

Many Parts, Many Purposes

A supermarket is divided into many parts. Each part has a specific function. Aisles of shelves hold boxed and canned foods, while freezers and refrigerators store other foods. In the produce section, fruits and vegetables are arranged in cushioned containers.

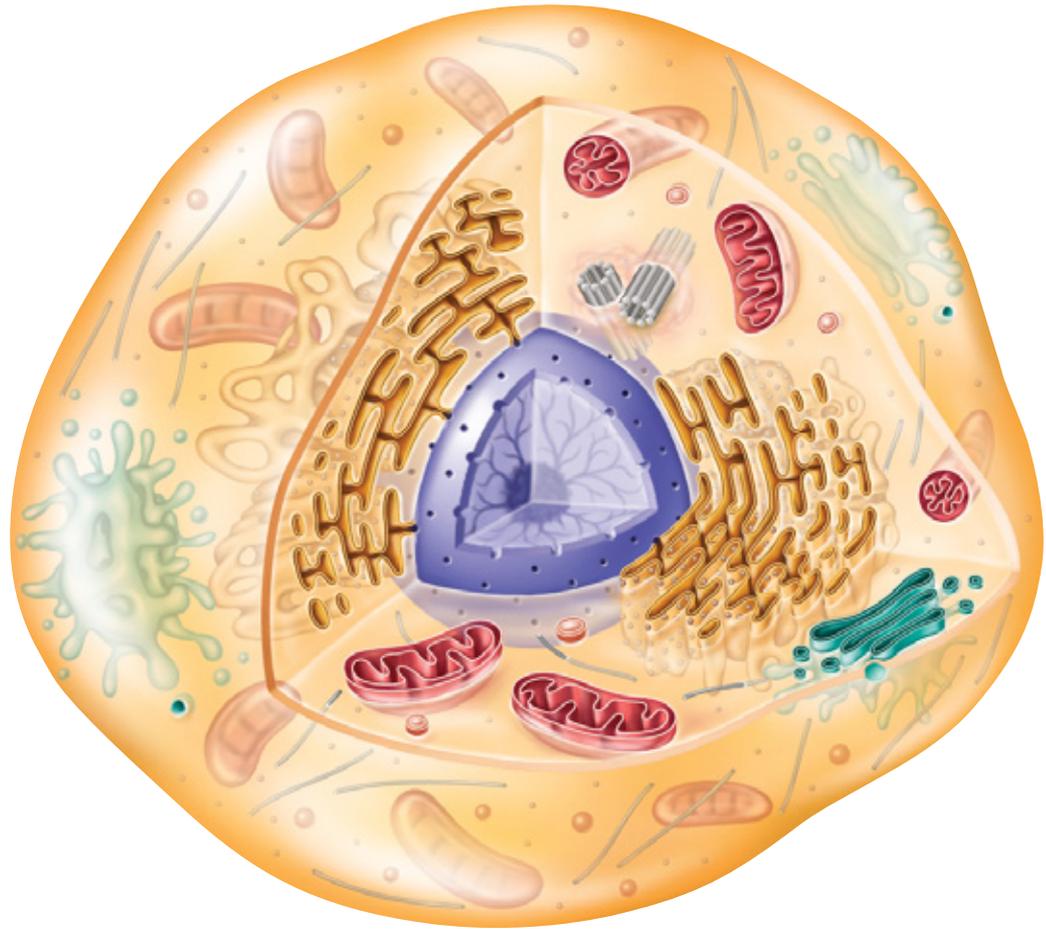
Just like a supermarket, cells have many parts. Each part performs a specific function.

- ❶ Why does a supermarket have different parts?
- ❷ Why are parts important for cells?
- ❸ What parts of a cell do you know about?



The Cell Theory

- All living things are made of one or more cells.
- The cell is the smallest unit of life.
- All new cells come from preexisting cells.



