

6-2016

# Prokaryotic and Eukaryotic Cells (6th grade)

Samantha Bos

Trinity University, [the.samantha.bos@gmail.com](mailto:the.samantha.bos@gmail.com)

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# UNDERSTANDING BY DESIGN

## Unit Cover Page

Unit Title: Prokaryotic and Eukaryotic Cells

Grade Level: 6<sup>th</sup>

Subject/Topic Area(s): Science/Biology

Designed By: Samantha Bos

Time Frame: 1½ - 2 Weeks

School District: Winston School San Antonio

School: Winston School San Antonio

School Address and Phone: 8565 Ewing Halsell Dr., San Antonio, TX 78229

(210) 615-6544

### **Brief Summary of Unit** (Including curricular context and unit goals):

This unit is meant to provide a concrete and hands-on approach to introducing cells and differences between prokaryotic cells (cells without a nucleus), and eukaryotic cells (cells with a nucleus). Certain organelles and their functions are introduced, although this is covered much more in depth in 7<sup>th</sup> grade; the unit is based on the TEKS (Texas Standards).

The conclusion of the unit is a fun lab in which students practice using the scientific method as well microscopes to collect data. Students will be expected to apply their knowledge to identify the eukaryotic and prokaryotic cells provided on the slides.

This unit comes at the beginning of the biology unit, introducing the concepts of cells and differentiating between prokaryotic and eukaryotic cell types. After this unit, students will move to a brief introduction of taxonomy.

## Stage 1 Desired Results

<p>ESTABLISHED GOALS</p> <p>6.1A Demonstrate safe practices during laboratory and field investigations as outlined in the Texas Safety Standards.</p> <p>6.2A Plan and implement comparative and descriptive investigations by making observations, asking well-defined questions, and using appropriate equipment and technology.</p> <p>6.2E Analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends.</p> <p>6.12A Understand that all organisms are composed of one or more cells.</p> <p>6.12B Recognize that the presence of a nucleus determines whether a cell is prokaryotic or eukaryotic.</p>	<b>Transfer</b>	
	<p><i>Students will be able to independently use their learning to...</i></p> <p>Identify cell types in real-life situations and use their understanding of cell structures to describe the characteristics of organisms and vice versa.</p>	
	<b>Meaning</b>	
	<p><b>UNDERSTANDINGS</b> <i>Students will understand that...</i></p> <p>The scientific method provides a critical and well-structured means of testing scientific thought.</p> <p>Differences in organisms are based on the differences at the cellular level.</p>	<p><b>ESSENTIAL QUESTIONS</b></p> <p>How are facts proven to be true?</p> <p>How do organisms differ?</p> <p>How can you classify organisms?</p>
	<b>Acquisition</b>	
<p><b>Knowledge</b> <i>Students will know...</i></p> <p>All living things are made of cells.</p> <p>Organisms made of prokaryotic cells are simple, single-celled organisms.</p> <p>All organisms that we can see with the naked eye are made of eukaryotic cells.</p> <p>Provide examples of organisms that are composed of eukaryotic and prokaryotic cells.</p>	<p><b>Skills</b> <i>Students will be able to...</i></p> <p>Identify a eukaryotic cell and a prokaryotic cell using sketches and drawings.</p> <p>Use a microscope safely and effectively to identify prokaryotic and eukaryotic cells.</p> <p>Identify the steps of the scientific method.</p>	

## Stage 2 - Evidence

Code (M or T)	Evaluative Criteria (for rubric)	Assessment Evidence
T		PERFORMANCE TASK(S):  Identify the type of cells in cheek swabs and bacteria cultures as being either prokaryotic or eukaryotic.
		OTHER EVIDENCE: Cell Venn Diagram, Exit Tickets

### Stage 3 – Learning Plan

Code (A, M, or T)	Pre-Assessment <i>How will you check students' prior knowledge, skill levels, and potential misconceptions?</i> Key terms including cell, multi-cellular, unicellular, organism, and organelle will be written on a large piece of butcher paper. Students will complete a chalk talk, writing phrases, drawing pictures, or asking questions in regards to the key terms on the paper.	
	Learning Activities	Progress Monitoring (e.g. formative assessment)
M	<p><b>Day 1 -</b> Students will complete the chalk talk. Using their answers as a starting point, introduce the concept of cells as the introduction to biology for the year.</p> <p>Questions asked by the students can remain displayed for the remainder of the unit and help drive some discussions.</p> <p>Students will then begin to take notes in the INB on eukaryotic and prokaryotic cells.</p> <p><b>Day 2 –</b> Students will continue taking notes in their notebook different types of cells.</p> <p><b>Day 3 -</b> The Cell as a Factory Analogy Teacher provides the example of the cell as a factory analogy, describing how each specific organelle functions within that analogy.</p>	<p>Exit Ticket – Students will draw a prokaryotic cell and a eukaryotic cell.</p> <p>Exit Ticket – 3,2,1 – 3 facts about cells, 2 differences between a eukaryote and prokaryote, and 1</p>

