

06/09/2021

LESSON:2

CELL STRUCTURE AND FUNCTION



LEARNING OBJECTIVES

- Describe the function of a cell as a whole and explore ways parts of cells contribute to the function
- Develop and use models to enhance their understanding of these concepts

STARTER

- Discussion on cell and its types.
- <https://www.twig-world.com/film/what-is-a-cell-1041/>
- <https://www.twig-world.com/film/the-very-first-cell-1045/>

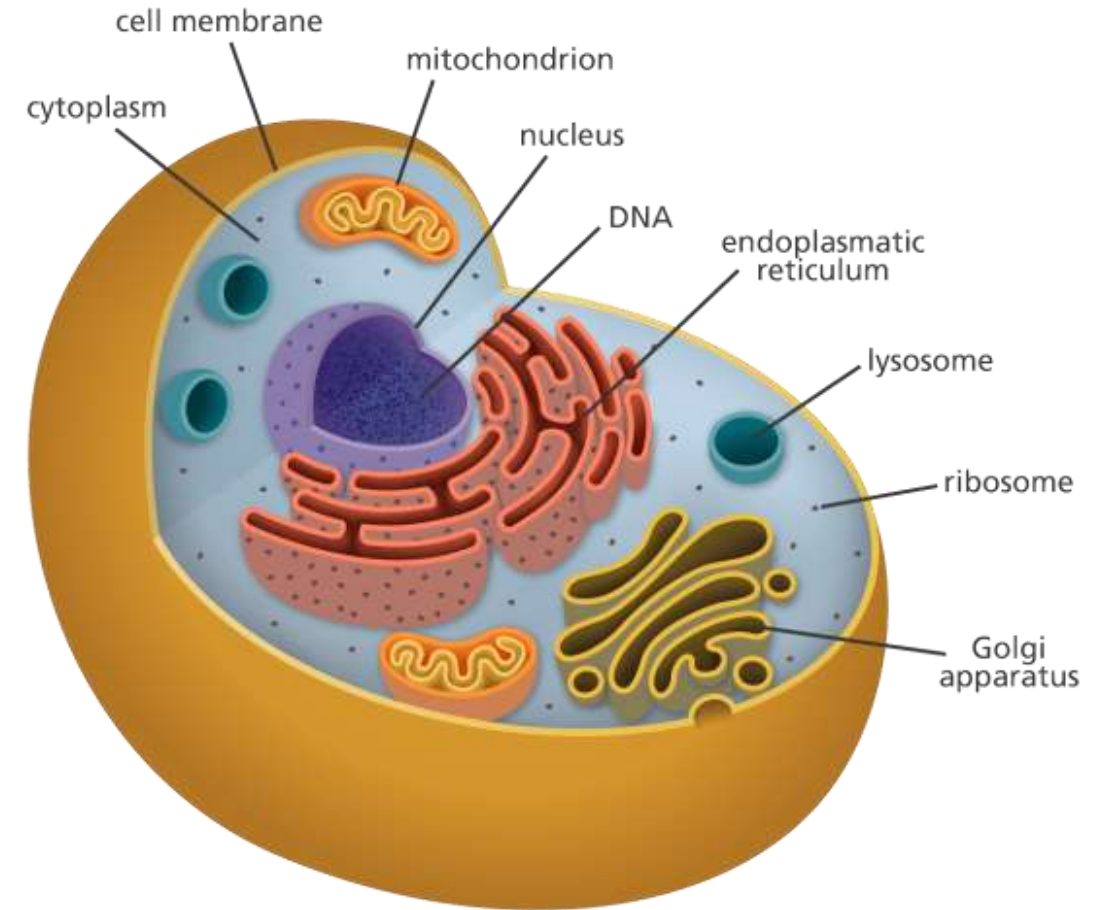


ENCOUNTER THE PHENOMENON

- How do the parts of an ostrich egg—the largest cell on the planet—work together in order for it to function?
- Bird eggs have different structures, such as a shell, a membrane, and a yolk. Each structure has a different function that assists in development of the baby bird.
- Place an uncooked egg in a bowl. Feel the shell and record your observations in your Science Notebook. Crack open the egg. Pour the contents into the bowl. Observe the inside of the shell and the contents of the egg. Record your observations. What do you think is the role of the eggshell? What does the structure of the eggshell tell you about its function?

WHAT SURROUNDS A CELL?

- Although different types of cells perform different functions, all cells have some structures in common.
- Every cell is surrounded by a protective boundary called a membrane.
- **The cell membrane is a flexible covering that protects the inside of a cell from the environment outside a cell.**