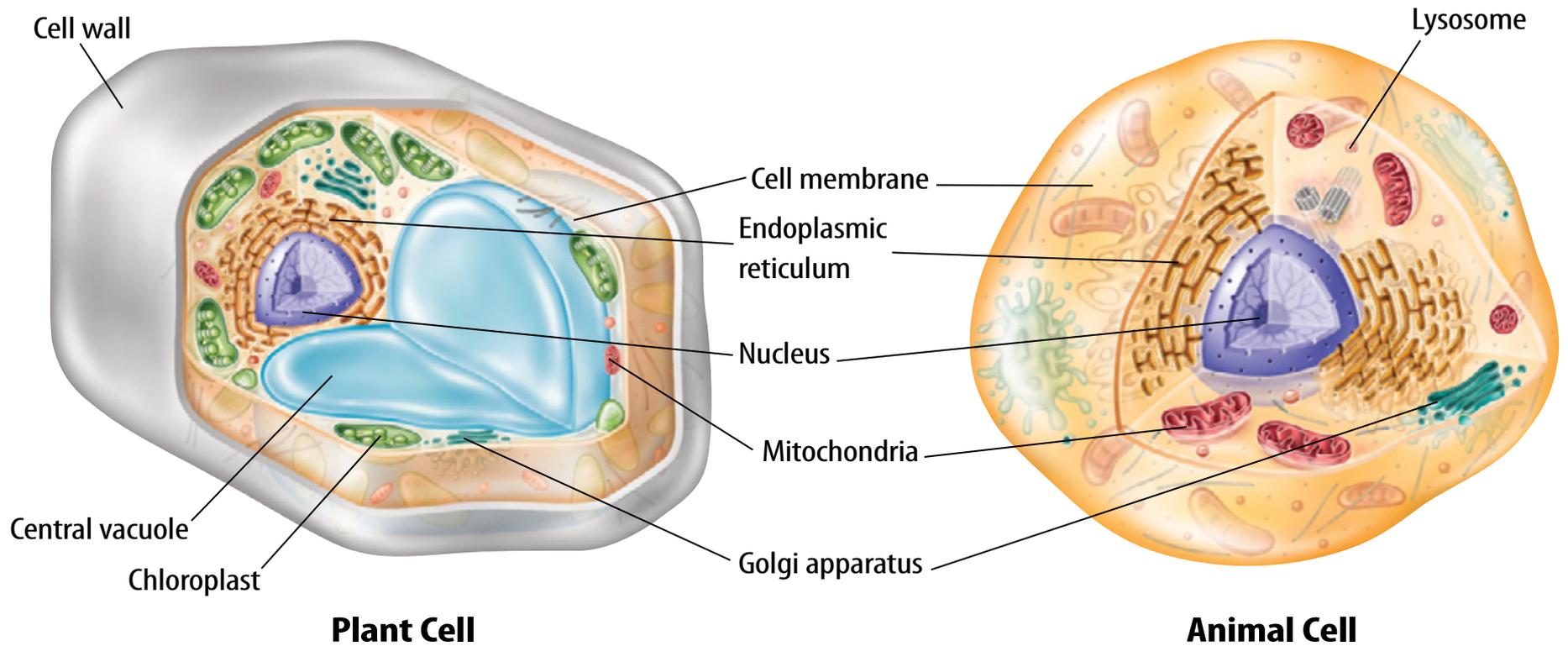
A Winning Team

Cells and soccer teams have a lot in common. Both are made of parts that must work together to accomplish tasks.

- ❶ Why is it important for soccer players to work together as a team?
- ❷ What are some functions that parts of a cell might perform?
- ❸ A soccer team is penalized if a player breaks the rules. What “penalty” might a cell face if its parts break or fail?



Plant and Animal Cells



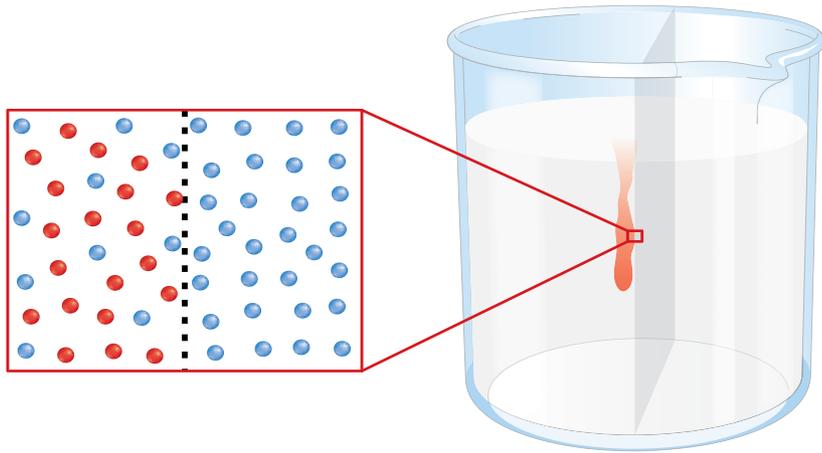
Hold Your Horses

This fence encloses a space for horses called a paddock. This horse must stay behind the fence because he is too large to squeeze between the boards.

