simplify the comparison of plant vs. animal cells, and prokaryotes vs eukaryotes.
- The POGIL activity should be broken into smaller blocks of information given over several days as to not overwhelm ELL or other struggling populations.
- ELL learners write vocabulary in their native language noting function of the organelle and how it works within the cell. Students may use the four square or Frayer model to better understand vocabulary.
- It is important for ELL and struggling readers to create visual cues.

ANIMAL AND PLANT CELL FOLDABLE

FOLD DIRECTIONS:

1. Fold a sheet of paper in half horizontally (hamburger) so that one side is one inch longer than the other side.
2. Cut the shorter side in half, up towards the fold (mountain top) to create two flaps.



LABEL FRONT OF FLAPS

1. Label the **LEFT** flap, **ANIMAL CELL**, and sketch, color, and label an **ANIMAL CELL**.
2. Label the **RIGHT** flap, **PLANT CELL**, and sketch, color, and label a **PLANT CELL**.
3. Label the **BOTTOM** flap, **EUKARYOTIC CELLS**.

LABEL BACK OF FLAPS

1. On the **LEFT BACK** flap Title it **UNIQUE TO ANIMAL CELLS** and include the following:
 - a. Explain the role of centrioles.
 - b. Explain the role of lysosomes.
 - c. Describe the shape of animal cells **AND** explain why they have this shape.
2. On the **RIGHT BACK** flap Title it **UNIQUE TO PLANT CELLS** and include the following:
 - a. Explain the role of the cell wall.
 - b. Explain the role of chloroplasts.
 - c. Explain the role of vacuoles.

CENTER UN-CUT SECTION

1. Categorize all of the structures and organelles in Table 1 (page 199) into a chart based on cell type like shown below:

Organelle	Animal Cell	Plant Cell	Prokaryote (protist)

Cells OST Released Question Practice

Name _____ Period _____ Date _____

A group of students studied four different cell specimens under a microscope and recorded information about each cell in this table.

Characteristics of Four Cell Specimens

Cell Specimen	Cell Wall	Cell Membrane	Chloroplasts	DNA in Nucleus
Cell 1	Yes	Yes	Yes	Yes
Cell 2	No	Yes	No	Yes
Cell 3	Yes	Yes	No	No
Cell 4	No	Yes	No	Yes

Which cell specimen is a prokaryote?

- (A) Cell 1
- (B) Cell 2
- (C) Cell 3
- (D) Cell 4

2.

Identify which structures are present in animal cells and which structures are present in bacteria cells.

Click on the blank box next to a structure to mark it as present in each of the two cell types.

Cell Structures	Present in Animal Cells	Present in Bacteria Cells
Cell wall	<input type="checkbox"/>	<input type="checkbox"/>
DNA	<input type="checkbox"/>	<input type="checkbox"/>
Nucleus	<input type="checkbox"/>	<input type="checkbox"/>
Ribosome	<input type="checkbox"/>	<input type="checkbox"/>

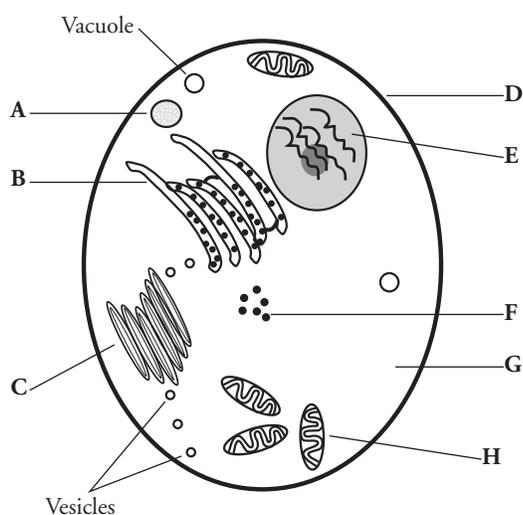
Organelles in Eukaryotic Cells

What are the functions of different organelles in a cell?

Why?

The cell is the basic unit and building block of all living things. Organisms rely on their cells to perform all necessary functions of life. Certain functions are carried out within different structures of the cell. These structures are called **organelles**.