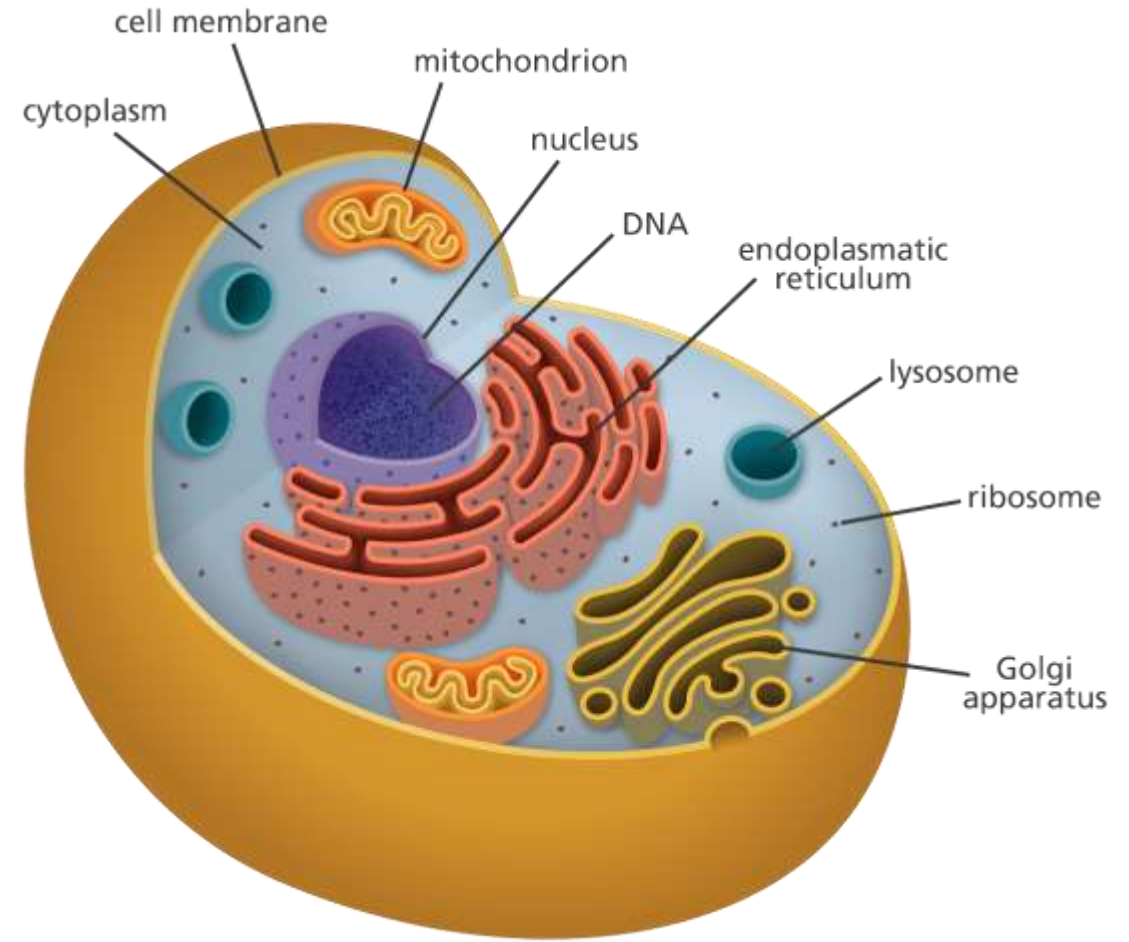




CELL MEMBRANE

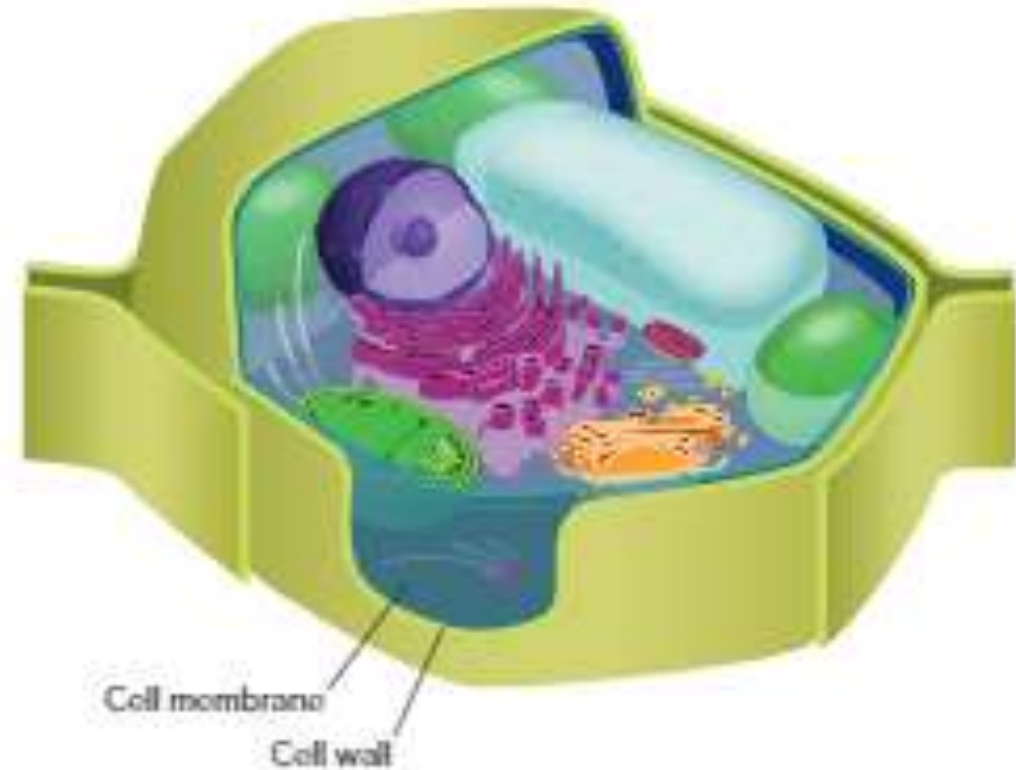
- The cell membrane surrounds the cytoplasm.
- The cytoplasm is a fluid inside a cell that contains salts and other molecules.
- A cell membrane is semipermeable. This means it allows only certain substances, like nutrients and wastes, to enter or leave a cell

<https://www.twig-world.com/film/the-cell-membrane-1044/>



CELL WALL

- Plant cells, fungal cells, bacteria, and some types of protists have cell walls.
- A cell wall is a stiff structure outside the cell membrane.
- A cell wall protects a cell from attack by viruses and other harmful organisms.
- In some plant cells and fungal cells, a cell wall helps maintain the cell's shape and gives structural support
- <https://www.twig-world.com/film/glossary/cell-wall-298/>



How does cell size affect the transport of materials?

- Nutrients, oxygen, and other materials enter and leave a cell through the cell membrane.
- **Surface Area and Volume:**
- The movement of nutrients, waste material, and other substances into and out of a cell is important for survival. For this movement to happen, the area of the cell membrane must be large compared to its volume.