<p>A</p> <p>T</p> <p>T</p>	<p>Students will then be asked to provide a gesture, a sound, or another word to relate to that part of the cell in the factory analogy.</p> <p>As a challenge, students may provide their own analogy of the cell.</p> <p>If time allows, students will play a game of charades as a whole class, acting out the function of the cell to be guessed by the group.</p> <p><b>Day 4 –</b> Compare and Contrast Students will create a Venn Diagram comparing the differences and similarities between a Prokaryotic and a Eukaryotic Cell. Students will be given a blank Venn Diagram and may use their notes if they need them.</p> <p>Students will play “four corners” with the vocabulary terms spread around the room to review the definitions and components of each type of cell and organelle.</p> <p><b>Day 5 –</b> Students will use the microscopes to identify a handful of slides as being either eukaryotic or prokaryotic. Students will be expected to justify their answers.</p> <p><b>Day 6 –</b> Students will begin the set up for the alien lab–taking notes on the problem, the hypothesis, the materials, and the procedure for the lab. Students will take a swab from their cheeks, and one selected student will be asked in private to act as the “alien” and have his or her cheek swab switched out for a prokaryotic cell.</p> <p><b>Day 7 -</b> Students will use the microscopes to identify the cheek swab samples and the “alien cheek” as being either prokaryotic or eukaryotic cells.</p> <p><b>Day 8 –</b> Students will complete the post-lab write up and conclusion in the alien lab.</p>	<p>favorite gesture of the day</p> <p>Students will demonstrate understanding of the difference in cells through the Venn diagram.</p> <p>Students will demonstrate ability to identify the different cell types.</p>
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	Using their conclusions as a starting point, lead a discussion on the differences in the cells and what they can tell us about the organism. Any unanswered questions from the first day will be answered.	
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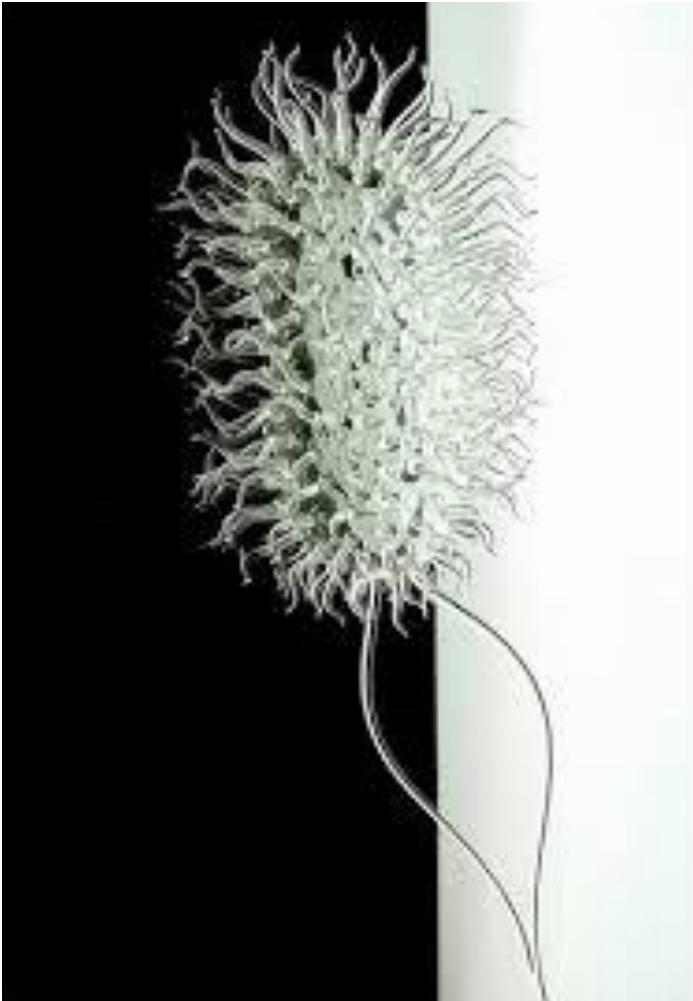
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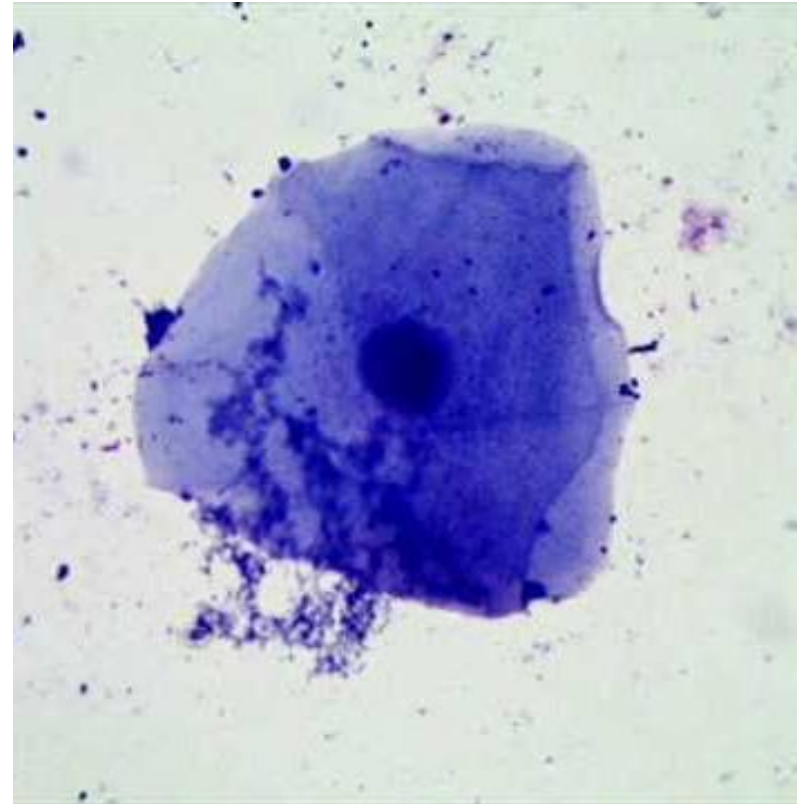
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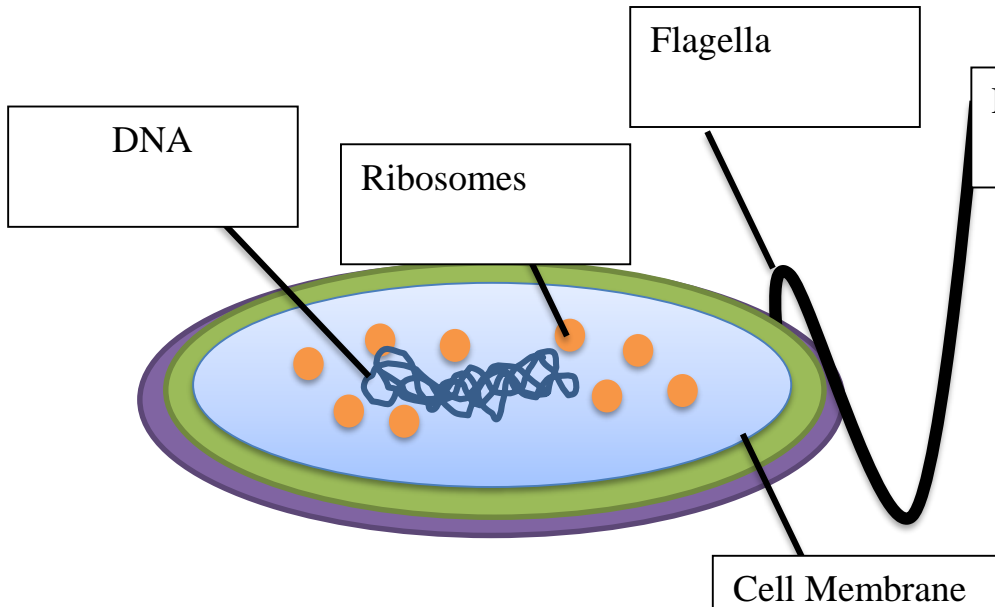
Prokaryotic Cell



