

8

The Living World (Life Science)

Essential Question: How do ecosystems maintain equilibrium?

Enduring Knowledge	Science Concepts	GE	Evidence of Understanding
<p><u>Interdependence within Ecosystems:</u> Energy enters an ecosystem in the form of sunlight and flows through the system to each cell. Matter interacts, changes, and recycles in an ecosystem. Populations of organisms survive by maintaining interdependent relationships with one another and by utilizing biotic and abiotic resources from the environment.</p>	<p>a. Given adequate biotic and abiotic resources, an ecosystem will maintain equilibrium and continue indefinitely. b. Factors that affect biotic or abiotic resources such as disease, predation, climate, and pollution can change the dynamics of an ecosystem and the interdependent relationships among populations of organisms until a new equilibrium is reached (e.g., members of a species that occur together at a given time are referred to as a population).</p>	36	Identifying an abiotic or biotic change in a local ecosystem and predicting the short and long-term effects of this change (e.g., local river study)
<p><u>Interdependence within Ecosystems:</u> Energy enters an ecosystem in the form of sunlight and flows through the system to each cell. Matter interacts, changes, and recycles in an ecosystem. Populations of organisms survive by maintaining interdependent relationships with one another and by utilizing biotic and abiotic resources from the environment.</p>	<p>a. When decomposers break down the matter contained in plants and animals, the molecules of matter can be recycled through the ecosystem and used by plants to produce food or as building material for all organisms. b. As matter is transferred from one organism to another in an ecosystem, the total amount (mass) remains the same.</p>	37	Explaining how products of decomposition are utilized by the ecosystem to sustain life while conserving mass (e.g., worm farm, compost)
<p>Natural Resources: The Universe, Earth, and all Earth systems have undergone change in the past, continue to change in the present and are predicted to continue changing in the future.</p>	<p>a. Human activities have impacts on natural resources, such as increasing wildlife habitats, reducing/managing the amount of forest cover, increasing the amount and variety of chemicals released into the atmosphere, and intensive farming. Some of these changes have decreased the capacity of the environment to support life forms. Others have enhanced the environment to support greater availability of resources. b. Fresh water, limited in supply, is essential for life and also for most industrial processes. Rivers, lakes, and groundwater can be depleted or polluted, becoming unavailable or unsuitable for life.</p>	49	Investigating natural resources in the community and monitoring/managing them for responsible use Identifying a human activity—in a local environment - and determining the impact of that activity on a specific (local) natural resource Researching the impact of different human activities on the earth's land, waterways and atmosphere and describing possible effects on the living organisms in those environments

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8

Concepts in Detail	Inquiries/Activities	Resources/Notes
<ul style="list-style-type: none"> - Ecosystems can be at equilibrium. - Ecosystems can maintain equilibrium if they have appropriate resources. - A disease is an abnormal condition of an organism that impairs normal physiological functioning. - A population is a group of individuals of the same species that occupies a specific area at the same time. - Disease, predation, climate, pollution, etc. affect biotic and abiotic resources. - Changes in abiotic and biotic resources disrupt the current equilibrium. - After equilibrium is disrupted, a new equilibrium will eventually be reached. 	<ul style="list-style-type: none"> - Design an experiment to test how a change in an abiotic or biotic factor affects the growth of a radish plant. - See Evidence of Understanding column. 	
<ul style="list-style-type: none"> - Molecules are small particles of matter. - When dead living things are broken down by decomposers, the resulting molecules are used by plants and other organisms for certain survival functions. - Define conservation of mass and be able to apply this concept to recycling in an ecosystem. 	<p>Activity: have a worm compost in classroom and grow plants with the soil.</p> <ul style="list-style-type: none"> - Predict and explain how the mass of a piece of bread is affected by decomposition (bread in a closed jar). 	
	<ul style="list-style-type: none"> - Activity: research project about how a human activity impacts a local resource. 	

8

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Essential Question: Why is there so much diversity among organisms, and how do

Enduring Knowledge	Science Concepts	GE	Evidence of Understanding
<p><u>Classification of Living Things:</u> All living things exhibit patterns of similarity in their structures, behaviors, and biochemistry.</p>	<p>a. Scientists organize the vast diversity of organisms by describing similarities and differences among living things. Details of internal and external structures of organisms are more important for scientific classification than behavior and general appearance. b. Individuals that can reproduce with one another and produce fertile offspring are classified as a species.</p>	38	<p>Comparing and sorting organisms with similar characteristics into groups based on internal and external structures recognized by scientists Recognizing that individuals that can reproduce with one another and produce fertile offspring are classified as a species</p>
<p><u>Natural Selection/Evolution:</u> All living things exhibit patterns of similarity in their structures, behaviors, and biochemistry.</p>	<p>a. Differences in physical characteristics (traits) occur randomly (by chance) in a population or species. b. As environments change, organisms that possess advantageous traits (those that enable them to survive) pass those traits to offspring through reproduction.</p>	39	<p>Explaining that advantageous traits of organisms are passed on through reproduction Identifying that traits occur randomly</p>
<p><u>Heredity:</u> The human body is unique in its heredity, body systems, and development and can be affected by the environment.</p>	<p>a. Every organism requires a set of instructions (genes) for specifying its traits. Heredity is the passage of these instructions from one generation to another. b. An inherited trait of an individual can be determined by one or by many genes, and a single gene can influence more than one trait.</p>	40	<p>Identifying that traits are produced from the instructions of one or more genes that are inherited from the parents</p>

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8

scientists navigate this diversity?

Concepts in Detail	Inquiries/Activities	Resources/Notes
<ul style="list-style-type: none"> - There is a vast diversity of organisms on Earth. - Organisms can be grouped according to similarities and differences in internal and external structures. - Organisms should not be grouped based on behavior and general appearance. - Members of a species have nearly identical internal and external structures. - Fertile refers to the ability to reproduce. - A species is a group of individuals that can reproduce with one another and produce fertile offspring. 	<ul style="list-style-type: none"> - Design a system for classification of a collection of objects or pictures. 	
<ul style="list-style-type: none"> - Random means happening by chance. - Identify how specific traits in a species could be different (e.g., fur color, leg length, eye color). - Understand that different traits (variations) in a species are introduced through mutations that are not harmful. - A mutation is a change in a gene or genes that produces a new trait in an organism. - In the face of a changing environment, individuals with the best suited traits to this new environment will be more likely to survive, reproduce, and pass their traits on to their offspring. This is called natural selection. - A species that does not have traits suited to the changing environment will fail to survive and reproduce, and will go extinct. 	<p>Activity: create a new living organism, describe its traits, concentrating on how it fits into its environment. Choose one abiotic or biotic factor in the environment that changes and explain how your population will be affected by this change. Which individuals survive and why?</p>	
<ul style="list-style-type: none"> - Genes are biological instructions that tell the body what traits to develop. - Humans inherit their genes from their parents, and give their genes to their children. - A single gene can determine 1 or more traits. - Multiple genes can determine 1 or more traits as well. 		