# California Next Generation Science Standards
# Core Content Connectors for Alternate Assessments

## Prepared for the California Department of Education by Educational Testing Service



*Measuring the Power of Learning.*™

Revised January 2018

# Introduction:

For the California Next Generation Science Standards (CA NGSS) alternate summative assessments, Educational Testing Service, in collaboration with their subcontractor edCount (the developers of the National Center and State Collaborative Connectors for ELA and mathematics), developed the preliminary CA NGSS alternate summative assessment Content Core Connectors (Connectors). The Connectors provide learning goals aligned appropriately with the needs of students with the most significant cognitive disabilities, and serve as the basis for the state's CA NGSS alternate summative assessments for eligible students.

The CDE continues to have discussions with stakeholders (including California special education and science educators.) The CDE is planning to provide the final Connectors along with the California Alternate Assessment (CAA) for Science test blueprint for approval by the SBE in January 2018.

Table 1 below illustrates how the CA NGSS Connectors for CAA for Science are organized. The CA NGSS performance expectation (PE) is provided in the second row then followed in subsequent rows by the Connector; the associated focal knowledge, skills, and abilities (FKSAs); and the essential understanding (EU) respectively.

## Table 1. Organization of CA NGSS Connectors

| Components of CA NGSS for ALT Assessments | Grade Level (kindergarten [K] through grade 12) |
|---|---|
| PE* | **4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.** |
| Connector | Build a bridge to the content of the PE |
| FKSA | FKSA1 up to FKSA6: Describe what students should know and be able to do in terms of the original PE and associated Connector. |
| EU | Define a basic, foundational key idea or concept. |

*A grade four PE is shown as an example.

Grade columns that are shaded gray are intentionally left blank to indicate the grade level does not contain any PEs for the core idea of the science domain, which are life sciences (LS); physical sciences (PS); earth and space sciences (ESS); and engineering, technology, and applications of science (ETS). The ETS PEs are not shown in the table below as the developers recommend that each of the ETS PEs, for every grade, be prioritized for assessment because these PEs can be combined with any of the other science domains to provide rich learning experiences for students in the classroom. For example, grade two does not have PEs for the core idea LS1.

Grade level and span PE coding is as follows: kindergarten (K), numeric for grades one through five (1–5), grades six through eight (6–8) or middle school (MS), and high school (HS). Table cells with no content have a patterned shading and are indicated with "no content." Table cells that are not applicable are shaded in gray and indicated with "N/A."

# Life Science 1 (LS1)—From Molecules to Organisms: Structures and Processes (K–2)

| Components of CA NGSS for ALT Assessments | Kindergarten (K) | Grade One | Grade Two |
|---|---|---|---|
| **PE** | **K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.** | **1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.** | N/A |
| **Connector** | Through observations, identify that animals (including humans) obtain food they need to survive from plants, and plants need water and light to survive. | Use materials to solve a human problem by identifying how plants and/or animals use their external parts to help them survive, grow, and meet their needs (e.g., use straw/chenille stick to make a beak, use a blanket/umbrella to create shade). | N/A |
| **FKSA 1** | FKSA 1: Ability to identify that animals obtain food they need to survive from plants. | FKSA 1: Ability to identify external structures used to help an animal survive. | N/A |
| **FKSA 2** | FKSA 2: Ability to identify that plants need water and light to survive. | FKSA 2: Ability to identify external structures used to help a plant survive. | N/A |

| Components of CA NGSS for ALT Assessments | Kindergarten (K) | Grade One | Grade Two |
|---|---|---|---|
| EU | Recognize that all animals drink water to survive. | Identify external structures (characteristics) in animals (e.g., fur, feathers, scales) to help them survive, grow, and meet their needs. | N/A |
| PE | N/A | **1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.** | N/A |
| Connector | N/A | Identify behaviors between parents and offspring that help the offspring (their children) survive (live) (e.g., lion carrying cub by scruff of neck). | N/A |
| FKSA 1 | N/A | FKSA 1: Ability to identify behaviors between parents and offspring that help the offspring (their children) survive (live) (e.g., feeding, protecting the offspring). | N/A |
| EU | N/A | Recognize the fact that animals can have offspring (babies). | N/A |

# Life Science 1 (LS1)—From Molecules to Organisms: Structures and Processes (3–5)

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| PE | 3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. | 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. | 5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water. |
| Connector | Identify a common pattern between models of different life cycles. | Match internal and external structures of plants and animals (e.g., thorns, stems, roots, heart, stomach, lung, brain) to functions that support growth, survival, behavior, and reproduction of organisms. | Recognize that plants acquire material for growth chiefly from air and water, not from soil. |
| FKSA 1 | FKSA 1: Ability to identify a common pattern between models of different life cycles (e.g., birth, growth, reproduction, death). | FKSA 1: Ability to match internal structures of a plant that support behavior of organisms. | FKSA 1: Ability to match the materials most used for plant growth to air and water. |
| FKSA 2 | No content | FKSA 2: Ability to match external structures of a plant that support survival of organisms. | FKSA 2: Ability to match the material least used for plant growth to soil. |
| FKSA 3 | No content | FKSA 3: Ability to match internal structures of an animal that support behavior of organisms. | No content |

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| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **FKSA 4** | No content | FKSA 4: Ability to match external structures of an animal that support survival of organisms. | No content |
| **EU** | Identify a life cycle stage that all organisms have in common (e.g., birth, growth, death). | Match an external structure of an animal to its primary function (body parts; fingers to grasp, nose to smell/breathe). | Identify that plants cannot grow without water or air. |
| **PE** | N/A | **4-LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.** | N/A |
| **Connector** | N/A | Identify how animals use their sense receptors to respond to different types of information in their surroundings (e.g., sound, light, odor, temperature) with behaviors that help them survive. | N/A |
| **FKSA 1** | N/A | FKSA 1: Ability to identify how animals use their sense receptors to respond to different types of information in their surroundings (e.g., sound, light, odor, temperature) with behaviors that help them survive. | N/A |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **EU** | N/A | Identify the sense receptor (body part) of an animal used to smell, see, hear, or touch that would help it to survive in its surroundings. | N/A |

# Life Science 1 (LS1)—From Molecules to Organisms: Structures and Processes (6–8)

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **PE** | **MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.** | **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.** | N/A |
| **Connector** | Identify that living things are made of one cell or many and different types of cells. | Recognize the movement of matter and flow of energy as plants use the energy from light to make sugars using a model of photosynthesis. | N/A |
| **FKSA 1** | FKSA 1: Ability to identify a representation of a living thing that is made of one cell. | FKSA 1: Ability to recognize the movement of matter across a series of reactions using a model of photosynthesis. | N/A |
| **FKSA 2** | FKSA 2: Ability to identify a representation of a living thing that is made of different types of cells. | FKSA 2: Ability to recognize the flow of energy across a series of reactions by using a model of photosynthesis. | N/A |
| **EU** | Distinguish between living and nonliving things. | Recognize that plants produce food molecules (e.g., sugar) and oxygen from sunlight by using a model of photosynthesis. | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **PE** | **MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.** | **MS-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.** | N/A |
| **Connector** | Identify the function of a cell as a whole and the function of a cell wall or cell membrane by using a model of a cell. | Identify the outcome of the process of breaking down food molecules (e.g., sugar) as the release of energy, which can be used to support other processes within the organism. | N/A |
| **FKSA 1** | FKSA 1: Ability to identify the function of a cell as a whole by using a model of a cell. | FKSA 1: Ability to identify the outcome of the process of breaking down food molecules (e.g., sugar) as the release of energy. | N/A |
| **FKSA 2** | FKSA 2: Ability to identify the function of a cell wall by using a model of a cell. | FKSA 2: Identify ways in which energy from food can be used to support other processes within the organism. | N/A |
| **FKSA 3** | FKSA 3: Ability to identify the function of a cell membrane by using a model of a cell. | No content | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **EU** | Identify a model of a cell. | Recognize that food taken in by an organism is broken down and used by an organism for growth. | N/A |
| **PE** | **MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.** | N/A | N/A |
| **Connector** | Identify the basic function of major organ systems (e.g., circulatory, excretory, digestive, respiratory, muscular, nervous). | N/A | N/A |
| **FKSA 1** | FKSA 1: Ability to identify the basic function of the circulatory system. | N/A | N/A |
| **FKSA 2** | FKSA 2: Ability to identify the basic function of the excretory system. | N/A | N/A |
| **FKSA 3** | FKSA 3: Ability to identify the basic function of the digestive system. | N/A | N/A |
| **FKSA 4** | FKSA 4: Ability to identify the basic function of the respiratory system. | N/A | N/A |
| **FKSA 5** | FKSA 5: Ability to identify the basic function of the muscular system. | N/A | N/A |
| **FKSA 6** | FKSA 6: Ability to identify the basic function of the nervous system. | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| EU | Recognize that the human body contains organs to carry out necessary functions for survival and growth. | N/A | N/A |
| PE | **MS-LS1-4. Use argument 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.** | N/A | N/A |
| Connector | Using scientific reasoning, identify behaviors animals engage in (e.g., vocalization) and specialized plant structures (e.g., bright flower parts) that increase the likelihood of reproduction. | N/A | N/A |
| FKSA 1 | FKSA 1: Ability to identify behaviors animals engage in (e.g., vocalization) that increase the likelihood of reproduction. | N/A | N/A |
| FKSA 2 | FKSA 2: Ability to identify specialized plant structures (e.g., bright flower parts) that increase the likelihood of reproduction. | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| EU | Identify a step of plant reproduction (e.g., aromas of flowers attracting insects, insects flying into flowers, grains of pollen sticking to insects, spreading of pollen by insects, seeds developing) OR Identify a behavior animals engage in to increase reproduction (e.g., vocalization, coloration, fighting, other sound generation, nesting). | N/A | N/A |
| PE | **MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.** | N/A | N/A |
| Connector | Identify a scientific explanation for how environmental (e.g., availability of light, space, water, size of habitat) and genetic (e.g., specific breeds of plants and animals and their typical sizes) factors affect the growth of animals and plants. | N/A | N/A |
| FKSA 1 | FKSA 1: Ability to identify a scientific explanation for how environmental factors (e.g., availability of light, space, water, size of habitat) affect the growth of animals. | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| FKSA 2 | FKSA 2: Ability to Identify a scientific explanation for how environmental factors (e.g., availability of light, space, water, size of habitat) affect the growth of plants. | N/A | N/A |
| FKSA 3 | FKSA 3: Ability to Identify a scientific explanation for how genetic factors (e.g., specific breeds of animals and their typical sizes) affect the growth of animals. | N/A | N/A |
| FKSA 4 | FKSA 4: Ability to Identify a scientific explanation for how genetic factors (e.g., specific species of plants and their typical sizes) affect the growth of plants. | N/A | N/A |
| EU | Identify the reason a plant or an animal did not grow. | N/A | N/A |
| PE | **MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.** | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **Connector** | Identify examples of how sensory information sent to the brain is used immediately for behavior or stored as a memory. | N/A | N/A |
| **FKSA 1** | FKSA 1: Ability to identify an example of how sensory information is used immediately for behavior. | N/A | N/A |
| **FKSA 2** | FKSA 2: Ability to identify an example of how sensory information sent to brain is stored as a memory. | N/A | N/A |
| **EU** | Identify that the brain and behavioral responses are part of a system that allows animals to survive (e.g., how the appearance of food generates behavioral responses like salivation or hunger, how the smell of particular foods can bring up past memories associated with that smell). | N/A | N/A |

# Life Science 1 (LS1)—From Molecules to Organisms: Structures and Processes (High School)

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **PE** | **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.** |
| **Connector** | Using evidence based on DNA structures, recognize how different cell types have different functions. |
| **FKSA 1** | FKSA 1: Ability to identify the basic functions of specialized cells. |
| **EU** | Identify basic types of specialized cells in animals and plants. |
| **PE** | **HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.** |
| **Connector** | Using model(s), identify that different systems of the body carry out essential functions (e.g., digestive system, respiratory system, circulatory system, nervous system). |
| **FKSA 1** | FKSA 1: Ability to identify how the digestive system of the body carries out essential functions (e.g., breakdown and absorption of fats, proteins, and carbohydrates). |
| **FKSA 2** | FKSA 2: Ability to identify how the respiratory system of the body carries out essential functions (e.g., movement of oxygen to the body). |
| **FKSA 3** | FKSA 3: Ability to identify how the circulatory system of the body carries out essential functions (e.g., movement of blood and nutrients throughout the body). |
| **FKSA 4** | FKSA 4: Ability to identify how the nervous system of the body carries out essential functions (e.g., brain controls body movement, breathing, and heartbeat; brain processes physical sensations). |
| **EU** | Identify which organ performs a specific function. |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| PE | **HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.** |
| Connector | Use data from an investigation to identify how different organisms react to environmental changes (e.g., heart rate, body temperature). |
| FKSA 1 | FKSA 1: Ability to identify using data from an investigation how different organisms' heart rate reacts to environmental changes. |
| FKSA 2 | FKSA 2: Ability to identify using data from an investigation how different organisms' body temperature reacts to environmental changes. |
| EU | Identify that changes occur to an organism before and after exercise (e.g., heartbeat, breathing rate). |
| PE | **HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.** |
| Connector | Identify how growth occurs when cells multiply (mitosis) by using a model. |
| FKSA 1 | FKSA 1: Ability to use a model to identify how growth occurs during stages of mitosis. |
| EU | Recognize that organisms are composed of a collection of different types of cells. |
| PE | **HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.** |
| Connector | Recognize a model of photosynthesis, which shows the conversion of light energy to stored chemical energy. |
| FKSA 1 | FKSA 1: Ability to recognize a model of photosynthesis, which shows the conversion of light energy to stored chemical energy. |
| FKSA 2 | FKSA 2: Demonstrate understanding that photosynthesis results in the conversion of light energy to stored chemical energy. |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **EU** | Recognize that plants are able to use light to make food energy. |
| **PE** | **HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.** |
| **Connector** | Identify a model that demonstrates how organisms take in matter (allowing growth and maintenance) and rearrange the atoms to make new structures in chemical reactions. |
| **FKSA 1** | FKSA 1: Identify a model which demonstrates how animals take in matter and rearrange molecules to grow. |
| **FKSA 2** | FKSA 2: Identify a model which demonstrates how plants take in matter and rearrange molecules to grow. |
| **EU** | Recognize that all organisms take in matter in order for growth to occur. |
| **PE** | **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.** |
| **Connector** | Identify cellular respiration as the transfer of stored energy to the cell to sustain life's processes by using a model. |
| **FKSA 1** | FKSA 1: Ability to recognize a model of respiration, which shows the transfer of stored energy from food molecules to the cell to sustain life's processes. |
| **EU** | Recognize that oxygen allows animal cells to produce energy from food. |

