

Michigan Science Grade Level Content Expectations

Correlations with *Seeds of Science/Roots of Reading*[™] 4th/5th grade units:

*Aquatic Ecosystems,
Planets and Moons,
Models of Matter,
and,
Chemical Changes*

- ● ● = Major focus on concept, skill, or understanding, explicitly taught
- ● = Moderate focus on concept, skill, or understanding with explicit teaching or practice
- = Peripheral focus on concept, skill, or understanding with practice

	Aquatic Ecosystems	Planets & Moons	Models of Matter	Chemical Changes
GRADE 4- SCIENCE PROCESSES				
S.IP.E.1 Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation.				
S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.	• • •	• • •	• • •	• • •
S.IP.04.12 Generate questions based on observations.	• • •	•	• •	• • •
S.IP.04.13 Plan and conduct simple and fair investigations.	• • •	• •	• •	• • •
S.IP.04.14 Manipulate simple tools that aid observation and data collection	• •		• •	•
S.IP.04.15 Make accurate measurements with appropriate units for the measurement tool.	• •		• •	•
S.IP.04.16 Construct simple charts and graphs from data and observations.	• •	•	• •	• •

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	Aquatic Ecosystems	Planets & Moons	Models of Matter	Chemical Changes
GRADE 4- SCIENCE PROCESSES continued				
S.IA.E.1 Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations.				
S.IA.04.11 Summarize information from charts and graphs to answer scientific questions.	• • •	• •	• •	• • •
S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.	• • •	• • •	• • •	• • •
S.IA.04.13 Communicate and present findings of observations and investigations.	• • •	• • •	• • •	• • •
S.IA.04.14 Develop research strategies and skills for information gathering and problem solving.	• • •	• • •	• • •	• • •
S.IA.04.15 Compare and contrast sets of data from multiple trials of a science investigation to explain reasons for differences.	• •		•	• •
S.RS.E.1 Reflecting on knowledge is the application of scientific knowledge to new and different situations. Reflecting on knowledge requires careful analysis of evidence that guides decision-making and the application of science throughout history and within society.				
S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.	• •	• •	• •	• •
S.RS.04.14 Use data/samples as evidence to separate fact from opinion.	• •	• •	• •	• •
S.RS.04.15 Use evidence when communicating scientific ideas.	• • •	• • •	• • •	• • •
S.RS.04.16 Identify technology used in everyday life.		•	•	•
S.RS.04.17 Identify current problems that may be solved through the use of technology.		• •	•	
S.RS.04.18 Describe the effect humans and other organisms have on the balance of the natural world.	• • •			
S.RS.04.19 Describe how people have contributed to science throughout history and across cultures.	• •	• •	• •	• •
GRADE 4- PHYSICAL SCIENCE				
P.EN.E.1 Forms of Energy- Heat, electricity, light, and sound are forms of energy.				
P.EN.04.12 Identify heat and electricity as forms of energy.				

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	Aquatic Ecosystems	Planets & Moons	Models of Matter	Chemical Changes
GRADE 4- PHYSICAL SCIENCE continued				
P.EN.E.4 Energy and Temperature- Increasing the temperature of any substance requires the addition of energy.				
P.EN.04.41 Demonstrate how temperature can be increased in a substance by adding energy.			•••	
P.EN.04.42 Describe heat as the energy produced when substances burn, certain kinds of materials rub against each other, and when electricity flows through wire.				
P.EN.04.43 Describe how heat is produced through electricity, rubbing, and burning.				
P.EN.E.5 Electrical Circuits- Electrical circuits transfer electrical energy and produce magnetic fields.				
P.EN.04.51 Explain how electrical energy is transferred and changed through the use of a simple circuit.				
P.EN.04.52 Create a simple working electromagnet and explain the conditions necessary to make the electromagnet.				
P.PM.E.1 Physical Properties- All objects and substances have physical properties that can be measured.				
P.PM.04.16 Measure the weight and mass of objects.				
P.PM.04.17 Measure volumes of liquids and capacities of containers in milliliters and liters.				••
P.PM.04.18 Demonstrate the use of centimeter cubes poured into a container to estimate the container's capacity.				
P.PM.E.2 States of Matter- Matter exists in several different states: solids, liquids, and gases. Each state of matter has unique physical properties. Gases are easily compressed, but liquids and solids do not compress easily. Solids have their own particular shapes, but liquids and gases take the shape of the container.				
P.PM.04.23 Compare and contrast the states of matter.			•••	
P.PM.E.3 Magnets- Magnets can repel or attract other magnets. Magnets can also attract certain non-magnetic objects at a distance.				
P.PM.04.33 Demonstrate magnetic field by observing the patterns formed with iron filings using a variety of magnets.				
P.PM.04.34 Demonstrate that non-magnetic objects are affected by the strength of the magnet and the distance away from the magnet.				
P.PM.E.5 Conductive and Reflective Properties- Objects vary to the extent they absorb and reflect Aquatic Ecosystems and conduct heat and electricity.				
P.PM.04.53 Identify objects that are good conductors or poor conductors of heat and electricity.			•	

