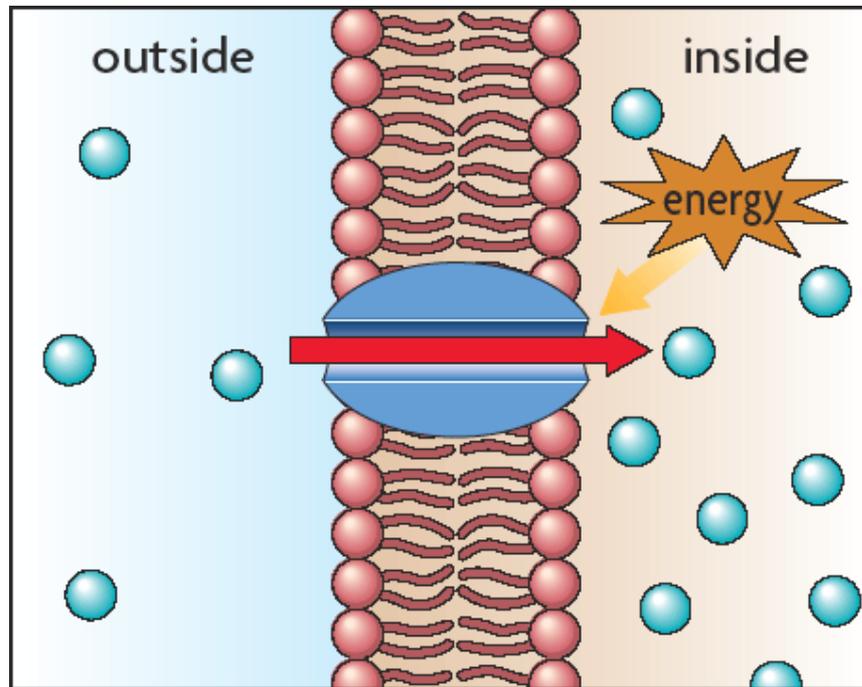


## 3.5 Active Transport, Endocytosis, and Exocytosis

**KEY CONCEPT** Cells use energy to transport materials that cannot diffuse across a membrane.



A microscopic image showing various cells, likely from a tissue sample, with different shapes and internal structures. The image is in shades of blue and green.

## 3.5 Objectives

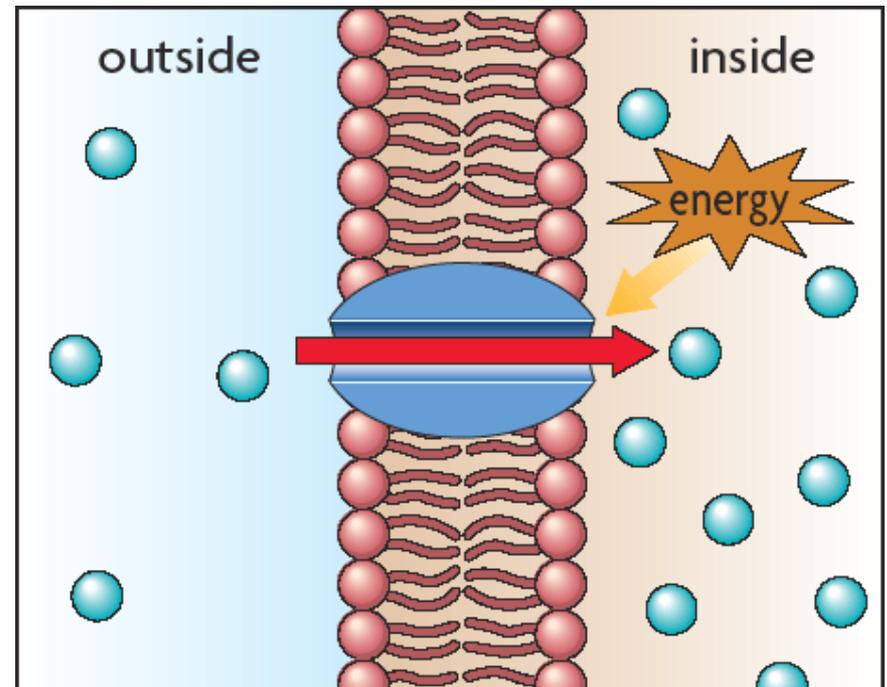
Describe active transport.

Distinguish among endocytosis, phagocytosis, and exocytosis.