# Life Science 2 (LS2)—Ecosystems: Interactions, Energy, and Dynamics (K–2)

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **PE** | N/A | N/A | **2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.** |
| **Connector** | N/A | N/A | Observe an investigation and recognize that plants need water and light to grow. |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to recognize that plants need water and light to grow. |
| **FKSA 2** | N/A | N/A | FKSA 2: Ability to observe that plants need water and light to grow. |
| **EU** | N/A | N/A | Identify a plant in a group of living and nonliving things. |
| **PE** | N/A | N/A | **2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.** |
| **Connector** | N/A | N/A | Recognize and identify a simple model that shows that plants need animals to disperse (move around) seeds. |

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| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to observe how plants need animals to disperse (move around) seeds. |
| **EU** | N/A | N/A | Recognize that plants have seeds. |

## Life Science 2 (LS2)—Ecosystems: Interactions, Energy, and Dynamics (3–5)

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **PE** | **3-LS2-1. Construct an argument that some animals form groups that help members survive.** | N/A | **5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.** |
| **Connector** | Recognize that animals within a group help the group obtain food for survival, defend themselves, and survive changes in their ecosystem. | N/A | Identify a model that shows the movement of matter (e.g., plant growth, eating, composting) through living things. |
| **FKSA 1** | FKSA 1: Ability to recognize that animals within a group help the group obtain food for survival. | N/A | FKSA 1: Ability to identify a model that shows the movement of matter (e.g., plant growth, eating, composting) through living things. |
| **FKSA 2** | FKSA 2: Ability to recognize that animals within a group help the group defend themselves. | N/A | No content |
| **FKSA 3** | FKSA 3: Ability to recognize that animals within a group help the group survive changes in their ecosystem. | N/A | No content |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **EU** | Recognize that some animals form groups to survive. | N/A | Identify that an animal needs the plant in a food chain or food web and that the food chain or food web has two main parts: producer and consumer. |

# Life Science 2 (LS2)—Ecosystems: Interactions, Energy, and Dynamics (6–8)

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **PE** | N/A | **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.** | N/A |
| **Connector** | N/A | Identify factors in a graph (including resources, climate or competition) in an ecosystem that influence growth in populations of organisms. | N/A |
| **FKSA 1** | N/A | FKSA 1: Ability to identify resources in an ecosystem that influence growth in populations of organisms. | N/A |
| **FKSA 2** | N/A | FKSA 2: Ability to identify climate in an ecosystem that influences growth in populations of organisms. | N/A |
| **FKSA 3** | N/A | FKSA 3: Ability to identify competition in an ecosystem that influences growth in populations of organisms. | N/A |
| **EU** | N/A | Match organisms to their habitats. | N/A |

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| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **PE** | N/A | **MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.** | N/A |
| **Connector** | N/A | Describe examples of competitive, predatory, or symbiotic relationships by using models of interactions between organisms in an ecosystem. | N/A |
| **FKSA 1** | N/A | FKSA 1: Ability to describe a competitive relationship by using a model of interactions between organisms in an ecosystem. | N/A |
| **FKSA 2** | N/A | FKSA 2: Ability to describe a predatory relationship by using a model of interactions between organisms in an ecosystem. | N/A |
| **FKSA 3** | N/A | FKSA 3: Ability to describe a symbiotic relationship by using a model of interactions between organisms in an ecosystem. | N/A |
| **EU** | N/A | Identify that animals compete for food. | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **PE** | N/A | **MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.** | N/A |
| **Connector** | N/A | Using a model, identify energy transfer between producers, consumers, and decomposers in an ecosystem. | N/A |
| **FKSA 1** | N/A | FKSA 1: Ability to identify energy transfer between producers, consumers, and decomposers in an ecosystem by using a model (e.g., producers get energy from sunlight, producers provide energy for consumers, and decomposers recycle nutrients and matter in the ecosystem). | N/A |
| **EU** | N/A | Recognize that when people or animals eat plants they are taking energy into their bodies. | N/A |
| **PE** | N/A | **MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.** | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| Connector | N/A | Identify the outcome using evidence of changes in physical or biological components of an ecosystem to populations of organisms in that ecosystem. | N/A |
| FKSA 1 | N/A | FKSA 1: Ability to identify the outcome of changes in physical or biological components of an ecosystem to populations of organisms in that ecosystem. | N/A |
| EU | N/A | Recognize effects of changes in an ecosystem to an organism. (e.g., some organisms survive and reproduce, some move to new locations, some move into the transformed environment, some die). | N/A |
| PE | N/A | **MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.** | N/A |
| Connector | N/A | Recognize that an ecosystem's biodiversity is the foundation of a healthy, stable, functioning ecosystem. | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **FKSA 1** | N/A | FKSA 1: Ability to identify that an ecosystem's biodiversity is the foundation of a healthy, stable, functioning ecosystem. | N/A |
| **EU** | N/A | Identify ways in which living things interact with other living things and their environment. | N/A |

## Life Science 2 (LS2)—Ecosystems: Interactions, Energy, and Dynamics (High School)

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
| --- | --- |
| **PE** | **HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.** |
| **Connector** | Use a mathematical and/or graphical representation to identify factors of change over time in the numbers and types of organisms in ecosystems. |
| **FKSA 1** | FKSA 1: Ability to use a representation (mathematical or graphical) to identify factors of change over time in the numbers and types of organisms in ecosystems. |
| **EU** | Identify basic needs of animals to survive in a given ecosystem. |
| **PE** | **HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.** |
| **Connector** | Use mathematical representations (e.g., trends, averages, graphs) to identify dependencies of an animal population on other organisms for food and their environment for shelter. |
| **FKSA 1** | FKSA 1: Ability to use mathematical representations to identify dependencies of an animal population on other organisms for food and their environment for shelter. |
| **EU** | Identify factors (e.g., competition) that affect the numbers of organisms in an ecosystem. |
| **PE** | **HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.** |
| **Connector** | Recognize and state that energy drives the cycling of matter within and between systems in aerobic and anaerobic conditions by using a model. |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **FKSA 1** | FKSA 1: Ability to recognize that energy drives the cycling of matter within and between systems in aerobic conditions by using a model. |
| **FKSA 2** | FKSA 2: Ability to recognize that energy drives the cycling of matter within and between systems in anaerobic conditions by using a model. |
| **EU** | Identify cellular respiration as the process that provides most of the energy for animals. |
| **PE** | **HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.** |
| **Connector** | Using a graphical representation, identify the changes in the amount of matter or energy as it travels through an energy pyramid or food web. |
| **FKSA 1** | FKSA 1: Ability to identify using a graphical representation the changes in the amount of matter as it travels through an energy pyramid or food web. |
| **FKSA 2** | FKSA 2: Ability to identify using a graphical representation the changes in the amount of energy as it travels through an energy pyramid or food web. |
| **EU** | Recognize that there are generally fewer organisms at higher levels of an energy pyramid or food web (e.g., a graphical representation) than at lower levels. |
| **PE** | **HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.** |
| **Connector** | Using a model, recognize that carbon is exchanged between living and nonliving systems. |
| **FKSA 1** | FKSA 1: Ability to recognize that carbon is exchanged between living and nonliving systems by using a model. |
| **EU** | Identify a model describing the cycling of carbon. |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| PE | **HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.** |
| Connector | Use evidence to identify how modest versus extreme biological or physical changes affect the types of organisms and stability in ecosystems. |
| FKSA 1 | FKSA 1: Ability to use evidence to identify how biological changes (modest versus extreme) affect stability of ecosystems. |
| FKSA 2 | FKSA 2: Ability to use evidence to identify how modest physical changes versus extreme changes affect stability and change in ecosystems. |
| FKSA 3 | FKSA 3: Ability to use evidence to identify how biological changes (modest versus extreme) affect types of organisms. |
| EU | Identify biological or physical changes in an ecosystem by using data. |
| PE | **HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.** |
| Connector | Describe how people can help protect the Earth's environment and biodiversity (e.g., preserving ecosystems) and how a human activity would threaten Earth's environment and biodiversity (e.g., pollution, damaging habitats, overhunting). |
| FKSA 1 | FKSA 1: Ability to describe that people can help protect the Earth's environment and biodiversity (e.g., preserving ecosystems). |
| FKSA 2 | FKSA 2: Ability to describe that a human activity would threaten Earth's environment and biodiversity (e.g., pollution, damaging habitats, overhunting). |
| EU | Identify the need for the protection of habitats (e.g., organisms have parts of their habitat that they depend on). |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **PE** | **HS-LS2-8. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.** |
| **Connector** | Identify evidence supporting the outcome of group behavior (e.g., predation, life expectancy) on species' chances to survive and reproduce. |
| **FKSA 1** | FKSA 1: Ability to Identify evidence supporting an outcome of group behavior. |
| **EU** | Identify an example of group behavior (e.g., flocking, schooling, herding, and cooperative behaviors such as hunting, migrating, and swarming). |

## Life Science 3 (LS3)—Heredity: Inheritance and Variation of Traits (K–2)

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| PE | N/A | **1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.** | N/A |
| Connector | N/A | Identify a similarity based on evidence through observation of an external feature (e.g., shape of ears on animals, shape of leaves on plants) between young plants and animals and their parents. | N/A |
| FKSA 1 | N/A | FKSA 1: Ability to identify a similarity in an external feature between young animals and their parents. | N/A |
| FKSA 2 | N/A | FKSA 2: Ability to identify a similarity in an external feature between young plants and their parents. | N/A |
| EU | N/A | Match a young plant or animal to its parents. | N/A |

## Life Science 3 (LS3)—Heredity: Inheritance and Variation of Traits (3–5)

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **PE** | **3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.** | N/A | N/A |
| **Connector** | Based on data through observation, identify similarities in the traits of a parent and the traits of an offspring and variations in similar traits in a grouping of similar organisms. | N/A | N/A |
| **FKSA 1** | FKSA 1: Ability to identify similarities in the traits of a parent and the traits of an offspring (e.g., tall plants typically have tall offspring). | N/A | N/A |
| **EU** | Identify variations in similar traits in a grouping of similar organisms (e.g., dogs come in many shapes and sizes, siblings look alike and different). | N/A | N/A |
| **PE** | **3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.** | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **Connector** | Using evidence, identify a cause and effect relationship between a specific causal environmental factor and its effect on a given variation in a trait (e.g., not enough water produces plants that have fewer flowers than plants that had more water available). | N/A | N/A |
| **FKSA 1** | FKSA 1: Ability to identify a cause and effect relationship between a specific causal environmental factor and its effect on a given variation in a trait. | N/A | N/A |
| **EU** | Identify an environmental factor that affects a characteristic of a plant or an animal (e.g., diet, exercise). | N/A | N/A |

## Life Science 3 (LS3)—Heredity: Inheritance and Variation of Traits (6–8)

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **PE** | **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.** | N/A | **MS-LS3-1. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.** |
| **Connector** | Use a model, through observation, to identify that a variety of inherited traits passed from parents to offspring lead to differences in offspring (e.g., eye color, fur pattern, plant height). | N/A | Use a model, through observation, to identify that genetic variations in specific traits may occur because organisms pass on their genetic material from one generation to the next, sometimes with small changes. |
| **FKSA 1** | FKSA 1: Ability to identify that a variety of inherited traits passed from parents to offspring lead to differences in offspring (e.g., eye color, fur pattern, plant height). | N/A | FKSA 1: Ability to identify that organisms pass on their genetic material from one generation to the next. |
| **FKSA 2** | No content | N/A | FKSA 2: Ability to identify that genetic variations in specific traits may occur as a result of small changes to genetic material. |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **EU** | Identify similarities and differences between animal or plant parents and their offspring. | N/A | Match a trait change in an organism that would benefit its chances for survival to one environmental factor from a list of environmental factors (e.g., a thicker fur coat to a gradually cooling environment). |