Eukaryotic Cell

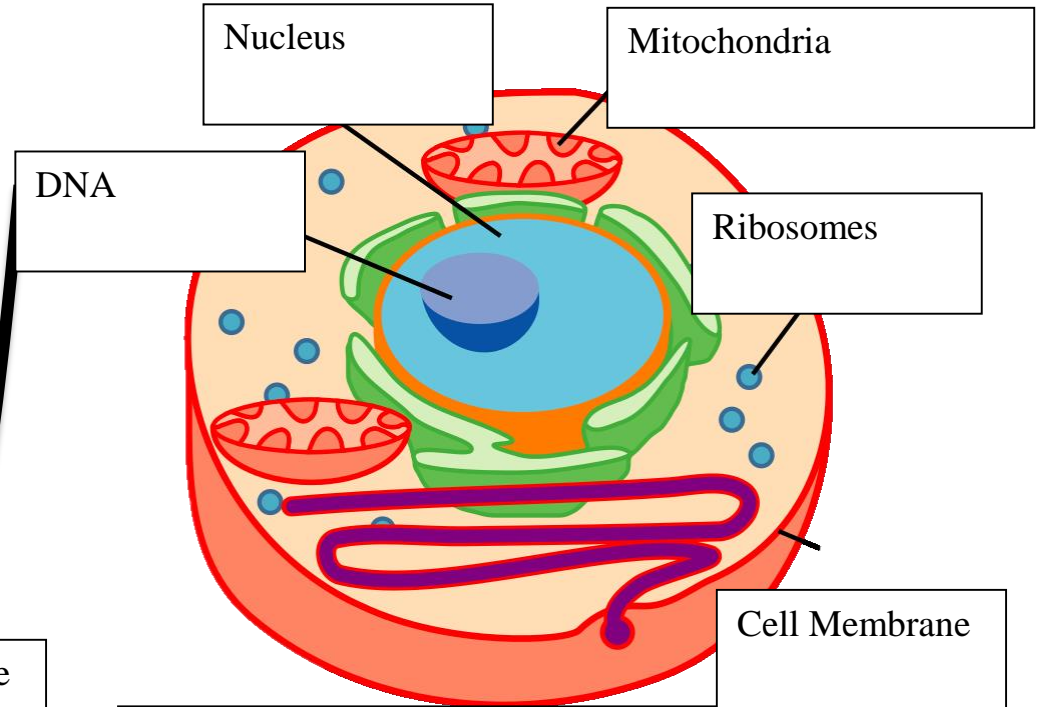


# Prokaryotic Cell



- Key Parts of a Prokaryotic Cell**
- DNA
  - Cell Membrane
  - Flagellum
  - Ribosomes

# Eukaryotic Cell



- Key Parts of a Eukaryotic Cell**
- Nucleus
  - DNA
  - Cell Membrane
  - Ribosomes
  - Mitochondria



Prokaryotic Cell

Both

Eukaryotic Cell

- Does not have a nucleus
- Less organized
- Always Unicellular
- DNA is **not** enclosed in a membrane
- Example: Bacteria

Has a cell membrane  
Can be unicellular  
Living organism  
Has DNA  
Needs energy

Has a nucleus  
Can be multi-cellular  
Has many organelles  
DNA is inside a nucleus  
Example: plants or animals