Model 1 – How Is a Cell Like a Factory?



Part of factory	Cell organelle	Function
Control room (E)	Nucleus	Contains and protects genetic material (DNA)
Factory manager	DNA/chromosomes	Information for making proteins
Assembly workers (F)	Ribosomes	Make proteins
Production line (B)	Endoplasmic reticulum (ER)	Transports and finishes proteins and other biological molecules
Custodians (A)	Lysosomes	
Power generators (H)	Mitochondria	
Shipping department (C)	Golgi apparatus	
Factory interior (G)	Cytoplasm	Space for work to be done
Items to be shipped	Vesicles	Cellular package containing products such as protein
Warehouse for storage of products	Vacuole	
Loading dock	Pores/gated channels	Points of entry and exit for materials
Security fence (D)	Cell membrane	

1. Using the letters from the table in Model 1, label the cell diagram with the organelle names.
2. According to the table,
 - a. what substance is analogous to a factory manager?

 - b. in what organelle would this substance be found?
3. Using the information in Question 2, which cell organelle controls the activities of the entire cell?
4. Which organelle generates energy to power cellular activities?
5. Which organelle is responsible for assembling proteins?
6. Once proteins have been assembled, to which organelle would they go next?
7. Into what organelle might the cellular products be placed?



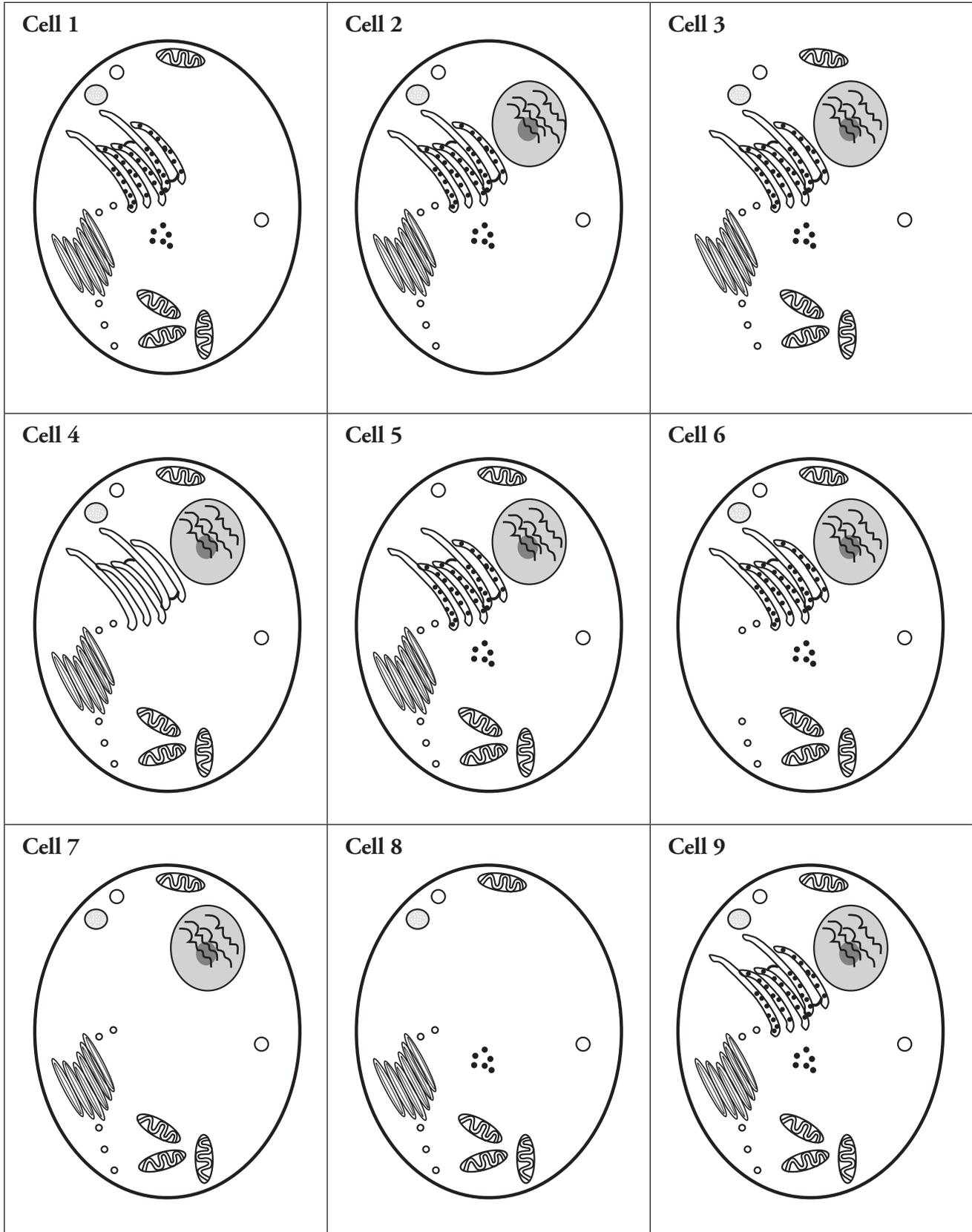
8. Fill in the missing functions of cellular organelles in the table in Model 1.



