Stayin’ Alive

What is homeostasis?

- **Homeostasis** is the maintenance of a constant internal state in a changing environment.

- Homeostasis ensures that cells can obtain and use energy, make new cells, exchange materials, and eliminate wastes in a changing environment.
What is homeostasis?

- Unicellular organisms exchange materials directly with the environment.

- Multicellular organisms have systems that transport materials to cells from other places within the organism.

- The cardiovascular system in humans and xylem and phloem in plants are transport systems.
Get Growing!

How do cells get energy?

• Cells get energy by breaking down materials.

• Plants, algae, and some bacteria make their own food by a process called **photosynthesis**.

• In the presence of sunlight, carbon dioxide and water are converted to sugar and oxygen in the chloroplasts.
How do cells get energy?

- Plants and animals use oxygen during cellular respiration to produce energy from food.

- Sugars and oxygen are converted to water, carbon dioxide, and energy during respiration.

- Photosynthesis and respiration are linked because each process depends on the products of the other.
How do cells divide?

- Cells grow, divide, and die at different rates and for different reasons.

- In eukaryotes, DNA is copied before a cell can divide.

- The nucleus and the rest of the cell divide to make two new cells.
How do cells divide?

- **Mitosis** is cell division that forms two new nuclei that are identical to each other.

- DNA is packaged as *chromosomes* in the cell.

- During mitosis, the chromosomes are separated and genetic material is split evenly between the new, genetically identical cells.
Move It!

How do cells exchange materials?

• Cell membranes are *semi-permeable*, allowing only certain particles to move into or out of the cell.

• The movement of materials across a cell membrane without the use of energy is called *passive transport*. 
How do cells exchange materials?

- **Diffusion** is the movement of molecules from high concentrations to low concentrations.

- **Osmosis** is the diffusion of water through a semi-permeable membrane.

- Large molecules move into and out of cells through protein channels.
How do cells exchange materials?

- At some point, the movement of tea out of the bag stops or slows down considerably. Why?
How do cells exchange materials?

- **Active transport** is the movement of particles against a concentration gradient and requires energy.

- *Endocytosis* and *exocytosis* are forms of active transport that move large particles into and out of cells.
How do cells exchange materials?

- Why are both active and passive transport necessary to move materials into and out of cells?
How do cells exchange materials?

• **Endocytosis** is a process by which a cell uses energy to surround and enclose a particle in a vesicle to bring the particle into the cell.

• **Exocytosis** is a process by which particles are enclosed in a vesicle in a cell and released from the cell.
How do organisms maintain homeostasis?

• Cells and whole organisms must work to maintain homeostasis in a constantly changing environment.

• Some animals adapt their behavior to control body temperature.

• Trees can show seasonal responses to changes in the environment.