CELL SIZE AND TRANSPORT OF MATERIALS

- **MATH Connection**

A ratio is a comparison of two numbers, such as surface area and volume. If a cell were cube-shaped, you would calculate surface area by multiplying its length (ℓ) by its width (w) by the number of sides (6). You would calculate the volume of the cell by multiplying its length (ℓ) by its width (w) by its height (h). To find the surface-area-to-volume ratio of the cell, divide its surface area by its volume

$$\text{Surface area} = \ell \times w \times 6$$

$$\text{Volume} = \ell \times w \times h$$

$$\frac{\text{Surface area}}{\text{Volume}}$$

What organelles
are involved in
the transport of
materials?

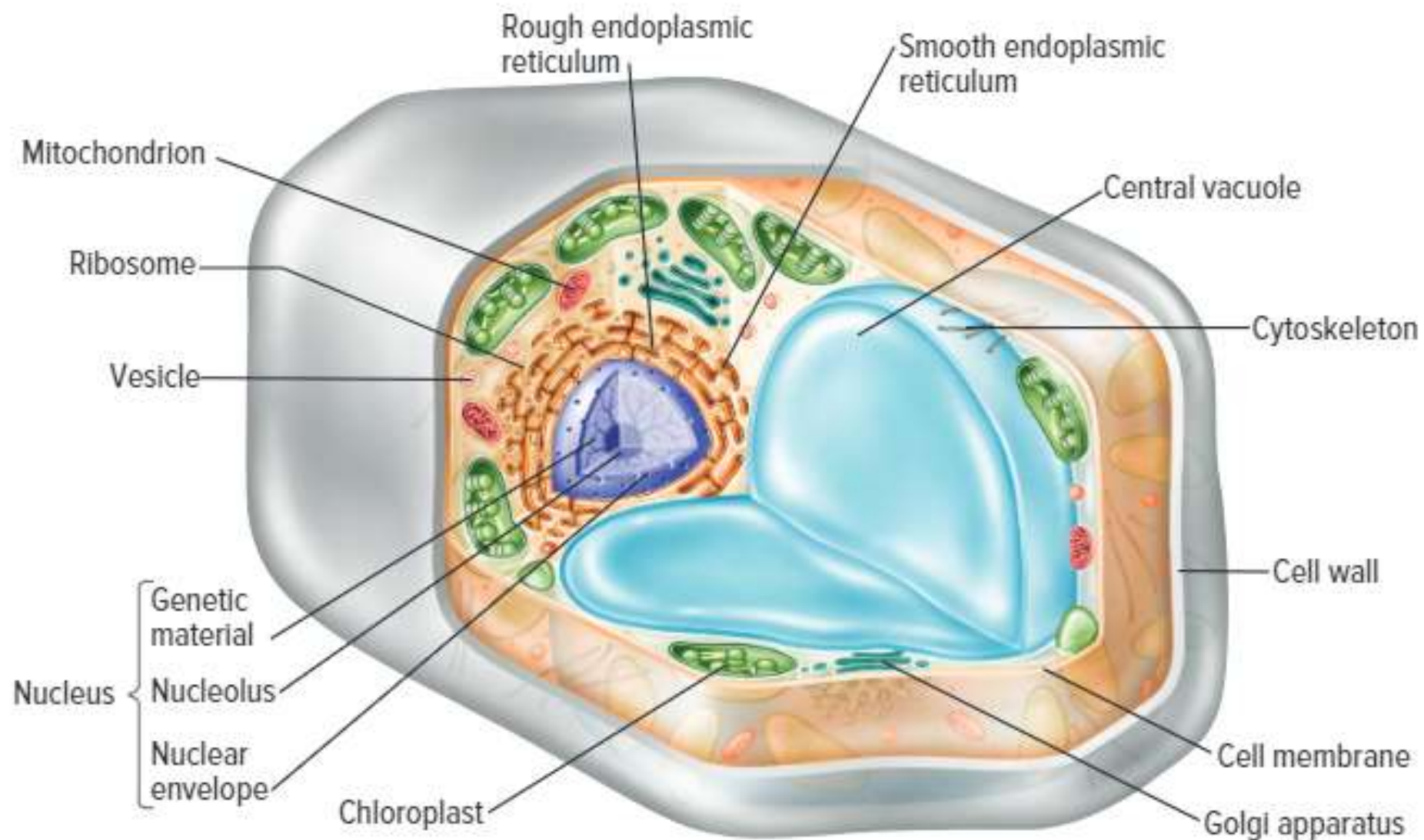
