

Grade Eight Range Achievement Level Descriptors for the California Science Test



June 2021



Three-Dimensional (3-D) Earth and Space Sciences

Earth and Space Sciences: DCI Strands	Nearly Met Standard	Met Standard	Exceeded Standard
Earth's Place in the Universe (ESS1)	Students at level 2 consistently apply their knowledge and skills of the CA NGSS to problems of low complexity , demonstrating a partial understanding of the earth and space sciences.	Students at level 3 consistently apply their knowledge and skills of the CA NGSS to problems of medium complexity , demonstrating an adequate understanding of the earth and space sciences.	Students at level 4 consistently apply their knowledge and skills of the CA NGSS to problems of high complexity , demonstrating a thorough understanding of the earth and space sciences.
	Students can use a model of the Earth-sun-moon system to identify the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons; use a model to identify the motions of objects within galaxies and the solar system; use data to describe scale properties of objects in the solar system; and use rock strata to describe the order of geologic time scale events.	Students can 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; develop and use a physical model to describe the role of gravity in the motions within galaxies and the solar system; analyze and interpret data to determine scale properties of objects in the solar system; and 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.	Students can develop a model of the Earth-sun-moon system to predict the occurrence of lunar phases, eclipses of the sun and moon, and seasons; develop and use a conceptual model to explain the role of gravity in the motions within galaxies and the solar system; analyze and interpret data to predict patterns of scale properties of objects in the solar system; and construct a scientific explanation based on evidence from rock strata, the fossil record, and geologic events to organize Earth's 4.6-billion-year-old history.

Earth and Space Sciences: DCI Strands	Nearly Met Standard	Met Standard	Exceeded Standard
Earth's Systems (ESS2)	Students can use a model to describe the cycling of Earth's materials and the flow of energy that drives this process; describe that geoscience processes have changed Earth's surface; use data on the distribution of fossils and rocks, continental shapes, and seafloor structures to describe past plate motions; use a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity; describe that the motions and interactions of air masses cause changes in weather conditions; and use a model to describe how unequal heating and the rotation of Earth can affect regional climates.	Students can develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process; construct an explanation based on evidence for how geoscience processes have changed Earth's surface; analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of past tectonic plate motions; develop a model to describe that the cycling of water through Earth's systems is driven by energy from the sun and the force of gravity; use evidence to explain how the motions and interactions of air masses cause changes in weather conditions; and develop and use a model to describe how unequal heating and the rotation of Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.	Students can develop a model to explain the cycling of Earth's materials and the flow of energy that drives this process; construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales; analyze and interpret data to identify patterns in the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of past tectonic plate motions; develop a model to explain how the cycling of water through Earth's systems is driven by energy from the sun and the force of gravity; use evidence to predict changing weather conditions using the motions and interactions of air masses; and develop and use a model to explain how unequal heating and the rotation of Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

Earth and Space Sciences: DCI Strands	Nearly Met Standard	Met Standard	Exceeded Standard
Earth and Human Activity (ESS3)	<p>Students at level 2 consistently apply their knowledge and skills of the CA NGSS to problems of low complexity, demonstrating a partial understanding of the earth and space sciences.</p>	<p>Students at level 3 consistently apply their knowledge and skills of the CA NGSS to problems of medium complexity, demonstrating an adequate understanding of the earth and space sciences.</p>	<p>Students at level 4 consistently apply their knowledge and skills of the CA NGSS to problems of high complexity, demonstrating a thorough understanding of the earth and space sciences.</p>
	<p>Students can describe how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of geological processes; use data on natural hazards to predict future catastrophic events and identify an example of a technology that mitigates their effects; describe an example of how humans monitor their impact on the environment; describe that increases in human population and per-capita consumption of natural resources can impact Earth's systems; and make observations about the factors that have caused the rise in global temperatures over the past century.</p>	<p>Students can construct a scientific (i.e., based on theories and laws) explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of geological processes; analyze and interpret data on natural hazards to predict future catastrophic events and inform the development of technologies to mitigate their effects; design a method for monitoring and minimizing a human impact on the environment; construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems; and ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.</p>	<p>Students can construct a scientific (i.e., based on theories and laws) explanation based on evidence of the cause and effect relationship between geological processes and the uneven distributions of Earth's mineral, energy, and groundwater resources; analyze and interpret patterns in data on natural hazards to predict future catastrophic events and inform the development of technologies to mitigate their effects; design and evaluate a method based on how well it meets the criteria and constraints for monitoring and minimizing a human impact on the environment; construct an argument supported by evidence for how the rates of change in human population and per-capita consumption of natural resources impact Earth's systems; and ask and differentiate between testable and non-testable questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.</p>

