

MAPPING GRADE 7 SCIENCE INSTRUCTION

Concept: Patterns of Cellular Organization

PWC Objective: LS-3

The student will investigate and understand that all living things show patterns of cellular organization. Key concepts include:

- cells, tissues, organs, and systems **(SOL LS.3a)**
- life functions and processes of cells, tissues, organs, and systems (respiration, removal of wastes, growth, reproduction, digestion, and cellular transport) **(SOL LS.3b)**

What Students Should Know (Critical Attributes)	What Students Should Be Able To Do (Essential Skills)
<p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> • What are the levels of cellular organization? • How does the division of labor differ between single-celled organisms and many-celled organisms? • What are the processes that are essential for cells to carry out life functions? • What are essential life processes cells must carry out in order to survive? <p><u>Critical Attributes:</u></p> <p>LS.3a The basic structure and function of all living things is the cell. Cells that have the same function group together to form tissues. Tissues that have the same function group together to form organs. Organs with similar functions group to work together in an organ system. Body systems working together form the entire organism.</p> <p>LS.3a The shape of the cell can tell a great deal about the job it performs. For example, the nerve cell has fine extensions that send or receive impulses through the body. The white blood cell can change its shape, allowing it to engulf microbes or invading organisms, and the red blood cells are disk-shaped, to carry oxygen, and have to be small and flexible enough to move through tiny blood vessels. Muscle cells have to allow for contraction, and the sperm cell has a flagellum to allow for locomotion.</p>	<ul style="list-style-type: none"> • Differentiate among cells, tissues, organs, and organ systems. • Explain how cell structure is related to cell function.

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What Students Should Know (Critical Attributes)	What Students Should Be Able To Do (Essential Skills)
LS.3b Unicellular organisms are made of only one cell. A one-celled, or single-celled, organism performs all its functions by itself.	<ul style="list-style-type: none"> • Differentiate between unicellular organisms and multicellular organisms and name common examples of each. • Compare and contrast how unicellular and multicellular organisms perform various life functions. This includes the application of knowledge about systems in organisms. • Compare and contrast the various basic life functions of an organism, including respiration, waste removal, growth, irritability, and reproduction and explain the role that each life function serves for an organism. • Model how materials move into and out of cells in the processes of osmosis, diffusion, and active transport. This includes creating and interpreting three dimensional models and/or illustrations demonstrating the processes involved. Analyze the components of these models and diagrams and communicate observations and conclusions. • Analyze and critique the experimental design of basic investigations as related to the understanding the cellular organization with emphasis on observations of cells and tissue. This analysis and critique should focus on skills in objectives LS-1(a) and LS-1(b).
LS.3b Multicellular organisms are made of many different types of cells that do different jobs. Multicellular organisms exhibit a hierarchy of cellular organization. The division of labor in cells helps multicellular organisms carry out specific, necessary life processes. The different types of tissues present in many-celled organisms are muscle nerve, bone, and connective.	
LS.3b Cells perform numerous functions and processes including respiration, waste removal, growth, irritability, reproduction, and cellular transport.	
LS.3b Cellular respiration (both aerobic and anaerobic) allows cells to release energy.	
LS.3b Metabolism is the total of all activities (such as ingestion, digestion, cellular transport, and excretion) of an organism that allows for cell growth and development.	
LS.3b Cellular transport refers to the processes necessary for moving materials into and /or out of the cell.	
LS.3b Osmosis, diffusion, and active transport are processes by which materials are transported between cells and their environment. Osmosis is the passive transport of water through a cell membrane by diffusion. Diffusion is the movement of molecules from where they are concentrated to where they are less concentrated (a type of passive transport). Active transport is movement of material through a cell membrane with the use of energy.	