Ribosomes

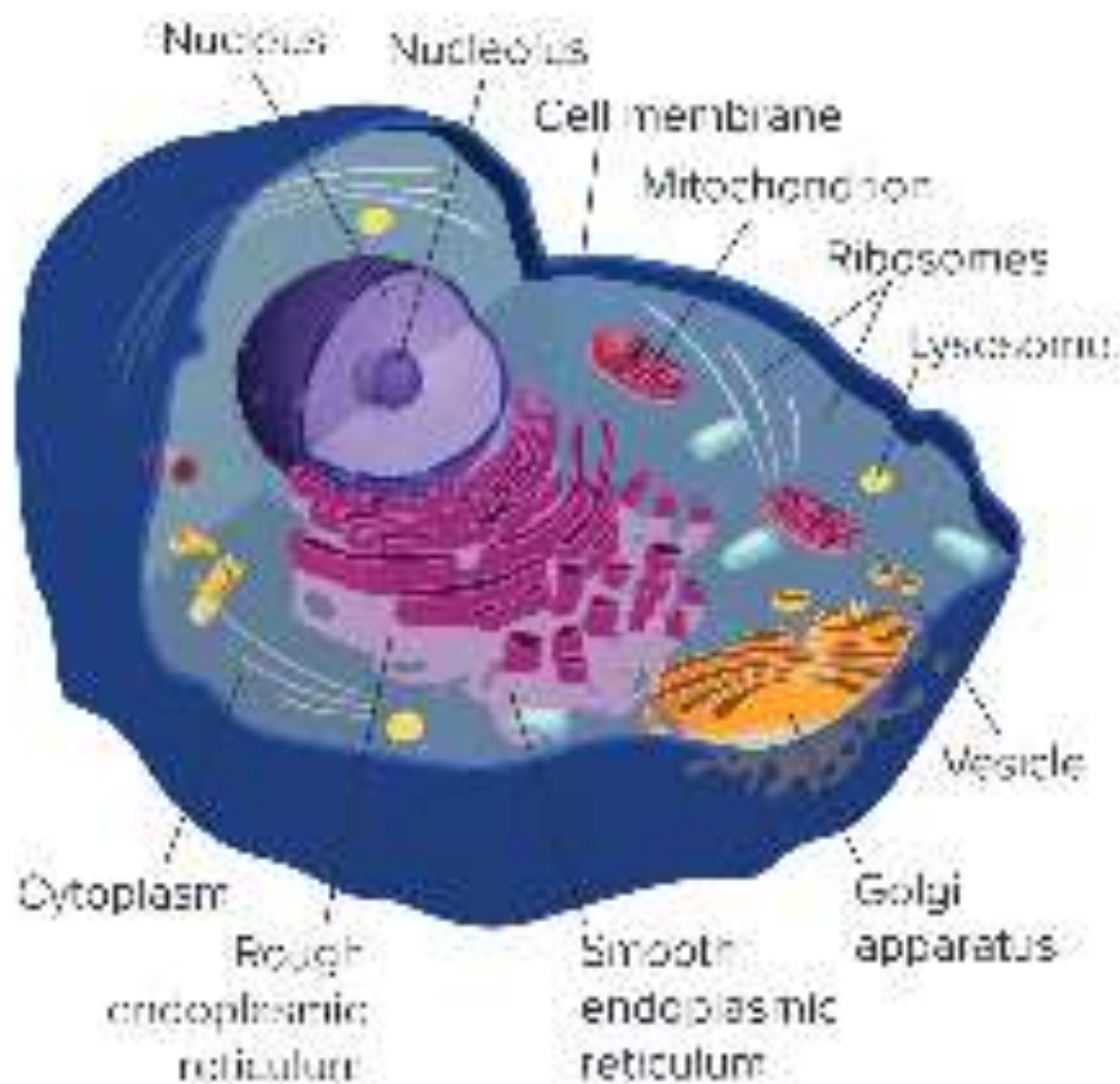
Proteins are made on small structures called ribosomes. Unlike other cell organelles, a ribosome is not surrounded by a membrane

Amino acid molecules made up of carbon, hydrogen, oxygen, nitrogen, and sometimes sulfur, join to form long chains called proteins.

Some proteins help cells communicate with each other while others transport substances inside cells.

This plant cell has a cell membrane and a cell wall.





Animal Cell

<https://www.liveworksheets.com/jj2162323nv>

ENDOPLASMIC RETICULUM

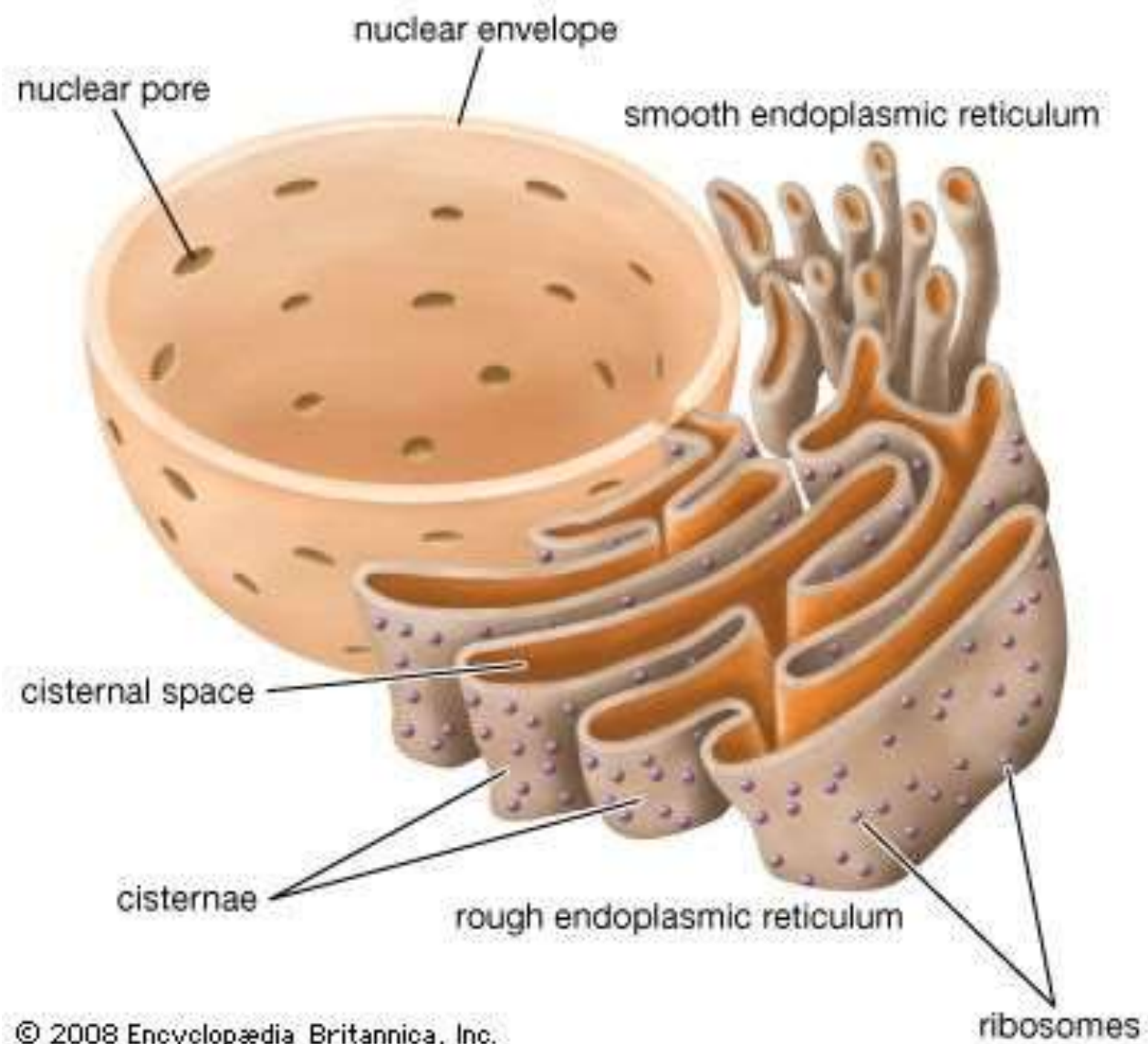
Ribosomes can be attached to a weblike organelle called the endoplasmic reticulum or ER.

