

**Colorado Middle School Science Grades 5 - 8**  
**Colorado Academic Standards Mapping**

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Middle School Science	Boardworks Middle School Presentations
<b>Physical Science</b>	
GRADE 5	
1. Mixtures of matter can be separated regardless of how they were created; all weight and mass of the mixture are the same as the sum of weight and mass of its parts	
a. Develop, communicate, and justify a procedure to separate simple mixtures based on physical properties	Separating Mixtures
b. Share evidence-based conclusions and an understanding of the impact on the weight/mass of a liquid or gas mixture before and after it is separated into parts	Conservation of Mass
GRADE 6	
1. All matter is made of atoms, which are far too small to see directly through a light microscope. Elements have unique atoms and thus, unique properties. Atoms themselves are made of even smaller particles	
a. Identify evidence that suggests there is a fundamental building block of matter	What Are Atoms?
b. Use the particle model of matter to illustrate characteristics of different substances	Atomic Structure
c. Develop an evidence based scientific explanation of the atomic model as the foundation for all chemistry	Atomic Structure
d. Find and evaluate appropriate information from reference books, journals, magazines, online references, and databases to compare and contrast historical explanations for the nature of matter	Atomic Structure What Are Atoms?
2. Atoms may stick together in well-defined molecules or be packed together in large arrays. Different arrangements of atoms into groups compose all substances	
a. Explain the similarities and differences between elements and compounds	Elements and Compounds
b. Identify evidence suggesting that atoms form into molecules with different properties than their components	Elements and Compounds
<i>c. Find and evaluate information from a variety of resources about molecules</i>	-
3. The physical characteristics and changes of solid, liquid, and gas states can be explained using the particulate model	
a. Explain how the arrangement and motion of particles in a substance such as water determine its state	Changes of Matter Particles in Action

b. Distinguish between changes in temperature and changes of state using the particle model of matter	Changes of Matter Changing State
4. Distinguish among, explain, and apply the relationships among mass, weight, volume, and density	
a. Explain that the mass of an object does not change, but its weight changes based on the gravitational forces acting upon it	Gravity
b. <i>Predict how changes in acceleration due to gravity will affect the mass and weight of an object</i>	–
c. <i>Predict how mass, weight, and volume affect density</i>	–
d. <i>Measure mass and volume, and use these quantities to calculate density</i>	–
e. <i>Use tools to gather, view, analyze, and report results for scientific investigations about the relationships among mass, weight, volume, and density</i>	–
GRADE 7	
1. Mixtures of substances can be separated based on their properties such as solubility, boiling points, magnetic properties, and densities	
a. Identify properties of substances in a mixture that could be used to separate those substances from each other	Separating Mixtures
b. Develop and design a scientific investigation to separate the components of a mixture	Separating Mixtures
GRADE 8	
1. Identify and calculate the direction and magnitude of forces that act on an object, and explain the results in the object's change of motion	
a. Predict and evaluate the movement of an object by examining the forces applied to it	What Are Forces? Calculating Resultant Forces
b. Use mathematical expressions to describe the movement of an object	Calculating Resultant Forces
c. <i>Develop and design a scientific investigation to collect and analyze speed and acceleration data to determine the net forces acting on a moving object</i>	–
2. There are different forms of energy, and those forms of energy can be changed from one form to another – but total energy is conserved	
a. Gather, analyze, and interpret data to describe the different forms of energy and energy transfer	What is Energy? Energy Changes
b. <i>Develop a research-based analysis of different forms of energy and energy transfer</i>	–
c. Use research-based models to describe energy transfer mechanisms, and predict amounts of energy transferred	Energy Changes

3. Distinguish between physical and chemical changes, noting that mass is conserved during any change	
a. Identify the distinguishing characteristics between a chemical and a physical change	Types of Chemical Reactions
b. Gather, analyze, and interpret data on physical and chemical changes	Types of Chemical Reactions
c. Gather, analyze, and interpret data that show mass is conserved in a given chemical or physical change	Conservation of Mass
d. Identify evidence that suggests that matter is always conserved in physical and chemical changes	Conservation of Mass
<i>e. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate physical and chemical changes</i>	–
4. Recognize that waves such as electromagnetic, sound, seismic, and water have common characteristics and unique properties	
a. Compare and contrast different types of waves	Electromagnetic Waves What is Sound? What is Light?
b. Describe for various waves the amplitude, frequency, wavelength, and speed	What is Sound?
c. Describe the relationship between pitch and frequency in sound	What is Sound?
d. Develop and design a scientific investigation regarding absorption, reflection, and refraction of light	Reflection Refraction
<b>Life Science</b>	
<b>GRADE 5</b>	
1. All organisms have structures and systems with separate functions	
a. Develop and communicate an evidence-based scientific explanation of the role of different organs or structures that are important for an organism's survival – in both plants and animals	Cells to Organisms
b. Analyze and interpret data to generate evidence that all organisms have structures that are required for survival in both plants and animals	Cells to Organisms Animal and Plant Cells

