

Biology Lab Activities: Prokaryotic and Eukaryotic Cells

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How to use this manual

This lab manual is intended for use with the [Visible Biology](#) product.

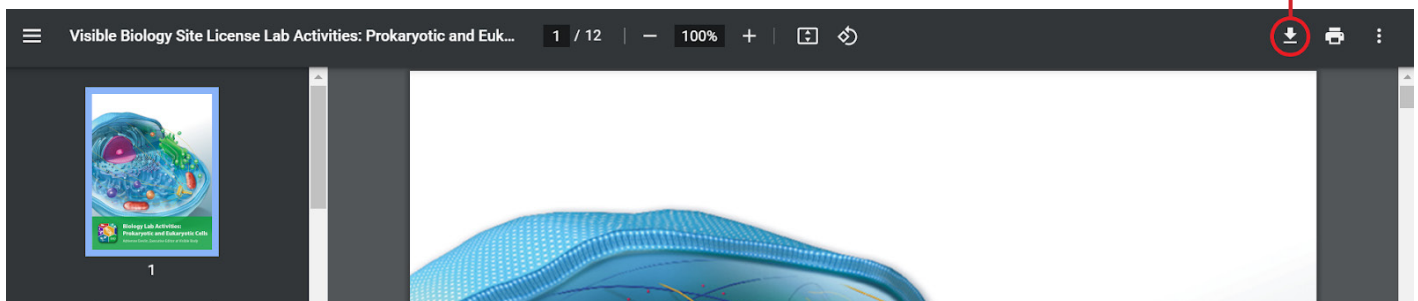
Where to find 3D models

The screenshot shows the Visible Biology interface. At the top, there are three tabs: 'Units', 'Study', and 'My Library'. The 'Study' tab is active. Below the tabs, there are three sections: 'Quizzes', 'Lab Activities', and 'Get PDFs'. The 'Lab Activities' tab is circled in red, with a red arrow pointing to it from the text 'Under the Study section of Visible Biology, there is a Lab Activities tab.' Below this, there is a section titled 'Lab activities that correspond to the following views are available as PDFs.' The 'Get PDFs' button is circled in red, with a red arrow pointing to it from the text 'Select "Get PDFs" to download the lab activities.' Below this, there is a section titled 'Prokaryotic and Eukaryotic Cells Lab' with three 3D models: '1. Bacterial Cell', '2. Animal Cell', and '3. Plant Cell'. A red arrow points to these models from the text 'Find the row of 3D views that corresponds to each lab manual and use the views to investigate and find answers.'

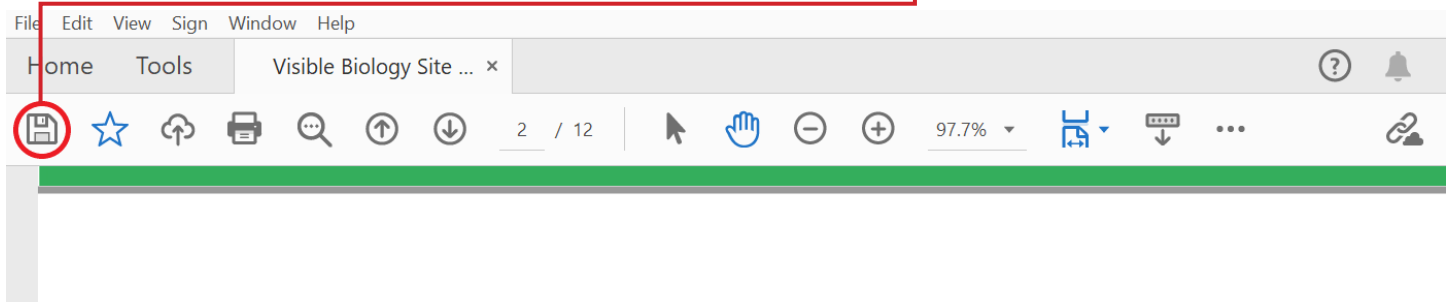
How to save answers

1. Have Adobe Reader installed on your computer.
Windows: <https://get.adobe.com/reader/>
Mac: <https://helpx.adobe.com/acrobat/kb/install-reader-dc-mac-os.html>

2. Download each lab file to your computer.



3. Open the downloaded file in Adobe Reader.
Right-click on the file. In the menu that appears, go to "Open with..." and select Adobe Reader from the submenu.
4. Type your answers into the boxes to complete the lab and select the "Save" icon to save the lab.



