



Grade 8

Pacing and Planning Guide

Science

2013-2014



Colorado Academic Standards: Grade Level Expectations (GLE) Evidence Outcomes (EO) Nature of Science (NOS)	Time Frame & Resource
<p>Science and Engineering Practices (Nat'l Science Frameworks)</p> <ul style="list-style-type: none"> • Asking questions (for science) and defining problems (for engineering) • Developing and using models • Planning and carrying out investigations • Analyzing and interpreting data • Using mathematics and computational thinking • Constructing explanations (for science) and designing solutions (for engineering) • Engaging in argument from evidence • Obtaining, evaluating, and communicating information 	<p>Year-long</p>
<p>PS.8.2. There are different forms of energy, and those forms of energy can be changed from one form to another - but total energy is conserved.</p> <ul style="list-style-type: none"> • EOb - Gather, analyze, and interpret data to describe the different forms of energy and energy transfer (DOK 1-2) • EOb - Develop a research-based analysis of different forms of energy and energy transfer (DOK 1-3) • EOb - Use research-based models to describe energy transfer mechanisms, and predict amounts of energy transferred (DOK 1-2) • NOS1 - Share experimental data, and respectfully discuss conflicting results. (DOK 2-3) • NOS2 - Recognize and describe the ethical traditions of science: value peer review; truthful reporting of methods and outcomes; making work public; and sharing a lens of professional skepticism when reviewing the work of others. (DOK 1) • NOS3 - Use tools to gather, view, analyze, and report results for scientific investigations designed to answer questions about energy transformations. (DOK 1-2) <p>PS.8.4. Recognize that waves such as electromagnetic, sound, seismic, and water have common characteristics and unique properties.</p> <ul style="list-style-type: none"> • EOb - Compare and contrast different types of waves (DOK 1-2) • EOb - Describe for various waves the amplitude, frequency, wavelength, and speed (DOK 1) • EOb - Describe the relationship between pitch and frequency in sound (DOK 1) • EOb - Develop and design a scientific investigation regarding absorption, reflection, and refraction of light (DOK 2-4) • NOS1 - Evaluate models used to explain and predict wave phenomena that cannot be directly measured. (DOK 2-3) • NOS2 - Understand that scientists work from the assumption that the universe is a single system in which the basic rules are the same everywhere. For example, the speed of light in a vacuum is constant across space and time. (DOK 1) • NOS3 - Select and use technology tools to gather, view, analyze, and report results for scientific investigations about the characteristics and properties of waves. (DOK 1-2) 	<p>PBIS Module: Energy</p> <p>≈8/6 to ≈12/19 88 days</p>



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<p>ES.6.3. 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.</p> <ul style="list-style-type: none"> • EOb – 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 (DOK 2-3) • EOb – Identify and evaluate types and availability of renewable and nonrenewable resources (DOK 1-2) • EOb – Use direct and indirect evidence to determine the types of resources and their applications used in communities (DOK 1-2) • EOb – Research and critically evaluate data and information about the advantages and disadvantages of using fossil fuels and alternative energy sources (DOK 2-3) • NOS1 – Recognize and describe the ethical traditions of science: value peer review; truthful reporting of methods and outcomes; making work public; and sharing a lens of professional skepticism when reviewing the work of others. (DOK 1) 	
<p>PS.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.</p> <ul style="list-style-type: none"> • EOb - Predict and evaluate the movement of an object by examining the forces applied to it (DOK 1-2) • EOb - Use mathematical expressions to describe the movement of an object (DOK 1-2) • EOb - Develop and design a scientific investigation to collect and analyze speed and acceleration data to determine the net forces acting on a moving object (DOK 2-4) • NOS1 - Recognize that our current understanding of forces has developed over centuries of studies by many scientists, and that we will continue to refine our understanding of forces through continued scientific investigations and advances in data collection. (DOK 1) • NOS2 - Find, evaluate, and select appropriate information from reference books, journals, magazines, online references, and databases to answer scientific questions about motion and acceleration. (DOK 1-2) 	<p>PBIS Module: Vehicles in Motion</p> <p>≈1/6 to ≈2/21 31 days</p>
<p>ES.8.1. 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.</p> <ul style="list-style-type: none"> • EOb - Differentiate between basic and severe weather conditions, and develop an appropriate action plan for personal safety and the safety of others (DOK 1-3) • EOb - Observe and gather data for various weather conditions and compare to historical data for that date and location (DOK 1-2) • EOb - Use models to develop and communicate a weather prediction (DOK 1-2) 	<p>PBIS Module: Weather Watch</p> <p>≈2/24 to ≈5/21 57 days</p>