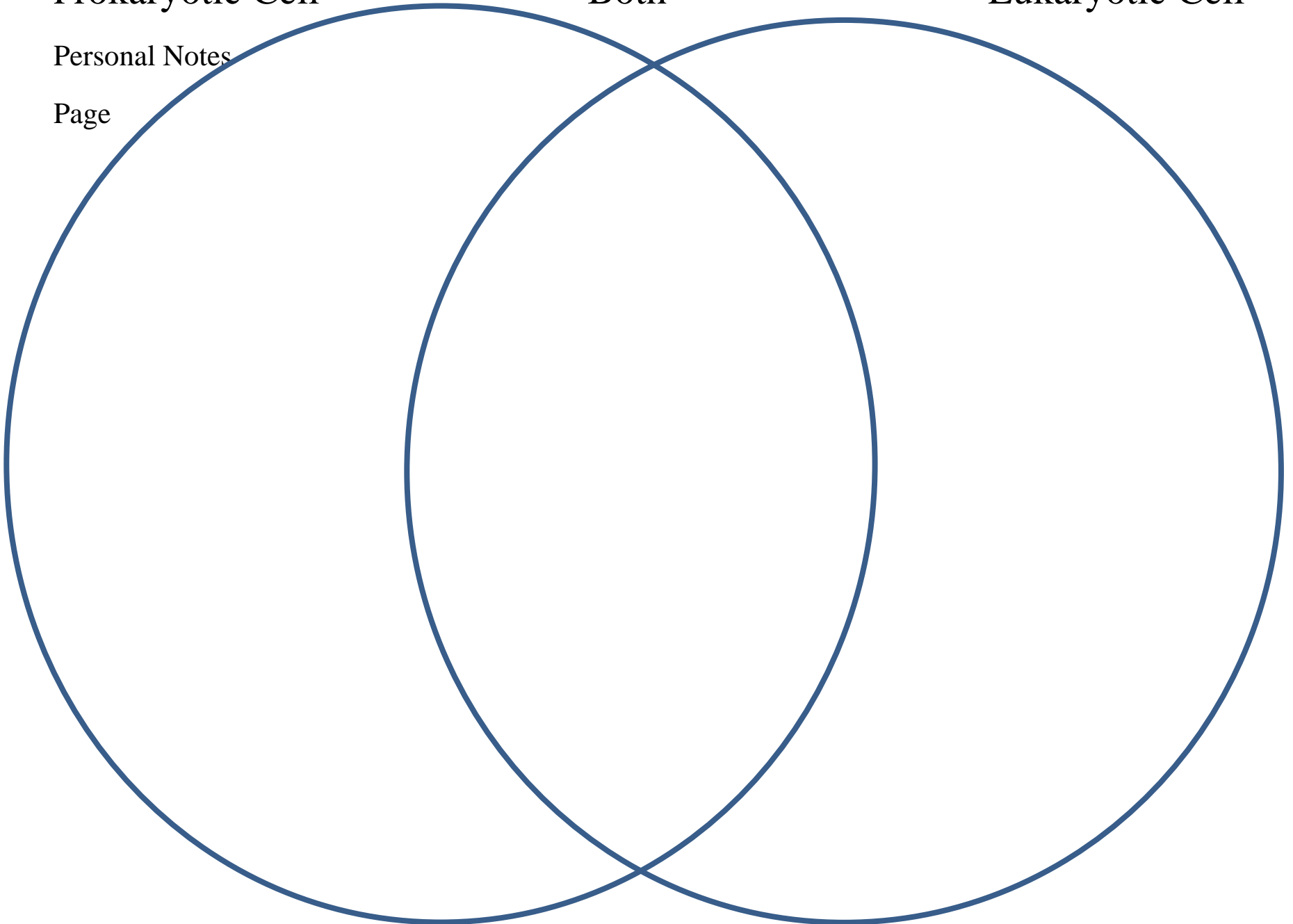
Prokaryotic Cell

Both

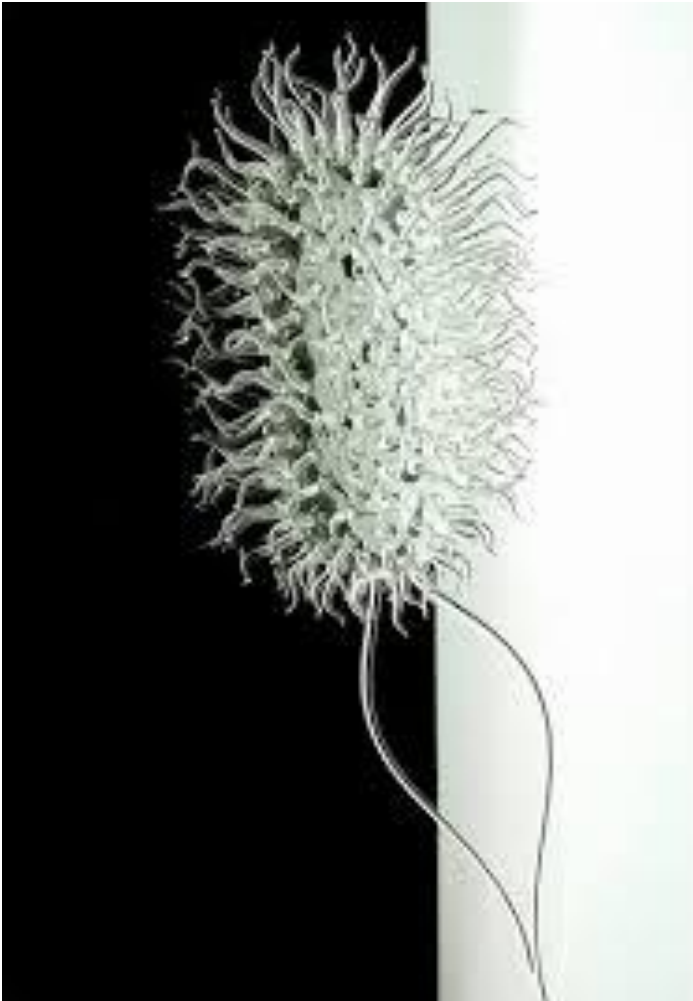
Eukaryotic Cell

Personal Notes

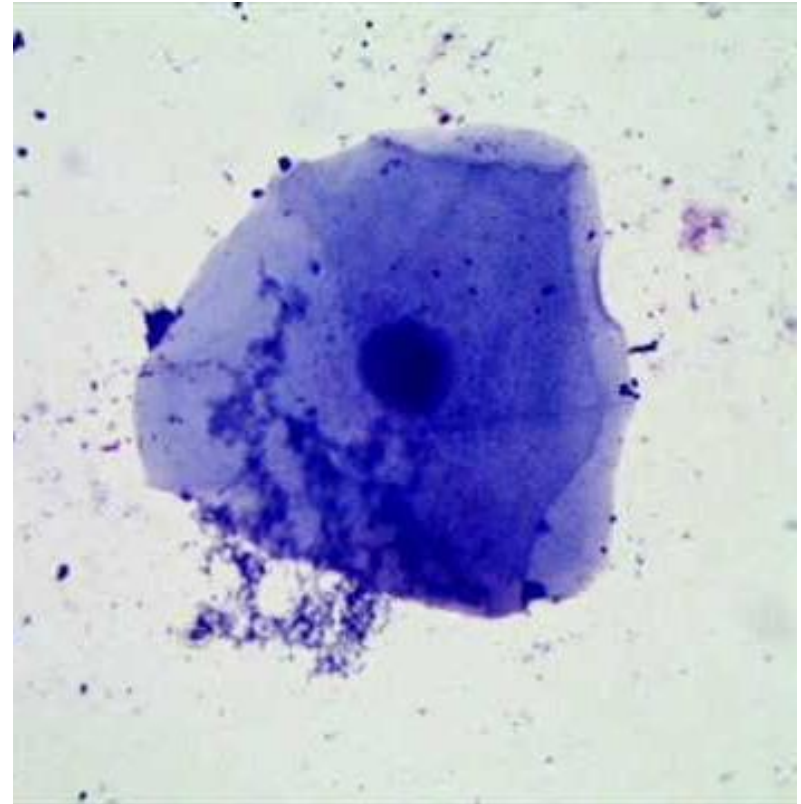
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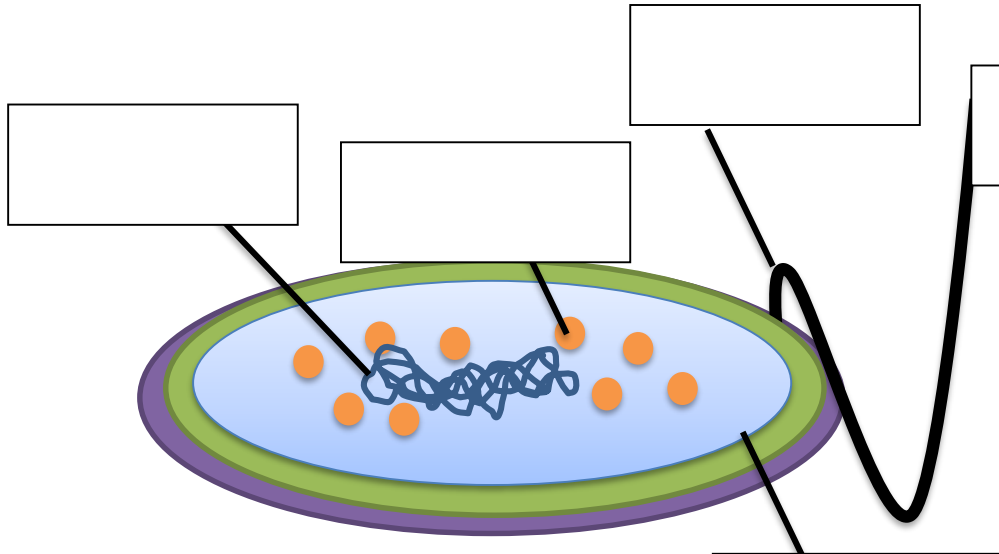
Prokaryotic Cell