5. Submit your saved version of the lab to your instructor via email, dropbox, Google Drive, or however your instructor has requested.

Any questions?
visiblebiology.com

Name:

Date:

Biology Lab Activities: Prokaryotic and Eukaryotic Cells

Background Questions

Read through the Overview of Cells article on the Visible Body Biology Learn Site (<https://www.visiblebody.com/learn/biology/cells/cell-overview>).

Based on what you've learned in class, in your textbook, from the Biology Learn Site article, and from using Visible Biology, answer the following questions about cells.

1. What are cells?

2. What are the main functions of cells?

3. Complete the following sentences about the two main types of cells: prokaryotic and eukaryotic cells.

- a. _____ cells include bacteria and archaea.
- b. _____ cells are found in animals, plants, fungi, and protists.
- c. Prokaryotes are made up of _____, whereas eukaryotes are made up of _____.

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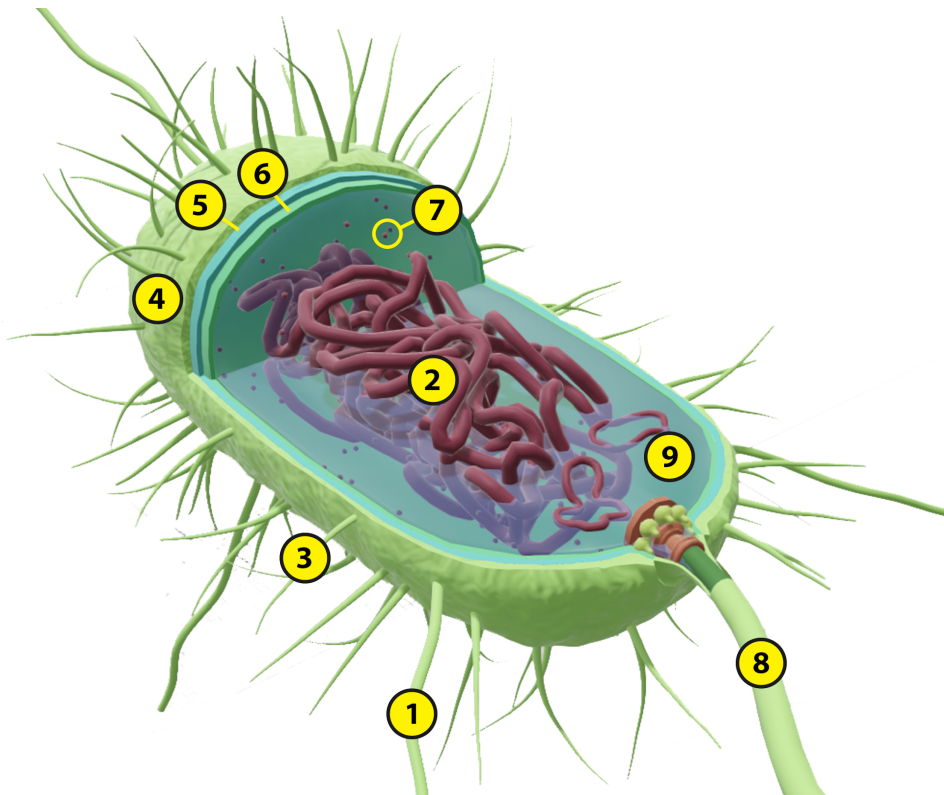
Lab 1: Prokaryotic Cell Structure and Functions

Activity 1: Label a bacterial cell

1. Launch the view
 - Launch Visible Biology.
 - Navigate to Study/Lab Activities, and find the Prokaryotic and Eukaryotic Cells Lab section.
 - Select view 1. Bacterial Cell.
2. Label the image below
 - Explore the 3D model of the bacterial cell to find the structures you need to label.
 - Fill in the blanks to label the structures from the list below.