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- NOS1 - Evaluate of the accuracy of various tools used in forecasting weather. (DOK 2-3)
- NOS2 - Use the historical context and impact of early weather research and consider the potential implications for current weather studies on science and our society. (DOK 1-3)

ES.8.2. 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.

- EOb - Research and evaluate direct and indirect evidence to explain how climates vary from one location to another on Earth (DOK 2-3)
- EOC - Examine, evaluate, and question information from a variety of sources and media to investigate how climates vary from one location to another on Earth (DOK 1-3)
- NOS1 - Ask testable questions and make a falsifiable hypothesis about earth's climate and use an inquiry based approach to find an answer. (DOK 1-4)
- NOS2 - Describe various techniques that scientists use to study climate, and suggest ways that each technique can be used to better understand various climates and changes in climate. (DOK 1-2)

ES6.2. Water on Earth is distributed and circulated through oceans, glaciers, rivers, groundwater, and the atmosphere

- EOa - Gather and analyze data from a variety of print resources and investigations to account for local and world-wide water circulation and distribution patterns (DOK 1-3)
- EOb - Use evidence to model how water is transferred throughout the earth (DOK 1-3)
- EOC - Identify problems, and propose solutions related to water quality, circulation, and distribution - both locally and worldwide (DOK 1-4)
- EOD - Identify the various causes and effects of water pollution in local and world water distributions (DOK 1-2)
- EOE - Describe where water goes after it is used in houses or buildings (DOK 1-2)
- NOS1 - Ask testable questions and make falsifiable hypotheses research about water distribution. (DOK 2)
- NOS2 - Create and evaluate models; identifying the strengths and weaknesses of the model in representing water circulation and distribution. (DOK 2-3)

8th Grade GLEs addressed in previous years:

Air Quality (6th Grade)

PS.8.3. Distinguish between physical and chemical changes, noting that mass is conserved during any change

- EOa - Identify the distinguishing characteristics between a chemical and a physical change (DOK 1)
- EOb - Gather, analyze, and interpret data on physical and chemical changes (DOK 1-2)
- EOC - Gather, analyze, and interpret data that show mass is conserved in a given chemical or physical change (DOK 1-2)
- EOD - Identify evidence that suggests that matter is always conserved in physical and chemical changes (DOK 1)
- EOE - Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate physical and chemical changes (DOK 1-2)



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- *NOS1 - Evaluate the reproducibility of an experiment, and critically examine conflicts in experimental results. (DOK 2-3)*
- *NOS2 - Share experimental data, and respectfully discuss conflicting results emulating the practice of scientists. (DOK 2-3)*

LS.8.1. Human activities can deliberately or inadvertently alter ecosystems and their resiliency

- *EOa - Develop, communicate, and justify an evidence-based scientific example of how humans can alter ecosystems (DOK 1-3)*
- *EOb - Analyze and interpret data about human impact on local ecosystems (DOK 1-3)*
- *EOc - Recognize and infer bias in print and digital resources while researching an environmental issue (DOK 1-3)*
- *EOd - 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 (DOK 1-2)*
- *EOe - Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate an environmental issue (DOK 1-2)*
- *NOS1 - Critically evaluate scientific claims in popular media and peer generated explanations regarding interactions in ecosystems, and determine if the evidence presented is appropriate and sufficient to support the claims. (DOK 2-3)*

Living Together

LS.8.1. Human activities can deliberately or inadvertently alter ecosystems and their resiliency

