

Botany: Structure and Function

Stage 1 Desired Results		
ESTABLISHED GOALS: <u>Competencies:</u> <i>Systems & System Models Students will demonstrate the ability to investigate and analyze a natural or human designed system in terms of its boundaries, inputs, outputs, interactions, and behaviors and use this information to develop a system model that can be used to understand and empirically evaluate the accuracy of models in terms of representing the underlying system.</i> <i>Energy & Matter in Systems Students will demonstrate the ability to analyze evidence from a variety of sources (investigations, models) to predict, connect and/or evaluate the cycling of matter and flow of energy within and between systems in order to understand, describe, or predict possibilities and limitations of systems.</i> <i>Stability & Change in Systems Students will demonstrate the ability to investigate and analyze static and dynamic conditions of natural and human designed systems in order to explain and predict changes over time.</i> <i>Nature of Science Student will demonstrate the ability to work collaboratively and individually to generate testable questions or define problems, plan and conduct investigations using a variety of research methods in a various settings, analyze and interpret data, reason with evidence to construct explanations in light of existing theory and previous research, and effectively communicate the research processes and conclusions.</i> <i>Students will demonstrate the ability to analyze and summarize text and integrate knowledge to make meaning of discipline-specific materials.</i> <i>Students will demonstrate the ability to produce coherent and supported writing in order to communicate effectively for a range of discipline-specific tasks, purposes, and audiences.</i> <i>Students will demonstrate the ability to speak purposefully and effectively by strategically making decisions about content, language use, and discourse style.</i> <u>Content Standards:</u> - HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. - HS-LS1-2. Develop and use a model to illustrate the	Transfer	
	<i>Students will be able to independently use their learning to evaluate the importance of structure and function within a system.</i>	
	Meaning	
	ENDURING UNDERSTANDINGS <i>Students will understand that...</i> - models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. - investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. - feedback (negative or positive) can stabilize or destabilize a system. - technological advances have influenced the progress of science and science has influenced advances in technology. - changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system. - energy cannot be created or destroyed-it only moves between one place and another place, between objects and /or fields, or between systems.	ESSENTIAL QUESTIONS <i>How have plants evolved to respond to their environment?</i> <i>How are plants crucial to sustaining life on Earth?</i>
Acquisition		
<i>Students will know...</i> that systems of specialized cells within organisms help them perform the essential functions of life.		<i>Students will be skilled at...</i> constructing explanations based on evidence

hierarchical organization of interacting systems that provide specific functions within multicellular organisms. • HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	• that 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. • that 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 discourage (negative feedback) what is going on inside the living system. • that the main way that solar energy is captured and stored on Earth is through the complex chemical process known as photosynthesis. • that the process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen. • that as matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. • that the sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells. • that photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes. • that photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geological, and biological processes. • that adaptation also means that the distribution of traits in a population can change when conditions change.	• developing and using models. • planning and conducting investigations.
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	- that changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline –and sometimes the extinction-of some species. - that gradual atmospheric changes were due to plants and other organisms that captured carbon <u>vocabulary:</u> cell, plastids, vacuole, stomata, parenchyma, collenchyma, sclerenchyma, xylem, phloem, epidermis, cambium, photosynthesis, chloroplast, plasmodesmata, filament, anther, stigma, style, ovary, ovule, locule, placentation, peduncle, pedicel, receptacle, inflorescence, leaf, flowers, stem, root, pollination, fertilization, dispersal, taproot, prop root, rhizome, runner, stolon, monocot, endicot, cotyledon, spore, meristem, node, internode, thallus, germma	
Content Area Literacy Standards		21 st Century Skills
- RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. - RST.11-12.2 Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. - RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. - RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 11-12 texts and topics</i>. - RST.11-12.5 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. - RST.11-12.6 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. - RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. - RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. - RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. - WHST.11-12.1 Write arguments focused on <i>discipline-specific content</i>. - WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments,		<i>use systems thinking</i> <i>communicate clearly</i> <i>collaborate with others</i>

or technical processes. • WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. • WHST.11-12.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. • WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. • WHST.11-12.9 Draw evidence from informational texts to support analysis, reflection, and research.	
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Stage 2 - Evidence	
<i>Evaluative Criteria</i>	<i>Assessment Evidence</i>
	PERFORMANCE TASK(S):
	OTHER EVIDENCE:

Stage 3 – Learning Plan	
Summary of Key Learning Events and Instruction	
<i>Language Arts Integration</i>	<i>Mathematics Integration</i>
• 1.OA.1 Use	• 1.OA.1 Use
<i>Technology Integration</i>	<i>District Materials</i>
• 1.OA.1 Use	

<i>SCIENCE AND ENGINEERING PRACTICES</i>	
S&EP 2. Developing and using models S&EP 3. Planning and carrying out investigations S&EP 4. Analyzing and interpreting data S&EP 7. Engaging in argument from evidence S&EP 8. Obtaining, evaluating, and communicating information	