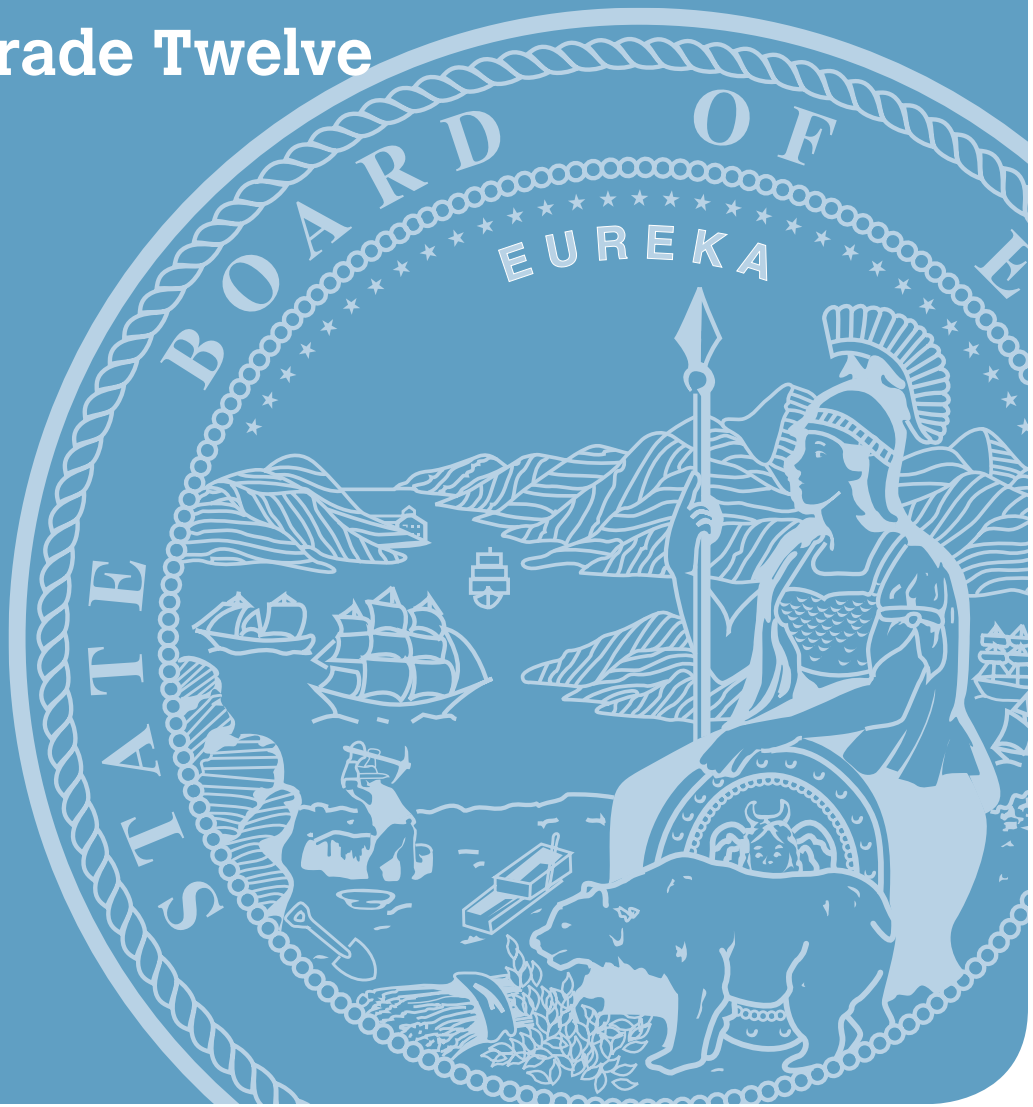
Grade-Level Standards:

Kindergarten Through Grade Twelve



California Department of Education

Clarification statements were created by the writers of NGSS to supply examples or additional clarification to the performance expectations and assessment boundary statements.

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

The section titled "Disciplinary Core Ideas" is reproduced verbatim from *A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Revised March 2015.

K-LS1 From Molecules to Organisms: Structures and Processes

K-LS1 From Molecules to Organisms: Structures and Processes

Students who demonstrate understanding can:

K-LS1-1. **Use observations to describe patterns of what plants and animals (including humans) need to survive.**
[Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and that all living things need water.]

