

## LIFE SCIENCE CURRICULUM GRADE 7

Enduring Understandings	Standards Addressed	Essential Questions	Activities/Lessons
<b>Structure and Function of Cells</b>			
Breakthroughs in technology can lead to new understandings	Skills of Inquiry The Nature of Science	What technological breakthrough allowed for the discovery of cells?	<ul style="list-style-type: none"> <li>Learn the parts of a microscope and how to use it</li> </ul>
Cells are the basic unit of life	Structure and Function of Cells – Standards 2,3,4	How was it determined that all living things are made up of cells?	<ul style="list-style-type: none"> <li>View slides of different animal, plant, and bacteria cells (project from computer with LCD projector)</li> <li>Examine plant and animal cells under the microscope</li> </ul>
Plant and animal cells share many common structures.	Structure and Function of Cells – Standards 2,3,4 Reproduction and Heredity – Standard 7,8,9	What structures are the same and different in animal, plant, and bacteria cells.	<ul style="list-style-type: none"> <li>Study cell structures in plant, animal, and bacteria cells including elodea cells and human cheek cells</li> <li>Examine plant and animal cells under the microscope</li> <li>Virtual Cell Internet site</li> <li>Live Organisms lab with euglena, paramecium, hydra and daphnia</li> <li>View Cells DVD</li> </ul>
Advance technologies in microscopy continue to help us learn more about cell structure	Structure and Function of Cells – Standards 2,3,4	How have cell staining techniques, digital photography, and electron microscopes helped further the understanding of cells and cell structure?	<ul style="list-style-type: none"> <li>Cell staining lab</li> <li>View slides of cells magnified by electron microscopes (project from computer with LCD projector)</li> <li>View Bacteria DVD</li> </ul>
<b>The Scientific Method</b>			
The Scientific Method is an organized approach to solving problems or answering questions	Inquiry and Experimentation Skills of Inquiry	What is the scientific method and how does it work?	<ul style="list-style-type: none"> <li>Explore the components of the scientific method including hypothesis, theory, controls, variables, replication, and sample size.</li> </ul>
Dependent, Independent, and Controlled Variables are important components of controlled experiments	Inquiry and Experimentation Skills of Inquiry	What are the qualities of a good experiment?	<ul style="list-style-type: none"> <li>Analyze sample experiments</li> </ul>
Accidental discoveries are responsible for some significant discoveries	Inquiry and Experimentation	What are some examples of serendipity?	<ul style="list-style-type: none"> <li>Site famous examples of serendipity</li> </ul>

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<b>Systems of Living Things</b> Living things have a cellular organization, contain similar chemicals, use energy, respond to their surroundings, grow and develop, and reproduce.	Guiding Principle II Reproduction and Heredity – Standard 9	What are the characteristics of living things?	<ul style="list-style-type: none"> <li>Identify and explore the six characteristics of living things</li> <li>Distinguish between unicellular and multi-cellular organisms</li> <li>Observe unicellular organisms under the microscope</li> <li>Identify the common chemicals of life</li> <li>Contrast sexual and asexual reproduction</li> </ul>
Describe the hierarchical organization of multi-cellular organisms	Systems of Living Things – Standard 5	What is the hierarchical order of organs, cells, organisms, tissues, and organ systems?	<ul style="list-style-type: none"> <li>Explore and identify the levels of organization in sample organisms using pictures, slides, or textbook material</li> <li>Observe slides of different tissues</li> </ul>
Cells reproduce through mitosis and meiosis	Reproduction and Heredity – Standards 7 and 9	How do cells reproduce?	<ul style="list-style-type: none"> <li>Compare and contrast the need for two different kinds of cell division</li> <li>Present the steps of mitosis – use mnemonics to help with steps</li> <li>Use video clips, animations, and posters to illustrate the steps of cell division</li> </ul>
Genetic information is stored in DNA. DNA's double helix is made up of combinations of 4 nitrogen bases.	Reproduction and Heredity – Standards 7, 8, and 9	What is the structure of DNA and how does it replicate?	<ul style="list-style-type: none"> <li>Illustrate DNA with pictures, video clips and animations to show how DNA replicates</li> </ul>
All organisms are classified into three domains	Classification of Organisms – Standard 1	How are organism grouped?	<ul style="list-style-type: none"> <li>Identify the three domains and define eukaryotes and prokaryotes</li> <li>Provide visual representations in the form of posters and note sheets</li> </ul>
<b>Classification</b> The three domains each represent large groups of organisms with fundamental similarities	Classification of Organisms – Standard 1	What are the characteristics of bacteria, archaea, and eukarya	<ul style="list-style-type: none"> <li>Highlight representative organisms from each domain</li> <li>Observe unicellular organism under the microscope</li> </ul>
The domain Eukarya contains four kingdoms	Classification of Organisms – Standard 1	Why did the three domains supplant the five-kingdom system?	<ul style="list-style-type: none"> <li>Describe and highlight representative organisms from the 4 kingdoms: Animal, Plant, Protist, and Fungi</li> <li>Illustrate the similarities and differences of organisms in the seven levels of classification</li> </ul>