The ER spreads from the nucleus throughout most of the cytoplasm.

Endoplasmic reticulum with ribosomes on its surface is called rough endoplasmic reticulum. Rough ER is the site of protein production.

ER without ribosomes is called smooth ER. Smooth ER helps remove harmful substances from a cell.

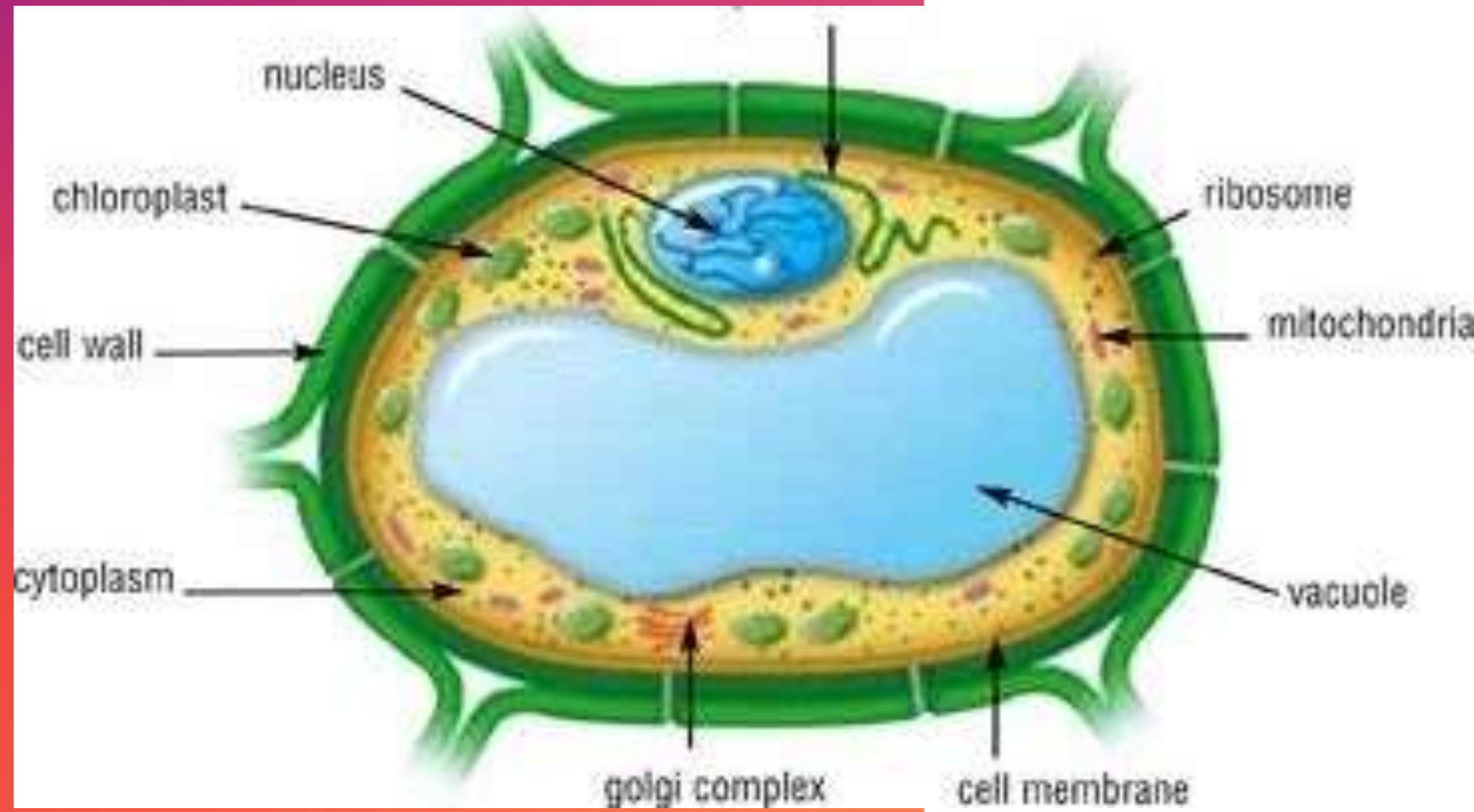
Endoplasmic reticulum





LEARNING OBJECTIVES

- . To know about the different organelles in animal cell and plant cell.



VACUOLES

Vacuoles are organelles that store food, water, and waste material.

A typical plant cell usually has one large vacuole. Some animal cells have many small vacuoles. A plant cell's vacuole may take up half of the cell's size.

This vacuole not only stores water and other substances, but also enables the plant to stay rigid and supported when filled with water.

THE GOLGI APPARATUS

Proteins are prepared for their specific jobs or functions by an organelle called the Golgi apparatus.

Then the Golgi apparatus packages the proteins into tiny, membrane-bound, ball-like structures called vesicles.

Vesicles are organelles that transport substances from one area of a cell to another area of a cell. Some vesicles in an animal cell are called lysosomes.