## Life Science 3 (LS3)—Heredity: Inheritance and Variation of Traits (High School)

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **PE** | **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.** |
| **Connector** | Demonstrate understanding that DNA molecules in all cells, passed from parents to children, contain the instructions for forming species' characteristics. |
| **FKSA 1** | FKSA 1: Demonstrate an understanding that DNA molecules are in all cells. |
| **FKSA 2** | FKSA 2: Ability to recognize that DNA molecules are passed from parents to children and that DNA determines species' characteristics. |
| **EU** | Recognize that all cells contain genetic information in the form of DNA molecules, and that information is passed from parents to children. |
| **PE** | **HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.** |
| **Connector** | Identify a model showing evidence that parents and offspring may have different traits. |
| **FKSA 1** | FKSA 1: Ability to identify a model showing evidence that parents and offspring may have different traits from new genetic combinations through meiosis. |
| **FKSA 2** | FKSA 2: Ability to identify a model showing evidence that parents and offspring may have different traits from viable errors occurring during replication. |
| **FKSA 3** | FKSA 3: Ability to identify a model showing evidence that parents and offspring may have different traits from mutations caused by environmental factors. |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **EU** | Match factors that affect genetic variation in offspring. |
| **PE** | **HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.** |
| **Connector** | Identify the probability (e.g., two out of four) of a particular trait in an offspring based on the interpretation of data (e.g., a Punnett square). |
| **FKSA 1** | FKSA 1: Ability to identify the probability (e.g., two out of four) of a particular trait in an offspring based on the interpretation of data (e.g., a Punnett square). |
| **EU** | Identify the dominant trait in a given allele pair (e.g., trait shown in a gene pair represented by a capital letter). |

## Life Science 4 (LS4)—Biological Evolution: Unity and Diversity (K–2)

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **PE** | N/A | N/A | **2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.** |
| **Connector** | N/A | N/A | Observe and recognize that different kinds of plants and animals live in different habitats (places) on land and in water. |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to recognize that different kinds of plants and animals live in different habitats (places) on land and in water. |
| **EU** | N/A | N/A | Match an animal to its habitat (the place it lives). |

## Life Science 4 (LS4)—Biological Evolution: Unity and Diversity (3–5)

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **PE** | **3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.** | N/A | N/A |
| **Connector** | Using data, through observation, recognize that fossils represent plants and animals that lived long ago. | N/A | N/A |
| **FKSA 1** | FKSA 1: Ability to use data through observation to recognize that fossils represent plants and animals that lived long ago. | N/A | N/A |
| **EU** | Match an extinct organism to its habitat. | N/A | N/A |
| **PE** | **3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.** | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **Connector** | Using evidence, through observation, identify features and characteristics that enable an organism to survive in a particular environment. | N/A | N/A |
| **FKSA 1** | FKSA 1: Ability to identify features and characteristics that enable an organism to survive in a particular environment using evidence through observation. | N/A | N/A |
| **EU** | Match characteristics to a plant or animal (e.g., thorns on a plant, camouflage of an animal). | N/A | N/A |
| **PE** | **3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.** | N/A | N/A |
| **Connector** | Use evidence to identify changes in a habitat that would cause some organisms to survive and reproduce, some to move to new locations, and some to not survive at all. | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **FKSA 1** | FKSA 1: Ability to use evidence to identify changes in a habitat that would cause some organisms to survive and reproduce. | N/A | N/A |
| **FKSA 2** | FKSA 2: Ability to use evidence to identify changes in a habitat that would cause some organisms to move new locations. | N/A | N/A |
| **FKSA 3** | FKSA 3: Ability to identify changes in a habitat that would cause some organisms to not survive at all. | N/A | N/A |
| **EU** | Identify changes in a habitat that would cause some organisms to die. | N/A | N/A |
| **PE** | **3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.** | N/A | N/A |
| **Connector** | Identify evidence that supports a claim related to the impact of a problem on plants and animals that is caused by the environmental change in a system. | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **FKSA 1** | FKSA 1: Ability to identify evidence that supports a claim related to the impact on an animal of a problem that is caused by the environmental change in a system. | N/A | N/A |
| **FKSA 2** | FKSA 2: Ability to identify evidence that supports a claim related to the impact on a plant of a problem that is caused by the environmental change in a system. | N/A | N/A |
| **EU** | Identify the best solution to a given problem that is caused when the environment changes (e.g., What happens to animals/plants as a result of a drought?). | N/A | N/A |

## Life Science 4 (LS4)—Biological Evolution: Unity and Diversity (6–8)

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **PE** | N/A | N/A | **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.** |
| **Connector** | N/A | N/A | Using data, through observation, recognize that fossils of different plants and animals that lived at different times are located in different sedimentary layers. |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to recognize that fossils of different plants that lived at different times are located in different sedimentary layers by using data through observation. |
| **FKSA 2** | N/A | N/A | FKSA 2: Ability to recognize that fossils of different animals that lived at different times are located in different sedimentary layers by using data through observation. |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| FKSA 3 | N/A | N/A | FKSA 3: Ability to recognize that different sedimentary layers correspond to different time periods by using data through observation. |
| EU | N/A | N/A | Recognize that fossils are the remains of plants or animals that lived long ago. |
| PE | N/A | N/A | **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.** |
| Connector | N/A | N/A | Using scientific ideas, recognize that similarities in external structures can be used to infer evolutionary relationships between living and fossil organisms. |
| FKSA 1 | N/A | N/A | FKSA 1: Ability to recognize that similarities in external structures can be used to infer evolutionary relationships between living and fossil organisms. |

**California Next Generation Science Standards**
**Core Content Connectors for Alternate Assessments**

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **EU** | N/A | N/A | Match a modern organism to a representation of a related organism from a fossil record. |
| **PE** | N/A | N/A | **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.** |
| **Connector** | N/A | N/A | Identify similarities in patterns of appearance in embryos at the same stage of development across species by using pictorial data. |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to identify similarities in patterns of appearance in embryos at the same stage of development across species by using pictorial data. |
| **EU** | N/A | N/A | Identify the embryo as the earliest stage of development of an animal or plant. |

**California Next Generation Science Standards**
**Core Content Connectors for Alternate Assessments**

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **PE** | N/A | N/A | **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.** |
| **Connector** | N/A | N/A | Identify evidence of how genetic variations increase some individuals' probability of surviving and reproducing. |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to identify evidence of how genetic variations increase some individuals' probability of surviving and reproducing. |
| **EU** | N/A | N/A | Identify a trait (e.g., specific variations of a characteristic) that would lead to survival of a specific organism. |
| **PE** | N/A | N/A | **MS-LS4-5. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.** |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **Connector** | N/A | N/A | Identify technologies (e.g., artificial selection for breeding of certain plants and animals) that have changed the way humans influence the inheritance of desired traits in plants and animals. |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to identify technologies that have changed the way humans influence the inheritance of desired traits in plants and animals. |
| **FKSA 2** | N/A | N/A | FKSA 2: Ability to sort ways in which humans influence the inheritance of desired traits in plants and animals versus natural selection. |
| **EU** | N/A | N/A | Recognize that, in artificial selection, humans choose desirable traits in organisms to pass on to offspring. |
| **PE** | N/A | N/A | **MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.** |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **Connector** | N/A | N/A | Use numerical data sets or graphical representations through observation that represent a proportional relationship between some change in the environment and corresponding changes in a population's genetic variation over time. |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to use numerical data sets or graphical representations that represent a proportional relationship between some change in the environment and corresponding changes in a population's genetic variation over time. |
| **EU** | N/A | N/A | Recognize that characteristics that allow an individual to survive lead to changes of genetic traits in populations over time. |

## Life Science 4 (LS4)—Biological Evolution: Unity and Diversity (High School)

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **PE** | **HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.** |
| **Connector** | Identify patterns of anatomical similarities or homologous (similar) structures among species as evidence to a claim of common ancestry. |
| **FKSA 1** | FKSA 1: Ability to identify patterns of anatomical similarities among species as evidence to a claim of common ancestry. |
| **EU** | Match external structures in a living species to a related earlier species now extinct. |
| **PE** | **HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.** |
| **Connector** | Recognize that different individuals of a species have specific traits that give advantages to survive and reproduce over other individuals in the species. |
| **FKSA 1** | FKSA 1: Ability to recognize that different individuals in a species have specific traits. |
| **FKSA 2** | FKSA 2: Ability to recognize that different traits give different advantages to individuals in a species. |
| **EU** | Recognize traits associated with individual members in a species. |
| **PE** | **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.** |

**California Next Generation Science Standards**
**Core Content Connectors for Alternate Assessments**

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **Connector** | Recognize that data can be used to determine that organisms with advantageous heritable traits will increase in proportion over a period of time. |
| **FKSA 1** | FKSA 1: Ability to use data to recognize that while the total number of individuals in a population may remain relatively constant, the traits represented in that population can change in response to environmental change. |
| **EU** | Recognize that traits that positively affect survival are more likely to be passed on to offspring. |
| **PE** | **HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.** |
| **Connector** | Use data to provide evidence for how natural selection leads to adaptations of populations. |
| **FKSA 1** | FKSA 1: When given data to provide evidence, identify that natural selection leads to adaptations of populations. |
| **EU** | Recognize that environmental factors affect the probability of occurrences of traits in a population. |
| **PE** | **HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.** |
| **Connector** | Recognize that changes in the environment result in: 1) increases in the number of individuals of some species, 2) the emergence of new species, and 3) the extinction of other species. |
| **FKSA 1** | FKSA 1: Recognize that changes in the environment result in increases in the number of individuals of some species. |
| **FKSA 2** | FKSA 2: Recognize that changes in the environment result in the emergence of new species. |
| **FKSA 3** | FKSA 3: Recognize that changes in the environment result in the extinction of some species. |
| **EU** | Recognize that changes in the environment result in changes in the species in the environment. |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **PE** | **HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.** |
| **Connector** | Analyze data to determine a potential solution to mitigate adverse impacts of human activity on biodiversity. |
| **FKSA 1** | FKSA 1: Ability to look at data and determine that there is a solution to mitigate adverse impacts of human activity on biodiversity. |
| **EU** | Recognize that human activities can affect biodiversity. |

## Physical Science 1 (PS1)—Matter and Its Interactions (K–2)

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **PE** | N/A | N/A | **2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.** |
| **Connector** | N/A | N/A | Describe and classify different kinds of materials by their observable properties (e.g., color, texture). |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to classify different kinds of materials by their observable properties. |
| **FKSA 2** | N/A | N/A | FKSA 2: Ability to describe different kinds of materials by their observable properties. |
| **EU** | N/A | N/A | Identify materials by their observable properties (e.g., color, texture). |
| **PE** | N/A | N/A | **2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.** |

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **Connector** | N/A | N/A | Through observation, recognize a material that may be best suited for a given purpose (e.g., hard wood used for a shelf, paper used to absorb spills). |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to recognize a property (e.g., hard, flexible, absorbent) of a material for a potential purpose. |
| **EU** | N/A | N/A | Match a property (e.g., hard, flexible, absorbent) of a material to a potential purpose. |
| **PE** | N/A | N/A | **2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.** |
| **Connector** | N/A | N/A | Through observation, identify or construct different objects built from the same set of pieces. |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to identify different objects built from the same set of pieces. |

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **EU** | N/A | N/A | Match an original object with its disassembled pieces (e.g., by color, by shape). |
| **PE** | N/A | N/A | **2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.** |
| **Connector** | N/A | N/A | Identify through evidence examples of heating and cooling substances that cause changes that are sometimes reversible and sometimes not. |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to identify examples of heating substances that cause changes that are sometimes reversible. |
| **FKSA 2** | N/A | N/A | FKSA 2: Ability to identify examples of heating substances that cause changes that are sometimes not reversible. |
| **FKSA 3** | N/A | N/A | FKSA 3: Ability to identify examples of cooling substances that cause changes that are sometimes reversible. |

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **FKSA 4** | N/A | N/A | FKSA 4: Ability to identify examples of cooling substances that cause changes that are sometimes not reversible. |
| **EU** | N/A | N/A | Match a cause (e.g., heating or cooling) to an effect (e.g., ice melting). |

## Physical Science 1 (PS1)—Matter and Its Interactions (3–5)

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| PE | N/A | N/A | **5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen.** |
| Connector | N/A | N/A | Identify in a model (e.g., picture, diagram) that all matter can be broken down into smaller and smaller pieces until they are too small to be seen by human eyes. |
| FKSA 1 | N/A | N/A | FKSA 1: Ability to identify in a model (e.g., picture, diagram) that all matter can be broken down into smaller and smaller pieces until they are too small to be seen by human eyes. |
| EU | N/A | N/A | Match a means of detecting the existence of matter by other means than by the human eye (e.g., use of an inflated vs. flat balloon, breath of air on hand, microscope magnifying). |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| PE | N/A | N/A | **5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.** |
| Connector | N/A | N/A | Recognize through observation that the total weight of matter is conserved by comparing the weight of an object before and after it changes from a liquid to a solid and from a solid to a liquid. |
| FKSA 1 | N/A | N/A | FKSA 1: Ability to recognize that the total weight of matter is conserved by comparing the weight of an object before and after it changes from a liquid to a solid and from a solid to a liquid. |
| EU | N/A | N/A | Recognize the change in state from liquid to solid or from solid to liquid of the same material (e.g., water in a clear plastic bag that is frozen and defrosted has the same weight). |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **PE** | N/A | N/A | **5-PS1-3. Make observations and measurements to identify materials based on their properties.** |
| **Connector** | N/A | N/A | Classify through observation materials (e.g., shape, texture, buoyancy, color, magnetism, solubility) by physical properties. |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to classify materials by physical properties. |
| **EU** | N/A | N/A | Match materials with similar physical properties (e.g., color, hardness, response to magnets). |
| **PE** | N/A | N/A | **5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.** |
| **Connector** | N/A | N/A | Identify the changes that occur when two or more substances are mixed by using evidence provided from data. |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to identify the changes that occur when two or more substances are mixed by using evidence provided from data. |
| **EU** | N/A | N/A | Identify changes (e.g., color, clarity) that occur to water after mixing it with another substance. |

