

Key Concept 4: Organisms Maintaining Homeostasis

Learning Objectives

Students will be able to ...

Essential Knowledge

Students need to know that ...

Organ/Tissue Systems

CELLS 4.1(a) Describe how organ systems work together to maintain homeostasis.

CELLS 4.1(b) Predict the consequence of a disruption in homeostasis.

CELLS 4.1.1 Multicellular organisms rely on tissues and organ systems to transport nutrients and waste in order to maintain dynamic homeostasis.

- a. Animals have organ systems that work together to transport nutrients and excrete waste.
 - 1. The digestive system is needed to derive nutrients and basic building blocks (monomers) from food, which are required for cellular functioning and growth.
 - 2. The respiratory system is needed for gas exchange to obtain oxygen and remove carbon dioxide.
 - 3. The circulatory system is needed to transport oxygen and nutrients to cells.
 - 4. The excretory system is needed to remove toxins and nitrogenous wastes from the body and to maintain water balance with the help of the circulatory system.
- b. Plants have specialized vascular tissues and cells that transport nutrients, water, and waste.
 - 1. Plants depend on xylem to transport water and nutrients for photosynthesis from the roots to the leaves and on phloem to transport sugars from the leaves to the rest of the plant.
 - 2. Plants excrete waste products from photosynthesis through the stomata in their leaves.

Learning Objectives*Students will be able to ...***Essential Knowledge***Students need to know that ...***Response to Stimuli**

CELLS 4.2(a) Describe the benefits associated with tropisms and/or taxes in organisms in response to an external stimulus.

CELLS 4.2(b) Predict how an organism might respond to a change from the external environment in order to maintain homeostasis.

CELLS 4.2.1 Organisms have positive or negative responses to external stimuli in their environment in order to maintain dynamic homeostasis.

- a. Plants exhibit tropisms that determine direction of growth toward or away from a stimulus, such as light, chemicals, gravity, touch, and water.
- b. Animals exhibit taxes that enable them to move in response to a stimulus, such as food, light, or pH.

Content Boundary: It is not the intent for students to develop a deep understanding of body systems. The *focus* here is on using a few key systems—digestive, respiratory, circulatory, and excretory—as a means to understanding how systems work together to support overall functions in a multicellular organism. These systems help deepen students' understanding about acquiring energy, eliminating waste, and the role of diffusion in those processes. The nervous and endocrine systems are *beyond the scope* of this course.

Content Boundary: Understanding of the role of hormones (e.g., auxin) in plant tropisms is *beyond the scope* of this course.