

# Middle School Gardyn Curriculum



Lesson	NGSS Alignment
Getting to Know Your Gardyn	SEP#8 Obtaining, Evaluating, and Communicating Information
MyGardyn Website Scavenger Hunt	SEP#8 Obtaining, Evaluating, and Communicating Information
Hydroponics pH, EC and Plant Research	SEP#4 Analyzing and Interpreting Data SEP#8 Obtaining, Evaluating, and Communicating Information
Plant Selection and Placement	MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services. MS-ETS1-2 Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. MS-ETS1-3 Analyze and interpret data to determine scale properties of objects in the solar system.
Competing Plants	MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
Exploring Environmental Factors with Gardyn	MS-LS1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. MS-LS1-6 Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
Exploring Genetics with Gardyn	MS-LS1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
Seed Germination	MS-LS1-4 Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. MS-LS1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

<b>Materials Selection</b>	<p><b>MS-PS1-3</b> Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.</p> <p><b>MS-ETS1-1</b> Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.</p>
<b>Waves with Gardyn</b>	<p><b>MS-PS4-1</b> Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.</p> <p><b>MS-PS4-2</b> Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials</p>
<b>Herb Uses</b>	<p><b>MS-PS1-3</b> Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.</p>
<b>The History of Hydroponics</b>	<p><b>MS-LS1-5</b> Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</p> <p><b>MS-LS2-1</b> Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.</p> <p><b>MS-ETS1-1</b> Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.</p>
<b>Types of Hydroponics</b>	<p><b>MS-LS1-5</b> Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</p> <p><b>MS-LS2-1</b> Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.</p> <p><b>MS-ETS1-1</b> Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.</p>
<b>Gravity's Effect on Plant Roots</b>	<p><b>MS-ESS1-2</b> Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.</p> <p><b>MS-LS1-4</b> Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.</p> <p><b>MS-LS1-5</b> Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</p>

<b>International Space Station: Plant Research</b>	<p><b>MS-LS1-5</b> Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</p> <p><b>MS-ESS1-2</b> Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.</p>
<b>Design a Hydroponic Unit for Space</b>	<p><b>MS-ETS1-1</b> Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.</p> <p><b>MS-ETS1-2</b> Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</p>
<b>Plants and the Water Cycle</b>	<p><b>MS-ESS2-4</b> Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.</p> <p><b>MS-ESS2-1</b> Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.</p>
<b>Nutrients and Their Roles in Plant Growth</b>	<p><b>MS-LS1-5</b> Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</p> <p><b>MS-LS1-6</b> Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.</p> <p><b>MS-LS2-3</b> Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.</p> <p><b>MS-ESS3-4</b> Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.</p> <p><b>MS-PS1-3</b> Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.</p>
<b>Plant Cells and Specialized Structures of Gardyn Plants</b>	<p><b>MS-LS1-1</b> Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.</p> <p><b>MS-LS1-2</b> Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.</p> <p><b>MS-LS1-3</b> Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.</p>
<b>Exploring Plant Cell Parts and Structures with Gardyn</b>	<p><b>MS-LS1-1</b> Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.</p> <p><b>MS-LS1-2</b> Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.</p>

<b>Modeling Photosynthesis: Carbon Dioxide and Water to Glucose</b>	<p><b>MS-LS1-6</b> Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.</p> <p><b>MS-LS1-7</b> Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.</p> <p><b>MS-PS1-5</b> Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.</p>
<b>How Plant Structures Support Reproduction</b>	<b>MS-LS1-4</b> Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
<b>Flower Anatomy and Dissection</b>	<b>MS-LS1-4</b> Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
<b>Exploring DNA Extraction with Gardyn</b>	<p><b>MS-PS1-2</b> Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.</p> <p><b>MS-LS1-5</b> Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</p>
<b>Genetics with Gardyn: The Taste of Cilantro</b>	<p><b>MS-LS1-5</b> Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</p> <p><b>MS-LS3-2</b> Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.</p>
<b>Sense Receptor and The Brain</b>	<b>MS-LS1-8</b> Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.
<b>Light and Algae Growth</b>	<p><b>MS-PS4-2</b> Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials</p> <p><b>MS-LS1-5</b> Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</p>