Eukaryotic Cell



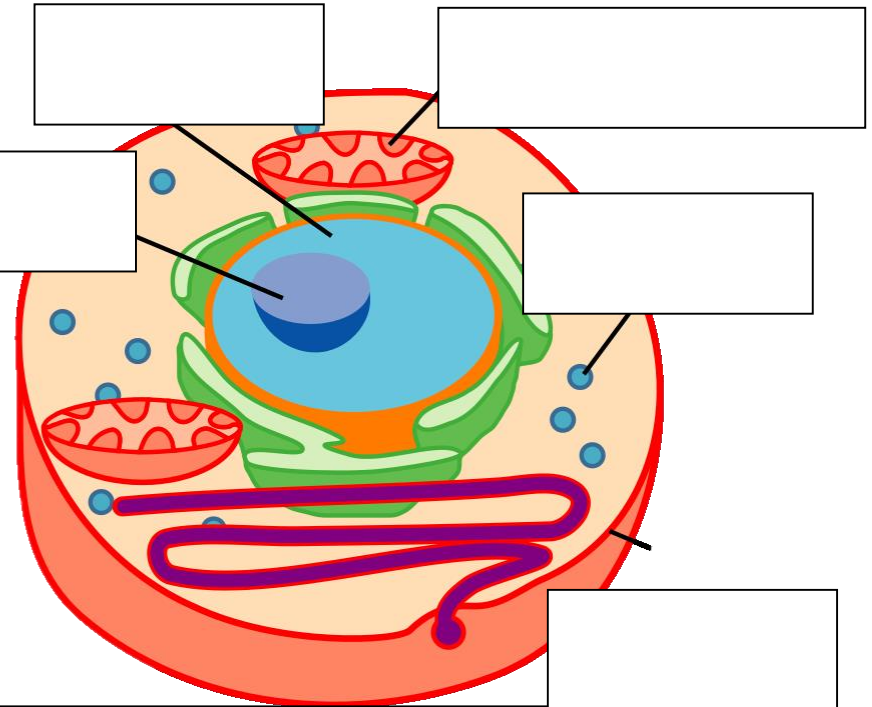
# Prokaryotic Cell



## Key Parts of a Prokaryotic Cell

- DNA
- Cell Membrane
- Flagellum
- Ribosomes

# Eukaryotic Cell



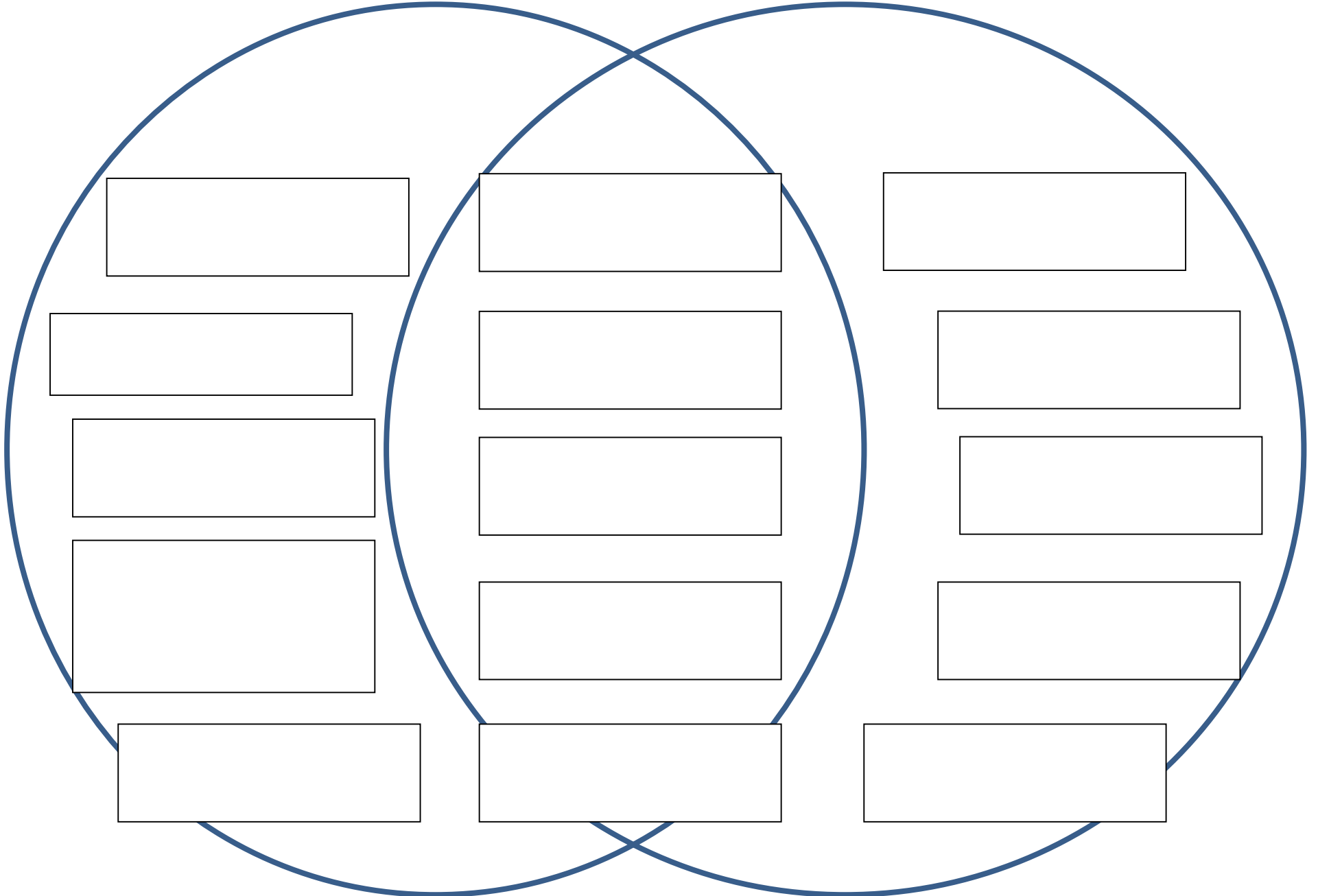
## Key Parts of a Eukaryotic Cell

- Nucleus
- DNA
- Cell Membrane
- Ribosomes
- Mitochondria

Prokaryotic Cell

Both