The performance expectation(s) above were developed using the following elements from the NRC document *A Framework for K–12 Science Education*:

Science and Engineering Practices

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world. (K-LS1-1)

Disciplinary Core Ideas

LS1.C: Organization for Matter and Energy Flow in Organisms

- All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1)

Crosscutting Concepts

Patterns

- Patterns in the natural and human designed world can be observed and used as evidence. (K-LS1-1)

K-LS1 From Molecules to Organisms: Structures and Processes

California Environmental Principles and Concepts aligned to the CA NGSS: (K-LS1-1)
Principle I: The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services.
Principle II: The long-term functioning and health of terrestrial, freshwater, coastal, and marine ecosystems are influenced by their relationships with human societies.

Connections to other DCIs in kindergarten: N/A

Articulation of DCIs across grade-bands: **1.LS1.A** (K-LS1-1); **2.LS2.A** (K-LS1-1); **3.LS2.C** (K-LS1-1); **3.LS4.B** (K-LS1-1); **5.LS1.C** (K-LS1-1); **5.LS2.A** (K-LS1-1)

California Common Core State Standards Connections:
ELA/Literacy –
W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-LS1-1)
Mathematics –
K.MD.2 Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. *For example, directly compare the heights of two children and describe one child as taller/shorter.* (K-LS1-1)

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The section titled "Disciplinary Core Ideas" is reproduced verbatim from *A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.*

K-ESS2 Earth's Systems

K-ESS2 Earth's Systems

Students who demonstrate understanding can:

K-ESS2-1. **Use and share observations of local weather conditions to describe patterns over time.** [Clarification Statement: Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months.] [*Assessment Boundary: Assessment of quantitative observations is limited to whole numbers and relative measures such as warmer/cooler.*]

K-ESS2-2. **Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.** [Clarification Statement: Examples of plants and animals changing their environment could include how a squirrel digs in the ground to hide its food and tree roots can break concrete.]

The performance expectation(s) above were developed using the following elements from the NRC document *A Framework for K–12 Science Education*:

Science and Engineering Practices

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-ESS2-1)

Engaging in Argument from Evidence

Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).

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

Connections to Nature of Science

Science Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world. (K-ESS2-1)

Disciplinary Core Ideas

ESS2.D: Weather and Climate

- Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. (K-ESS2-1)

ESS2.E: Biogeology

- Plants and animals can change their environment. (K-ESS2-2)

ESS3.C: Human Impacts on Earth Systems

- Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (secondary to K-ESS2-2)

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-ESS2-1)

Systems and System Models

- Systems in the natural and designed world have parts that work together. (K-ESS2-2)

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The section titled "Disciplinary Core Ideas" is reproduced verbatim from *A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*.

K-ESS2 Earth's Systems

California Environmental Principles and Concepts aligned to the CA NGSS: (K-ESS2-2)
Principle I: The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services.
Principle II: The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies.

Connections to other DCIs in kindergarten: N/A

Articulation of DCIs across grade-bands: **2.ESS2.A** (K-ESS2-1); **3.ESS2.D** (K-ESS2-1); **4.ESS2.A** (K-ESS2-1); **4.ESS2.E** (K-ESS2-2); **5.ESS2.A** (K-ESS2-2)

California Common Core State Standards Connections:
ELA/Literacy –

RI.K.1	With prompting and support, ask and answer questions about key details in a text. (K-ESS2-2)
W.K.1	Use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the topic or the name of the book they are writing about and state an opinion or preference about the topic or book (e.g., My favorite book is . . .). (K-ESS2-2)
W.K.2	Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. (K-ESS2-2)
W.K.7	Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-ESS2-1)

Mathematics –

MP.2	Reason abstractly and quantitatively. (K-ESS2-1)
MP.4	Model with mathematics. (K-ESS2-1)
K.CC.1–3	Know number names and the count sequence. (K-ESS2-1)
K.MD.1	Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. (K-ESS2-1)
K.MD.3	Classify objects into given categories; count the number of objects in each category and sort the categories by count. (K-ESS2-1)

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The section titled "Disciplinary Core Ideas" is reproduced verbatim from *A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.*

K-ESS3 Earth and Human Activity

K-ESS3 Earth and Human Activity

Students who demonstrate understanding can:

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.** [Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas; and grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.]

K-ESS3-2. **Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.*** [Clarification Statement: Emphasis is on local forms of severe weather.]

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.*** [Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.]

The performance expectation(s) above were developed using the following elements from the NRC document *A Framework for K–12 Science Education*:

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested.

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

Developing and Using Models

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, storyboard) that represent concrete events or design solutions.