3-D Life Sciences

Life Sciences: DCI Strands	Nearly Met Standard	Met Standard	Exceeded Standard
From Molecules to Organisms: Structures and Processes (LS1)	Students at level 2 consistently apply their knowledge and skills of the CA NGSS to problems of low complexity , demonstrating a partial understanding of the life sciences.	Students at level 3 consistently apply their knowledge and skills of the CA NGSS to problems of medium complexity , demonstrating an adequate understanding of the life sciences.	Students at level 4 consistently apply their knowledge and skills of the CA NGSS to problems of high complexity , demonstrating a thorough understanding of the life sciences.
	Students can make observations that living things are made of either one cell or different numbers and types of cells; use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function; identify evidence that the body is a system of interacting subsystems composed of groups of cells; identify characteristic animal behaviors and specialized plant structures that affect the probability of successful reproduction of animals and plants; describe how environmental and genetic factors influence the growth of organisms; describe the role of photosynthesis in the cycling of matter or flow of energy into and out of organisms; use a model to describe that food is rearranged through chemical reactions forming new molecules that support growth and/or release energy; and use information regarding how sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.	Students can investigate that living things are made of either one cell or different numbers and types of cells; develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function; construct an argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells; construct an argument to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants; construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms; construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter or flow of energy into and out of organisms; develop a model to describe that food is rearranged through chemical reactions forming new molecules that support growth and/or release energy; and gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.	Students can use evidence to plan an investigation about living things being made of either one cell or different numbers and types of cells; develop a model to explain the function of a cell as a whole and ways parts of cells contribute to the function; construct an argument supported by evidence for how every scale of body function is composed of systems of interacting components; construct an argument to support an explanation of the cause and effect relationship between characteristic animal behaviors and specialized plant structures and the probability of successful reproduction of animals and plants; construct a scientific explanation based on evidence regarding the cause and effect relationship between environmental and genetic factors and the growth of organisms; 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; develop and use a model to predict how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy; and evaluate information describing the cause and effect relationship between a stimulus and a response by sensory receptors.

	<p style="text-align: center;">Nearly Met Standard</p> <p>Students at level 2 consistently apply their knowledge and skills of the CA NGSS to problems of low complexity, demonstrating a partial understanding of the life sciences.</p>	<p style="text-align: center;">Met Standard</p> <p>Students at level 3 consistently apply their knowledge and skills of the CA NGSS to problems of medium complexity, demonstrating an adequate understanding of the life sciences.</p>	<p style="text-align: center;">Exceeded Standard</p> <p>Students at level 4 consistently apply their knowledge and skills of the CA NGSS to problems of high complexity, demonstrating a thorough understanding of the life sciences.</p>
<p>Ecosystems: Interactions, Energy, and Dynamics (LS2)</p>	<p>Students can identify the effects of resource availability on organisms and populations of organisms in an ecosystem; identify interactions among organisms across multiple ecosystems; use a model to identify the cycling of matter and flow of energy among living and nonliving parts of an ecosystem; describe that changes to physical or biological components of an ecosystem affect populations; and describe a solution for maintaining biodiversity and ecosystem services (e.g. clean air, clean water, etc.).</p>	<p>Students can analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem; construct an explanation that describes patterns of interactions among organisms across multiple ecosystems; develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem; construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations; and evaluate competing design solutions for maintaining biodiversity and ecosystem services (e.g. clean air, clean water, etc.).</p>	<p>Students can analyze and interpret data to identify cause and effect relationships between resource availability and the organisms and populations of organisms in an ecosystem; construct an explanation that predicts patterns of cause and effect relationships among organisms across multiple ecosystems; develop a model to explain how matter cycles and energy flows among living and nonliving parts of an ecosystem; construct an argument supported by empirical evidence why small changes to physical or biological components of an ecosystem might lead to larger changes in populations; and evaluate competing design solutions based on how well they meet the criteria and constraints for maintaining biodiversity and ecosystem services (e.g. clean air, clean water, etc.).</p>
<p>Heredity: Inheritance and Variation of Traits (LS3)</p>	<p>Students can use a model to describe that mutations may affect proteins and may result in effects to the structure and function of the organism; and use a model to describe that asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.</p>	<p>Students can develop and use a model to describe that mutations may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism; and develop and use a model to describe that asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.</p>	<p>Students can develop a model to explain why mutations may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism; and develop a model to explain why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.</p>

Life Sciences: DCI Strands	Nearly Met Standard	Met Standard	Exceeded Standard
Biological Evolution: Unity and Diversity (LS4)	Students at level 2 consistently apply their knowledge and skills of the CA NGSS to problems of low complexity , demonstrating a partial understanding of the life sciences.	Students at level 3 consistently apply their knowledge and skills of the CA NGSS to problems of medium complexity , demonstrating an adequate understanding of the life sciences.	Students at level 4 consistently apply their knowledge and skills of the CA NGSS to problems of high complexity , demonstrating a thorough understanding of the life sciences.