Eukaryotic Cell



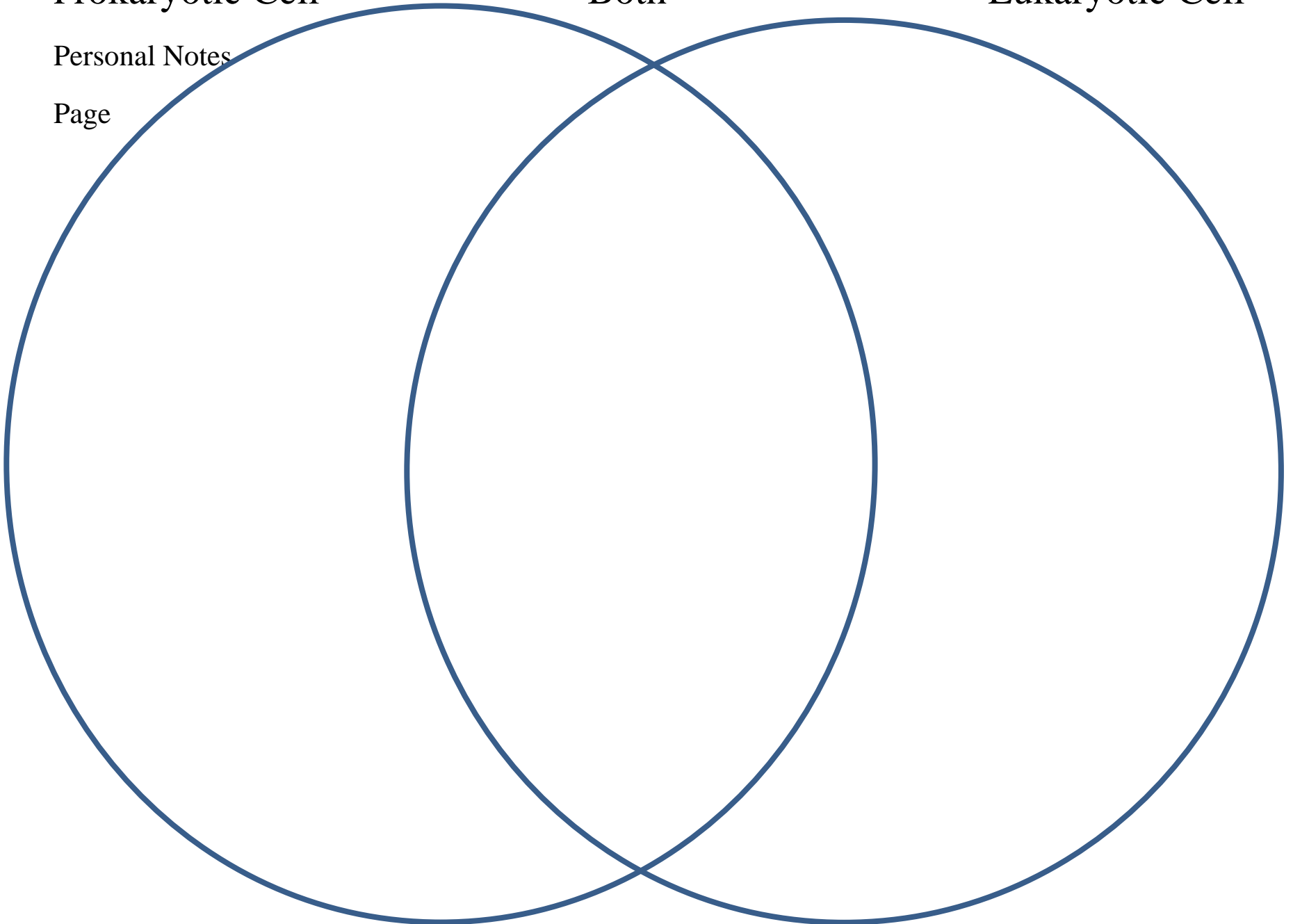
Prokaryotic Cell

Both

Eukaryotic Cell

Personal Notes

Page



Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Exit Ticket

In the spaces provided, draw a **prokaryotic cell** and an **eukaryotic cell**. Be sure to include and label the **nucleus** when it is a part of that cell.