c. Create and evaluate models of plant and/or animal systems or parts	Leaves and Glucose Roots and Water Digestion The Respiratory System The Endocrine System The Nervous System Respiration and the Circulatory System The Musculoskeletal System
<b>2. Human body systems have basic structures, functions, and needs</b>	
a. Develop and communicate an evidence-based scientific explanation regarding how humans address basic survival needs	Human Behavior
b. Analyze and interpret data to generate evidence that human systems are interdependent	Respiration and the Circulatory System
c. Assess further scientific explanations regarding basic human body system functions	The Endocrine System Digestion The Nervous System The Respiratory System
d. Create and evaluate models of human body systems and organs	The Endocrine System Digestion The Nervous System The Respiratory System The Musculoskeletal System
<i>e. Compare and contrast a human system to that of another organism, and provide hypotheses about why the similarities and differences exist</i>	–
<b>GRADE 6</b>	
<b>1. Changes in environmental conditions can affect the survival of individual organisms, populations, and entire species</b>	
a. Interpret and analyze data about changes in environmental conditions – such as climate change – and populations that support a claim describing why a specific population might be increasing or decreasing	Greenhouse Gases Environmental Change
<i>b. Develop, communicate, and justify an evidence-based explanation about how ecosystems interact with and impact the global environment</i>	–

c. Model equilibrium in an ecosystem, including basic inputs and outputs, to predict how a change to that ecosystem such as climate change might impact the organisms, populations, and species within it such as the removal of a top predator or introduction of a new species	Environmental Change Food Webs
d. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate how environmental conditions affect the survival of individual organisms	Evolution Environmental Change
2. Organisms interact with each other and their environment in various ways that create a flow of energy and cycling of matter in an ecosystem	
a. Develop, communicate, and justify an evidence-based explanation about why there generally are more producers than consumers in an ecosystem	Feeding Types Pyramids of Number and Biomass
b. Design a food web diagram to show the flow of energy through an ecosystem	Food Webs
c. Compare and contrast the flow of energy with the cycling of matter in ecosystems	Recycling Nutrients
GRADE 7	
1. Individual organisms with certain traits are more likely than others to survive and have offspring in a specific environment	
a. Develop, communicate, and justify an evidence-based explanation for why a given organism with specific traits will or will not survive to have offspring in a given environment	Evolution
b. Analyze and interpret data about specific adaptations to provide evidence and develop claims about differential survival and reproductive success	Adaptations Evolution
<i>c. Use information and communication technology tools to gather information from credible sources, analyze findings, and draw conclusions to create and justify an evidence-based scientific explanation</i>	–
<i>d. Use computer simulations to model differential survival and reproductive success associated with specific traits in a given environment</i>	–
2. The human body is composed of atoms, molecules, cells, tissues, organs, and organ systems that have specific functions and interactions	
a. Develop and design a scientific investigation about human body systems	The Endocrine System Digestion The Nervous System The Respiratory System Respiration and the Circulatory System The Musculoskeletal System

b. Develop, communicate, and justify an evidence-based scientific explanation regarding the functions and interactions of the human body	The Endocrine System Digestion The Nervous System The Respiratory System Respiration and the Circulatory System The Musculoskeletal System
c. Gather, analyze, and interpret data and models on the functions and interactions of the human body	The Endocrine System Digestion The Nervous System The Respiratory System The Musculoskeletal System
3. Cells are the smallest unit of life that can function independently and perform all the necessary functions of life	
a. Gather, analyze, and interpret data and models on the different types of cells, their structures, components and functions	Animal and Plant Cells Looking at Cells
b. Develop, communicate, and justify an evidence-based scientific explanation regarding cell structures, components, and their specific functions	Animal and Plant Cells Looking at Cells
c. Compare and contrast the basic structures and functions of plant cells, animal cells, and single-celled organisms	Animal and Plant Cells What Are Microbes?
<i>d. Employ tools to gather, view, analyze, and report results for the scientific investigations of cells</i>	–
4. Photosynthesis and cellular respiration are important processes by which energy is acquired and utilized by organisms	
a. Gather, analyze, and interpret data regarding the basic functions of photosynthesis and cellular respiration	What is Photosynthesis? Releasing Energy
b. Use direct and indirect evidence to describe the relationship between photosynthesis and cellular respiration within plants – and between plants and animals	What is Photosynthesis? Releasing Energy
c. Use computer simulations to model the relationship between photosynthesis and cellular respiration within plants – and between plants and animals	What is Photosynthesis? Releasing Energy
5. Multiple lines of evidence show the evolution of organisms over geologic time	
a. Interpret and analyze data from the fossil record to support a claim that organisms and environments have evolved over time	Evolution
<i>b. Analyze and critique the evidence regarding the causes and effects of a mass extinction event</i>	–