9. Starting with instructions from the factory manager (DNA/chromosomes), create a flow chart to show how a protein is produced and shipped from a cell.

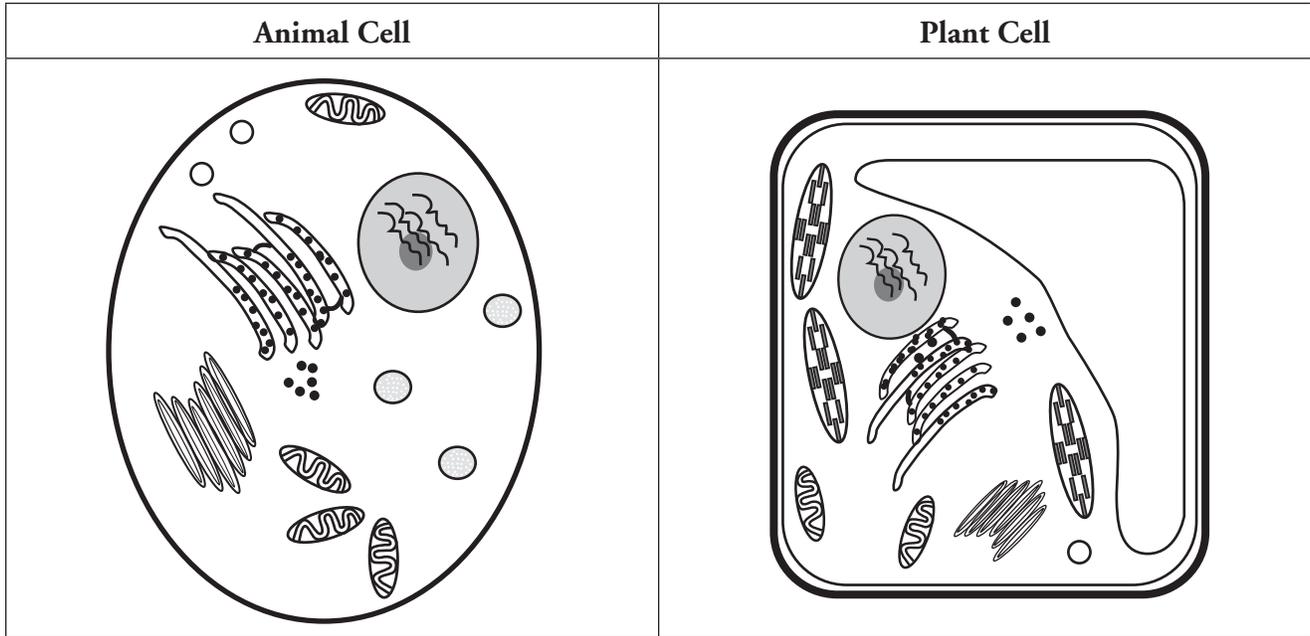


Model 2 – Animal Cells with Organelle(s) Removed



10. Study the cells in Model 2. Which cell is not missing any organelles compared to Model 1?
11. Look carefully at Cell 2 in Model 2. Compared to Model 1, what kind of organelle is missing?
12. Using grammatically correct sentences, describe why Cell 2 would not function normally.
13. Which two cells in Model 2 will have difficulty containing and getting rid of wastes within the cell? Why?
14. Cell 1 is missing one organelle. List as many reasons as possible why Cell 1 will not survive.
15. Cell 4 and Cell 7 will not be able to synthesize a major biological molecule. What molecule is this?