### Prokaryotic Cell



**Does your cell have a nucleus?**

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### Eukaryotic Cell



**Does your cell have a nucleus?**

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Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Exit Ticket

**3 – Facts about cells:** \_\_\_\_\_

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**2 – Differences between prokaryotic and eukaryotic cells:** \_\_\_\_\_

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**1 – Favorite gesture or word from today:** \_\_\_\_\_

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Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Exit Ticket

**3 – Facts about cells:** \_\_\_\_\_

---

---

**2 – Differences between prokaryotic and eukaryotic cells:** \_\_\_\_\_

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**1 – Favorite gesture or word from today:** \_\_\_\_\_

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Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Slide Analysis

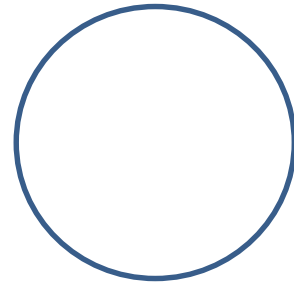
Directions: In the spaces provided, draw what you see on the slides provided. Be sure to include and label the nucleus if you see one.

Slide Number: \_\_\_\_\_

**Provide a detailed drawing of the cell you see on the slide. Label the nucleus if you see one.**

**What type of cell is on the slide?**

Prokaryotic      or      Eukaryotic

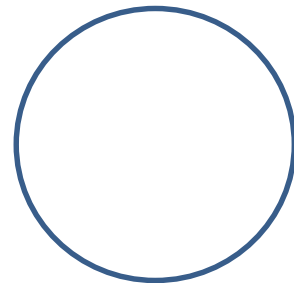


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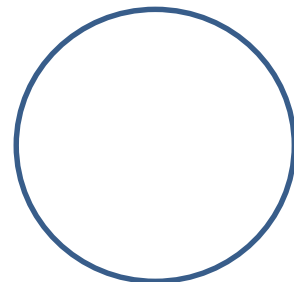


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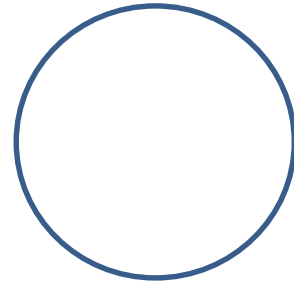


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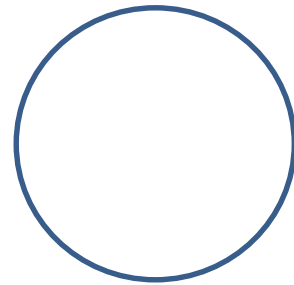


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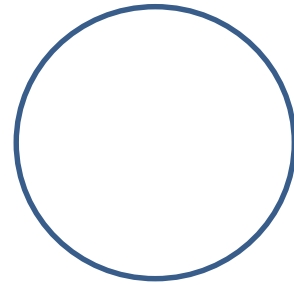


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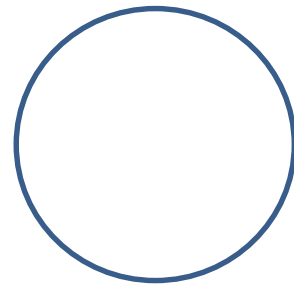


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Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Alien Screening Lab

### **Introduction:**

Cells make up all living organisms. Some organisms are visible to the naked eye and are complex creatures made up of eukaryotic cells. Other organisms are unicellular and invisible to the naked eye. These organisms are made up of prokaryotic cells. All humans, as complex organisms, are made of eukaryotic cells. Aliens, however, will have different cell structures from humans and may be composed of prokaryotic cells.

Using the microscopes, you are going to examine cheek cells taken from various students to determine if there is an alien in your midst.

**Research:** What do you know about human cells that will help you determine if you are looking at a human or alien cell? Provide three facts from the introduction above or your notes that will help you in this lab.

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_

**Hypothesis:** What do you expect to find in this lab? Please write your hypothesis in a complete statement.

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### **Materials:**

- One toothpick for each student
- One slide for each students' cheek cells
- Methylene blue stain
- One microscope for each pair or team of students

**Procedures:**

1. All students will hold the toothpick against their inner cheek and *gently* scrape the side of the cheek to release cheek cells.
2. Each student will prepare his or her own slide by gently rolling the toothpick against the glass slide and adding a drop of blue stain.
3. To observe each slide, each pair or team will place one slide in the microscope and collect data on the cell in each slide.
4. Working through each slide, students will determine which slide contains the alien cheek cell.

**Data:**

Slide Number: \_\_\_\_\_

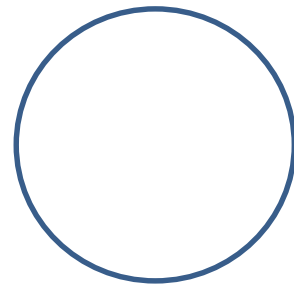
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Prokaryotic      or      Eukaryotic