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GRADE 4- PHYSICAL SCIENCE continued				
P.CM.E.1 Changes in State- Matter can be changed from one state to another and then back again. This may be caused by heating and cooling.				
P.CM.04.11 Explain how matter can change from one state to another by heating and cooling.			• • •	
GRADE 4- LIFE SCIENCE				
L.OL.E.1 Life Requirements- Organisms have basic needs. Animals and plants need air, water, and food. Plants also require light. Plants and animals use food as a source of energy and as a source of building material for growth and repair.				
L.OL.04.15 Determine that plants require air, water, light, and a source of energy and building material for growth and repair.	• • •			
L.OL.04.16 Determine that animals require air, water, and a source of energy and building material for growth and repair.	• • •			
L.EV.E.2 Survival- Individuals of the same kind differ in their characteristics, and sometimes the differences give individuals an advantage in surviving and reproducing.				
L.EV.04.21 Identify individual differences in organisms of the same kind.				
L.EV.04.22 Identify how variations in physical characteristics of individual organisms give them an advantage for survival and reproduction.				
L.EC.E.1 Interactions- Organisms interact in various ways including providing food and shelter to one another. Some interactions are helpful: others are harmful to the organism and other organisms.				
L.EC.04.11 Identify organisms as part of a food chain or food web.	• • •			
<i>L.EC.E.2 Changed Environment Effects- When the environment changes, some plants and animals survive to reproduce; others die or move to new locations.</i>				
L.EC.04.21 Explain how environmental changes can produce a change in the food web.	• • •			

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	Aquatic Ecosystems	Planets & Moons	Models of Matter	Chemical Changes
GRADE 4- EARTH SCIENCE				
E.ST.E.1 Characteristics of Objects in the Sky- Common in the sky have observable characteristics.				
E.ST.04.11 Identify common objects in the sky, such as the sun and the moon.		• • •		
E.ST.04.12 Compare and contrast the characteristics of the sun, moon and Earth, including relative distances and abilities to support life.		• • •		
E.ST.E.2 Patterns of Objects in the Sky- Common objects in the sky have observable characteristics and predictable patterns of movement.				
E.ST.04.21 Describe the orbit of the Earth around the sun as it defines a year.		• • •		
E.ST.04.22 Explain that the spin of the Earth creates day and night.		• • •		
E.ST.04.23 Describe the motion of the moon around the Earth.		• • •		
E.ST.04.24 Explain how the visible shape of the moon follows a predictable cycle which takes approximately one month.		•		
E.ST.04.25 Describe the apparent movement of the sun and moon across the sky through day/night and the seasons.		• •		
E.ST.E.3 Fossils- Fossils provide evidence about the plants and animals that lived long ago and the nature of the environment at that time.				
E.ST.04.31 Explain how fossils provide evidence of the history of the Earth.				
E.ST.04.32 Compare and contrast life forms found in fossils and organisms that exist today.				
GRADE 5- SCIENCE PROCESSES				
S.IP.M.1 Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation.				
S.IP.05.11 Generate scientific questions based on observations, investigations, and research.	• • •	• • •	• • •	• • •
S.IP.05.12 Design and conduct scientific investigations.	• • •	•	• •	• • •
S.IP.05.13 Use tools and equipment appropriate to scientific investigations.	• • •	• •	• •	• • •
S.IP.05.14 Use metric measurement devices in an investigation.	• •		• •	•
S.IP.05.15 Construct charts and graphs from data and observations.	• •		• •	•
S.IP.05.16 Identify patterns in data.	• •	•	• •	• •

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	Aquatic Ecosystems	Planets & Moons	Models of Matter	Chemical Changes
GRADE 5- SCIENCE PROCESSES continued				
S.IA.M.1 Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations.				
S.IA.05.11 Analyze information from data tables and graphs to answer scientific questions.	• • •	•	• •	• • •
S.IA.05.12 Evaluate data, claims, and personal knowledge through collaborative science discourse.	• • •	• • •	• • •	• • •
S.IA.05.13 Communicate and defend findings of observations and investigations using evidence.	• • •	• • •	• • •	• • •
S.IA.05.14 Draw conclusions from sets of data from multiple trials of a scientific investigation.	• •	• •	• •	• •
S.IA.05.15 Use multiple sources of information to evaluate strengths and weaknesses of claims, arguments, or data.	• • •	• • •	• • •	• • •
S.RS.M.1 Reflecting on knowledge is the application of scientific knowledge to new and different situations. Reflecting on knowledge requires careful analysis of evidence that guides decision-making and the application of science throughout history and within society.				
S.RS.05.11 Evaluate the strengths and weaknesses of claims, arguments, and data.	• • •	• • •	• • •	• • •
S.RS.05.12 Describe limitations in personal and scientific knowledge.	•			•
S.RS.05.13 Identify the need for evidence in making scientific decisions.	• • •	• • •	• • •	• • •
S.RS.05.15 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.	• •	• •	• •	• •
S.RS.05.16 Design solutions to problems using technology.		• • •		
S.RS.05.17 Describe the effect humans and other organisms have on the balance in the natural world.	• • •			
S.RS.05.19 Describe how science and technology have advanced because of the contributions of many people throughout history and across cultures.	• •	• •	• •	• •
GRADE 5- PHYSICAL SCIENCE				
P.FM.M.2 Force Interactions- Some forces between objects act when the objects are in direct contact (touching), such as friction and air resistance, or when they are not in direct contact (not touching), such as magnetic force, electrical force, and gravitational force.				
P.FM.05.21 Distinguish between contact forces and non-contact forces.				
P.FM.05.22 Demonstrate contact and non-contact forces to change the motion of an object.				