Lysosomes contain substances that help break down and recycle cellular components

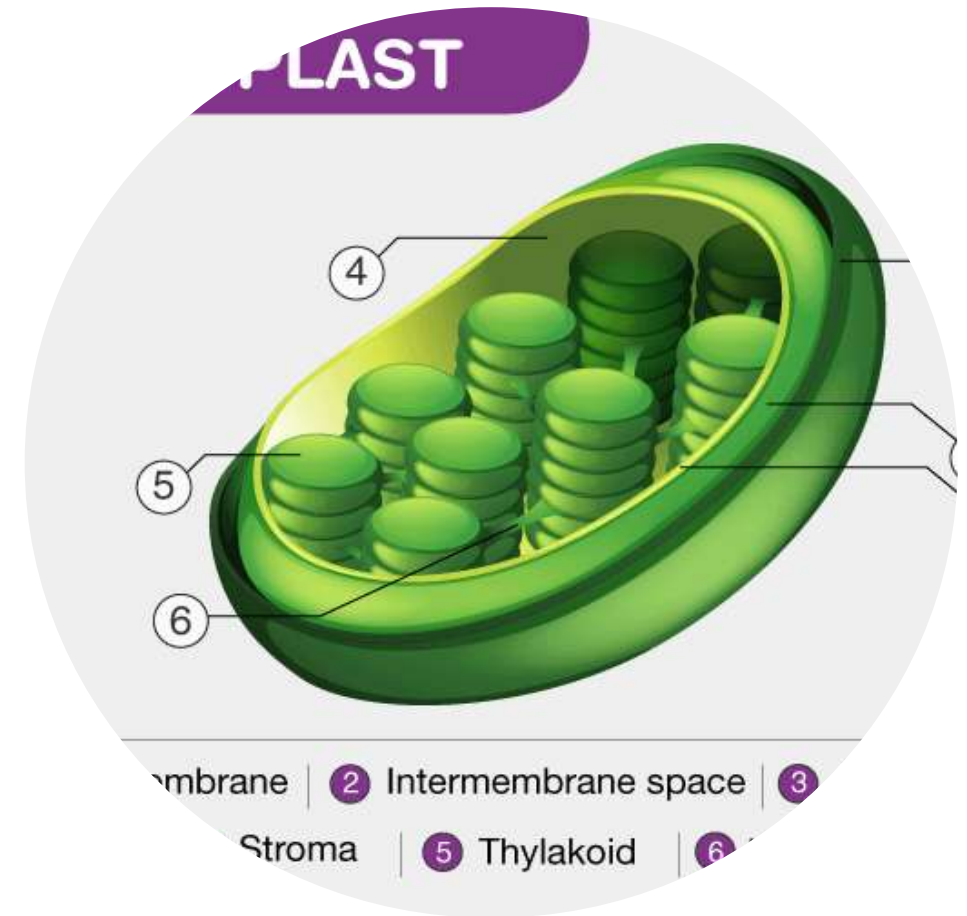
Mitochondria (Powerhouse)

- Mitochondrion powers the cell through chemical reactions.
- Mitochondria are found in both plant and animal cells. It has two membranes to increase the surface area for these reactions to occur.
- Mitochondria are a vital part of cellular respiration.
- Cellular respiration is a series of chemical reactions that convert the energy in food molecules into a usable form of energy called ATP



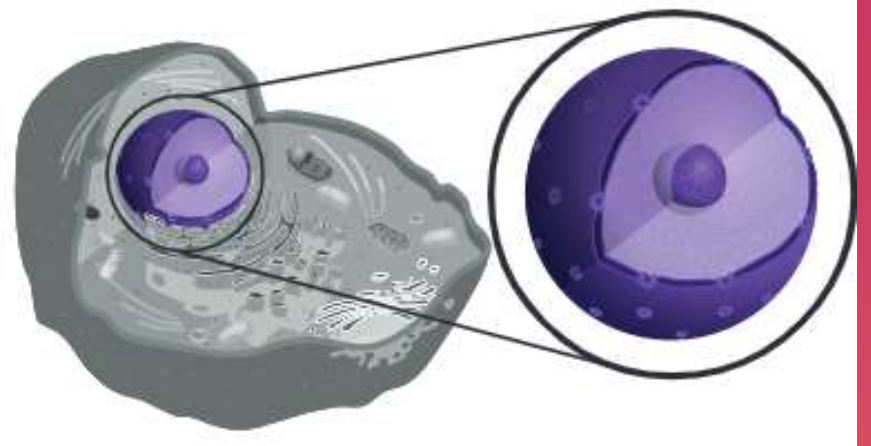
CHLOROPLASTS

- Chloroplasts are organelles that use light energy and make food—a sugar called glucose—from water and carbon dioxide.