3-D Physical Sciences

Physical Sciences: DCI Strands	Nearly Met Standard	Met Standard	Exceeded Standard
Matter and Its Interactions (PS1)	<p>Students at level 2 consistently apply their knowledge and skills of the CA NGSS to problems of low complexity, demonstrating a partial understanding of the physical sciences.</p> <p>Students can use a model to identify the atomic composition of simple molecules; identify properties of substances before and after their interaction; identify that synthetic materials come from natural resources and have an impact on society; use a model to identify changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed; use a model to identify how the total number of atoms does not change in a chemical reaction; and make observations or take measurements from a device that either releases or absorbs thermal energy by chemical processes.</p>	<p>Students at level 3 consistently apply their knowledge and skills of the CA NGSS to problems of medium complexity, demonstrating an adequate understanding of the physical sciences.</p> <p>Students can develop a model to describe the atomic composition of simple molecules and extended structures; analyze and interpret data to provide evidence of whether a chemical reaction has occurred; gather information to describe that synthetic materials come from natural resources and have an impact on society; develop and use a model to describe changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed; develop a model to predict and describe how the total number of atoms does not change in a chemical reaction; and design and test a device that either releases or absorbs thermal energy by chemical processes.</p>	<p>Students at level 4 consistently apply their knowledge and skills of the CA NGSS to problems of high complexity, demonstrating a thorough understanding of the physical sciences.</p> <p>Students can develop and use a model to predict the atomic composition of molecules and extended structures; analyze and interpret data to identify patterns in the properties of substances before and after interaction to determine if chemical reactions have occurred; synthesize information to describe that synthetic materials come from natural resources and evaluate the impact on society; develop and use a model to explain the changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed; develop a model to explain the law of conservation of matter to predict and describe how a total number of atoms does not change in a chemical reaction; and evaluate multiple solutions to a problem based on how well they meet the criteria and constraints using a device that either releases or absorbs thermal energy by chemical processes.</p>

Physical Sciences: DCI Strands	Nearly Met Standard	Met Standard	Exceeded Standard
Motion and Stability: Forces and Interactions (PS2)	Students at level 2 consistently apply their knowledge and skills of the CA NGSS to problems of low complexity , demonstrating a partial understanding of the physical sciences.	Students at level 3 consistently apply their knowledge and skills of the CA NGSS to problems of medium complexity , demonstrating an adequate understanding of the physical sciences.	Students at level 4 consistently apply their knowledge and skills of the CA NGSS to problems of high complexity , demonstrating a thorough understanding of the physical sciences.
	Students can use Newton's third law to identify a problem involving the motion of two colliding objects; identify that the change in an object's motion depends on the sum of the forces on the object or the mass of the object; make observations about the factors that affect the strength of electric and magnetic forces; identify that gravitational interactions are attractive and depend on the masses of interacting objects; and identify whether electric or magnetic fields exist between objects exerting forces on each other even though the objects are not in contact.	Students can apply Newton's third law to design a solution to a problem involving the motion of two colliding objects; investigate how the change in an object's motion depends on the sum of the forces on the object and the mass of the object; ask questions to determine the factors that affect the strength of electric and magnetic forces; construct arguments using evidence to support a claim that gravitational interactions are attractive and depend on the masses of interacting objects; and investigate whether electric or magnetic fields exist between objects exerting forces on each other even though the objects are not in contact.	Students can apply Newton's third law to design and evaluate a solution to a problem involving the motion of two colliding objects; use evidence to plan an investigation about how the change in an object's motion depends on the sum of the forces on the object and the mass of the object; identify testable and non-testable questions to determine the factors that affect the strength of electric and magnetic forces; construct arguments using multiple sources of evidence to support a claim that gravitational interactions are attractive and depend on the masses of interacting objects; and evaluate the experimental design of an investigation of whether electric or magnetic fields exist between objects exerting forces on each other even though the objects are not in contact.