<i>c. Analyze and interpret data that show human evolution</i>	–
<i>d. Use technology to share research findings about the evidence regarding the causes and effects of a mass extinction event</i>	–
GRADE 8	
1. Human activities can deliberately or inadvertently alter ecosystems and their resiliency	
a. Develop, communicate, and justify an evidence-based scientific example of how humans can alter ecosystems	Acid Rain Environmental Change Greenhouse Gases
b. Analyze and interpret data about human impact on local ecosystems	Acid Rain Environmental Change Greenhouse Gases
<i>c. Recognize and infer bias in print and digital resources while researching an environmental issue</i>	–
<i>d. Use technology resources such as online encyclopedias, online databases, and credible websites to locate, organize, analyze, evaluate, and synthesize information about human impact on local ecosystems</i>	–
e. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate an environmental issue	Environmental Change Greenhouse Gases
2. Organisms reproduce and transmit genetic information (genes) to offspring, which influences individuals' traits in the next generation	
a. Develop, communicate, and justify an evidence-based scientific explanation for how genetic information is passed to the next generation	Causes of Variation Inheritance Genes and Alleles Types of Reproduction
b. Use direct and indirect observations, evidence, and data to support claims about genetic reproduction and traits of individuals	Causes of Variation Inheritance Genes and Alleles Types of Reproduction
c. Gather, analyze, and interpret data on transmitting genetic information	Causes of Variation Inheritance Genes and Alleles Types of Reproduction
d. Use models and diagrams to predict the phenotype and genotype of offspring based on the genotype of the parents	Inheritance Genes and Alleles Gregor Mendel

e. Use computer simulations to model and predict phenotype and genotype of offspring based on the genotype of the parents	Inheritance Gregor Mendel
<b>Earth Systems Science</b>	
GRADE 5	
1. Earth and Sun provide a diversity of renewable and nonrenewable resources	
a. <i>Develop and communicate a scientific explanation addressing a question of local relevance about resources generated by the sun or Earth</i>	–
b. Analyze and interpret a variety of data to understand the origin, utilization, and concerns associated with natural resources	Fossil Fuels Greenhouse Gases Nonrenewable Energy Resources Renewable Energy
2. Earth's surface changes constantly through a variety of processes and forces	
a. Analyze and interpret data identifying ways Earth's surface is constantly changing through a variety of processes and forces such as plate tectonics, erosion, deposition, solar influences, climate, and human activity	What is Plate Tectonics? Plate Boundaries Erosion, Transportation and Deposition Greenhouse Gases
b. Develop and communicate an evidence based scientific explanation around one or more factors that change Earth's surface	What is Plate Tectonics? Plate Boundaries Erosion, Transportation and Deposition
3. Weather conditions change because of the uneven heating of Earth's surface by the Sun's energy. Weather changes are measured by differences in temperature, air pressure, wind and water in the atmosphere and type of precipitation	
a. Develop and communicate an evidence-based scientific explanation for changes in weather conditions	What is Weather? Wind and Ocean Currents
b. Gather, analyze, and interpret data such as temperature, air pressure, wind, and humidity in relation to daily weather conditions	What is Weather? Wind and Ocean Currents
c. <i>Describe weather conditions based on data collected using a variety of weather tools</i>	–
d. <i>Use data collection tools and measuring devices to gather, organize, and analyze data such as temperature, air pressure, wind, and humidity in relation to daily weather conditions</i>	–
GRADE 6	
1. Complex interrelationships exist between Earth's structure and natural processes that over time are both constructive and destructive	