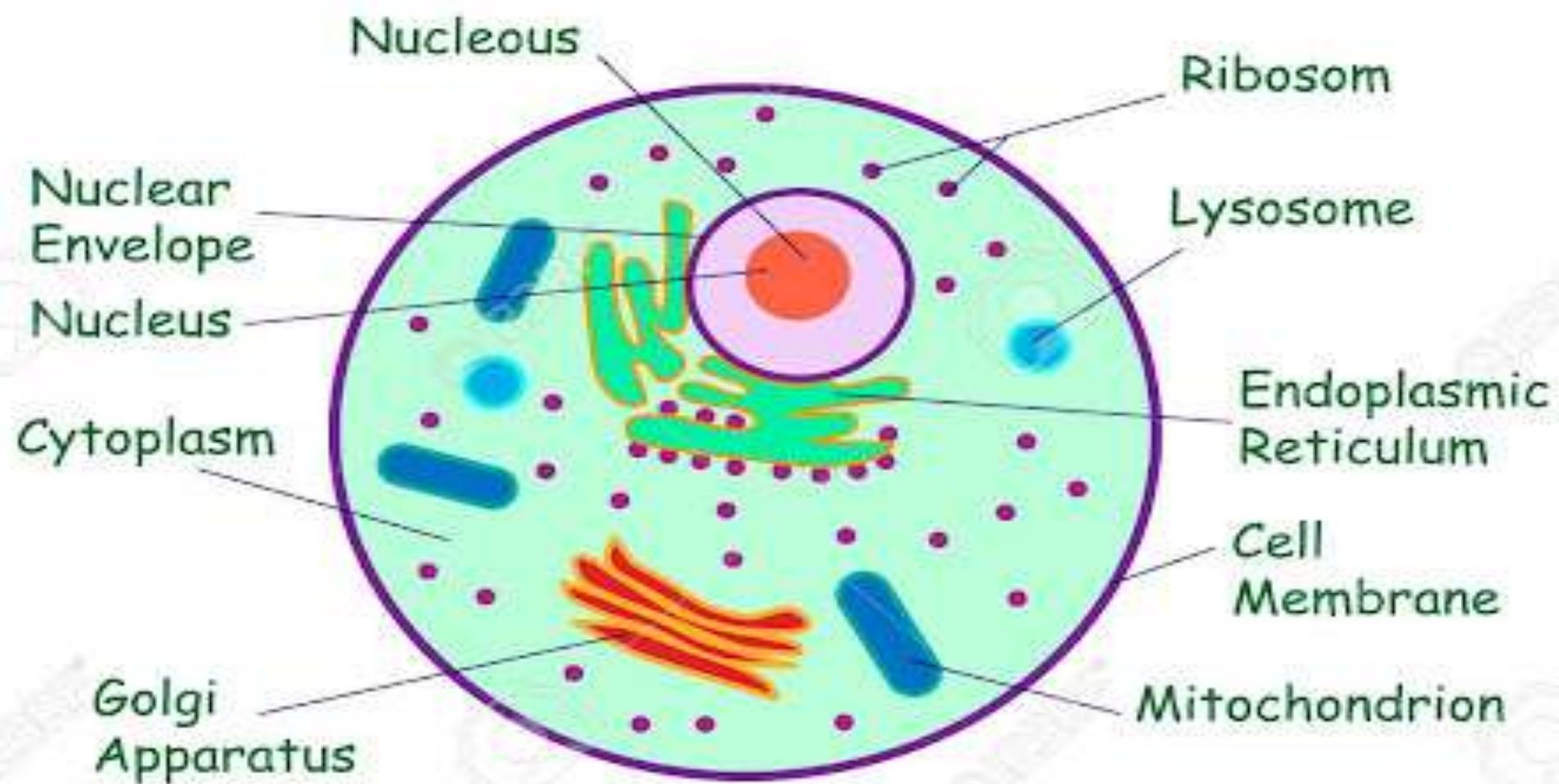


NUCLEUS

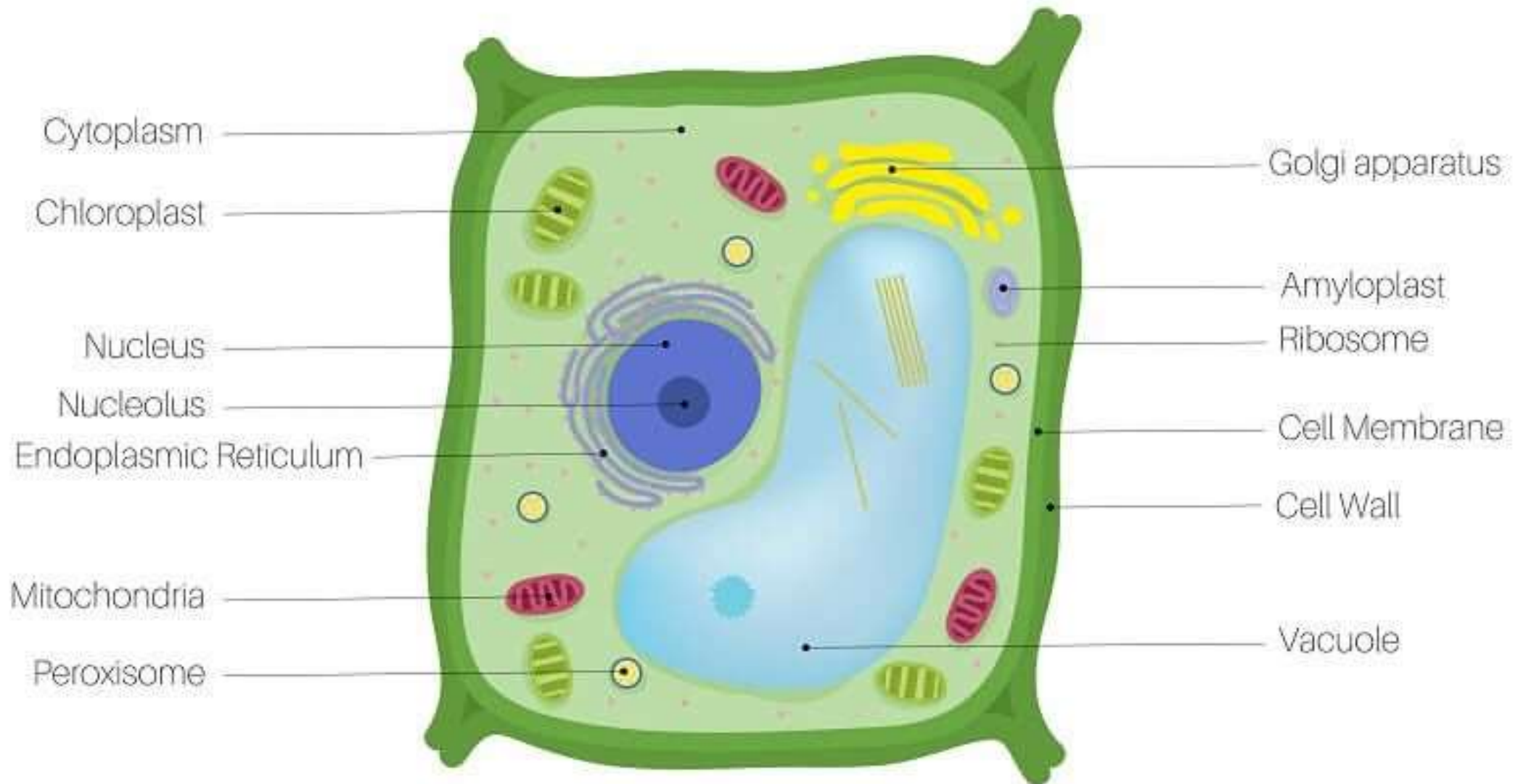
- **The nucleus is the part of a eukaryotic cell that directs cell activities and contains important cellular information stored in DNA.**
- DNA is organized into structures called chromosomes. The DNA of each cell carries information that provides instructions for making all the proteins a cell requires