## Physical Science 1 (PS1)—Matter and Its Interactions (6–8)

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **PE** | N/A | **MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.** | N/A |
| **Connector** | N/A | Recognize that compounds have different properties than the individual elements of which they are made (e.g., water ($H_2O$) is a compound with different characteristic properties than the elements hydrogen and oxygen from which it is made). | N/A |
| **FKSA 1** | N/A | FKSA 1: Ability to recognize that compounds have different properties than the individual elements of which they are made. | N/A |
| **EU** | N/A | Recognize that elements are grouped according to distinct characteristic properties (e.g., hydrogen and oxygen are nonmetals). | N/A |

**California Next Generation Science Standards**
**Core Content Connectors for Alternate Assessments**

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **PE** | N/A | **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.** | N/A |
| **Connector** | N/A | Using data provided through observation, identify evidence that proves a chemical reaction has taken place (e.g., change in color, gas is created, heat or light is given off or taken in). | N/A |
| **FKSA 1** | N/A | FKSA 1: Ability to identify evidence that proves a chemical reaction has taken place. | N/A |
| **EU** | N/A | Identify examples of change (e.g., state of matter, color, temperature). | N/A |
| **PE** | N/A | **MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.** | N/A |
| **Connector** | N/A | Classify material as a natural resource or as a synthetic material. | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **FKSA 1** | N/A | FKSA 1: Ability to compare characteristics of natural and synthetic materials (e.g., fibers) from provided information. | N/A |
| **FKSA 2** | N/A | FKSA 2: Ability to contrast characteristics of natural and synthetic materials (e.g., fibers) from provided information. | N/A |
| **EU** | N/A | Classify material as a natural resource or as a synthetic material. | N/A |
| **PE** | N/A | **MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.** | N/A |
| **Connector** | N/A | Identify that adding or removing thermal energy increases or decreases particle motion and the state of a pure substance by using drawings and diagrams. | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| FKSA 1 | N/A | FKSA 1: Ability to identify that adding thermal energy increases particle motion and the state of a pure substance by using drawings and diagrams. | N/A |
| FKSA 2 | N/A | FKSA 2: Ability to identify that removing thermal energy decreases particle motion and the state of a pure substance by using drawings and diagrams. | N/A |
| EU | N/A | Describe the arrangement or movement of particles in solids, liquids, and gases by using a particle model diagram. | N/A |
| PE | N/A | **MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.** | N/A |
| Connector | N/A | Using a model to observe, identify a chemical reaction in which the mass of the reactants is shown to be equal to the mass of the products. | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **FKSA 1** | N/A | FKSA 1: Ability to identify a chemical reaction in which the mass of the reactants is shown to be equal to the mass of the products. | N/A |
| **EU** | N/A | Recognize that the total mass of a compound is equal to the sum of the mass of the parts. | N/A |
| **PE** | N/A | **MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.** | N/A |
| **Connector** | N/A | Identify or modify a device in which a chemical process releases or absorbs thermal energy. | N/A |
| **FKSA 1** | N/A | FKSA 1: Ability to identify or modify a device in which a chemical process releases thermal energy. | N/A |
| **FKSA 2** | N/A | FKSA 2: Ability to identify or modify a device in which a chemical process absorbs thermal energy. | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **EU** | N/A | Identify examples of chemical reactions that release energy (e.g., heat, light). | N/A |

## Physical Science 1 (PS1)—Matter and Its Interactions (High School)

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| PE | **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.** |
| Connector | Organize different materials based on properties of elements. |
| FKSA 1 | FKSA 1: Recognize that types of materials (e.g., elements) can be grouped together. |
| EU | Recognize that materials have different properties. |
| PE | **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.** |
| Connector | Identify a simple chemical reaction (i.e., involving no more than 2 reactants) and the different elements causing that reaction. |
| FKSA 1 | FKSA 1: Ability to identify the reason that chemical reactions are different (e.g., baking soda in vinegar vs. baking soda in water). |
| EU | Identify a simple chemical reaction from the mixing of elements. |
| PE | **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.** |
| Connector | Describe how changes in the structure of a substance affect its properties (e.g., when you add water to salt). |
| FKSA 1 | FKSA 1: Ability to recognize that when elements change structure it can affect their properties. |
| EU | Identify that elements change structure. |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| PE | **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.** |
| Connector | Using a model, determine whether energy is released or absorbed in a chemical reaction system. |
| FKSA 1 | FKSA 1: Ability to use a model to determine whether energy is released or absorbed in a chemical reaction system by using data, presented in a table or graph, related to the relative energies of reactants and products. |
| EU | Determine whether energy is released or absorbed in a chemical reaction system. |
| PE | **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.** |
| Connector | Identify the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. |
| FKSA 1 | FKSA 1: Ability to identify the effects of changing the concentration of the reacting particles on the rate at which a reaction occurs. |
| FKSA 2 | FKSA 2: Ability to identify the effects of changing the temperature of the reacting particles on the rate at which a reaction occurs. |
| EU | Identify the effects of changing temperature. |
| PE | **HS-PS1-6. Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.** |
| Connector | Identify that changes in the conditions of a reaction result in changes in the amount of product produced. |
| FKSA 1 | FKSA 1: Ability to identify the changes during a chemical reaction. |
| FKSA 2 | FKSA 2: Ability to identify the conditions present in a chemical reaction. |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **EU** | Identify the reactants in a chemical reaction. |
| **PE** | **HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.** |
| **Connector** | Identify a mathematical representation (e.g., table, graph, pictorial depictions) that illustrates the claim that mass is conserved during a chemical reaction. |
| **FKSA 1** | FKSA 1: Ability to Identify a mathematical representation (e.g., table, graph, pictorial depictions) that illustrates the claim that mass is conserved during a chemical reaction. |
| **EU** | Recognize that the mass of the reactants is equal to the mass of the products in a chemical reaction. |
| **PE** | **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.** |
| **Connector** | Identify changes in the composition of the center of an atom during a reaction. |
| **FKSA 1** | FKSA 1: Ability to identify the center of an atom. |
| **FKSA 2** | FKSA 2: Ability to identify the changes to the center of an atom that occur during a reaction. |
| **EU** | Identify that there are reactions that produce more energy than basic chemical reactions. |

## Physical Science 2 (PS2)— Motion and Stability: Forces and Interactions (K–2)

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **PE** | **K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.** | N/A | N/A |
| **Connector** | Observe and recognize the effect caused by different strengths and directions of pushes and pulls on the motion of an object. | N/A | N/A |
| **FKSA 1** | FKSA 1: Ability to recognize the effect caused by different strengths of pushes and pulls on the motion of an object. | N/A | N/A |
| **FKSA 2** | FKSA 2: Ability to recognize the effect caused by different directions of pushes and pulls on the motion of an object. | N/A | N/A |
| **EU** | Recognize that an object can be in motion or at rest. | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **PE** | **K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.** | N/A | N/A |
| **Connector** | Determine if a design solution causes the intended change in speed or direction of motion of the object. | N/A | N/A |
| **FKSA 1** | FKSA 1: Ability to determine if a design solution causes the intended change in speed of motion of the object. | N/A | N/A |
| **FKSA 2** | FKSA 2: Ability to determine if a design solution causes the intended change in direction of motion of the object. | N/A | N/A |
| **EU** | Recognize that a push or a pull is required to start or stop the motion of an object. | N/A | N/A |

# Physical Science 2 (PS2)— Motion and Stability: Forces and Interactions (3–5)

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **PE** | **3-PS2-1. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.** | N/A | **5-PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down.** |
| **Connector** | Identify through observation and demonstration ways to change the motion of an object (e.g., size or mass of the object, direction of forces). | N/A | Identify through observation and demonstration that the gravitational force exerted by Earth on objects is directed down. |
| **FKSA 1** | FKSA 1: Ability to identify ways to change the motion of an object. | N/A | FKSA 1: Ability to identify that the gravitational force exerted by Earth on objects is directed down. |
| **EU** | Identify a push or a pull as a way to change the motion of an object. | N/A | Identify the direction an object will go when dropped. |
| **PE** | **3-PS2-2. Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.** | N/A | N/A |
| **Connector** | Through observation and demonstration, predict future motion of an object given its pattern of motion. | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **FKSA 1** | FKSA 1: Ability to predict future motion of an object given its pattern of motion. | N/A | N/A |
| **EU** | Identify an initial position and a final position of an object. | N/A | N/A |
| **PE** | **3-PS2-3. Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.** | N/A | N/A |
| **Connector** | Recognize cause and effect relationships of electric or magnetic interactions between two objects (e.g., how the distance between objects affects the strength of the force, how the orientation of magnets affects the direction of the magnetic force). | N/A | N/A |
| **FKSA 1** | FKSA 1: Ability to recognize a cause and effect relationship of electric interactions between two objects. | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **FKSA 2** | FKSA 2: Ability to recognize a cause and effect relationship of magnetic interactions between two objects. | N/A | N/A |
| **EU** | Match materials with similar physical properties (e.g., attracted to magnets, conduct electricity). | N/A | N/A |
| **PE** | **3-PS2-4. Define a simple design problem that can be solved by applying scientific ideas about magnets.** | N/A | N/A |
| **Connector** | Identify examples of forces between objects that do not require that those objects be in contact with each other and forces that act through contact. | N/A | N/A |
| **FKSA 1** | FKSA 1: Ability to identify examples of forces between objects that do not require that those objects be in contact with each other. | N/A | N/A |
| **FKSA 2** | FKSA 2: Ability to identify examples of forces between objects that require those objects be in contact with each other. | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **EU** | Identify an example of objects in contact that exert force on each other (e.g., magnet and metal) and objects that do not have contact that exert force on each other (e.g., same polarity of magnets). | N/A | N/A |

## Physical Science 2 (PS2)—Motion and Stability: Forces and Interactions (6–8)

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| PE | N/A | N/A | **MS-PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.** |
| Connector | N/A | N/A | Through observation and demonstration, identify that when objects collide, the contact forces transfer energy and changes the objects' motions. |
| FKSA 1 | N/A | N/A | FKSA 1: Recognize a solution (result) to a problem involving the motion of two colliding objects. |
| EU | N/A | N/A | Identify that when two objects collide there is a result. |
| PE | N/A | N/A | **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.** |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| Connector | N/A | N/A | Recognize that a change in an object's motion can be due to the mass of the object or the forces acting on the object by using data on the motion of the object. |
| FKSA 1 | N/A | N/A | FKSA 1: Ability to recognize that a change in an object's motion can be due to the mass of the object by using data on the motion of the object. |
| FKSA 2 | N/A | N/A | FKSA 2: Ability to recognize that a change in an object's motion can be due to the forces acting on the object by using data on the motion of the object. |
| EU | N/A | N/A | Recognize that a larger force causes a larger change in the motion of an object. |
| PE | N/A | N/A | **MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.** |

**California Next Generation Science Standards**
**Core Content Connectors for Alternate Assessments**

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **Connector** | N/A | N/A | Identify factors that affect electromagnetic forces by examining given data of objects (e.g., a model that demonstrates that a piece of metal, when magnetized by electricity, can pick up many times its own weight). |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to identify cause and effect relationships that affect electromagnetic forces by examining given data of objects. |
| **EU** | N/A | N/A | Recognize that some magnets are stronger than others. |
| **PE** | N/A | N/A | **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.** |
| **Connector** | N/A | N/A | Compare the magnitude of gravitational force on interacting objects of different mass (e.g., the Earth, the sun) using a chart displaying the mass of those objects and the strength of interaction. |

California Next Generation Science Standards
Core Content Connectors for Alternate Assessments

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to compare the magnitude of gravitational force on interacting objects of different mass (e.g., the Earth, the sun) using a chart displaying the mass of those objects and the strength of interaction. |
| **EU** | N/A | N/A | Recognize that the force of gravity does not require the interacting objects to be in contact with one another. |
| **PE** | N/A | N/A | **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.** |
| **Connector** | N/A | N/A | Recognize the change in the strength of a force (electric, magnetic, and gravitational) by using data regarding the cause of a force on one object mapped by its effect on a test object. |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to recognize the change in the strength of an electrical force by using data regarding the cause of a force on one object mapped by its effect on a test object. |
| **FKSA 2** | N/A | N/A | FKSA 2: Ability to recognize the change in the strength of a magnetic force by using data regarding the cause of a force on one object mapped by its effect on a test object. |
| **FKSA 3** | N/A | N/A | FKSA 3: Ability to recognize the change in the strength of a gravitational force by using data regarding the cause of a force on one object mapped by its effect on a test object. |
| **EU** | N/A | N/A | Identify electric and magnetic forces. |