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<b>Classification (cont.)</b>			
Many factors go into grouping organisms	Classification of Organisms – Standard 1	How do classification systems work?	<ul style="list-style-type: none"> <li>• Invent a classification system</li> <li>• Explore scientific names and what they mean</li> <li>• Identify organisms using a dichotomous key</li> </ul>
<b>Body Systems</b>			
There are many organ systems performing specific functions – all systems work together.	Systems of Living Things – Standard 6	What are the major systems of the human body?	<ul style="list-style-type: none"> <li>• Research the major body systems and their functions using textbook or Internet resources</li> </ul>
Food is broken down both physically and chemically into a form usable by the body	Systems of Living Things – Standard 6	What is the Function of the Digestive System?	<ul style="list-style-type: none"> <li>• Identify the anatomy of the digestive system</li> <li>• Test the effects of digestive enzymes on different foods</li> <li>• Relate the types of teeth organisms have with the types of food they eat</li> <li>• Research the function of the mouth, esophagus stomach, small intestine, large intestine, liver and gall bladder</li> </ul>
Comparative anatomy of frogs and humans Experience tissues, organs, and organ systems of a real specimen	Systems of Living Things – Standard 6	How are digestive organs in other animals the same and different than human digestive systems	<ul style="list-style-type: none"> <li>• Virtual frog dissection</li> <li>• Frog dissection</li> <li>• Birds of Prey movie</li> </ul>
The essential materials transported by blood and lymph are oxygen, carbon dioxide, food, chemical waste, and water	Systems of Living Things – Standard 6	What materials are transported by the circulatory system?	<ul style="list-style-type: none"> <li>• Blood circulation video clips</li> <li>• Teachers Domain, Malaria – Cycle Cell video clip</li> </ul>
Muscles, body movement, and the valves in blood and lymph vessels contribute to the transport of materials. The heart plays a major role in transport but does not do the job alone.	Systems of Living Things – Standard 6	How is blood and lymph pumped through the body?	<ul style="list-style-type: none"> <li>• Pulse Rate Activity</li> <li>• Teachers Domain video “From the Heart”</li> <li>• Teachers Domain video “Heart Transplant”</li> </ul>

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<b>Body Systems (cont.)</b>			
The left and right sides of the heart have different functions. The top two chambers of the heart are receiving chambers and the bottom chambers are the pumping chambers	Systems of Living Things – Standard 6	What is the function of the four chambers of a human heart?  Why do some organisms have one, two, or three chambered hearts?	<ul style="list-style-type: none"> <li>• Learn the route blood takes through the human heart</li> <li>• Identify the 4 chambers</li> <li>• Frog dissection – examine the 3-chambered amphibian heart</li> <li>• Heart circulation video clips</li> </ul>
Large multi-cellular organisms need a support structure	Systems of Living Things – Standard 6	How do organisms with exoskeletons and endoskeletons support and protect their bodies?	<ul style="list-style-type: none"> <li>• Bone video clips</li> <li>• X-ray and MRI samples</li> </ul>
Human skeletons have many comparative structures to other vertebrates.	Systems of Living Things – Standard 6	What is the structure of a human skeleton?	<ul style="list-style-type: none"> <li>• Owl pellet activity</li> <li>• Disarticulated Skeleton Activity</li> <li>• Anatomy Coloring Book activities</li> </ul>
The nervous system is made up of the brain, spinal column, and nerves	Systems of Living Things – Standard 6	How do the brain, spinal column, and nerves work together to provide sensory information and the ability to respond?  How does a spinal reflex work?	<ul style="list-style-type: none"> <li>• Reaction Time lab</li> <li>• Light Intensity lab</li> <li>• Eye activities after-image, blind spot, 20-20, flip book)</li> <li>• Eye-Brain activity</li> </ul>
<b>Relationships in Ecosystems/Energy and Living Things</b>			
Organisms interact and have different functions within an ecosystem that enable it to survive	Living Things and Their Environment - Standard 13 Energy and Living Things - Standard 14	What are the functions of different organisms in an ecosystem?  What are the functions or roles of different organisms in an ecosystem?	<ul style="list-style-type: none"> <li>• Identify the roles of producers, consumers, decomposers, and scavengers</li> <li>• Examine different ecosystems (forest, meadow, pond, etc.) and determine which organisms occupy each role</li> <li>• Construct food chains and food webs</li> <li>• Research how decomposers break down dead plants and animals and how that contributes to the system as a whole</li> </ul>

