# AP Biology Unit 2--Cells-- Study Guide

**Chapters 6 & 7**

1. **Prokaryotic and eukaryotic cells**
2. **Cell Structure and Function**
3. **Membrane**
4. **Passive and Active Transport**

##### Key Terms

1. **organelles**
2. **prokaryote**
3. **eukaryote**
4. **mitochondria**
5. **phospholipid**
6. **ribosomes**
7. **endoplasmic reticulum (smooth and rough)**
8. **golgi apparatus**
9. **vesicle**
10. **active transport**
11. **selectively permeable**
12. **hypertonic**
13. **hypotonic**
14. **isotonic**
15. **passive transport**
16. **diffusion**
17. **osmosis**
18. **plasmolysis**
19. **facilitated diffusion**
20. **exocytosis**
21. **endocytosis**
22. **phagocytosis**
23. **pinocytosis**
24. **receptor-mediated endocytosis**

**Life’s little compartments: Types of cells and how they work**

After the last unit, this one may be a little refreshing, since almost all you need to know about this unit can be summarized in a few tables and figures. This unit is about **cells**

#### Define cell:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

and parts of cells, and its builds upon the information presented in the last unit. While studying this unit, note that in cells, different types of reaction and products are produced in a compartmentalized world.

One way the living world stays compartmentalized is with **membranes**. ***Define****:\_\_\_\_\_\_\_*

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

Cells and cell **organelles *Define organelle:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

are surrounded by a membrane, a **selectively permeable *Define:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

barrier that segregates cell contents from the outside world. In this unit you’ll learn the basic components of the cell. In the laboratory exercise, you’ll learn how the membrane allows transport of certain materials between compartments. Cells and cell organelles come in many different sizes to form simple or complex organisms.

## Prokaryotes and Eukaryotes

There are two main types of cells—**prokaryotes and eukaryotes**. ***Compare and contrast these two types of cells.***

Compare:

Contrast:

Structure and Function of the Cell

The plasma membrane separates internal metabolic events from the external environment and controls the movement of materials into and out of cell. The plasma membrane is a double phospholipid membrane (lipid bilayer) with the polar hydrophilic heads forming the two outer faces and the nonpolar hydrophobic tails pointing toward the inside of the membrane.

Draw and label the plasma membrane with the following parts: polysaccharide chain, phospholipid bilayer, channel protein, cholesterol, transport protein, hydrophobic tails, hydrophilic heads, and recognition.

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Describe the roles of the following proteins in membranes:

1. Peripheral protein
2. Integral protein
3. Transmembrane protein

Describe why the plasma membrane is described as a Fluid Mosaic Model.

Describe the following features of the plasma membrane:

1. Phospholipid membrane

1. Proteins
   1. Transport proteins/ Channel proteins
   2. Cell-cell Recognition proteins
   3. Receptor proteins
2. Cholesterol

Organelles are bodies within the cytoplasm that serve to physically separate the various metabolic reactions that occur within the cell.

Complete the following chart and the worksheet at the end of the packet. Know how the label a diagram of an animal cell and plant cell. Know the function of each organelle.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Prokaryotes | Eukaryotes | |  |
|  |  | Plant cells | Animal cells |  |
| Size in um |  |  |  |  |
| Structure | Yes or No | Yes or No | Yes or No | Properties |
| Cytoplasm |  |  |  |  |
| Nucleus |  |  |  |  |
| Plasma membrane |  |  |  |  |
| Cell wall |  |  |  |  |
| Chromosome |  |  |  |  |
| Ribosomes |  |  |  |  |
| Rough Endoplasmic Reticulum |  |  |  |  |
| Smooth Endoplasmic Reticulum |  |  |  |  |
| Golgi Complex |  |  |  |  |
| Lysosomes |  |  |  |  |
| Vacuoles or Vesicles |  |  |  |  |
| Mitochondria |  |  |  |  |
| Microtubules |  |  |  |  |
| Centrioles |  |  |  |  |

Movement of Substances

Various terms are used to describe the movement of substances between cells and into and out of a cell.