a. Gather, analyze, and communicate an evidence-based explanation for the complex interaction between Earth's constructive and destructive forces	Erosion, Transportation and Deposition Plate Boundaries
b. Gather, analyze and communicate evidence from text and other sources that explains the formation of Earth's surface features	What is Plate Tectonics? Plate Boundaries
c. Use or create a computer simulation for Earth's changing crust	What is Plate Tectonics?
2. Water on Earth is distributed and circulated through oceans, glaciers, rivers, ground water, and the atmosphere	
a. Gather and analyze data from a variety of print resources and investigations to account for local and world-wide water circulation and distribution patterns	The Water Cycle
b. Use evidence to model how water is transferred throughout the earth	The Water Cycle Precipitation Wind and Ocean Currents
c. Identify problems, and propose solutions related to water quality, circulation, and distribution – both locally and worldwide	Acid Rain
d. Identify the various causes and effects of water pollution in local and world water distributions	Acid Rain
e. Describe where water goes after it is used in houses or buildings	–
3. Earth's natural resources provide the foundation for human society's physical needs. Many natural resources are nonrenewable on human timescales, while others can be renewed or recycled	
a. Research and evaluate data and information to learn about the types and availability of various natural resources, and use this knowledge to make evidence-based decisions	Nonrenewable Energy Resources Renewable Energy
b. Identify and evaluate types and availability of renewable and nonrenewable resources	Nonrenewable Energy Resources Renewable Energy
c. Use direct and indirect evidence to determine the types of resources and their applications used in communities	–
d. Research and critically evaluate data and information about the advantages and disadvantages of using fossil fuels and alternative energy sources	Fossil Fuels Greenhouse Gases Nonrenewable Energy Resources
GRADE 7	
1. Major geologic events such as earthquakes, volcanic eruptions, mid-ocean ridges, and mountain formation are associated with plate boundaries and attributed to plate motions	

a. Gather, analyze, and communicate data that explains Earth's plates, plate motions, and the results of plate motions	What is Plate Tectonics? Plate Boundaries Earthquakes Tsunami Case Study
b. Identify, interpret, and explain models of plates motions on Earth	What is Plate Tectonics? Plate Boundaries
c. Use maps to locate likely geologic "hot spots", using evidence of earthquakes and volcanic activity	Earthquakes
d. Use web-based or other technology tools to show connections and patterns in data about tectonic plate boundaries and earthquakes, volcanic eruptions, and mountain formation	Earthquakes Plate Boundaries
2. Geologic time, history, and changing life forms are indicated by fossils and successive sedimentation, folding, faulting, and uplifting of layers of sedimentary rock	
<i>a. Describe the geologic time scale and why it is used</i>	–
<i>b. Identify and describe the impact of major geologic events on life on Earth</i>	–
<i>c. Identify and describe major events in Earth's geologic history</i>	–
<i>d. Use direct and indirect evidence to determine the sequence of events in geologic time</i>	–
<b>GRADE 8</b>	
1. Weather is a result of complex interactions of Earth's atmosphere, land and water, that are driven by energy from the sun, and can be predicted and described through complex models	
a. Differentiate between basic and severe weather conditions, and develop an appropriate action plan for personal safety and the safety of others	Weather Hazards Hurricanes What is Weather? Flooding Tornados
<i>b. Observe and gather data for various weather conditions and compare to historical data for that date and location</i>	–
<i>c. Use models to develop and communicate a weather prediction</i>	–
2. Earth has a variety of climates defined by average temperature, precipitation, humidity, air pressure, and wind that have changed over time in a particular location	
a. Develop, communicate and justify an evidence-based scientific explanation to account for Earth's different climates	Climate Zones Wind and Ocean Currents

b. Research and evaluate direct and indirect evidence to explain how climates vary from one location to another on Earth	Climate Zones
c. Examine, evaluate, and question information from a variety of sources and media to investigate how climates vary from one location to another on Earth	Climate Zones
3. The solar system is comprised of various objects that orbit the Sun and are classified based on their characteristics	
a. Construct a scale model of the solar system, and use it to explain the motion of objects in the system such a planets, Sun, Moons, asteroids, comets, and dwarf planets	The Solar System Gravity
b. Describe methods and equipment used to explore the solar system and beyond	Exploring Space
c. Design an investigation that involves direct observation of objects in the sky, and analyze and explain results	Satellites The Earth, Moon and Sun
d. Research, critique, and communicate scientific theories that explain how the solar system was formed	The Solar System
e. Use computer data sets and simulations to explore objects in the solar system	The Solar System
<i>f. Recognize that mathematical models are used to predict orbital paths and events</i>	–
4. The relative positions and motions of Earth, Moon, and Sun can be used to explain observable effects such as seasons, eclipses, and Moon phases	
a. Develop, communicate, and justify an evidence-based explanation using relative positions of Earth, Moon, and Sun to explain the following natural phenomenon: Tides; Eclipses of the Sun and Moon; Different shapes of the Moon as viewed from Earth	The Earth, Moon and Sun
b. Analyze and interpret data to explain why we have seasons	Days, Years and Seasons
c. Use models to explain the relative motions of Earth, Moon, and Sun over time	The Earth, Moon and Sun