



Biology - Unit 3 - Cellular Transport

Unit Focus

This unit introduces students to life at the cellular level with an emphasis on cell structure and function. The purpose of this unit is to help students recognize that interactions within complex levels of organization between organisms learned in previous units originate from complex physiological interactions at the cellular level within a single organism. Students explore the regulatory function of the cell membrane as well as the physical property of solubility.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
<p>Next Generation Science <i>High School Life Sciences: 9 - 12</i></p> <ul style="list-style-type: none"> Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. <i>HS-LS1-2</i> Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. <i>HS-LS1-3</i> <p>Next Generation Science Standards (DCI) <i>Science: 9</i></p> <ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life. <i>LS1.9.A1</i> Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. <i>LS1.9.A3</i> Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or 	<p>T1 Make observations and ask questions to define a problem based on prior knowledge and curiosity that stimulates further exploration, analysis, and discovery.</p> <p>T2 Use the scientific process to generate evidence that addresses the original questions.</p> <p>T3 Analyze qualitative and quantitative data to interpret patterns, draw conclusions, and/or make predictions.</p>	
	Meaning	
	Understanding(s)	Essential Question(s)
	<p>U1 All cells have internal structures that help regulate the movement of substances into and out of the cell.</p> <p>U2 Cells throughout an organism can develop in different ways to perform different tasks</p> <p>U3 Individual cells can combine to form structures that increase the complexity of an organism</p> <p>U4 All organisms strive to maintain a balance between the internal and external environment through positive and negative feedback loops</p> <p>U5 All organisms strive to maintain a balance between the internal and external environment through a variety of adaptations</p>	<p>Q1 How does a cell regulate the movement of substances into and out of the cell?</p> <p>Q2 How does structure and interdependence of the levels of organization allow cells to function as needed?</p> <p>Q3 How are cells organized to form a complex organisms?</p> <p>Q4 How have organisms adapted internal mechanisms to maintain homeostasis with changing external environments?</p>
	Acquisition of Knowledge and Skill	
	Knowledge	Skill(s)
<p>K1 Homeostasis is the process by which organisms keep internal conditions relatively constant despite changes in external environments</p>	<p>S1 Conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis</p>	

Stage 1: Desired Results - Key Understandings

<p>discourage (negative feedback) what is going on inside the living system. <i>LS1.9.A4</i></p> <p>Madison Public Schools Profile of a Graduate</p> <p><i>Critical Thinking</i></p> <ul style="list-style-type: none"> Analyzing: Examining information/data/evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2) <p><i>Creative Thinking</i></p> <ul style="list-style-type: none"> Design: Engaging in a process to refine a product for an intended audience and purpose. (POG.2.2) 	<p>K2 Every living cell exists in a liquid environment that it needs to survive</p> <p>K3 The cell membrane, composed of a phospholipid bilayer regulates what dissolved molecules enter and leave the cell and also provides protection and support</p> <p>K4 Because diffusion depends upon random particle movements, dissolved molecules move along a concentration gradient across the cell membrane without requiring energy.</p> <p>K5 Osmosis is the diffusion of water through a selectively permeable membrane</p> <p>K6 Cells also move dissolved molecules against a concentration gradient across the cell membrane in a process called active transport</p> <p>K7 Cell specialization is the process by which cells develop in different ways to perform specific tasks</p> <p>K8 The levels of organization in a multicellular organism are individual cells, tissues, organs, and organ systems.</p> <p>K9 Vocabulary: cohesion, adhesion, mixture, solution, solute, solvent, pH scale, acid, base, buffer, cell membrane, cell wall, lipid bilayer, concentration, diffusion, equilibrium, osmosis, isotonic, hypertonic, hypotonic, facilitated diffusion, active transport, endocytosis, phagocytosis, pinocytosis, exocytosis, cell specialization, tissue, organ, organ system, homeostasis, feedback inhibition</p>	<p>S2 Use a model to illustrate the organization of interacting systems that provide a specific function within a multicellular organism</p> <p>S3 Apply the principles of scientific concepts to novel, real-world situations.</p>
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