Word List:

Capsule	_____	Flagellum	_____	Plasma membrane	_____
Cell wall	_____	Nucleoid	_____	Plasmid	_____
Fimbria	_____	Pilus	_____	Ribosome	_____



Name:

Date:

Lab 1: Prokaryotic Cell Structure and Functions

Activity 2: Explore the functions of bacterial cell structures

Refer to your labeled bacterial cell from Activity 1 and the content in Visible Biology. Based on what you've learned about bacterial cells, match each of the following bacterial cell structures with its description.

Structures:

- a. Flagella
- b. Cell wall
- c. Fimbriae
- d. Capsule
- e. Plasma membrane
- f. Ribosomes
- g. Nucleoid
- h. Pili
- i. Plasmid

Descriptions:

- ___ A membrane that encloses the cell's cytoplasm
- ___ Short projections that allow the cell to transfer DNA to other cells
- ___ A rigid, chemically complex structure that protects the cell and maintains its shape
- ___ A small, circular DNA molecule
- ___ A coating that attaches the cell to surfaces or other cells
- ___ A region that contains most of the cell's DNA
- ___ Long projections that move the cell through its liquid surroundings
- ___ Short projections that attach the cell to substrate or other cells
- ___ Structures in the cell that synthesize proteins

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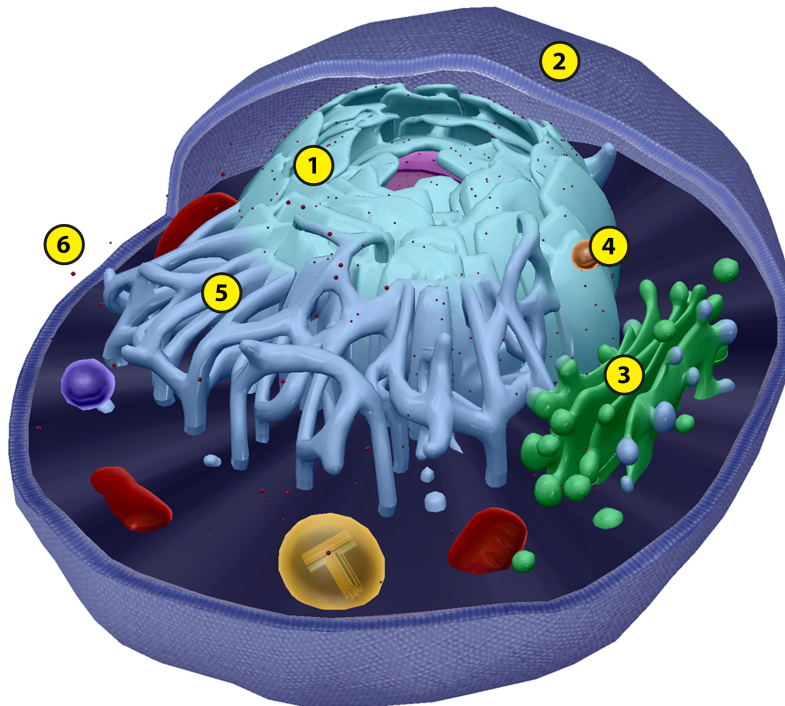
Lab 2: Eukaryotic Cell Structure and Functions

Activity 1: Label an animal cell

1. Launch the view
 - Launch Visible Biology.
 - Navigate to Study/Lab Activities, and find the Prokaryotic and Eukaryotic Cells Lab section.
 - Select view 2. Animal Cell.
2. Label the image below
 - Explore the 3D model of the animal cell to find the structures you need to label.
 - Fill in the blanks to label the structures from the list below.