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GRADE 5- PHYSICAL SCIENCE continued				
P.FM.M.3 Force- Forces have a magnitude and direction. Forces can be added. The net force on an object is the sum of all of the forces acting on the object. The speed and/or direction of motion of an object changes when a non-zero net force is applied to it. A balanced force on an object does not change the motion of the object.				
P.FM.05.31 Describe what happens when two forces act on an object in the same or opposing directions.				
P.FM.05.32 Describe how constant motion is the result of balanced (zero net) forces.				
P.FM.05.33 Describe how changes in the motion of objects are caused by a non-zero net (unbalanced) force.				
P.FM.05.34 Relate the size of change in motion to the strength of unbalanced forces and the mass of the object.				
P.FM.M.4 Speed- Motion can be described by a change in position relative to a point of reference. The motion of an object can be described by its speed and the direction it is moving. The position and speed of an object can be measured and graphed as a function of time.				
P.FM.05.41 Explain the motion of an object relative to its point of reference.		••		
P.FM.05.42 Describe the motion of an object in terms of distance, time and direction, as the object moves, and in relationship to other objects.		••		
P.FM.05.43 Illustrate how motion can be measured and represented on a graph.				
GRADE 5- LIFE SCIENCE				
L.OL.M.4 Animal Systems- Multicellular organisms may have specialized systems that perform functions which serve the needs of the organism.				
L.OL.05.41 Identify the general purpose of selected animal systems (digestive, circulatory, respiratory, skeletal, muscular, nervous, excretory, and reproductive).				
L.OL.05.42 Explain how animal systems work together to perform selected activities.				
L.HE.M.1 Inherited and Acquired Traits - The characteristics of organisms are influenced by heredity and environment. For some characteristics, inheritance is more important; for other characteristics, interactions with the environment are more important.				
L.HE.05.11 Explain that the traits of an individual are influenced by both the environment and the genetics of the individual.				
L.HE.05.12 Distinguish between inherited and acquired traits.				

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GRADE 5- LIFE SCIENCE continued				
L.EV.M.1 Species Adaptation and Survival- Species with certain traits are more likely than others to survive and have offspring in particular environments. When an environment changes, the advantage or disadvantage of the species' characteristics can change. Extinction of a species occurs when the environment changes and the characteristics of a species are insufficient to allow survival.				
L.EV.05.11 Explain how behavioral characteristics of animals help them to survive in their environment.	• • •			
L.EV.05.12 Describe the physical characteristics (traits) of organisms that help them survive in their environment.	• • •			
L.EV.05.13 Describe how fossils provide evidence about how living things and environmental conditions have changed.				
L.EV.05.14 Analyze the relationship of environmental change and catastrophic events to species extinction.				
L.EV.M.2 Relationships Among Organisms- Similarities among organisms are found in anatomical features, which can be used to infer the degree of relatedness among organisms. In classifying organisms, biologists consider details of internal and external structures to be more important than behavior or general appearance.				
L.EV.05.21 Relate degree of similarity in anatomical features to the classification of contemporary organisms.				
GRADE 5- EARTH SCIENCE				
E.ES.M.6 Seasons- Seasons result from annual variations in the intensity of sunlight and length of day due to the tilt of the axis of the Earth relative to the plane of its yearly orbit around the sun.				
E.ES.05.61 Demonstrate using a model, seasons as the result of variations in the intensity of sunlight caused by the tilt of the Earth on its axis, and revolution around the sun.				
E.ES.05.62 Explain how the revolution of the Earth around the sun defines a year.		• • •		
E.ST.M.1 Solar System- The sun is the central and largest body in our solar system. Earth is the third planet from the sun in a system that includes other planets and their moons, as well as smaller objects, such as asteroids and comets.				
E.ST.05.11 Design a model that describes the position and relationship of the planets and other objects to the sun.		• •		

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GRADE 5- EARTH SCIENCE continued				
E.ST.M.2 Solar System Motion- Gravity is the force that most objects in the solar system in regular and predictable motion.				
E.ST.05.21 Describe the motion of planets and moons in terms of rotation on axis and orbits due to gravity.		• •		
E.ST.05.22 Explain moon phases as they relate to the position of the moon in its orbit around the Earth, resulting in the amount of observable reflected light.				
E.ST.05.23 Recognize that nighttime objects and the sun appear to move because the Earth rotates on its axis and orbits the sun.		• • •		
E.ST.05.24 Explain lunar and solar eclipses based on the relative positions of the Earth, moon, and sun, and the orbit of the moon.				
E.ST.05.25 Explain the tides of the oceans as they relate to the gravitational pull and orbit of the moon.				

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