Describe the following terms that involve membranes that are selectively permeable.

1. Bulk flow
2. Passive transport
3. Simple diffusion
4. Osmosis
5. Hypertonic
6. Hypotonic
7. Isotonic
8. Plasmolysis
9. Facilitated diffusion
10. Active transport
11. Exocytosis
12. Endocytosis (phagocytosis, pinocytosis)
13. Receptor-mediated endocytosis

Complete the following table:

TYPES OF TRANSPORT ACROSS THE CELL MEMBRANE

|  |  |  |
| --- | --- | --- |
| Type of Transport  Gradient | Requires  Energy?  (Yes or No) | Concentration  Gradient  (Down, Up, or N/A) |
| Passive (Diffusion) |  |  |
| Osmosis  (Diffusion of H2O) |  |  |
| Facilitated Diffusion  (via carrier protein) |  |  |
| Active Transport  (ATP mediated) |  |  |
| Exocytosis |  |  |
| Phagocytosis |  |  |
| Pinocytosis |  |  |
| Receptor-mediated  Endocytosis |  |  |

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Grid-In Questions (these call for a numerical response)

The cells in question are:

* 1. Small cell is 10um x 10um x 10um
  2. Large cell is 20um x 20um x 20um

1. Simple cuboidal epithelial cells line the ducts of certain human exocrine glands. Various materials are transported into or out of the cell by diffusion. (The formula for the surface area of a cube is 6 x S2, and the formula for the volume of a cube is S3, where S = the length of a side of the cube.) What would be the volume of the larger cell in um3?

Answer\_\_\_\_\_\_\_\_\_\_\_

1. How many of the small cells could fit inside the larger cell?

Answer\_\_\_\_\_\_\_\_\_\_\_

1. Potato cores were placed in solutions of varying concentrations and were found to neither gain nor lose mass in a sucrose solution of 0.32M. Use this information to calculate the solute potential of the potato cores. The temperature of the solution is 22o C. (Refer to Appendix A, AP Biology Equations and Formules.)

Answer\_\_\_\_\_\_\_\_\_\_\_

Unit 2 Short-Answer Essay #1

Compare and contrast the cellular characteristics of prokaryotes and eukaryotes.

Unit 2 Short-Answer Essay #2

Describe the structure of the plasma membrane and the various ways in which the plasma membrane permits interactions with the outside environment.

Unit 2 Essay #3

Fertilizers help plant growth by supplying important nutrients like nitrogen and phosphorous to plants. These nutrients are found in fertilizers in the form of ionic salts such as ammonium sulfate { (NH4)2SO4 } and phosphoric acid { H3PO4 }. Growers have to be careful to follow a careful regimen of irrigation after applying fertilizer to ensure that plants are not damaged by a high concentration of solutes in the soil.

* 1. Explain why high concentrations of fertilizer in the soil might harm plants due to water movement into or out of root cells. Include a discussion of water potential in your answer.
  2. Design a simple diffusion experiment that would allow a farmer to know the approximate concentration of fertilizer to apply without damaging a crop.
  3. Some plants thrive in ecosystems with incredibly high solute concentrations, such as brine lakes or alkaline deserts. Describe some plants adaptations to severe solute concentrations that allow them to survive in their environment.

Unit 2 Essay #4

Prokaryotic and eukaryotic cells are physiologically different in many ways, but both represent functional, evolutionarily successful cells.

1. It has been theorized that the organelles of eukaryotic cells evolved from prokaryotes living symbiotically within a larger cell. Compare and contrast the structure of the prokaryotic cell with eukaryotic cell organelles, and make an argument for or against this theory. Be sure to justify your position with factual information/evidence.
2. Create a model to show the path of a protein in a eukaryotic cell from its formation to its secretion from the cell.