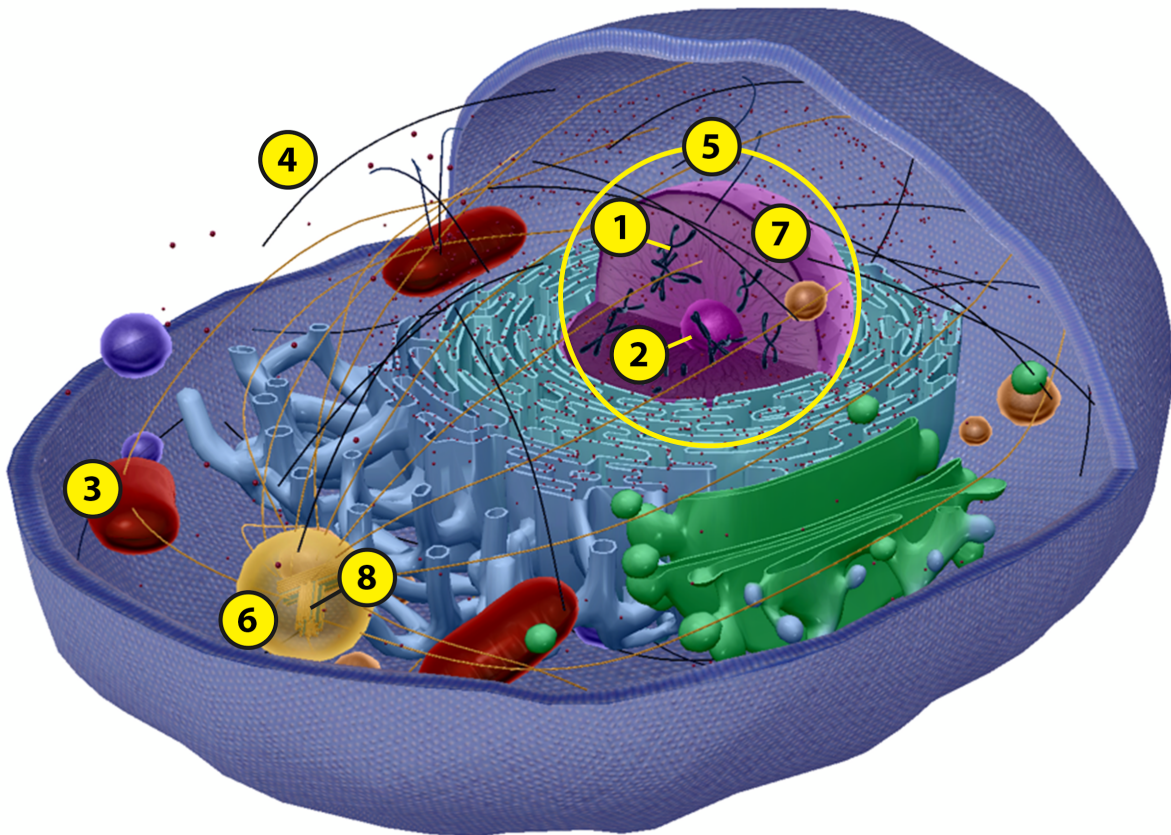
In the first animal cell image, label the following structures:

Golgi apparatus	_____	Rough endoplasmic reticulum	_____
Plasma membrane	_____	Smooth endoplasmic reticulum	_____
Ribosomes	_____	Vesicle (lysosome or peroxisome)	_____



In the second animal cell image, label the following structures:

- | | | | | | |
|-------------|-------|------------------|-------|-----------|-------|
| Centrioles | _____ | Cytoskeleton | _____ | Nucleolus | _____ |
| Centrosome | _____ | Mitochondria | _____ | Nucleus | _____ |
| Chromosomes | _____ | Nuclear envelope | _____ | | |



Name:

Date:

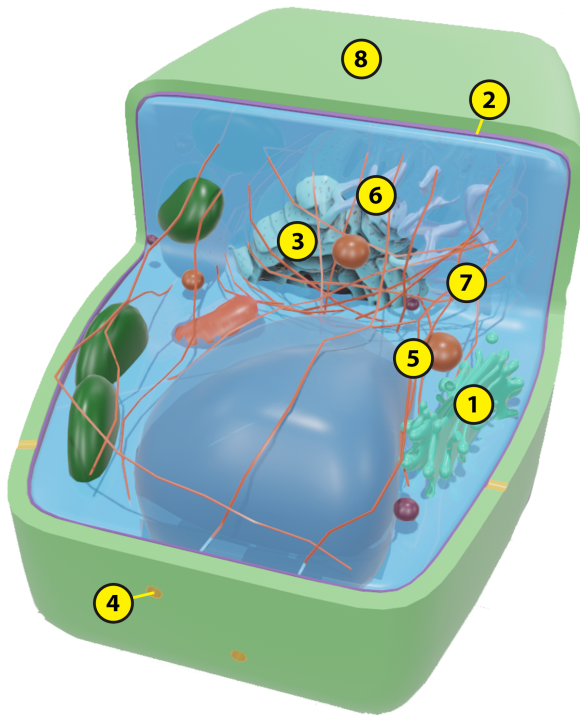
Lab 2: Eukaryotic Cell Structure and Functions