## 3.5 Active Transport, Endocytosis, and Exocytosis

**Active transport requires energy input from a cell and enables a cell to move a substance against its concentration gradient.**

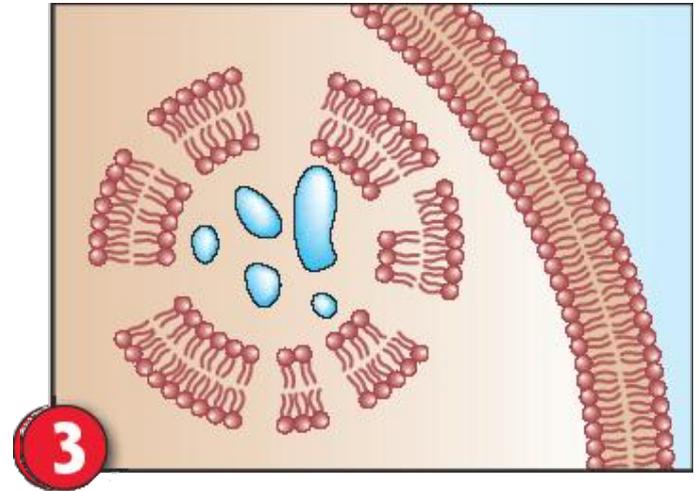
- Passive transport requires no energy from the cell.
- Active transport is powered by chemical energy (ATP).
- Active transport occurs through transport protein pumps.
- Cells use active transport to maintain homeostasis.



## 3.5 Active Transport, Endocytosis, and Exocytosis

**A cell can import and export large materials or large amounts of material in vesicles during the processes of endocytosis and exocytosis.**

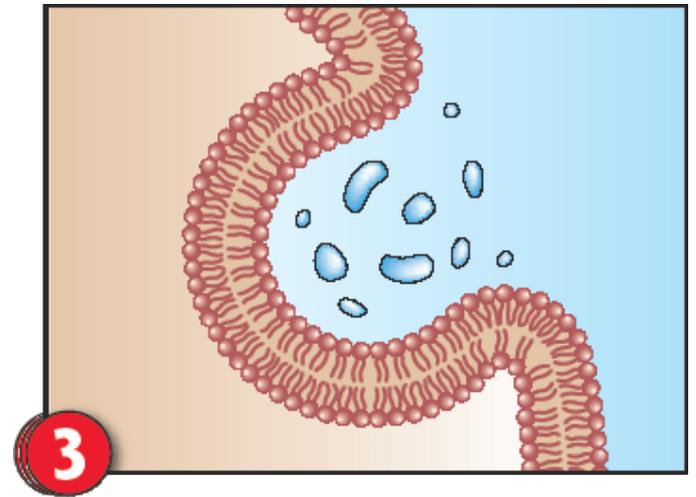
- Cells use energy to transport material in vesicles.
- Endocytosis is the process of taking material into the cell.
- Phagocytosis is a type of endocytosis.



## 3.5 Active Transport, Endocytosis, and Exocytosis

**A cell can import and export large materials or large amounts of material in vesicles during the processes of endocytosis and exocytosis.**

- Cells use energy to transport material in vesicles.
- Exocytosis is the process of expelling material from the cell.



A microscopic image showing various cells and structures, likely from a biological specimen, with a blue and green color palette. The image is positioned at the top of the slide, above the text.

### 3.5 Assessment: How do transport proteins that are pumps differ from those that are channels?

Pumps require energy, transport a molecule against its concentration gradient, and change shape upon binding. A protein channel does not change shape or require energy. It allows certain molecules to diffuse through it, down their concentration gradient.

A microscopic image showing various cells, likely from a tissue sample, with different shapes and internal structures. The image is in shades of blue and green.

### 3.5 Assessment: How do endocytosis and exocytosis differ from diffusion?

They require energy input; diffusion does not. They also enable larger particles to enter a cell, particles that are too large to diffuse across a cell membrane.

A microscopic image showing various cells, likely from a tissue sample, with different shapes and internal structures. The image is in shades of blue and green.

3.5 Assessment: Small lipid molecules are in high concentration outside a cell. They slowly cross the membrane into the cell. What term describes this action? Does it require energy?

Diffusion

No

A microscopic image showing various cells, likely from a tissue sample, with different shapes and internal structures. The image is in shades of blue and green.

3.5 Assessment: Ions are in low concentration outside a cell. They move rapidly into the cell via protein molecules. What term describes this action? Does it require energy?

Active transport

Yes