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Recognize that energy moves through ecosystems	Energy and Living Things - Standard 14, 15, 16	Where does the energy for living things come from?  How does energy move through an ecosystem?	<ul style="list-style-type: none"> <li>• Research, discuss and review photosynthesis and chemosynthesis as the methods producers use to make food energy</li> <li>• Manipulate food pyramids and food webs to determine how food energy moves through an ecosystem</li> <li>• Examine the relationship between biomass and energy using food pyramids</li> <li>• Investigate a variety of ecosystems to trace how energy moves from organism to organism.</li> </ul>
Feeding relationships work as a system	Living Things and Their Environment - Standard 13	What happens to a food web if a specific population increases, decreases, or is absent altogether?  How do humans affect the balance of ecosystems?	<ul style="list-style-type: none"> <li>• Explore the interconnectedness of feeding relationships through case studies and examples. Include a study of invasive species.</li> <li>• Use food webs to predict the effects of changes within an ecosystem.</li> <li>• Examine the affects when humans interact with ecosystem. (Whaling, American bison, fisheries management)</li> <li>• Site examples of symbiosis, mutualism, commensalisms, and parasitism.</li> </ul>
<b>Reproduction and Heredity</b>			
Recognize that genetic information is stored in chromosomes and that this information can be passed from one generation to another	Reproduction and Heredity - Standard 7, 8	Where and how is genetic information stored?  How are traits passed on to offspring?	<ul style="list-style-type: none"> <li>• Bill Nye Genetics DVD and discussion as overview of traits, heredity, Gregor Mendel's work and the history of genetics</li> <li>• PTC paper activity</li> </ul>
Genetic information can be passed through sexual or asexual reproduction	Reproduction and Heredity - Standard 9	How do two parents contribute to the makeup of their offspring?  How is asexual reproduction different than sexual reproduction?	<ul style="list-style-type: none"> <li>• Human Trait Inventory Activity</li> <li>• Punnett Square Activities</li> <li>• Use the Human Trait Activity and Punnett Squares to illustrate how traits can be dominant or recessive</li> <li>• Research cloning</li> </ul>

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<p><b>Evolution and Biodiversity</b></p> <p>Both genetic variation and environmental factors contribute to the diversity of organisms</p>	Evolution and Biodiversity - Standard 10	<p>How do mutations and genetic variations occur?</p> <p>How can environmental factors selectively change genetic variations?</p>	<ul style="list-style-type: none"> <li>• Study the finches of the Galapagos Islands and the work of Charles Darwin.</li> <li>• Discovery Channel, Raising the Mammoth DVD</li> <li>• Compare and contrast woolly mammoths and modern elephants</li> </ul>
Evidence from geology, fossils, and comparative anatomy provide the basis for the theory of evolution	Evolution and Biodiversity - Standard 11, 12	<p>Are there clear examples in the fossil record of organisms that have evolved?</p> <p>How does comparative anatomy illustrate similarities and differences</p>	<p>Examine the history of horse fossils from early horses to present-day horses.</p> <p>Research the evidence of whale evolution</p> <p>Compare anatomy of mammal skeletal structures</p>
<p><b>Changes in Ecosystems Over Time</b></p> <p>Ecosystems change over time.</p> <p>Change can be slow or abrupt</p>	Changes in Ecosystems Over Time - Standards 17, 18	<p>What happened to the dinosaurs?</p> <p>Are birds descendents of dinosaurs?</p> <p>What is the history of Earth's climate?</p>	<ul style="list-style-type: none"> <li>• Walking with Dinosaurs DVD</li> <li>• Shivericks Pond Project</li> <li>• Research the KT Boundary</li> <li>• Climate Change Project</li> </ul>
<p><b>Engineering</b></p> <p>The design and construction process is challenging and requires testing, trials, and refinement to produce the desired results.</p>	Engineering Design Standard 2.1, 2.2, 2.3, 2.4 Materials, Tools, and Machines Standard 1.1, 1.2	<p>What is involved in the design and construction process?</p> <p>Why is trial and error part of the engineering process?</p>	<ul style="list-style-type: none"> <li>• Grade 7 Engineering projects (Terms 2 and 4)</li> <li>• Engineering journal</li> </ul>
<p>Knowledge of tools and materials are part of the engineering process.</p> <p>Experience with tools and construction materials aid the design and construction process.</p>	Materials, Tools, and Machines Standard 1.1, 1.2	<p>How do engineers determine appropriate materials and tools to meet an engineering challenge?</p> <p>How are construction techniques evaluated?</p>	<ul style="list-style-type: none"> <li>• Grade 7 engineering projects (Terms 2 and 4)</li> <li>• Engineering journal</li> </ul>