- *EOa - Develop, communicate, and justify an evidence-based scientific example of how humans can alter ecosystems (DOK 1-3)*
- *EOb - Analyze and interpret data about human impact on local ecosystems (DOK 1-3)*
- *Recognize and infer bias in print and digital resources while researching an environmental issue (DOK 1-3)*
- *EOc - 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 (DOK 1-2)*
- *EOd - Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate an environmental issue (DOK 1-2)*
- *NOS1 - Critically evaluate scientific claims in popular media and peer generated explanations regarding interactions in ecosystems, and determine if the evidence presented is appropriate and sufficient to support the claims. (DOK 2-3)*

Ever Changing Earth

LS.8.1. Human activities can deliberately or inadvertently alter ecosystems and their resiliency

- *EOa - Develop, communicate, and justify an evidence-based scientific example of how humans can alter ecosystems (DOK 1-3)*
- *EOb - Analyze and interpret data about human impact on local ecosystems (DOK 1-3)*
- *Recognize and infer bias in print and digital resources while researching an environmental issue (DOK 1-3)*
- *EOc - 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 (DOK 1-2)*
- *EOd - Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate an environmental issue (DOK 1-2)*
- *NOS1 - Critically evaluate scientific claims in popular media and peer generated explanations regarding interactions in ecosystems, and determine if the evidence presented is appropriate and sufficient to support the claims. (DOK 2-3)*



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Genetics

LS.8.2 Organisms reproduce and transmit genetic information (genes) to offspring, which influences individuals' traits in the next generation.

- *EOa - Develop, communicate, and justify an evidence based scientific explanation for how genetic information is passed to the next generation*
- *EOb - Use direct and indirect observations, evidence, and data to support claims about genetic reproduction and traits of individuals.*
- *EOc - Gather, analyze and interpret data on transmitting genetic information.*
- *EOd - Use models and diagrams to predict and phenotype and genotype of offspring based on the genotype of the parents*
- *EOe - Use computer simulations to model and predict phenotype and genotype of offspring based on the genotype of the parents*
- *NOS1 - Understand the interconnected nature of math and science by utilizing math in the prediction of future generations.*
- *NOS2 - Recognize that current understanding of genetics has developed over time and become more sophisticated as new technologies have lead to new evidence.*
- *NOS3 - Critically evaluate models used to represent DNA and genes; identify strengths and weaknesses of these models for representing complex natural phenomena.*

Astronomy

ES.8.3 The solar system is comprised of various objects that orbit the Sun and are classified based on their characteristics.

- *EOa - 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 (DOK 2-3)*
- *EOb - Describe methods and equipment used to explore the solar system and beyond (DOK 1)*
- *EOc - Design an investigation that involves direct observation of objects in the sky, and analyze and explain results (DOK 2-4)*
- *EOd - Research, critique, and communicate scientific theories that explain how the solar system was formed (DOK 1-3)*
- *EOe - Use computer data sets and simulations to explore objects in the solar system (DOK 1-2)*
- *EOf - Recognize that mathematical models are used to predict orbital paths and events (DOK 1)*
- *NOS1 - Understand that scientists work from the assumption that the universe is a single system in which the basic rules are the same everywhere - that planets follow the same rules about forces as other objects.*
- *NOS2 - Recognize that our current understanding of the solar system has developed over centuries of studies by many scientists, and that through continued scientific investigations and advances in data collection, we will continue to refine our understanding of the solar system. (DOK 1)*

ES.8.4 The relative positions and motions of Earth, Moon, and Sun can be used to explain observable effects such as seasons, eclipses, and Moon phases

- *EOa - Develop, communicate, and justify an evidence-based explanation using relative positions of Earth, Moon, and Sun to explain the following natural phenomenon: 1. Tides 2. Eclipses of the Sun and Moon 3. Different shapes of the Moon as viewed from Earth (DOK 1-3)*
- *EOb - Analyze and interpret data to explain why we have seasons (DOK 1-2)*
- *EOc - Use models to explain the relative motions of Earth, Moon, and Sun over time (DOK 1-2)*
- *NOS1 - Explore the global consequences of the interrelationships among science, technology and human activity. (DOK 1-4)*



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- *NOS2 - Evaluate visual and print media for scientific evidence, bias, and conjecture related to the historical ideas about relative positions of the Earth, Moon and Sun. (DOK 1-3)*