**What type of being does this cell belong to?**

Human      or      Alien



Slide Number: \_\_\_\_\_

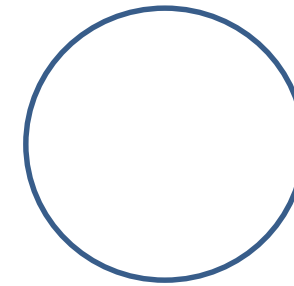
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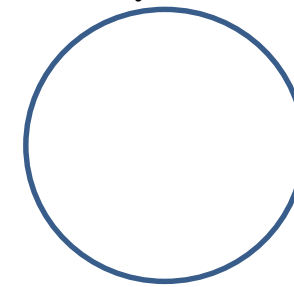
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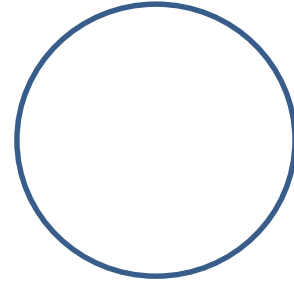
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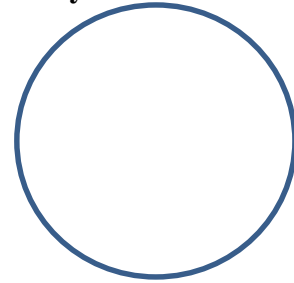
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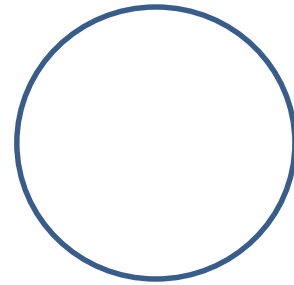
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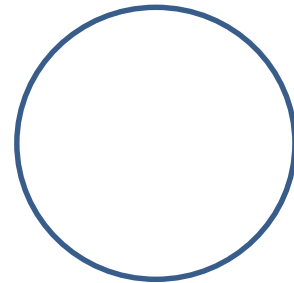
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Prokaryotic      or      Eukaryotic

**What type of being does this cell belong to?**

Human      or      Alien



**Analysis and Conclusion:** Answer the following questions using complete sentences in the space provided below. Be sure to include key terms such as **nucleus**, **prokaryotic**, and **eukaryotic** in you answer.

- What did you find in this lab?
- Are all of your classmates human?
- What evidence do you have to support your conclusion?

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Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Alien Screening Lab

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Using the microscopes, you are going to examine cheek cells taken from various students to determine if there is an alien in your midst.

**Research:** What do you know about human cells that will help you determine if you are looking at a human or alien cell? Provide three facts from the introduction above or your notes that will help you in this lab. (Answers will vary, but example answers are provided.)

4. \_\_\_\_\_ All humans are made of eukaryotic cells. \_\_\_\_\_  
\_\_\_\_\_
5. \_\_\_\_\_ All eukaryotic cells have a nucleus. \_\_\_\_\_  
\_\_\_\_\_
6. \_\_\_\_\_ Aliens may have prokaryotic cells. \_\_\_\_\_  
\_\_\_\_\_

**Hypothesis:** What do you expect to find in this lab? Please write your hypothesis in a complete statement. (Answers will vary, but an example answer is provided.)

If everyone in the classroom is an earthling, then all the cells examined will be eukaryotic cells.  
\_\_\_\_\_

### **Materials:**

- One toothpick for each student
- One slide for each students' cheek cells
- Methylene blue stain
- One microscope for each pair or team of students

**Procedures:**

5. All students will hold the toothpick against their inner cheek and *gently* scrape the side of the cheek to release cheek cells.
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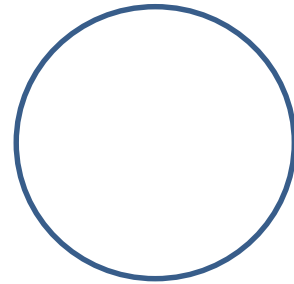
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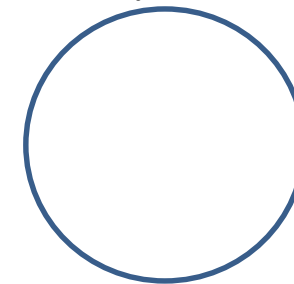
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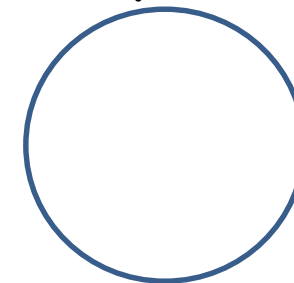
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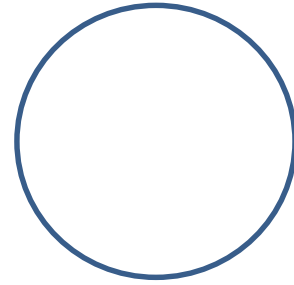
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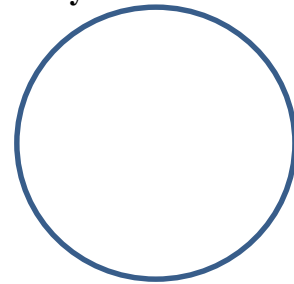
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Human      or      Alien



Slide Number: \_\_\_\_\_

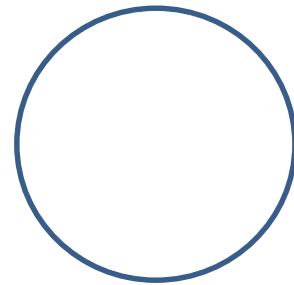
**Provide a detailed drawing of the cell you see on the slide. Label the nucleus if you see one.**

**What type of cell is on the slide?**

Prokaryotic      or      Eukaryotic

**What type of being does this cell belong to?**

Human      or      Alien



Slide Number: \_\_\_\_\_

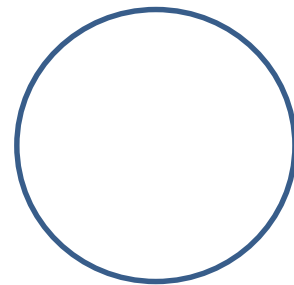
**Provide a detailed drawing of the cell you see on the slide. Label the nucleus if you see one.**

**What type of cell is on the slide?**

Prokaryotic      or      Eukaryotic

**What type of being does this cell belong to?**

Human      or      Alien



**Analysis and Conclusion:** Answer the following questions using complete sentences in the space provided below. Be sure to include **nucleus**, **prokaryotic**, and **eukaryotic** in your answer. (Answers will vary, but an example answer is provided below.)

- What did you find in this lab?
- Are all of your classmates human?
- What evidence do you have to support your conclusion?

Not all of my classmates are human. The cell on slide #6 does not have a nucleus, which means it is a  
prokaryotic cell. Humans have eukaryotic cells, and therefore the cell on slide #6 does not belong to a  
human. Whoever slide #6 belongs to is an alien.

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