Activity 2: Label a plant cell

1. Launch the view
 - Launch Visible Biology.
 - Navigate to Study/Lab Activities, and find the Prokaryotic and Eukaryotic Cells Lab section.
 - Select view 3. Plant Cell.
2. Label the image below
 - Explore the 3D model of the plant cell to find the structures you need to label.
 - Fill in the blanks to label the structures from the list below.

In the first plant cell image, label the following structures:

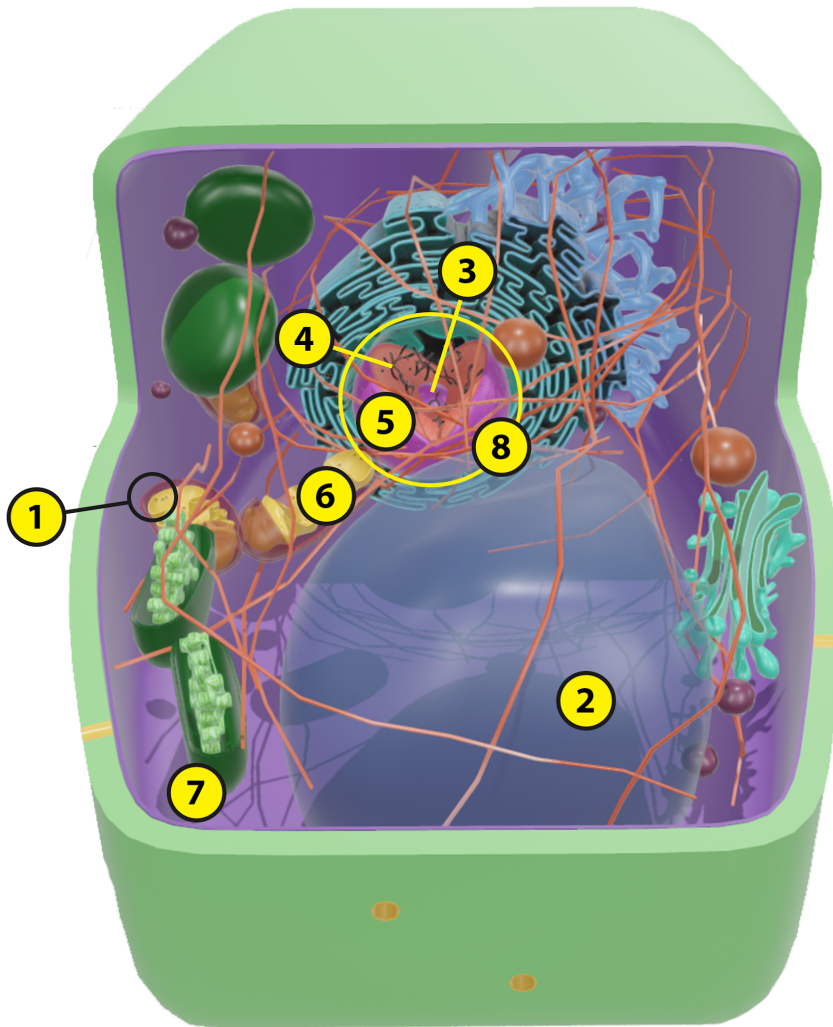
Cell wall	___	Plasma membrane	___
Cytoskeleton	___	Plasmodesma	___
Golgi body	___	Rough endoplasmic reticulum	___
Smooth endoplasmic reticulum	___	Vesicle (lysosome, peroxisome)	___



In the second plant cell image, label the following structures:

- | | | | | | |
|-----------------|-------|------------------|-------|------------|-------|
| Central vacuole | _____ | Mitochondrion | _____ | Nucleus | _____ |
| Chloroplast | _____ | Nuclear envelope | _____ | Ribosomes* | _____ |
| Chromosome | _____ | Nucleolus | _____ | | |

(*Hint: In mitochondria)



Name:

Date:

Lab 2: Eukaryotic Cell Structure and Functions

Activity 3: Compare animal and plant cells

Refer to your labeled animal and plant cells from Activities 1 and 2, as well as the models in Visible Biology, to help you answer the following questions comparing animal and plant cells.