## Physical Science 2 (PS2)—Motion and Stability: Forces and Interactions (High School)

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
| --- | --- |
| **PE** | **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.** |
| **Connector** | Recognize the relationship between an object's acceleration and the force. |
| **FKSA 1** | FKSA 1: Identify that there is a relationship between an object's acceleration and the force. |
| **EU** | Identify that acceleration changes force. |
| **PE** | **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.** |
| **Connector** | Identify an example of the law of momentum conservation by using graphical or visual displays. |
| **FKSA 1** | FKSA 1: Ability to identify an example of the law of momentum conservation by using graphical or visual displays. |
| **EU** | Identify an example of momentum using two equal forces. |
| **PE** | **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.** |
| **Connector** | Evaluate a device designed to minimize force by comparing data (e.g., momentum, mass, velocity, force, time). |
| **FKSA 1** | FKSA 1: Ability to evaluate a device designed to minimize force by comparing data. |
| **EU** | Identify cause and effect relationships among force, mass, and acceleration. |
| **PE** | **HS-PS2-4. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.** |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **Connector** | Predict the gravitational force between two objects of different masses. |
| **FKSA 1** | FKSA 1: Ability to identify that the gravitational force of two objects of different sizes would be different when applied to a third. |
| **EU** | Identify gravity and its effect on objects. |
| **PE** | **HS-PS2-5. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.** |
| **Connector** | Identify that electric current can produce a magnetic field. |
| **FKSA 1** | FKSA 1: Ability to identify electric currents. |
| **FKSA 2** | FKSA 2: Ability to identify that electric current can produce a magnetic field. |
| **EU** | Recognize that a magnetic field is the area of the force around a magnet. |
| **PE** | **HS-PS2-6. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.** |
| **Connector** | Recognize that different materials have different molecular structures and properties which determine different functioning (e.g., flexible, but durable) of the material. |
| **FKSA 1** | FKSA 1: Ability to recognize that different materials have different molecular structures and properties that determine different functioning (e.g., flexible, but durable) of the material. |
| **EU** | Identify that different materials have different properties |

## Physical Science 3 (PS3)—Energy (K–2)

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **PE** | **K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface.** | N/A | N/A |
| **Connector** | Identify through observation the difference in temperature in the warmth of materials (soil, water). | N/A | N/A |
| **FKSA 1** | FKSA 1: Ability to compare the warmth of materials (soil, water) placed in sunlight. | N/A | N/A |
| **FKSA 2** | FKSA 2: Ability to compare the warmth of materials (soil, water) placed in shade. | N/A | N/A |
| **EU** | Identify whether a surface is warmer in the sunlight or in the shade. | N/A | N/A |
| **PE** | **K-PS3-2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.** | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **Connector** | Identify or use a tool or structure (e.g., umbrella, canopy, tent) that will reduce the warming caused by the sun. | N/A | N/A |
| **FKSA 1** | FKSA 1: Ability to identify a tool or structure (e.g., umbrella, canopy, tent) that will reduce the warming caused by the sun. | N/A | N/A |
| **EU** | Identify an object that can create a shaded area. | N/A | N/A |

## Physical Science 3 (PS3)—Energy (3–5)

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **PE** | N/A | **4-PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of that object.** | **5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.** |
| **Connector** | N/A | Use evidence to recognize that moving objects have energy and the faster an object moves, the more energy it has. | Identify components (e.g., the sun, energy, animals, plants) of a model that illustrate that the energy in animals' food was once energy from the sun. |
| **FKSA 1** | N/A | FKSA 1: Ability to recognize that moving objects contain energy. | FKSA 1: Ability to identify components of a model that illustrate that the energy in animals' food was once energy from the sun. |
| **FKSA 2** | N/A | FKSA 2: Ability to recognize that the faster an object moves, the more energy it has. | No content |
| **EU** | N/A | Recognize that moving objects have energy. | Identify a model that shows the role of sunlight in the process of energy transfer through an ecosystem. |
| **PE** | N/A | **4-PS3-2. Make observations to provide evidence that energy can be transferred from place to** | N/A |

**California Next Generation Science Standards**
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| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| | | **place by sound, light, heat, and electric currents.** | |
| Connector | N/A | Through observation of a model, identify that energy can be moved from place to place (e.g., by moving objects, through sound, light, or electric currents). | N/A |
| FKSA 1 | N/A | FKSA 1: Ability to identify a model showing that energy can be moved from place to place. | N/A |
| EU | N/A | Identify evidence that an object has energy (e.g., moving ball, lighted light bulb). | N/A |
| PE | N/A | **4-PS3-3. Ask questions and predict outcomes about the changes in energy that occur when objects collide.** | N/A |
| Connector | N/A | Identify the change in energy (e.g., speeds as objects interact) when objects collide. | N/A |
| FKSA 1 | N/A | FKSA 1: Ability to identify the change in energy (e.g., speeds as objects interact) when objects collide. | N/A |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **EU** | N/A | Identify the outcome of a large moving object hitting a small stationary object. | N/A |
| **PE** | N/A | **4-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.** | N/A |
| **Connector** | N/A | Using scientific ideas, recognize an example of how energy can be converted from one form to another form (e.g., electric circuits that convert electrical energy into light, sound, or warmth). | N/A |
| **FKSA 1** | N/A | FKSA 1: Ability to recognize an example of how energy can be converted from one form to another form. | N/A |
| **EU** | N/A | Recognize forms of energy (e.g., sunlight, heat, sound, electrical, light). | N/A |

## Physical Science 3 (PS3)—Energy (6–8)

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **PE** | **MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.** | N/A | **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.** |
| **Connector** | Use information (e.g., graph, model) to identify a device (e.g., foam cup, insulated box) that either minimizes or maximizes thermal energy transfer (e.g., keeping liquids hot or cold). | N/A | Describe the relationships of kinetic energy to the mass of an object and to the speed of an object by interpreting graphical displays of data. |
| **FKSA 1** | FKSA 1: Ability to use information to identify a device that minimizes thermal energy transfer. | N/A | FKSA 1: Ability to describe the relationships of kinetic energy to the mass of an object and to the speed of an object by interpreting graphical displays of data. |
| **FKSA 2** | FKSA 2: Ability to use information to identify a device that maximizes thermal energy transfer. | N/A | No content |
| **EU** | Identify objects used to minimize or maximize thermal energy transfer (e.g., gloves). | N/A | Identify that moving objects of different masses (e.g., balls) can have different energy. |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| PE | 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. | N/A | MS-PS3-2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. |
| Connector | Predict the outcome as measured by the temperature of a sample when thermal energy is added to or removed from the system when provided examples and data measurements. | N/A | Describe how a change in distance changes the amount of potential energy stored in the system (e.g., carts at varying positions on a hill) by using models. |
| FKSA 1 | FKSA 1: Ability to predict the outcome as measured by the temperature of a sample when thermal energy is added to the system when provided examples and data measurements. | N/A | FKSA 1: Ability to describe how changing distance changes the amount of potential energy stored in the system (e.g., carts at varying positions on a hill) by using models. |
| FKSA 2 | FKSA 2: Ability to predict the outcome as measured by the temperature of a sample when thermal energy is removed from the system when provided examples and data measurements. | N/A | No content |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **EU** | Recognize the change in temperature as measured by the temperature of a sample in everyday activities (e.g., taking a can of soda out of the refrigerator, putting an ice cube into a warm beverage). | N/A | Identify that the potential energy of an object changes when a force is changed (e.g. changing distance between magnets, bringing an object up or down a hill). |
| **PE** | **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.** | N/A | N/A |
| **Connector** | Identify the change in the kinetic energy of an object as energy transferred to or from the object using information from graphical displays of data and models. | N/A | N/A |
| **FKSA 1** | FKSA 1: Ability to identify the change in the kinetic energy of an object as energy transferred to or from the object using information from graphical displays of data and models. | N/A | N/A |
| **EU** | Identify examples of energy being transferred from one object to another. | N/A | N/A |

## Physical Science 3 (PS3)—Energy (High School)

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **PE** | **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.** |
| **Connector** | Identify a model that demonstrates changes in energy flows in relation to other components of the model. |
| **FKSA 1** | FKSA 1: Ability to identify different changes in energy flows in relation to other components in a model. |
| **EU** | Recognize that there is change in energy flows between different components in a model. |
| **PE** | **HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields.** |
| **Connector** | Identify energy at the macroscopic scale as either motions of particles or energy stored in fields by using models (e.g., diagrams, drawings, descriptions). |
| **FKSA 1** | FKSA 1: Ability to identify the energy at the macroscopic scale as motions of particles by using models. |
| **FKSA 2** | FKSA 2: Ability to identify the energy at the macroscopic scale stored in fields by using models. |
| **EU** | Recognize models (e.g., diagrams, drawings) illustrating conservation of energy. |
| **PE** | **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.** |
| **Connector** | Identify steps in a model of a device showing the transformations of energy that occur (e.g., dams, solar cells, solar ovens, generators, turbines). |
| **FKSA 1** | FKSA 1: Ability to identify steps in a model of a device showing the transformations of energy that occur. |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **EU** | Identify steps in a model showing the transformations of energy (e.g., battery, motor to a fan). |
| **PE** | **HS-PS3-4. Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).** |
| **Connector** | Identify that the temperature of two different components, when combined, show uniform energy distribution. |
| **FKSA 1** | Recognize that the mixture of two different components shows uniform energy distribution. |
| **EU** | Recognize components change their temperature when combined. |
| **PE** | **HS-PS3-5. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.** |
| **Connector** | Identify a model (e.g., drawing, diagram) that shows the cause and effect relationships between forces produced by electric or magnetic fields. |
| **FKSA 1** | FKSA 1: Identify a model (e.g., drawing, diagram) that shows the cause and effect relationships between forces produced by electric fields. |
| **FKSA 2** | FKSA 2: Identify a model (e.g., drawing, diagram) that shows the cause and effect relationships between forces produced by magnetic fields. |
| **EU** | Identify electric and magnetic forces that attract or repulse. |

# Physical Science 4 (PS4)—Waves & Their Applications in Technologies for Information Transfer (K–2)

## Kindergarten to Grade 2

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **PE** | N/A | **1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.** | N/A |
| **Connector** | N/A | Identify through investigation that vibrating materials can make sound and that sound can make materials vibrate. | N/A |
| **FKSA 1** | N/A | FKSA 1: Ability to identify that vibrating materials make sound. | N/A |
| **FKSA 2** | N/A | FKSA 2: Ability to identify that sound can make materials vibrate. | N/A |
| **EU** | N/A | Identify that sound can make objects vibrate. | N/A |
| **PE** | N/A | **1-PS4-2. Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.** | N/A |

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| Connector | N/A | Recognize through observation that objects in darkness can be seen only when illuminated (e.g., external light source, when they give off their own light). | N/A |
| FKSA 1 | N/A | FKSA 1: Ability to recognize that objects in darkness can be seen only when illuminated (e.g., external light source, when they give off their own light). | N/A |
| EU | N/A | Recognize that an object can be seen in darkness with a light source. | N/A |
| PE | N/A | **1-PS4-3. Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.** | N/A |
| Connector | N/A | Recognize through observation or investigation that some materials allow light to pass through them, others allow only some light through, and others block all the light. | N/A |

**California Next Generation Science Standards**
**Core Content Connectors for Alternate Assessments**

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **FKSA 1** | N/A | FKSA 1: Ability to recognize that some materials allow light to pass through them. | N/A |
| **FKSA 2** | N/A | FKSA 2: Ability to recognize that some materials allow only some light through. | N/A |
| **FKSA 3** | N/A | FKSA 3: Ability to recognize that some materials block all the light. | N/A |
| **EU** | N/A | Recognize that objects block light and create a shadow. | N/A |
| **PE** | N/A | **1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.** | N/A |
| **Connector** | N/A | Observe and recognize that light or sound can travel between objects to communicate. | N/A |
| **FKSA 1** | N/A | FKSA 1: Ability to observe and recognize that light can travel between objects to communicate. | N/A |
| **FKSA 2** | N/A | FKSA 2: Ability to observe and recognize that sound can travel between objects to communicate. | N/A |

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **EU** | N/A | Recognize an example of how sound travels through a solid object. | N/A |

## Physical Science 4 (PS4)—Waves & Their Applications in Technologies for Information Transfer (3–5)

### Grades 3 to 5

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **PE** | N/A | **4-PS4-1. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.** | N/A |
| **Connector** | N/A | Describe the properties of waves by using a model (e.g., drawings, diagrams) to show amplitude and wavelength. | N/A |
| **FKSA 1** | N/A | FKSA 1: Ability to describe the properties of waves by using a model (e.g., drawings, diagrams) to show amplitude. | N/A |

California Next Generation Science Standards
Core Content Connectors for Alternate Assessments

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **FKSA 2** | N/A | FKSA 2: Ability to describe the properties of waves by using a model (e.g., drawings, diagrams) to show wavelength. | N/A |
| **EU** | N/A | Demonstrate understanding that waves can cause an object to move. | N/A |
| **PE** | N/A | **4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.** | N/A |
| **Connector** | N/A | Recognize that an object can be seen when light reflected from its surface enters the eye. | N/A |
| **FKSA 1** | N/A | FKSA 1: Ability to recognize that an object can be seen when light reflected from its surface enters the eye. | N/A |
| **EU** | N/A | Compare the quality of sight before and after dimming a light source. | N/A |
| **PE** | N/A | **4-PS4-3. Generate and compare multiple solutions that use patterns to transfer information.** | N/A |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **Connector** | N/A | Compare and contrast ways in which patterns have been used in the past to communicate over distance (e.g., the use of smoke signals, drums, Morse code on a telegraph). | N/A |
| **FKSA 1** | N/A | FKSA 1: Ability to compare ways in which patterns have been used in the past to communicate over distance. | N/A |
| **FKSA 2** | N/A | FKSA 2: Ability to contrast ways in which patterns have been used in the past to communicate over distance. | N/A |
| **EU** | N/A | Recognize devices (e.g., computers, cell phones) that transfer information over a long distance. | N/A |