Model 3 – Animal Cell vs. Plant Cell



16. Do both cells in Model 3 have a nucleus?
17. Do both cells in Model 3 have mitochondria?
18. Describe at least three differences between the animal and plant cells shown in Model 3.

Read This!

Plant cells have three organelles not found in animal cells. They include the cell wall, large central vacuole, and plastids (including chloroplasts).



19. Complete the table below using the three plant organelles mentioned in the *Read This!* box.

Organelle	Function
	Fluid-filled organelle stores water, enzymes, and waste products. Size of this organelle can change.
	Supports and protects the cell.
	Some store food or pigments; some convert light energy to chemical energy in the form of organic compounds.

20. Label each of these three organelles on the plant cell diagram in Model 3.



21. Individually, in one grammatically correct sentence, describe why it is necessary for plants to have chloroplasts.
22. As a group, reach a consensus on the answer to Question 21. Record the answer below.
23. The central vacuole stores water. What would happen to the size of the central vacuole if a plant does not have enough water?
24. Describe the appearance of the vacuole in a well-watered plant. What effect would this have on the cell wall of the plant?
25. Using your response to Question 24, construct an explanation for why a plant has both a rigid cell wall and a cellular membrane.

Extension Questions

Read This!

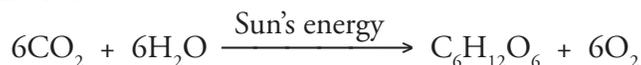
All cells undergo cellular respiration for the production of energy. Energy is necessary for all metabolic activity within the cell.

The formula for cellular respiration is



Plants carry out photosynthesis for the production of glucose. The glucose then becomes the energy source for cellular respiration.

The formula for photosynthesis is



26. Study the information given in the *Read This!* box.
- In what organelle does cellular respiration occur?
 - Do plant and animal cells both have this structure?
27. In what organelle does photosynthesis occur? Do plant and animal cells both have this structure?
28. Using the equations above, explain the relationship between mitochondria and chloroplasts.
29. Plants have both mitochondria and chloroplasts; they can produce their own glucose to fuel cellular respiration. Animal cells, on the other hand, have only mitochondria. If an animal eats only meat what would be its source of glucose?
30. Where in the human body would you find cells with a large number of mitochondria? Why?

