



Essential Standards: Science

Grades: K-12

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Essential Standards Science Kindergarten

With guidance, plan and conduct an investigation in collaboration with peers. (K-PS2-1)

Analyze data from tests of an object or tool to determine if it works as intended. (K-PS2-2)

Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem.
(K-PS3- 2)

Construct an argument with evidence to support a claim.
(K-ESS2-2)

Ask questions based on observations to find more information about the designed world. (K-ESS3-2)

Use a model to represent relationships in the natural world.
(K-ESS3-1)

Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world. (K-ESS3-2)

Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3)

Essential Standards Science 1st Grade

Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question.

(1-PS4-1),(1-PS4-3)

Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.

(1-ESS1-1)

Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena **(1-PS4- 2)**

Use tools and materials provided to design a device that solves a specific problem. **(1-PS4-4)**

Ask questions based on observations to find more information about the natural and/or designed world.

(K-2- ETS1-1)

Define a simple problem that can be solved through the development of a new or improved object or tool. **(K-2- ETS1-1)**

Develop a simple model based on evidence to represent a proposed object or tool. **(K-2-ETS1-2)**

Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. **(1-LS1-2)**

Essential Standards Science 2nd Grade

Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-PS1-1)

Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2)

Make observations (firsthand or from media) to construct and evidence-based account for natural phenomena. (2-PS1-3)

Construct an argument with evidence to support a claim.(2-PS1-4)

Ask questions based on observations to find more information about the natural and/or designed world.
(K-2-ETS1-1)

Define a simple problem that can be solved through the development of a new or improved object or tool.
(K-2-ETS1-1)

Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2)

Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3)

Essential Standards Science 3rd Grade

Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-PS2-1)

Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-PS2-2)

Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1)

Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2)

Construct an argument with evidence, data, and/or a model. (3-LS2-1)

Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3)

Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)

Develop models to describe phenomena. (3-LS1-1)

Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2)

Essential Standards Science 4th Grade

Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2)

Analyze and interpret data to make sense of phenomena using logical reasoning. (4-ESS2-2)

Use evidence (e.g., measurements, observations, patterns) to construct an explanation. (4-PS3-1)

Apply scientific ideas to solve design problems. (4-PS3-4)

Construct an argument with evidence, data, and/or a model. (4-LS1-1)

Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3)

Develop a model using an analogy, example, or abstract representation to describe a scientific principle. (4-PS4-1)

Develop a model to describe phenomena. (4-PS4-2)

Obtain and combine information from books and other reliable media to explain phenomena. (4-ESS3-1)

Essential Standards Science 5th Grade

Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (5-PS1-4)

Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (5-PS1-3)

Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. (5-ESS1-2)

Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)

Support an argument with evidence, data, or a model. (5-PS2-1)

Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)

Develop a model to describe phenomena. (5-PS1-1)

Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.
(5-ESS3-1)

Essential Standards Science 6th Grade

MS-ESS3-2

Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

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.

MS-PS-6 Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

MS-ESS2-1

Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

MS-PS1-5

Develop a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

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.

Essential Standards Science 7th Grade

MS-PS2-5.

Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

MS-PS3-4.

Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

MS-ESS1-3.

Analyze and interpret data to determine scale properties of objects in the solar system.

MS-LS2-1.

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-ESS1-4.

Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.

MS-LS2-2.

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS1-5.

Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

MS-LS1-6.

Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

MS-PS2-4.

Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

MS-PS3-5.

Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

MS-LS1-4.

Use arguments based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

MS-LS2-4.

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Essential Standards Science 8th Grade

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.

MS-ESS2-5.

Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.

MS-PS3-1.

Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

MS-LS4-1.

Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

MS-LS4-3.

Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.

MS-PS2-1.

Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.*

MS-PS3-3.

Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.*

MS-ESS3-3.

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*

MS-LS4-2.

Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

MS-LS4-4.

Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

MS-ESS3-4.

Construct an argument supported by evidence for how increases in human population and per capita consumption of natural resources impact Earth's systems.

MS-ESS3-5.

Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

MS-LS2-5.

Evaluate competing design solutions for maintaining biodiversity and ecosystem Services.

MS-PS4-2.

Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

MS-ESS2-4.

Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

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.

Essential Standards Science Global Science

HS-PS1-3

Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

HS-ESS3-5

Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems.

HS-PS1-2

Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

HS-ESS1-5

Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.

HS-PS1-1

Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

HS-PS1-8

Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

HS-ESS1-3

Communicate scientific ideas about the way stars, over their life cycle, produce elements.

HS-PS4-4

Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.

HS-PS4-1

Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

Essential Standards Science

Biology

HS-LS4-3

Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

HS-LS1-1

construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.

HS-LS3-1

Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

HS-LS1-7

Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.

HS-LS1-2

Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-5

Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

HS-LS1-4

Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

Essential Standards Science

Introduction to Chemistry

HS-PS3-4

Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

HS-PS1-5

Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

HS-PS1-4

Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

HS-PS3-1

Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.

HS-PS1-7

Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

Essential Standards Science

Introduction to Physics

HS-PS1-7

Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

HS-PS2-1

Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration

HS-PS3-3

Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

HS-PS2-3

Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.

HS-PS2-2

Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system