# Physical Science 4 (PS4)—Waves & Their Applications in Technologies for Information Transfer (6–8)

## Grades 6 to 8

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| PE | N/A | N/A | **MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.** |
| Connector | N/A | N/A | Given a mathematical or graphical representation, identify how the amplitude of a wave is related to the energy in a wave. |
| FKSA 1 | N/A | N/A | FKSA 1: Ability to identify qualitatively how the amplitude of a wave is related to the energy in a wave by using a mathematical or graphical representation. |
| EU | N/A | N/A | Recognize that a simple wave has a repeating pattern. |
| PE | N/A | N/A | **MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.** |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| Connector | N/A | N/A | Identify how light waves, or sound waves are reflected, absorbed or transmitted through various materials (e.g., water, air, glass) by using a model. |
| FKSA 1 | N/A | N/A | FKSA 1: Ability to identify how light waves are reflected, absorbed, or transmitted through various materials (e.g., water, air, glass) by using a model. |
| FKSA 2 | N/A | N/A | FKSA 2: Ability to identify how sound waves are reflected, absorbed, or transmitted through various materials (e.g., water, air, glass) by using a model. |
| EU | N/A | N/A | Recognize that light can have different brightness and color. |
| PE | N/A | N/A | **MS-PS4-3. 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.** |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **Connector** | N/A | N/A | Determine if the claim that digitized signals are a more reliable way to encode and transmit information than analog signals is supported by evidence by using data or qualitative scientific and technical information. |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to determine if the claim that digitized signals are a more reliable way to encode and transmit information than analog signals is supported by evidence. |
| **EU** | N/A | N/A | Identify an example of a digitized device versus an analog device. |

# Physical Science 4 (PS4)—Waves & Their Applications in Technologies for Information Transfer (HS)

## High School

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **PE** | **HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.** |
| **Connector** | Identify cause and effect relationships between changes in wave speed and type of media through which the wave travels. |
| **FKSA 1** | FKSA 1: Ability to identify that cause and effect relationships exist between changes in wave speed. |
| **EU** | Recognize that the frequency, wavelength, and speed of waves can vary. |
| **PE** | **HS-PS4-2. Evaluate questions about the advantages of using a digital transmission and storage of information.** |
| **Connector** | Determine whether features of a digital transmission or storage device are advantages or disadvantages by using data or qualitative scientific and technical information. |
| **FKSA 1** | FKSA 1: Ability to determine whether features of a digital transmission device are advantages or disadvantages by using data or qualitative scientific and technical information. |
| **FKSA 2** | FKSA 2: Ability to determine whether features of a digital storage device are advantages or disadvantages by using data or qualitative scientific and technical information. |
| **EU** | Identify real-life examples of sharing digital information (e.g., copying music, using the internet for research) using computers. |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| PE | **HS-PS4-3. Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.** |
| Connector | Recognize that electromagnetic radiation (e.g., a radio, microwave, light) can be modeled as a wave of changing electric and magnetic fields or as particles called photons. |
| FKSA 1 | FKSA 1: Ability to recognize that electromagnetic radiation (e.g., a radio, microwave, light) can be modeled as a wave of changing electric and magnetic fields. |
| FKSA 2 | FKSA 2: Ability to recognize that electromagnetic radiation (e.g., a radio, microwave, light) can be modeled as particles called photons. |
| EU | Electromagnetic radiation (e.g., radio, microwave, light) can be modeled as a wave |
| PE | **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.** |
| Connector | Differentiate between the advantages and disadvantages of various electromagnetic frequencies (e.g., ultraviolet radiation, gamma radiation). |
| FKSA 1 | FKSA 1: Identify the advantages of various electromagnetic frequencies (e.g., ultraviolet radiation, gamma radiation). |
| FKSA 2 | FKSA 2: Identify the disadvantages of various electromagnetic frequencies (e.g., ultraviolet radiation, gamma radiation). |
| EU | Identify that different levels of radiation could have positive and negative effects. |
| PE | **HS-PS4-5. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.** |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **Connector** | Describe how a device operates using the principles of wave behavior by identifying steps in a model that show how a device uses waves to transmit and capture information and transmit energy. |
| **FKSA 1** | FKSA 1: Ability to describe how a device operates using the principles of wave behavior by identifying steps in a model that show how a device uses waves to transmit information. |
| **FKSA 2** | FKSA 2: Ability to describe how a device operates using the principles of wave behavior by identifying steps in a model that show how a device uses waves to capture information. |
| **FKSA 3** | FKSA 3: Ability to describe how a device operates using the principles of wave behavior by identifying steps in a model that show how a device uses waves to transmit energy. |
| **EU** | Identify common devices that use light or sound waves to transmit information. |

# Earth and Space Science 1 (ESS1)—Earth's Place in the Universe (K–2)

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **PE** | N/A | **1-ESS1-1. Use the observations of the sun, moon, and stars to describe patterns that can be predicted.** | **2-ESS1-1. Make observations from media to construct an evidence-based account that Earth events can occur quickly or slowly.** |
| **Connector** | N/A | Observe and predict patterns of the sun, moon, and stars. | Make observations using evidence to understand that some Earth events happen quickly (e.g., flood, volcano eruption, earthquake) and some Earth events happen slowly (e.g., erosion, weathering of rocks). |
| **FKSA 1** | N/A | FKSA 1: Ability to observe and predict the sunrise and sunset. | FKSA 1: Ability to observe using evidence to understand that some Earth events happen quickly. |
| **FKSA 2** | N/A | FKSA 2: Ability to observe and predict the moon phases. | FKSA 2: Ability to observe using evidence to understand that some Earth events happen slowly. |
| **EU** | N/A | Recognize the sun appears during the day and the moon appears at night. | Identify or observe a change in the shape of land that is caused by wind or water. |

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| PE | N/A | **1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year.** | N/A |
| Connector | N/A | Make observations about the amount of daylight across the seasons (winter, spring, summer, fall). | N/A |
| FKSA 1 | N/A | FKSA 1: Ability to make observations about the amount of daylight by seasons (winter, spring, summer, fall). | N/A |
| FKSA 2 | N/A | FKSA 2: Ability to make observations about the temperature during different seasons (winter, spring, summer, fall). | N/A |
| EU | N/A | Recognize the seasons (winter, spring, summer, fall). | N/A |

# Earth and Space Science 1 (ESS1)—Earth's Place in the Universe (3–5)

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **PE** | N/A | **4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock formations and fossils in rock layers for changes in a landscape over time to support an explanation for changes in a landscape over time.** | **5-ESS1-1. Support an argument that the apparent brightness of the sun and stars is due to their relative distances from Earth.** |
| **Connector** | N/A | Identify patterns of fossils and rock formations that show how the Earth's surface has changed over time. | Compare the brightness of stars to the brightness of the sun in relation to the distance to Earth. |
| **FKSA 1** | N/A | FKSA 1: Ability to identify patterns of fossils and rock formations that show how the Earth's surface has changed over time. | FKSA 1: Ability to identify that the sun appears larger and brighter than other stars because the sun is much closer to Earth than other stars. |
| **EU** | N/A | Match fossils with a landscape that has changed (e.g., marine fossils in an area previously covered by water). | Demonstrate understanding that the sun appears larger and brighter than other stars because the sun is much closer to Earth than other stars. |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **PE** | N/A | N/A | **5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.** |
| **Connector** | N/A | N/A | Use data to describe similarities and differences in the timing of observable changes in shadows, daylight, and the appearance of stars. |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to use data to describe similarities and differences in the timing of observable changes in shadows. |
| **FKSA 2** | N/A | N/A | FKSA 2: Ability to use data to describe similarities and differences in the timing of observable changes in daylight. |
| **FKSA 3** | N/A | N/A | FKSA 3: Ability to use data to describe similarities and differences in the timing of observable changes in the appearance of stars. |
| **EU** | N/A | N/A | Recognize daily changes in the length and direction of shadows. |

# Earth and Space Science 1 (ESS1)—Earth's Place in the Universe (6–8)

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| PE | N/A | N/A | **MS-ESS1-1. 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.** |
| Connector | N/A | N/A | Use an Earth-sun-moon model to show that the Earth-moon system orbits the sun once an Earth year and the orbit of the Moon around Earth corresponds to a month. |
| FKSA 1 | N/A | N/A | FKSA 1: Ability to use an Earth-sun-moon model to show that the Earth-moon system orbits the sun once an Earth year. |
| FKSA 2 | N/A | N/A | FKSA 2: Ability to use an Earth-sun-moon model to show that the orbit of the moon around Earth corresponds to a month. |
| EU | N/A | N/A | Recognize components of a model of the Earth, moon, and sun system. |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| PE | N/A | N/A | **MS-ESS1-2. Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.** |
| Connector | N/A | N/A | Use a model to represent the solar system as a collection of many varied objects held together by gravity. |
| FKSA 1 | N/A | N/A | FKSA 1: Ability to use a model to represent the solar system as a collection of many varied objects held together by gravity. |
| EU | N/A | N/A | Demonstrate understanding that objects in the solar system move in a regular and predictable way. |
| PE | N/A | N/A | **MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system.** |
| Connector | N/A | N/A | Determine similarities and differences among solar system objects by using data (e.g., statistical information, drawings and photographs, models). |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to determine similarities and differences among solar system objects by using data. |
| **EU** | N/A | N/A | Identify categories of solar system objects (e.g., planets, meteors, asteroids, comets). |
| **PE** | N/A | N/A | **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.** |
| **Connector** | N/A | N/A | Sequence the relative order of events from Earth's history shown by rock strata and patterns of layering (organize was more complex as a task/term than sequence). |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to sequence the relative order of events from Earth's history shown by rock strata and patterns of layering. |
| **EU** | N/A | N/A | Identify older fossils as being found in deeper, older rock layers. |

# Earth and Space Science 1 (ESS1)—Earth's Place in the Universe (High School)

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
| --- | --- |
| **PE** | **HS-ESS1-1. Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation.** |
| **Connector** | Identify components of a model illustrating that the sun shines because of nuclear fusion reactions that release light and heat energy, which make life on Earth possible. |
| **FKSA 1** | FKSA 1: Ability to describe components of a model illustrating that the sun shines because of nuclear fusion reactions that release light and heat energy, which make life on Earth possible. |
| **EU** | Recognize that the sun is the source of most of the energy on Earth. |
| **PE** | **HS-ESS1-2. Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.** |
| **Connector** | Identify that the universe is expanding and must have been smaller in the past based on astronomical evidence. |
| **FKSA 1** | FKSA 1: Ability to identify that the universe is expanding and must have been smaller in the past based on astronomical evidence. |
| **EU** | Identify that the universe is expanding. |
| **PE** | **HS-ESS1-3. Communicate scientific ideas about the way stars, over their life cycle, produce elements.** |
| **Connector** | Demonstrate understanding that solar activity creates elements. |
| **FKSA 1** | FKSA 1: Ability to identify that stars create elements. |
| **EU** | Recognize that the Earth's sun is a star. |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
| --- | --- |
| PE | **HS-ESS1-4. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.** |
| Connector | Using a model, describe how Earth's motion causes changes over time (e.g., seasons, ice ages). |
| FKSA 1 | FKSA 1: Ability to use a model to describe how the Earth's motion causes changes over time. |
| EU | Identify orbiting objects in the solar system. |
| PE | **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.** |
| Connector | Identify the relationship between the motion of continental plates and how materials of different ages are arranged on Earth's surface. |
| FKSA 1 | FKSA 1: Ability to identify the relationship between the motion of continental plates and how materials of different ages are arranged on Earth's surface. |
| EU | Identify that the Earth has continental and oceanic crusts. |
| PE | **HS-ESS1-6. Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.** |
| Connector | Identify ancient Earth materials, lunar rocks, asteroids, and meteorites as sources of evidence scientists use to understand Earth's early history. |
| FKSA 1 | FKSA 1: Ability to identify ancient Earth materials as sources of evidence scientists use to understand Earth's early history. |
| FKSA 2 | FKSA 2: Ability to identify lunar rocks as sources of evidence scientists use to understand Earth's early history. |
| FKSA 3 | FKSA 3: Ability to identify asteroids as sources of evidence scientists use to understand Earth's early history. |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **FKSA 4** | FKSA 4: Ability to identify meteorites as sources of evidence scientists use to understand Earth's early history. |
| **EU** | Recognize there are different ages of Earth material. |

# Earth and Space Science 2 (ESS2)—Earth's Systems (K–2)

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **PE** | **K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time.** | N/A | **2-ESS2-1. Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.** |
| **Connector** | Use and share observations of local weather conditions to describe patterns over time. | N/A | Compare two solutions (e.g., barriers built from different materials) to slow or prevent wind or water from changing the shape of the land. |
| **FKSA 1** | FKSA 1: Ability to use observations of local weather conditions to describe patterns over time (e.g., week, month, year). | N/A | FKSA 1: Ability to choose between two solutions to slow or prevent wind from changing the shape of the land (e.g., barriers built from different materials). |
| **FKSA 2** | FKSA 2: Ability to share observations of local weather conditions to describe patterns over time (e.g., week, month, year). | N/A | FKSA 2: Ability to choose between two solutions to slow or prevent water from changing the shape of the land (e.g., barriers built from different materials). |
| **EU** | Recognize that weather conditions can change from day to day. | N/A | Recognize that wind and water can change the shape of the land. |

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| PE | K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. | N/A | 2-ESS2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area. |
| Connector | Using evidence, identify examples of how plants and animals change their environments to meet their needs. | N/A | Create and identify landmarks (e.g., lake, mountain, river) on a model (e.g., 3-dimensional model, map). |
| FKSA 1 | FKSA 1: Ability to identify examples of how plants change their environments to meet their needs. | N/A | FKSA 1: Ability to identify landmarks (e.g., lake, mountain, river) on a 3-dimensional model or map. |
| FKSA 2 | FKSA 2: Ability to Identify examples of how animals change their environments to meet their needs. | N/A | FKSA 2: Ability to create landmarks (e.g., lake, mountain, river) on a 3-dimensional model or map (e.g., blocks, play dough). |
| EU | Identify examples of how plants and/or animals (including humans) meet their needs. | N/A | Identify a landmark on a model or map. |
| PE | N/A | N/A | 2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid. |