1. As you labeled the animal and plant cells, you probably noticed that they share many of the same structures, and they each have some unique structures. In the following table, list the two unique structures of animal cells and the four unique structures of plant cells.

Animal Cells	Plant Cells
1. 2.	1. 2. 3. 4.

2. The cytoskeleton of animal cells includes three types of proteins, and the cytoskeleton of plant cells includes two types of proteins.

- They both include _____ and _____.
- What type of protein is only included in animal cells?

3. In this lab, you've identified the shared and unique structures that make up animal and plant cells. These structures carry out the many essential functions of animal and plant cells. In the table below, list the shared and unique animal and plant cell structures involved in each of the four essential functions listed in the first column of the table.

Essential Functions	Shared Animal & Plant Cell Structures	Unique Plant Cell Structures
DNA Storage & Replication	1. 2.	1.
Protein Synthesis	1. 2. 3. 4.	
Energy Processing	1.	1.
Support & Movement	1. 2.	1. 2.

Need some help filling out the table above? Here are some hints:

- Animal and plant cells share two structures that play a role in DNA storage and replication.
- Plant cells have one unique structure that plays a role in DNA storage and replication.
- Animal and plant cells share four structures that play a role in protein synthesis.
- Animal and plant cells share one structure that plays a role in energy processing.
- Plant cells have one unique structure that plays a role in energy processing.
- Animal and plant cells have two shared structures that support and move the cell.
- Plant cells have two unique structures that support the cell.

4. Which animal and plant cell organelles are responsible for digestion, detoxification, and the breakdown of large molecules?

Name:

Date:

Lab 3: Compare Prokaryotic and Eukaryotic Cells

Refer to your labeled bacterial, animal, and plant cells from Labs 1 and 2, as well as the 3D bacterial, animal, and plant cells in Visible Biology, to help you answer the following questions comparing prokaryotic and eukaryotic cells. You can also use the Prokaryotes vs. Eukaryotes article on the Biology Learn Site to help you

(<https://www.visiblebody.com/learn/biology/cells/prokaryotes-vs-eukaryotes>).

1. As you explored in Lab 2, animal and plant cells are two types of eukaryotic cells that have many structures in common and a few unique structures. When you compare your labeled bacterial (prokaryotic) cell from Lab 1 with your labeled animal and plant cells from Lab 2, you'll see that there are a few structures that all three types of cells share. Complete the following sentences about the shared structures of prokaryotic and eukaryotic cells.

- a. All prokaryotic and eukaryotic cells are bound by a _____.
- b. The interior of all prokaryotic and eukaryotic cells consists of _____ filled with _____ and suspended cellular components.
- c. Prokaryotic and eukaryotic cells both have _____, which contain DNA, and _____, which are involved in creating proteins.

2. As you compare your labeled bacterial, animal, and plant cells from Labs 1 and 2, you'll notice that bacterial cells have some unique structures that set them apart from animal and plant cells. Answer the following questions about the unique bacterial cell structures and how they compare to animal and plant cell structures.

- a. In animal and plant cells, the _____ contains the chromosomal DNA; whereas in bacterial cells, the _____ contains the chromosomal DNA.
- b. How would you describe the differences between the DNA of prokaryotic and eukaryotic cells?

c. _____ are small, circular DNA molecules that can replicate themselves, and they are not part of the cell's chromosomal DNA. They are most often found in _____ cells.

d. What support structure is shared by plant and bacterial cells?

e. What three structures support and move bacterial cells, but *not* animal and plant cells?

f. Which structure supports and moves bacterial cells and also moves some types of animal and plant cells?

3. In these labs, in class, in your textbook, and from using Visible Biology, you've learned a lot about the structure and functions of bacterial, animal, and plant cells. Based on what you've learned, explain in 1–3 sentences why there are so many structurally diverse types of cells.

4. Based on what you've learned about cell structure, how do you think modern medicine takes advantage of the differences in cell types to treat bacterial diseases in humans and animals?