Readtopia®

Essential Elements for Science

Standards for Middle School

DON•JOHNSTON
Human Learning Tools

MIDDLE SCHOOL SCIENCE STANDARDS		ADDRESSED WITH READTOPIA
PHYSICAL SCIENCE		
Matter and Its Interactions | Structure and Properties of Matter		
Initial Level	Observe and identify examples of change (e.g. state of matter, color, temperature, and odor).	●
Precursor Level	Gather data on the properties (e.g., color, texture, odor, and state of matter) of substances before and after chemical changes have occurred (e.g., burning sugar or burning steel wool, rust, effervescent tablets).	●
Target Level	Interpret and analyze data on the properties (e.g., color, texture, odor, and state of matter) of substances before and after chemical changes have occurred (e.g., burning sugar or burning steel wool, rust, effervescent tablets).	
General Education	**MS-PS1-2** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	
Motion and Stability: Forces and Interactions | Forces and Motion		
Initial Level	Identify ways to change the movement of an object (e.g., faster, slower, stop).	●
Precursor Level	Investigate and identify ways to change the motion of an object (e.g., change an incline's slope to make an object go slower, faster, farther).	●
Target Level	Investigate and predict the change in motion of objects based on the forces acting on those objects.	●
General Education	**MS-PS2-2** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	

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MIDDLE SCHOOL SCIENCE STANDARDS		ADDRESSED WITH READTOPIA
PHYSICAL SCIENCE		
Energy | Conservation of Energy and Energy Transfer		
Initial Level	Identify objects/materials used to minimize or maximize thermal energy transfer (e.g., gloves, vacuum flask, insulated hot pad holder or foam cup).	●
Precursor Level	Investigate objects/materials, and predict their ability to maximize or minimize thermal energy transfer.	●
Target Level	Test and refine a device (e.g., foam cup, insulated box, or thermos) to either minimize or maximize thermal energy transfer (e.g., keeping liquids hot or cold, preventing liquids from freezing, keeping hands warm in cold temperatures).	◒
General Education	**MS-PS3-3** Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.	
Waves and Their Applications in Technologies for Information Transfer | Wave Properties		
Initial Level	Use a model to recognize that sound waves are transmitted by vibrations.	●
Precursor Level	Investigate changes in vibrations and sources of sound in everyday life.	●
Target Level	Use a model to show how light waves (e.g., light through a water glass, light on colored objects) or sound waves are reflected, absorbed, or transmitted through various materials (e.g., water, air, table).	●
General Education	**MS-PS4-2** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	●

MIDDLE SCHOOL SCIENCE STANDARDS		ADDRESSED WITH READTOPIA
LIFE SCIENCE		
From Molecules to Organisms: Structures and Processes | Structure and Function		
Initial Level	Recognize major organs of animals.	
Precursor Level	Use a model to demonstrate how organs are connected in major organ systems.	
Target Level	Make a claim about how a structure (e.g., organs and organ systems) and its related function supports survival of animals (circulatory, digestive, and respiratory systems).	
General Education	**MS-LS1-3** Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.	
From Molecules to Organisms | Growth and Development of Organisms		
Initial Level	Match organisms to their habitats.	●
Precursor Level	Identify factors that influence growth of organisms.	●
Target Level	Interpret data to show that environmental resources (e.g., food, light, space, water) influence growth of organisms (e.g., drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, fish growing larger in large ponds than small ponds).	●
General Education	**MS-LS1-5** Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	

