

Key Concept 3: Cell Transport and Homeostasis

Learning Objectives

Students will be able to ...

Essential Knowledge

Students need to know that ...

Cellular Membrane Structure

CELLS 3.1(a) Explain how cell membranes function in maintaining dynamic homeostasis for biological systems.

CELLS 3.1(b) Create and/or use models to explain the structure and function of cell membrane components.

CELLS 3.1.1 Cells have phospholipid membranes that are selectively permeable.

- a. All cells have membranes that separate the cell from the external environment; some cells also have a cell wall for structure and protection.
- b. Membranes consist of a phospholipid bilayer with proteins interspersed throughout and on either surface.
- c. Carbohydrate chains attach to some surface proteins and together they contribute to cell-to-cell chemical identification.

CELLS 3.2(a) Use data to investigate how various solutes and/or solvents passively move across membranes.

CELLS 3.2(b) Explain how materials move into or out of the cell across the cell membrane.

CELLS 3.2(c) Create and/or use representations and/or models to predict the movement of solutes into or out of the cell.

CELLS 3.2.1 Cells depend on the ability to move material into and out of the cell membrane in order to maintain dynamic homeostasis.

- a. Passive transport involves the movement of solutes across the membrane along the concentration gradient, without the use of additional energy.
- b. Active transport involves the movement of solutes across the membrane against their concentration gradients with the use of additional energy.
- c. Bulk transport of molecules across the membrane is accomplished using endocytosis or exocytosis.

Cell Size and Diffusion

CELLS 3.3(a) Describe how the size of a cell affects its ability to function efficiently.

CELLS 3.3.1 Diffusion is most efficient when the surface area is high and the volume is low.

- a. Small cell size creates a surface-area-to-volume ratio that enables more efficient diffusion.
- b. The surface-area-to-volume ratio gets smaller as the cell gets larger.

Cross Connections: Students should make *connections to key concepts* from Unit 1: Ecological Systems. The cycling of matter contributes to the type of materials that the cell will transport to sustain necessary functions and support energy production.