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

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

Disciplinary Core Ideas

ESS3.A: Natural Resources

- Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1)

ESS3.B: Natural Hazards

- Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events. (K-ESS3-2)

ESS3.C: Human Impacts on Earth Systems

- Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (K-ESS3-3)

Crosscutting Concepts

Cause and Effect

- Events have causes that generate observable patterns. (K-ESS3-2), (K-ESS3-3)

Systems and System Models

- Systems in the natural and designed world have parts that work together. (K-ESS3-1)

Connections to Engineering, Technology, and Applications of Science

Interdependence of Science, Engineering, and Technology

- People encounter questions about the natural world every day. (K-ESS3-2)

Influence of Engineering, Technology, and Science on Society and the Natural World

- People depend on various technologies in their lives; human life would be very different without technology. (K-ESS3-2)

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The section titled "Disciplinary Core Ideas" is reproduced verbatim from *A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*.

K-ESS3 Earth and Human Activity

▪ Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world. (K-ESS3-2) ▪ Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3)	**ETS1.A: Defining and Delimiting an Engineering Problem** ▪ Asking questions, making observations, and gathering information are helpful in thinking about problems. (secondary to K-ESS3-2) **ETS1.B: Developing Possible Solutions** ▪ Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (secondary to K-ESS3-3)	

California Environmental Principles and Concepts aligned to the CA NGSS: (K-ESS3-1), (K-ESS3-3)
Principle I: The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services.
Principle II: The long-term functioning and health of terrestrial, freshwater, coastal, and marine ecosystems are influenced by their relationships with human societies.

Connections to other DCIs in kindergarten: **K.ETS1.A** (K-ESS3-2), (K-ESS3-3)

Articulation of DCIs across grade-bands: **1.LS1.A** (K-ESS3-1); **2.ESS1.C** (K-ESS3-2); **2.ETS1.B** (K-ESS3-3); **3.ESS3.B** (K-ESS3-2); **4.ESS3.**A (K-ESS3-3); **4.ESS3.B** (K-ESS3-2); **5.LS2.A** (K-ESS3-1); **5.ESS2.A** (K-ESS3-1); **5.ESS3.C** (K-ESS3-3)

California Common Core State Standards Connections:
ELA/Literacy –

RI.K.1	With prompting and support, ask and answer questions about key details in a text. (K-ESS3-2)
W.K.2	Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. (K-ESS3-3)
SL.K.3	Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (K-ESS3-2)
SL.K.5	Add drawings or other visual displays to descriptions as desired to provide additional detail. (K-ESS3-1)

Mathematics –

MP.2	Reason abstractly and quantitatively. (K-ESS3-1)
MP.4	Model with mathematics. (K-ESS3-1), (K-ESS3-2)
K.CC.1–3	Know number names and the count sequence. (K-ESS3-1), (K-ESS3-2)
K.CC.4–5	Count to tell the number of objects. (K-ESS3-1), (K-ESS3-2)
K.CC.6–7	Compare numbers. (K-ESS3-1), (K-ESS3-2)

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K-PS2 Motion and Stability: Forces and Interactions

K-PS2 Motion and Stability: Forces and Interactions

Students who demonstrate understanding can:

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.** [Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.] [*Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.*]

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.*** [Clarification Statement: Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn.] [*Assessment Boundary: Assessment does not include friction as a mechanism for change in speed.*]

The performance expectation(s) above were developed using the following elements from the NRC document *A Framework for K–12 Science Education*:

Science and Engineering Practices

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

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

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

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

Connections to Nature of Science

Scientific Investigations Use a Variety of Methods

- Scientists use different ways to study the world. (K-PS2-1)

Disciplinary Core Ideas

PS2.A: Forces and Motion

- Pushes and pulls can have different strengths and directions. (K-PS2-1), (K-PS2-2)
- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (K-PS2-1), (K-PS2-2)

PS2.B: Types of Interactions

- When objects touch or collide, they push on one another and can change motion. (K-PS2-1)

PS3.C: Relationship Between Energy and Forces

- A bigger push or pull makes things speed up or slow down more quickly. (secondary to K-PS2-1)

ETS1.A: Defining Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. (secondary to K-PS2-2)

Crosscutting Concepts

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (K-PS2-1), (K-PS2-2)

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The section titled "Disciplinary Core Ideas" is reproduced verbatim from *A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*.