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **Connector** | N/A | N/A | Recognize and identify that water is found on Earth and that it can be solid or liquid. |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to recognize that water is found in many types of places. |
| **FKSA 2** | N/A | N/A | FKSA 2: Ability to recognize that water exists as solid ice. |
| **FKSA 3** | N/A | N/A | FKSA 3: Ability to recognize that water exists in liquid form. |
| **EU** | N/A | N/A | Recognize that water is found on Earth. |

# Earth and Space Science 2 (ESS2)—Earth's Systems (3–5)

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| PE | 3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. | 4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. | 5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. |
| Connector | Use data to describe observed weather conditions (e.g., temperature, precipitation, wind direction) during a season. | Use data to compare differences in the shape of the land due to the effects of weathering or erosion. | Identify examples of ways the four major Earth systems interact to affect living things and the Earth's surface materials and processes. |
| FKSA 1 | FKSA 1: Ability to use data to describe observed weather conditions (e.g., temperature, precipitation, wind direction) during a season. | FKSA 1: Ability to use data to compare differences in the shape of the land due to the effects of weathering. | FKSA 1: Ability to identify examples of ways the four major Earth systems interact to affect living things and the Earth's surface materials and processes. |
| EU | Identify various weather conditions (e.g., sunny or cloudy, hot or cold, windy or calm, rainy or dry) on a given day, in a specific season. | Recognize that land (e.g., rocks, soil) can be shaped by weathering (e.g., flowing water). | Match a feature, material, or plant/animal to a sphere (e.g., plants (biosphere); water (hydrosphere); soil (geosphere); release water vapor (atmosphere). |
| PE | 3-ESS2-2. Obtain and combine information to describe climates in different regions of the world. | 4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features. | 5-ESS2-2. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **Connector** | Identify different climates with different patterns of typical weather conditions. | Identify patterns of Earth's features on maps. | Recognize using data that the majority of water on Earth is found in the oceans as salt water and most of the Earth's fresh water is stored in glaciers. |
| **FKSA 1** | FKSA 1: Ability to identify different climates with different patterns of typical weather conditions. | FKSA 1: Ability to identify patterns of Earth's features by using maps. | FKSA 1: Ability to recognize that the majority of water on Earth is found in the oceans as salt water. |
| **FKSA 2** | No content | No content | FKSA 2: Ability to recognize that most of the Earth's fresh water is stored in glaciers. |
| **EU** | Recognize that different regions have different climates. | Identify different land and water features by using a map. | Recognize where salt water and fresh water can be found on Earth. |

# Earth and Space Science 2 (ESS2)—Earth's Systems (6–8)

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **PE** | **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-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.** | N/A |
| **Connector** | Identify components in a model of water cycling among land, ocean, and atmosphere, and recognize how it is propelled by sunlight and gravity. | Identify relationships between components in a model of energy flows and matter cycles within and among Earth's systems, including the sun and Earth's interior as primary energy sources. | N/A |
| **FKSA 1** | FKSA 1: Ability to identify components in a model of water cycling among land, ocean, and atmosphere. | FKSA 1: Ability to identify relationships between components in a model of energy flows and matter cycles (e.g., weathering, erosion, sedimentation) among Earth's systems, with the sun as the primary energy source. | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **FKSA 2** | FKSA 2: Ability to recognize how water cycling is propelled by sunlight. | FKSA 2: Ability to identify relationships between components in a model of energy flows and matter cycles (e.g., melting, crystallization, deformation) among Earth's systems, with Earth's interior as the primary energy source. | N/A |
| **FKSA 3** | FKSA 3: Ability to recognize how water cycling is propelled by gravity. | No content | N/A |
| **EU** | Recognize that water is continually cycled among land, ocean, and the atmosphere (water cycle). | Identify types of Earth materials that can be located at the surface (exterior) and/or in the interior. | N/A |
| **PE** | **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-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.** | N/A |
| **Connector** | Identify how air masses influence weather using data and/or simulated demonstrations. | Using evidence, identify examples of processes that change Earth's surface at time and spatial scales that can be large (e.g., plate motions) or small (e.g., landslides). | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **FKSA 1** | FKSA 1: Ability to identify how patterns of the changes and the movement of air masses in the atmosphere, determined by temperature, influence local weather patterns using models. | FKSA 1: Ability to identify examples of processes that change Earth's surface at time and spatial scales that can be large (e.g., plate motions). | N/A |
| **FKSA 2** | FKSA 2: Ability to identify how patterns of the changes and the movement of air masses in the atmosphere, determined by landforms, influence local weather patterns using models. | FKSA 2: Ability to identify examples of processes that change Earth's surface at time and spatial scales that can be small (e.g., landslides). | N/A |
| **FKSA 3** | FKSA 3: Ability to identify how proximity to an ocean influences local weather patterns using models. | No content | N/A |
| **EU** | Identify weather information used to compare weather conditions in different locations on the same day. | Recognize a description of rapid catastrophic events (e.g., earthquakes, volcanoes, meteor impacts) that can change the surface of the Earth. | N/A |
| **PE** | **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.** | **MS-ESS2-3. Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.** | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **Connector** | Recognize that as the sun's energy warms the air over the land (expands and rises), the air over the ocean (cooler air) rushes in to take its place and is called wind (sea breeze). | Identify how the shapes of the continents (fit like a jigsaw puzzle) and fossil comparisons (fit together) along the edges of continents demonstrate lithospheric plate movement. | N/A |
| **FKSA 1** | FKSA 1: Ability to recognize that as the sun's energy warms the air over the land (expands and rises), the air over the ocean (cooler air) rushes in to take its place and is called wind (sea breeze). | FKSA 1: Ability to identify how the shapes of the continents (fit like a jigsaw puzzle) along the edges of continents demonstrate lithospheric plate movement. | N/A |
| **FKSA 2** | No content | FKSA 2: Ability to identify how fossil comparisons (fit together) along the edges of continents demonstrate lithospheric plate movement. | N/A |
| **EU** | Recognize that generally warm air rises and cool air sinks. | Identify the crust or core in a model of Earth's layers. | N/A |

# Earth and Space Science 2 (ESS2)—Earth's Systems (High School)

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **PE** | **HS-ESS2-1. Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.** |
| **Connector** | Using a model, recognize that specific internal processes (e.g., volcanism, tectonic uplift) build up the Earth's surface over time and that specific surface processes (e.g., weathering, erosion) wear down the Earth's surface over time. |
| **FKSA 1** | FKSA 1: Ability to use a model to recognize that specific internal processes (e.g., volcanism, tectonic uplift) build up the Earth's surface over time. |
| **FKSA 2** | FKSA 2: Ability to use a model to recognize that specific surface processes (e.g., weathering, erosion) wear down the Earth's surface over time. |
| **EU** | Identify Earth's surface features and ocean-floor features. |
| **PE** | **HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth's systems.** |
| **Connector** | Identify relationships, using a model, of how the Earth's surface is a complex and dynamic set of interconnected systems (e.g., geosphere, hydrosphere, atmosphere, biosphere). |
| **FKSA 1** | FKSA 1: Ability to identify relationships, using a model, of how the Earth's surface is a complex and dynamic set of interconnected systems. |
| **EU** | Recognize that climate change occurs when the Earth's systems are changed. |
| **PE** | **HS-ESS2-3. Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.** |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **Connector** | Use a model of Earth to identify the motion of the mantle and its plates occurs primarily through thermal convection, which is primarily driven by radioactive decay within Earth's interior. |
| **FKSA 1** | FKSA 1: Ability to use a model to identify that the motions of the mantle and its plates occur primarily through thermal convection. |
| **FKSA 2** | FKSA 2: Ability to identify radioactive decay as the primary source of the heat that drives mantle convection by using a model. |
| **EU** | Use a model of Earth to identify the inner core, the outer core, the mantle, and the crust. |
| **PE** | **HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.** |
| **Connector** | Identify different causes of climate change and results of those changes with respect to the Earth's surface temperatures, precipitation patterns, or sea levels over a wide range of temporal and spatial scales by using a model. |
| **FKSA 1** | FKSA 1: Ability to identify different causes of climate change and results of those changes with respect to the Earth's surface temperatures over a wide range of temporal and spatial scales by using a model. |
| **FKSA 2** | FKSA 2: Ability to identify different causes of climate change and results of those changes with respect to the Earth's precipitation patterns over a wide range of temporal and spatial scales by using a model. |
| **FKSA 3** | FKSA 3: Ability to identify different causes of climate change and results of those changes with respect to the Earth's sea levels over a wide range of temporal and spatial scales by using a model. |
| **EU** | Recognize that climate change can occur over periods of time. |
| **PE** | **HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.** |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **Connector** | Observe and identify the effect of water on the Earth's materials and surface processes (e.g., stream transportation and deposition, erosion, frost wedging). |
| **FKSA 1** | FKSA 1: Identify the effects of water on the Earth's materials and surface processes. |
| **EU** | Recognize that water can erode rocks and soil. |
| **PE** | **HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.** |
| **Connector** | Use a model of the carbon cycle to identify how carbon moves around in the environment from one place to another between the Earth's four spheres. |
| **FKSA 1** | FKSA 1: Ability to use a model of the carbon cycle to identify how carbon moves around in the environment from one place to another between the Earth's four spheres. |
| **EU** | Recognize that carbon atoms move from one place to another (e.g., plants take in carbon dioxide from the atmosphere for photosynthesis). |
| **PE** | **HS-ESS2-7. Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.** |
| **Connector** | Identify examples of coevolution of Earth's systems and the evolution of life on Earth. |
| **FKSA 1** | FKSA 1: Ability to identify examples of evolution of Earth's systems. |
| **FKSA 2** | FKSA 2: Ability to identify examples of the evolution of life on Earth. |
| **EU** | Recognize that animals have evolved over time. |

# Earth and Space Science 3 (ESS3)—Earth's and Human Activity (K–2)

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **PE** | **K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.** | N/A | N/A |
| **Connector** | Identify the relationship between the needs of different plants or animals and the places they live (e.g., deer eat buds and leaves and live in forests) given a model (e.g., representation, diagram, drawing). | N/A | N/A |
| **FKSA 1** | FKSA 1: Ability to identify the relationship between the needs of different animals and the places they live given a model. | N/A | N/A |
| **FKSA 2** | FKSA 2: Ability to identify the relationship between the needs of different plants and the places they live given a model. | N/A | N/A |
| **EU** | Match a plant or an animal to its habitat. | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| PE | **K-ESS3-2. Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.** | N/A | N/A |
| Connector | Observe and recognize how weather forecasting can help people prepare for severe weather. | N/A | N/A |
| FKSA 1 | FKSA 1: Ability to observe and recognize that predicting weather can help people prepare for severe weather. | N/A | N/A |
| EU | Recognize problems for people caused by severe weather. | N/A | N/A |
| PE | **K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.** | N/A | N/A |
| Connector | Identify ways that people can reduce their impact on the land, water, air, and/or other living things. | N/A | N/A |
| FKSA 1 | FKSA 1: Ability to identify ways that people can reduce their impact on land. | N/A | N/A |

| Components of CA NGSS for ALT Assessments | Kindergarten | Grade One | Grade Two |
|---|---|---|---|
| **FKSA 2** | FKSA 2: Ability to identify ways that people can reduce their impact on water. | N/A | N/A |
| **FKSA 3** | FKSA 3: Ability to identify ways that people can reduce air pollution. | N/A | N/A |
| **FKSA 4** | FKSA 4: Ability to identify ways that people can reduce their impact on living things. | N/A | N/A |
| **EU** | Recognize that humans use land, water, air, and living things. | N/A | N/A |

# Earth and Space Science 3 (ESS3)—Earth's and Human Activity (3–5)

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **PE** | **3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.** | **4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.** | **5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.** |
| **Connector** | Identify the positive impact of a solution humans can take to reduce the impact of weather-related hazards (e.g., barriers to prevent flooding). | Identify environmental effects associated with the use of a given energy resource. | Using provided information, identify ways people can help protect the Earth's resources and how that affects the environment. |
| **FKSA 1** | FKSA 1: Ability to identify the positive impact of a solution humans can take to reduce the impact of weather-related hazards. | FKSA 1: Ability to identify environmental effects associated with the use of a given energy resource. | FKSA 1: Ability to use information to identify ways people can help protect the Earth's resources and how that affects the environment. |
| **EU** | Match a problem caused by a weather-related hazard to a solution to address the problem. | Match humans' use of energy to its consequence (e.g., cars being driven create smog, building of hydroelectric dams). | Identify a way a community could protect a natural resource (e.g., reusing paper, recycling cans and bottles). |
| **PE** | N/A | **4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.** | N/A |

| Components of CA NGSS for ALT Assessments | Grade Three | Grade Four | Grade Five |
|---|---|---|---|
| **Connector** | N/A | Identify and compare human solutions to reduce the impact of a natural Earth process (e.g., earthquake, flood, volcanic activity) on humans. | N/A |
| **FKSA 1** | N/A | FKSA 1: Ability to identify a human solution to reduce the impact of a natural Earth process on humans. | N/A |
| **EU** | N/A | Recognize that different types of hazards result from natural Earth processes (e.g., earthquakes, tsunamis, volcanic eruptions) and their impact on humans (e.g., earthquake-resistant buildings). | N/A |