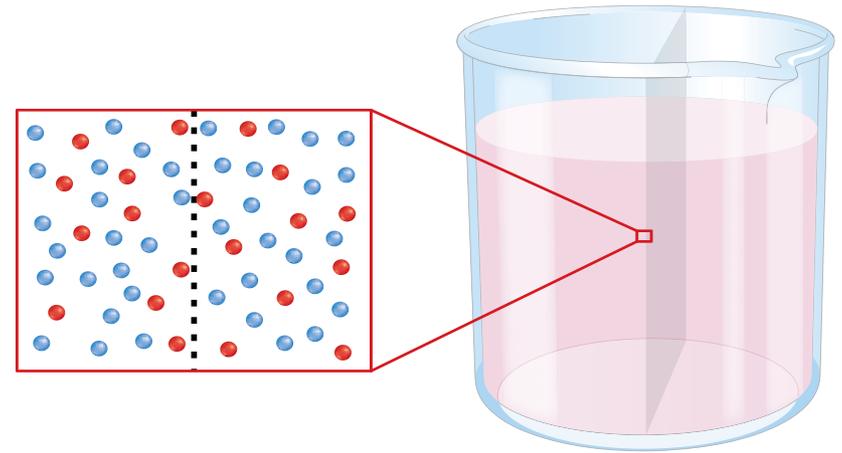
- ❶ What other animals could this paddock hold? What animals could easily enter or leave the paddock?
- ❷ A living cell is like a paddock. Which part makes up the “fence” of the cell?
- ❸ Why does a cell have a part that acts like a fence rather than a brick wall?



Diffusion



Dye added to water



After 30 minutes

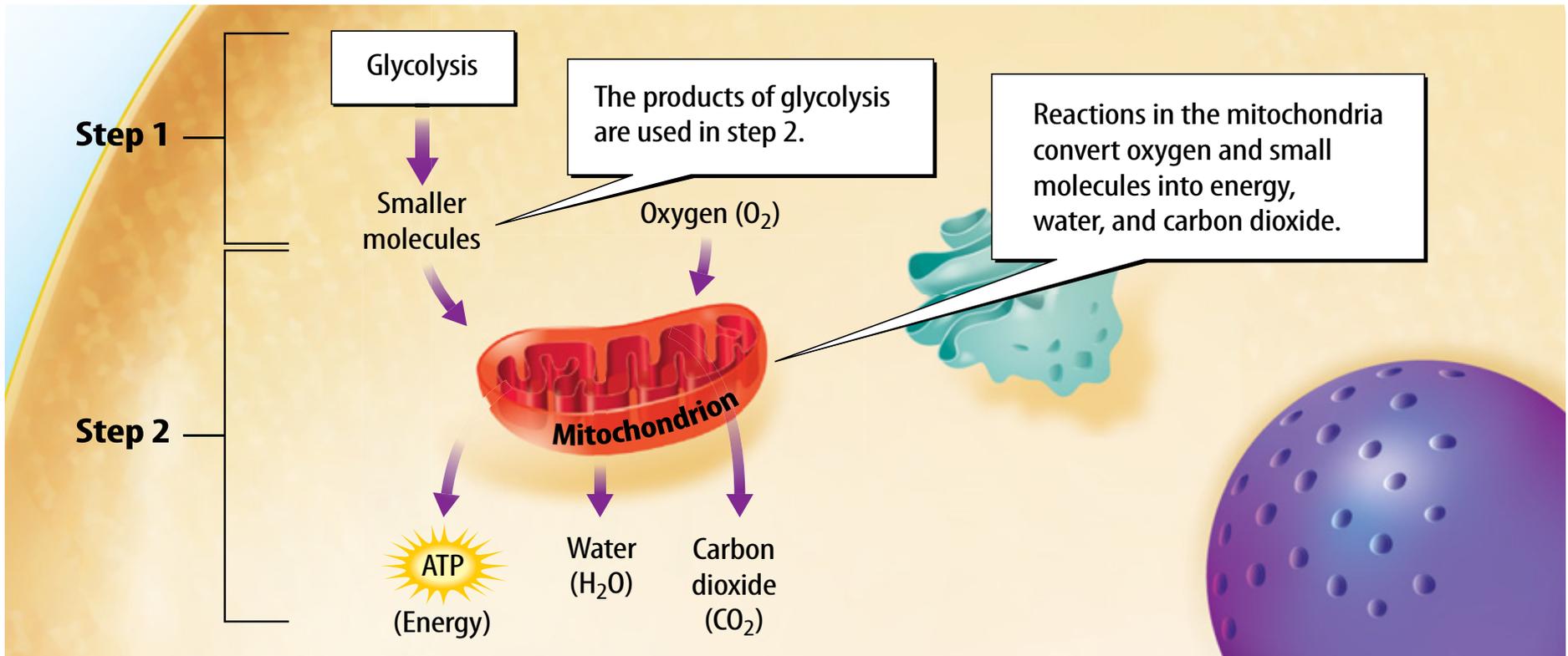
Basking in the Sun

Visitors to this tropical island depend on the leaves of the palm trees for shade. Unlike the needs of human visitors to the island, all of the palm tree's needs are fulfilled while rooted to one spot. This is true for trees of all kinds.