Physical Sciences: DCI Strands	Nearly Met Standard	Met Standard	Exceeded Standard
Energy (PS3)	<p>Students at level 2 consistently apply their knowledge and skills of the CA NGSS to problems of low complexity, demonstrating a partial understanding of the physical sciences.</p> <p>Students can use graphical displays of data to describe the relationship of kinetic energy to the mass and speed of an object; use a model to describe that when the positions of objects interacting at a distance changes, different amounts of potential energy are stored in the system; describe a device that either minimizes or maximizes thermal energy transfer; identify 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; and identify evidence that when the kinetic energy of an object changes, energy is transferred to or from the object.</p>	<p>Students at level 3 consistently apply their knowledge and skills of the CA NGSS to problems of medium complexity, demonstrating an adequate understanding of the physical sciences.</p> <p>Students can construct graphical displays of data to describe the relationship of kinetic energy to the mass and speed of an object; develop a model to describe that when the positions of objects interacting at a distance changes, different amounts of potential energy are stored in the system; apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer; investigate the relationships among energy transferred, type of matter, mass, and change in the average kinetic energy of the particles as measured by the temperature of the sample; and construct an argument to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.</p>	<p>Students at level 4 consistently apply their knowledge and skills of the CA NGSS to problems of high complexity, demonstrating a thorough understanding of the physical sciences.</p> <p>Students can construct and/or analyze graphical displays of data to describe the linear proportional relationship of kinetic energy to mass of an object and the nonlinear (square) proportional relationship of kinetic energy to the speed of an object; develop a model to explain or predict how potential energy stored in a system will change when the positions of objects interacting at a distance changes; use scientific principles to refine a design solution based on a set of criteria and constraints for a device that either minimizes or maximizes thermal energy transfer; use evidence to plan an investigation about 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; and construct an argument to support the claim that energy takes different forms when energy is transferred to or from an object when the kinetic energy of the object changes.</p>

Physical Sciences: DCI Strands	Nearly Met Standard	Met Standard	Exceeded Standard
Waves and their Applications in Technologies for Information Transfer (PS4)	Students at level 2 consistently apply their knowledge and skills of the CA NGSS to problems of low complexity , demonstrating a partial understanding of the physical sciences.	Students at level 3 consistently apply their knowledge and skills of the CA NGSS to problems of medium complexity , demonstrating an adequate understanding of the physical sciences.	Students at level 4 consistently apply their knowledge and skills of the CA NGSS to problems of high complexity , demonstrating a thorough understanding of the physical sciences.
	Students can identify the components of a simple wave model that includes how the amplitude of a wave is related to the energy in a wave; use a model to describe that waves are reflected, absorbed, or transmitted through various materials; and use information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	Students can use mathematical representations to describe a simple wave model that includes how the amplitude of a wave is related to the energy in a wave; develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials; and integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	Students can use mathematical representations to describe patterns in a simple wave model that include that the energy of the wave is proportional to the square of the amplitude; develop and use a model to predict how waves are reflected, absorbed, or transmitted through various materials; and integrate qualitative scientific and technical information to support the claim that digitized signals are more reliable than analog by describing the structure and function of a specific technology that uses digital encoding.

3-D Engineering Technology and Applications of Science

Engineering, Technology, and Applications of Science: DCI Strand	<p>Nearly Met Standard</p> <p>Students at level 2 consistently apply their knowledge and skills of the CA NGSS to problems of low complexity, demonstrating a partial understanding of engineering, technology, and applications of science.</p>	<p>Met Standard</p> <p>Students at level 3 consistently apply their knowledge and skills of the CA NGSS to problems of medium complexity, demonstrating an adequate understanding of engineering, technology, and applications of science.</p>	<p>Exceeded Standard</p> <p>Students at level 4 consistently apply their knowledge and skills of the CA NGSS to problems of high complexity, demonstrating a thorough understanding of engineering, technology, and applications of science.</p>
Engineering Design (ETS1)	<p>Students can describe a problem that needs to be solved using the design process; describe a design solution based on how well it meets the criteria and constraints of the problem; use data to compare several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success; and use a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.</p>	<p>Students can define the criteria and constraints of a design problem, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions; compare competing design solutions based on how well they meet the criteria and constraints of the problem; analyze data from tests to compare several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success; and develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.</p>	<p>Students can evaluate a design solution based on the criteria and constraints and the potential impacts on people and the natural environment that may limit possible solutions; use a systematic process to support a claim about the relative effectiveness of competing design solutions based on the strengths and weaknesses of each and how well they meet the criteria and constraints of the problem; use quantitative analysis of data from tests to compare several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success; and develop and use a model to generate multiple forms of data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.</p>