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MIDDLE SCHOOL SCIENCE STANDARDS		ADDRESSED WITH READTOPIA
LIFE SCIENCE		
Ecosystems: Interactions, Energy, and Dynamics | Interdependent Relationships in Ecosystems		
Initial Level	Identify food that animals eat.	●
Precursor Level	Classify animals based on what they eat (e.g., herbivore, omnivore, carnivore).	●
Target Level	Use models of food chains/webs to identify producers and consumers in aquatic and terrestrial ecosystems.	●
General Education	**MS-LS2-2** Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.	
Heredity: Inheritance and Variation of Traits | Variation of Traits		
Initial Level	Recognize that organisms differ within same species (e.g., dogs, chickens, oaks that differ in color and size).	●
Precursor Level	Identify similarities and differences between plant and animal parents and their offspring (e.g., eye color, hair/fur color, height, leaf shape, and/or markings).	●
Target Level	Make a claim supported by evidence that offspring inherit traits from their parents.	●
General Education	**MS-LS3-2** 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.	
EARTH AND SPACE SCIENCE		
Earth's Place in the Universe | Earth and the Solar System		
Initial Level	Recognize models of the Earth, Moon, and Sun system.	●
Precursor Level	Use a model to show that Earth's Moon moves around Earth, and Earth and its Moon move around the Sun.	●
Target Level	Use an Earth-Sun-Moon model to show that Earth's orbit around the Sun corresponds to a calendar year and the orbit of the Moon around Earth corresponds to a month.	●
General Education	**MS-ESS1-1** Develop and use a model of the Earth-Sun-Moon system to describe the cyclic patterns of lunar phases, eclipses of the Sun and Moon, and seasons.	

MIDDLE SCHOOL SCIENCE STANDARDS		ADDRESSED WITH READTOPIA
EARTH AND SPACE SCIENCE		
Earth's Systems | Earth's Materials and Systems		
Initial Level	Identify the process that forms igneous rock (e.g., volcanoes).	●
Precursor Level	Use a model to describe the change from igneous to sedimentary rock.	
Target Level	Use a model to describe the change within the rock cycle between igneous, metamorphic, and sedimentary rock.	
General Education	**MS-ESS2-1** Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.	
Earth's Systems | Earth's Materials and Systems		
Initial Level	Identify differences in weather conditions from day to day	●
Precursor Level	Identify geoscience processes (e.g., wind, rain, runoff) that have an impact on landforms (e.g., landslides, erosion such as gullies).	●
Target Level	Explain how geoscience processes that occur daily (e.g.,wind, rain, runoff) slowly change the surface of Earth, while catastrophic events (e.g., earthquakes, tornadoes, floods) can quickly change the surface of Earth.	●
General Education	**MS-ESS2-2** Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	
Earth's Systems | Weather and Climate		
Initial Level	Interpret basic weather information (e.g., radar, map) to identify weather conditions.	●
Precursor Level	Interpret basic weather information (e.g., radar, map) to compare weather conditions (either over several days at the same location or different locations on the same day).	●
Target Level	Interpret basic weather information (e.g., radar, map) to make predictions about future conditions (e.g., precipitation, temperature, wind).	●
General Education	**MS-ESS2-6** Develop and use a model to describe how unequal heating and rotation of the earth cause patterns of atmospheric and oceanic circulation that determine regional climates.	

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MIDDLE SCHOOL SCIENCE STANDARDS		ADDRESSED WITH READTOPIA
EARTH AND SPACE SCIENCE		
Earth and Human Activity | Natural Resources		
Initial Level	Identify a natural resource (e.g., water, sand, wind).	●
Precursor Level	Identify the geoscience process that produces a natural resource (e.g., solar energy creating wind energy, rock cycle with ores and minerals).	●
Target Level	Interpret, based on evidence, how the geoscience processes (e.g., weathering, erosion) create resources.	●
General Education	**MS-ESS3-1** Construct a scientific explanation based on evidence for how the uneven distribution of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.	
Earth and Human Activity | Human Impacts on Earth Systems		
Initial Level	Recognize resources (e.g., food, water, shelter, air) in the local environment that are important for human life.	●
Precursor Level	Recognize ways in which humans impact the environment (e.g., agriculture, pollution, recycling, city growth).	●
Target Level	Develop a plan to monitor and minimize human impact on the local environment (e.g., water, land, pollution).	◒
General Education	**MS-ESS3-3** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	