- 1 Describe the different parts of a palm tree.
- 2 Leaves provide shade for humans. What do they provide for the tree?
- 3 Compare the leaves of a palm tree to the leaves of another plant that you know about.



Reactions in the Mitochondria



Teacher Guide

Cell Structure and Function

Lesson 1 Bellringer

Philip Coblenz/Brand X Pictures/PictureQuest

Many Parts, Many Purposes

- Have students describe the parts and layout of a supermarket they visit. Ask them to name parts not mentioned in the transparency, such as bakery and meat counters, cashier stations, and store entryways. Lead them to recognize that each part makes its own contribution to the function of the supermarket, and that many of the parts are essential.
- Remind students that living cells are much smaller than canned goods or trays of fruit. The human body consists of about 10 to 100 trillion cells, each a fraction of a millimeter wide.

Answers to Questions

- 1 Different foods must be stored under different sets of conditions. Each part of the supermarket is designed to store and display a certain type of food.
- 2 Each part performs a specific job or function that is necessary to keep the cell alive.
- 3 Possible answers include the cell membrane, which divides the cell from the environment and protects it from invaders; the nucleus, which is the control center for the cell; mitochondria, which provide energy; and chloroplasts in plant cells, which perform photosynthesis.

Lesson 1 Focus on Content

The Cell Theory

- Remind students that the cell theory was proposed in the mid 1800s, and scientists still use it to this day. Ask students to discuss the meaning of each of the three principles of this theory.

Lesson 2 Bellringer

Moodboard/Corbis

A Winning Team

- Ask students to describe the different jobs that soccer players perform during a game. These jobs include kicking the ball toward the goal, passing it to another player, or blocking the kicks of the opposing team. Parts of the cell also do specific jobs to help their “team,” which is the cell as a whole.

Answers to Questions

- 1 To win a game, a team must score goals and stop the other team from scoring. This requires cooperation and communication among teammates, as well as every teammate completing his or her assigned tasks.
- 2 Possible answers: The cell membrane divides the cell from the outside and protects the cell from invaders. The cell nucleus is like the team captain: it controls all cell functions.
- 3 Without all of its parts working properly, a cell most likely would die.

Lesson 2 Focus on Content

Plant and Animal Cells

- Have students compare and contrast the parts of the plant and animal cell. Point out parts that both cells share, such as the nucleus, endoplasmic reticulum, and ribosomes. Then point out parts

that distinguish the two cells, such as the cell wall and chloroplasts.

Lesson 3 Bellringer

George Gutenberg/Beateworks/Corbis

Hold Your Horses

- A horse paddock also includes a gate for letting horses in and out. In the cell membrane, special proteins act like gates. They open and close to allow the passage of certain ions and other particles.

Answers to Questions

- 1 The paddock could hold large grazing animals, such as donkeys, cows, and llamas. Animals small enough to pass through the fence, as well as animals that could jump or fly over it, could easily enter and leave.
- 2 Like a paddock, a cell is made of parts that stay inside a boundary. The cell membrane acts as the fence of the cell.
- 3 To stay alive, cells take in materials such as water, food, and, in many cases, oxygen. These materials must pass through the cell membrane, which acts more like a fence than a wall.

Lesson 3 Focus on Content

Diffusion

- Remind students that diffusion can take place across a membrane or without a membrane. In this example, the dye will continue diffusing until its concentration is uniform throughout the beaker of water.

Lesson 4 Bellringer

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Basking in the Sun

- Plants make their own food in the process of photosynthesis. Photosynthesis is a series of chemical reactions that convert water and carbon dioxide into glucose and oxygen. Sunlight provides the energy for photosynthesis.
- Ask students to describe other familiar plants. Lead them to conclude that nearly all plants have green leaves or other green parts. The green color comes from chlorophyll, the pigment that most plants use to perform photosynthesis.

Answers to Questions

- 1 The parts of a palm tree include thin green leaves on top, a thick trunk, and a network of roots in the ground below.
- 2 The leaves meet the tree’s need for energy. Cells in the leaves harness the energy of sunlight.
- 3 Type of leaf, size, shape, thickness, surface features, and color are some of the characteristics that students might use to compare the leaves of another plant to those of a palm tree.

Lesson 4 Focus on Content

Reactions in the Mitochondria

- Have students review the roles of cell parts and structures shown in the transparency, including the mitochondria, cell membrane, and cytoplasm. Point out that oxygen enters into the reactions of cellular respiration only inside the mitochondria, not in the cytoplasm.