K-PS2 Motion and Stability: Forces and Interactions	
Connections to other DCIs in kindergarten: **K.ETS1.A** (K-PS2-2); **K.ETS1.B** (K-PS2-2)	
Articulation of DCIs across grade-bands: **2.ETS1.B** (K-PS2-2); **3.PS2.A** (K-PS2-1), (K-PS2-2); **3.PS2.B** (K-PS2-1); **4.PS3.A** (K-PS2-1); **4.ETS1.A** (K-PS2-2)	
California Common Core State Standards Connections:	
ELA/Literacy –	
RI.K.1	With prompting and support, ask and answer questions about key details in a text. (K-PS2-2)
W.K.7	Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-PS2-1)
SL.K.3	Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (K-PS2-2)
Mathematics –	
MP.2	Reason abstractly and quantitatively. (K-PS2-1)
K.MD.1–2	Describe and compare measurable attributes. (K-PS2-1)

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K-PS3 Energy

K-PS3 Energy

Students who demonstrate understanding can:

K-PS3-1. **Make observations to determine the effect of sunlight on Earth's surface.** [Clarification Statement: Examples of Earth's surface could include sand, soil, rocks, and water.] [*Assessment Boundary: Assessment of temperature is limited to relative measures such as warmer/cooler.*]

K-PS3-2. **Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.*** [*Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.*]

The performance expectation(s) above were developed using the following elements from the NRC document *A Framework for K–12 Science Education*:

Science and Engineering Practices

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (K-PS3-1)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

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

Connections to Nature of Science

Scientific Investigations Use a Variety of Methods

- Scientists use different ways to study the world. (K-PS3-1)

Disciplinary Core Ideas

PS3.B: Conservation of Energy and Energy Transfer

- Sunlight warms Earth's surface. (K-PS3-1), (K-PS3-2)

Crosscutting Concepts

Cause and Effect

- Events have causes that generate observable patterns. (K-PS3-1), (K-PS3-2)

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K-PS3 Energy	
Connections to other DCIs in kindergarten: **K.ETS1.A** (K-PS3-2); **K.ETS1.B** (K-PS3-2)	
Articulation of DCIs across grade-bands: **1.PS4.B** (K-PS3-1), (K-PS3-2); **2.ETS1.B** (K-PS3-2), **3.ESS2.D** (K-PS3-1); **4.ETS1.A** (K-PS3-2)	
California Common Core State Standards Connections:	
ELA/Literacy –	
W.K.7	Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-PS3-1), (K-PS3-2)
Mathematics –	
K.MD.2	Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. *For example, directly compare the heights of two children and describe one child as taller/shorter.* (K-PS3-1), (K-PS3-2)

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K–2 Engineering Design

K–2 ETS1 Engineering Design

Students who demonstrate understanding can:

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.**

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.**

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.**

The performance expectation(s) above were developed using the following elements from the NRC document *A Framework for K–12 Science Education*:

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.

- Ask questions based on observations to find more information about the natural and/or designed world(s). (K–2-ETS1-1)
- Define a simple problem that can be solved through the development of a new or improved object or tool. (K–2-ETS1-1)

Developing and Using Models

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

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

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. (K–2-ETS1-1)
- Asking questions, making observations, and gathering information are helpful in thinking about problems. (K–2-ETS1-1)
- Before beginning to design a solution, it is important to clearly understand the problem. (K–2-ETS1-1)

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K–2-ETS1-2)

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K–2-ETS1-3)

Crosscutting Concepts

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (K–2-ETS1-2)

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K–2 Engineering Design

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended. (K–2-ETS1-3)

California Environmental Principles and Concepts aligned to the CA NGSS:(K-2-ETS1-1)
Principle V: Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes.

Connections to other DCIs in this grade-band:
Connections to K–2-ETS1.A: Defining and Delimiting Engineering Problems include:
Kindergarten: K-PS2-2, K-ESS3-2
Connections to K–2-ETS1.B: Developing Possible Solutions Problems include:
Kindergarten: K-ESS3-3, **First Grade:** 1-PS4-4, **Second Grade:** 2-LS2-2
Connections to K–2-ETS1.C: Optimizing the Design Solution include:
Second Grade: 2-ESS2-1

Articulation of DCIs across grade-bands: **3–5.ETS1.A** (K–2-ETS1-1), (K–2-ETS1-2), (K–2-ETS1-3); **3–5.ETS1.B** (K–2-ETS1-2); **3–5.ETS1.C** (K–2-ETS1-1), (K–2-ETS1-2), (K–2-ETS1-3)

California Common Core State Standards Connections:
ELA/Literacy –

RI.2.1	Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (K–2-ETS1-1)
W.2.6	With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K–2-ETS1-1), (K–2-ETS1-3)
W.2.8	Recall information from experiences or gather information from provided sources to answer a question. (K–2-ETS1-1), (K–2-ETS1-3)
SL.2.5	Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (K–2-ETS1-2)

Mathematics –

MP.2	Reason abstractly and quantitatively. (K–2-ETS1-1), (K–2-ETS1-3)
MP.4	Model with mathematics. (K–2-ETS1-1), (K–2-ETS1-3)
MP.5	Use appropriate tools strategically. (K–2-ETS1-1), (K–2-ETS1-3)

California Department of Education, June 2021

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