Animal Cell



Plant cell



STARTER

- https://www.liveworksheets.com/worksheets/en/Science/Cells/Plant_and_Animal_Cells_zr1433394hn

- <https://quizizz.com/admin/quiz/613cb3785de830001d386d8b/cells-and-cell-parts>

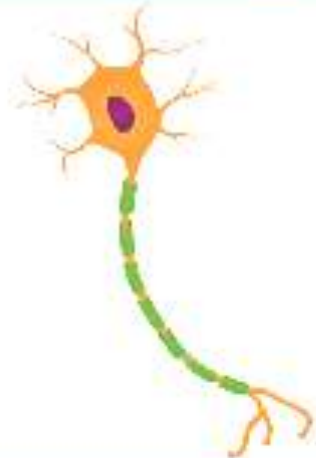
Types of cells and structures

Cells in the body can be incredibly diverse.

- Red blood cells are disk-shaped, which helps them move through blood vessels so that they can carry oxygen throughout the body.
- Xylem cells are tubelike cells that transport water from the roots to the leaves of plants.
- The neuron is a cell found in many animals that transmits impulses from different parts of the body. Each cell is unique but works with other cells as body functions are carried out

Create a table like the one below in your Science Notebook. Infer each cell's function based on its shape.

Red blood cells are disk-shaped, which helps them move through blood vessels



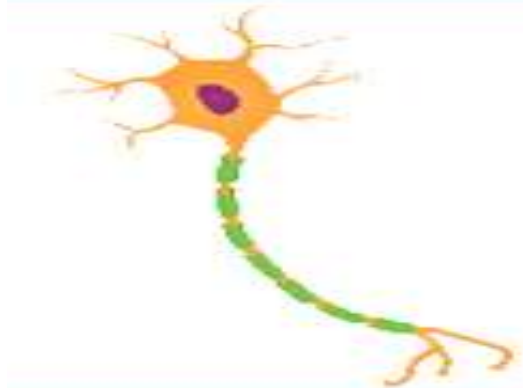
Types of cells and structures



Red blood cells are disk-shaped, which helps them move through blood vessels



Xylem cells are tubelike cells that transport water from the roots to the leaves of plants.



The neuron is a cell found in many animals that transmits impulses from different parts of the body

- Classify information about organelles and cell structures. Draw a table like the one below in your Science Notebook. In the center column, describe the function of each. In the right-hand column, indicate whether the organelle is in a plant cell, an animal cell, or both.

Organelle	Function	Plant, animal, or both
Nucleus		
Mitochondria		
Chloroplasts		
Cell wall		
Cell membrane		

Three-Dimensional Thinking

2. Rosa is planning an investigation using a microscope to try to identify a group of cells. She sees that the cells are joined together, so she knows that they are from one organism. If she also sees that all of the cells have cell walls, Rosa can conclude that she could be looking at

A bacterial cells.

B human cells.

C mouse cells.

D plant cells.

3. Mitochondria function as subsystems within the larger system of the cell as a whole. Which explains why a mitochondrion, shown on the right, is known as the “powerhouse” of a cell?

- A. It converts energy in food to ATP.
- B. It helps the cell gather sunlight
- C. The cell eats it as food.
- D. It has two membranes

Which statement could you use to construct an explanation for why it is important for a cell's surface-area-to-volume ratio to not be too small?

- A. Wastes and nutrients need to move through the membrane
- B. If a cell's surface-area-to-volume ratio was too small, the cell would starve
- C. If a cell's surface-area-to-volume ratio was too small, the cell would not produce enough waste material
- D. If a cell's surface-area-to-volume ratio was too small, the organelles would grow too large to fit within the cell

Infer

Suppose that you are a scientist and you have been given a sample of unknown cells. By looking at the cells under a microscope, what would you be able to determine about the organisms the cells came from? Explain your reasoning

Explain

Your friend is making a model of a cell and wants to use metal to represent the cell membrane because metal is solid and would allow nothing to enter or leave the cell. Explain why you agree or disagree with his reasoning.

- <https://www.youtube.com/watch?v=oebd3sdoCz4>

<https://www.ixl.com/science/grade-6/compare-cells-and-cell-parts>

Infer

Suppose that you are a scientist and you have been given a sample of unknown cells. By looking at the cells under a microscope, what would you be able to determine about the organisms the cells came from? Explain your reasoning

Answers may vary. Sample answer: By looking at the cells under a microscope, I would be able to infer what kind of organism the cells came from. I could see if the cells had cell walls, and if so, I could infer they came from a plant, fungus, bacteria or protist. If the cells had chloroplasts, I could infer that they were either from a plant or were a protist.

Explain

Your friend is making a model of a cell and wants to use metal to represent the cell membrane because metal is solid and would allow nothing to enter or leave the cell. Explain why you agree or disagree with his reasoning.

Answers may vary. Sample answer: I disagree because cell membranes are flexible and allow certain materials to enter and leave cells.