# Earth and Space Science 3 (ESS3)—Earth's and Human Activity (6–8)

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **PE** | **MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.** | **MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.** | **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.** |
| **Connector** | Use data from an existing design solution for minimizing a human impact on the environment to identify limitations of the use of technologies employed by the solution. | Identify explanations of the uneven distributions of Earth's minerals, energy, and groundwater resources due to past and current geoscience processes or by removal of resources. | Using a variety of resources (e.g., tables, graphs, maps), identify whether changes made by humans to Earth's natural resources have impacted natural systems. |
| **FKSA 1** | FKSA 1: Ability to use data from an existing design solution for minimizing a human impact on the environment to identify limitations of the use of technologies employed by the solution. | FKSA 1: Ability to identify explanations of the uneven distributions of Earth's minerals, energy, and groundwater resources due to past geoscience processes. | FKSA 1: Ability to identify if changes that humans have made to Earth's natural systems have positive impacts, negative impacts, or some combination of positive and negative impacts using a variety of resources. |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **FKSA 2** | No content | FKSA 2: Ability to identify explanations of the uneven distributions of Earth's minerals, energy, and groundwater resources due to current geoscience processes. | No content |
| **FKSA 3** | No content | FKSA 3: Ability to identify explanations of the uneven distributions of Earth's minerals, energy, and groundwater resources due to removal of resources. | No content |
| **EU** | Identify a way humans can minimize their impact on the environment. | Recognize that there are different types of Earth resources (e.g., mineral, energy, groundwater) distributed throughout the Earth (e.g., maps showing the current global distribution of different resources). | Recognize the relationship between an increase in human population and an increase in the consumption of food and natural resources. |
| **PE** | **MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.** | **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.** | N/A |

| Components of CA NGSS for ALT Assessments | Grade Six | Grade Seven | Grade Eight |
|---|---|---|---|
| **Connector** | Find evidence of the effects of human activities on changes in global temperatures over the past century by using a variety of resources (e.g., tables, graphs, maps of global and regional temperatures, data on atmospheric levels of gases (such as carbon dioxide and methane), data on rates of human activities). | Use resources (e.g., maps, charts, images of natural hazards) to identify patterns in past occurrences of catastrophic events in each of two regions to predict which location may receive a future similar catastrophic event. | N/A |
| **FKSA 1** | FKSA 1: Ability to find evidence of the effects of human activities on changes in global temperatures over the past century by using a variety of resources. | FKSA 1: Ability to use maps, charts, and images of natural hazards to look for patterns in past occurrences of catastrophic events in each of two regions to predict which location may receive a future similar catastrophic event. | N/A |
| **EU** | Identify ways that human activities affect the environment (e.g., agriculture, pollution, recycling, city growth). | Recognize that some natural hazards (e.g., volcanic eruptions, severe weather) can be predicted while others are not predictable. | N/A |

# Earth and Space Science 3 (ESS3)—Earth's and Human Activity (High School)

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **PE** | **HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.** |
| **Connector** | Explain the cause and effect relationship between human activity (e.g., population size, where humans live, types of crops grown) and changes in the amounts of natural resources, the occurrence of natural hazards or changes in climate using evidence. |
| **FKSA 1** | FKSA 1: Ability to explain the cause and effect relationship between human activity and changes in the amounts of natural resources using evidence. |
| **FKSA 2** | FKSA 2: Ability to explain the cause and effect relationship between human activity and changes in the occurrence of natural hazards using evidence. |
| **FKSA 3** | FKSA 3: Ability to explain the cause and effect relationship between human activity and changes in the climate using evidence. |
| **EU** | Match the effect of a natural hazard (e.g., hurricanes, floods, droughts) on a human activity. |
| **PE** | **HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.** |
| **Connector** | Identify the solution that has the most preferred cost-benefit ratios for developing, managing, and utilizing energy and mineral resources. |
| **FKSA 1** | FKSA 1: Ability to identify the solution that has the most preferred cost-benefit ratios for developing, managing, and utilizing energy and mineral resources. |
| **EU** | Identify why we conserve, recycle, or reuse resources. |

**California Next Generation Science Standards**
**Core Content Connectors for Alternate Assessments**

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **PE** | **HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.** |
| **Connector** | Compare models to determine the effects of a conservation strategy to manage natural resources and to sustain human society and plant and animal life. |
| **FKSA 1** | FKSA 1: Ability to identify effects of a conservation strategy to manage natural resources and to sustain human society and plant and animal life. |
| **EU** | Identify human activities that result in positive or negative impacts on land, ocean, atmosphere, or biosphere resources. |
| **PE** | **HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.** |
| **Connector** | Match a technological solution (e.g., wet scrubber, air filter) to its outcome (e.g., clean air) and to which human activity impact (e.g., air pollution) it is reducing. |
| **FKSA 1** | FKSA 1: Ability to match a technological solution to its outcome and to which human activity impact it is reducing. |
| **EU** | Recognize that scientists are creating technological solutions that reduce the impact of human activities on natural systems. |
| **PE** | **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 systems.** |
| **Connector** | Determine the relationship between a change in climate (such as precipitation or temperature) and its impact in a region. |
| **FKSA 1** | FKSA 1: Ability to determine the relationship between a change in climate (such as precipitation or temperature) and its impact in a region. |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **EU** | Recognize that regional or global climate change includes changes in temperature and precipitation. |
| **PE** | **HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.** |
| **Connector** | Use representations to identify the relationships among Earth systems and how those relationships are being modified due to human activity (e.g., increase in atmospheric carbon dioxide, increase in ocean acidification, effects on organisms in the ocean (coral reef), carbon cycle of the ocean, possible effects on marine populations). |
| **FKSA 1** | FKSA 1: Ability to use representations to identify the relationships among Earth systems and how those relationships are being modified due to human activity. |
| **EU** | Recognize that some human activities have negative consequences for the Earth's air, water, plants, and animals. |

# Engineering, Technology, and Applications of Science (ETS) (K–8)

*Note: Universally consider all to be "With guidance, support, and input from adults and peers" as appropriate for the student.*

| Components of CA NGSS for ALT Assessments | Kindergarten–Grade Two | Grade Three–Grade Five | Grade Six–Grade Eight |
|---|---|---|---|
| **PE** | **K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.** | **3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.** | **MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.** |
| **Connector** | Ask and answer questions and make observations to investigate a simple problem that can be solved through the development of a new or improved object or tool. | Define a simple design problem that can be solved with the development of a new or improved object, tool, or process, and identify the materials and the amount of time needed to develop a successful solution. | Define a design problem that can be solved through consideration of criteria and constraints, potential impacts on people and the environment, and scientific or other issues that are relevant to the problem. |
| **FKSA 1** | FKSA 1: Ability to ask and answer questions that can be answered by an investigation. | FKSA 1: Ability to define a simple design problem that can be solved with the development of a new or improved object, tool, or process. | FKSA 1: Ability to define a design problem that can be solved through consideration of criteria and constraints relevant to the problem. |

| Components of CA NGSS for ALT Assessments | Kindergarten–Grade Two | Grade Three–Grade Five | Grade Six–Grade Eight |
|---|---|---|---|
| **FKSA 2** | FKSA 2: Ability to make observations to investigate a simple problem that can be solved through the development of a new or improved object or tool. | FKSA 2: Ability to identify the materials and the amount of time needed to develop the improved object, tool, or process. | FKSA 2: Ability to define a design problem that can be solved through consideration of potential impacts on people and the environment that are relevant to the problem. |
| **FKSA 3** | No content | No content | FKSA 3: Ability to define a design problem that can be solved through consideration of scientific or other issues that are relevant to the problem. |
| **EU** | Identify tools or objects that could be used to solve a simple problem (e.g., shovel to dig a hole, hammer to pound a nail, sandpaper to shape wood). | Recognize that materials, time, or cost, limits solutions to simple design problems. | Recognize that a solution to a simple design problem can impact people and the environment. |
| **PE** | **K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.** | **3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.** | **MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.** |
| **Connector** | Use simple sketches, drawings, or physical models of the object to identify the relationship between how the shape of each object helps it function to solve a problem. | Compare two possible solutions to the same problem based on how well each is likely to meet the identified criteria (required features) and constraints (limits) for a successful solution. | Use a systematic process to evaluate how well two different design solutions meet the criteria and constraints of the problem. |

| Components of CA NGSS for ALT Assessments | Kindergarten–Grade Two | Grade Three–Grade Five | Grade Six–Grade Eight |
|---|---|---|---|
| **FKSA 1** | FSKA 1: Ability to use simple sketches, drawings, or physical models of the object to identify the relationship between how the shape of each object helps it function to solve a problem. | FKSA 1: Ability to compare two possible solutions to the same problem based on how well each is likely to meet the identified criteria for a successful solution. | FKSA 1: Ability to use a systematic process to evaluate how well two different design solutions meet the criteria and constraints of the problem. |
| **FKSA 2** | No content | FKSA 2: Ability to compare two possible solutions to the same problem based on how well each is likely to meet the identified constraints for a successful solution. | No content |
| **EU** | Identify how the shape of an object or tool helps it function. | Recognize the best solution to a simple problem when given a choice of two possible solutions. | Recognize how a solution through a systematic process would solve the problem. |
| **PE** | **K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.** | **3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.** | **MS-ETS1-3. Analyze data from tests to determine similarities and differences among 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.** |

| Components of CA NGSS for ALT Assessments | Kindergarten–Grade Two | Grade Three–Grade Five | Grade Six–Grade Eight |
|---|---|---|---|
| Connector | Observe and recognize graphical displays (e.g., tables, pictographs, line plots) to compare the strengths and weaknesses of two objects designed to solve the same problem. | Carry out tests in which variables are controlled and failure points are considered to determine which solution best solves the problem. | Analyze data from tests to identify how aspects of two different design solutions can be modified or combined to create a better solution. |
| FKSA 1 | FKSA 1: Ability to use graphical displays (e.g., tables, pictographs, line plots) to compare the strengths of two objects designed to solve the same problem. | FKSA 1: Ability to carry out tests in which variables are controlled and failure points are considered to determine which solution best solves the problem. | FKSA 1: Ability to analyze data from tests to identify how aspects of different design solutions can be modified to create a better solution. |
| FKSA 2 | FKSA 2: Ability to use graphical displays (e.g., tables, pictographs, line plots) to compare the weaknesses of two objects designed to solve the same problem. | No content | FKSA 2: Ability to analyze data from tests to identify how aspects of two different design solutions can be combined to create a better solution. |
| EU | Match shape(s) of the object and the object's function. | Match possible solutions to a simple problem, and recognize a failure point. | Identify evidence of similarities or differences in features of solutions. |
| PE | N/A | N/A | **MS-ETS1-4. 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.** |

**California Next Generation Science Standards**
**Core Content Connectors for Alternate Assessments**

| Components of CA NGSS for ALT Assessments | Kindergarten–Grade Two | Grade Three–Grade Five | Grade Six–Grade Eight |
|---|---|---|---|
| **Connector** | N/A | N/A | Evaluate the data from various testing methods to modify a proposed object, tool, or process to optimize the design solution. |
| **FKSA 1** | N/A | N/A | FKSA 1: Ability to evaluate the data from various testing methods to modify a proposed object, tool, or process to optimize the design solution. |
| **EU** | N/A | N/A | Identify a strength or weakness of a particular design solution using data. |

# Engineering, Technology, and Applications of Science (ETS) (High School)

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
| --- | --- |
| **PE** | **HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.** |
| **Connector** | Define a real-world problem or challenge (e.g., need for clean water, food, and energy sources) and identify solutions. |
| **FKSA 1** | FKSA 1: Ability to define a real-world problem or challenge. |
| **FKSA 2** | FKSA 2: Ability to evaluate specified qualitative and quantitative criteria and constraints in the design of a solution for a defined problem. |
| **EU** | Identify criteria for acceptable solutions to a problem. |
| **PE** | **HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.** |
| **Connector** | Break down a real-world problem into smaller problems that can be approached systematically to solve. |
| **FKSA 1** | FKSA 1: Ability to identify a real-world problem. |
| **FKSA 2** | FKSA 2: Ability to identify solutions to the problem. |
| **EU** | Identify how to solve one part of a larger problem. |
| **PE** | **HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.** |
| **Connector** | Describe the strengths and weaknesses of a solution to a real-world problem with respect to specific criteria and trade-offs, as well as possible social and cultural acceptability and environmental impacts. |

| Components of CA NGSS for ALT Assessments | Grades Nine–Twelve |
|---|---|
| **FKSA 1** | FKSA 1: Ability to describe the strengths and weaknesses of a solution to a real-world problem with respect to specific criteria and trade-offs. |
| **FKSA 2** | FKSA 2: Ability to describe the strengths and weaknesses of a solution to a real-world problem with respect to possible social and cultural acceptability and environmental impacts. |
| **EU** | With guidance, identify a possible barrier to the solution of a real-world problem. |
| **PE** | **HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.** |
| **Connector** | Use computer simulations to evaluate the impact of proposed solutions to a real-world problem to see which one is most efficient or economical. |
| **FKSA 1** | FKSA 1: Ability to use computer simulations to evaluate the impact of proposed solutions to a real-world problem to see which one is most efficient or economical. |
| **FKSA 2** | FKSA 2: Ability to use computer simulations to evaluate solutions to see which one is most efficient or economical. |
| **EU** | Compare different possible solutions to a real-world problem. |