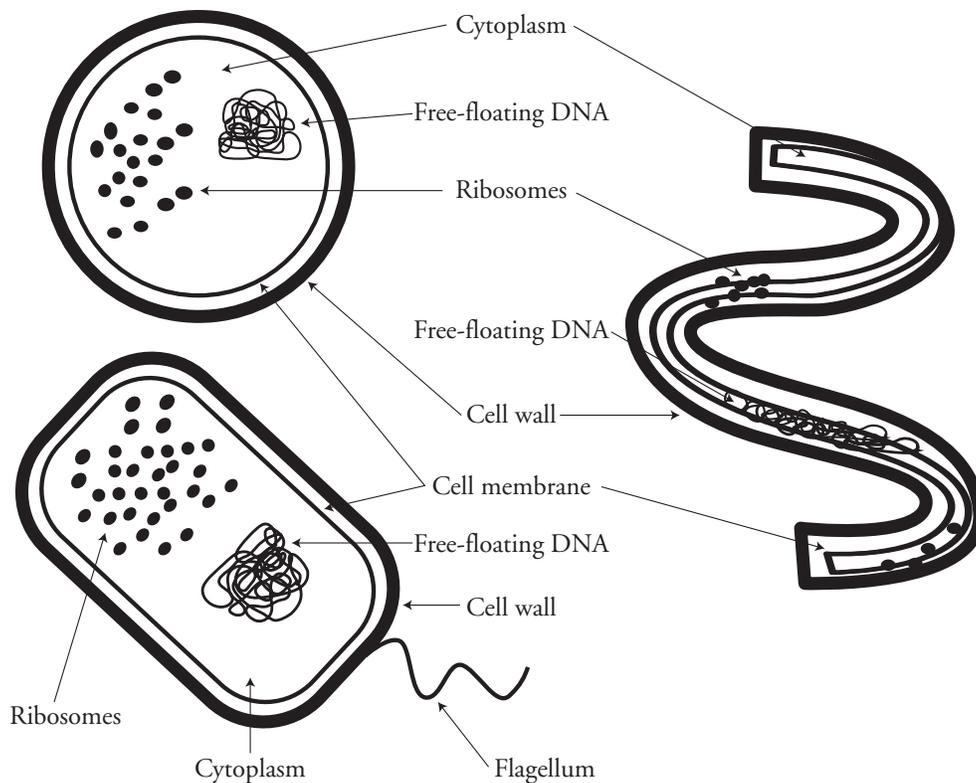
Prokaryotic and Eukaryotic Cells

Do all cells have the same structure?

Why?

An efficiency apartment is a one-room apartment. This one room is where you sleep, eat, shower, and entertain your guests. It all happens in one room. It is a simple way of living in a small space. A mansion is a large, complex living space with many separate rooms. There are rooms for cooking, eating, sleeping, bathing, reading, watching TV, entertaining guests, exercising, and storage. The rooms in a mansion are constructed for the specific things you would like to be able to do. You can live in simple efficiency or complexity. In this activity we will be looking at cells that are as simple as a one-room efficiency apartment or as complex as a mansion.

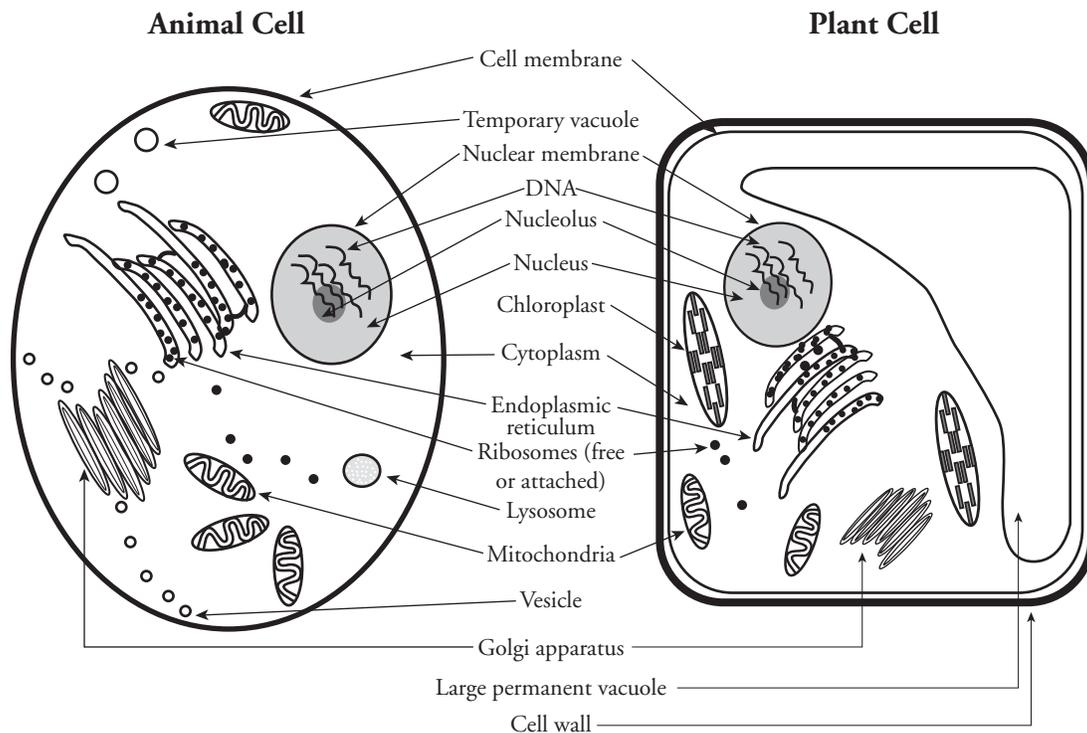
Model 1 – Three Types of Bacterial Cells



1. The three bacterial shapes in Model 1 are referred to as *coccus* (sphere), *spirillum*, and *bacillus* (rod). Label the diagrams in Model 1 with the correct descriptions.
2. What is represented by the small dots found in each of the bacteria cells?
3. What is the name of the outermost layer that forms a boundary around the outside of each cell?
4. How is the DNA described and what does this mean?

5. All the internal structures are suspended (floating) in what substance?
6. One of the bacteria in Model 1 has a tail-like structure.
 - a. What is this structure called?
 - b. What might be the purpose of this structure?
 - c. Based on your answer to the previous question, what might you infer about the absence of this structure in the other two bacteria cells?

Model 2 – Animal and Plant Cells



7. Looking at Model 2, list at least three structural differences (other than shape) between an animal and a plant cell.
8. Where do you find the DNA in each cell in Model 2?
9. Do both cells in Model 2 have a nucleus?

10. List the structure(s) that form the boundary between the inside and the outside of each cell in Model 2.

11. What is different about the outermost boundary in a plant cell compared to an animal cell?

12. Decide as a group whether the cells in Model 1 or 2 are more complex and list at least three supporting reasons for your choice.



Model 3 – Structural Comparisons

Word Part	Meaning
pro	before
karyon	nucleus or kernel
eu	true

13. Use the chart in Model 3 to determine the meaning of the word prokaryote.

14. What does the word eukaryote mean?

15. Based on the above word definitions, label the cells in Model 1 and Model 2 as prokaryotic or eukaryotic.

16. By comparing Model 1 and Model 2, what structures are the same in both prokaryotic and eukaryotic cells?

17. What differences are there between a prokaryotic and eukaryotic cell?

18. Refer to Models 1 and 2 to complete the chart below. Write yes or no in the box for each cell.

	Bacterial Cell	Animal Cell	Plant Cell	All Cells
Cell Membrane				
Ribosome				
Cytoplasm				
Mitochondria				
Nucleolus				
Nucleus				
DNA				
Cell Wall				
Prokaryotic				
Eukaryotic				



19. As a group, write a definition for a prokaryotic cell.

20. As a group, write a definition for a eukaryotic cell.

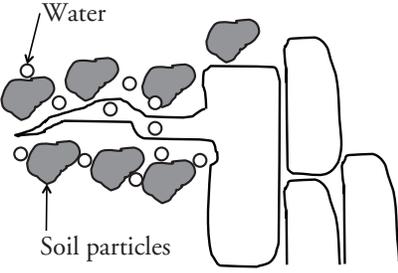
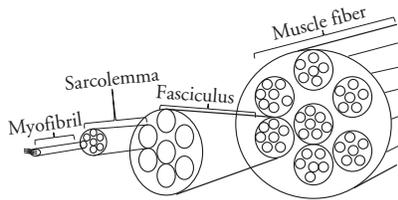
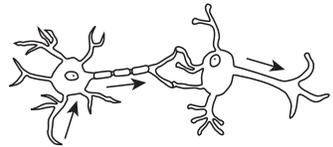
21. Complete the phrase below. Each member must contribute one complete sentence. The words prokaryotic and eukaryotic must be used:

All cells are not the same because...

22. As a group, discuss the opening analogy of an efficiency apartment and a mansion as it relates to cells. Record your final consensus of how this analogy applies to cell structure.



25. Complete the chart by describing the function and structure in each cell.

Cell Type	Function	Structural adaptation(s) that enable the cell to carry out its function.
<p>Root hair cell from a plant</p> 		
<p>Muscle cell</p> 		
<p>Nerve cell</p> 		
<p>Sperm cell</p> 