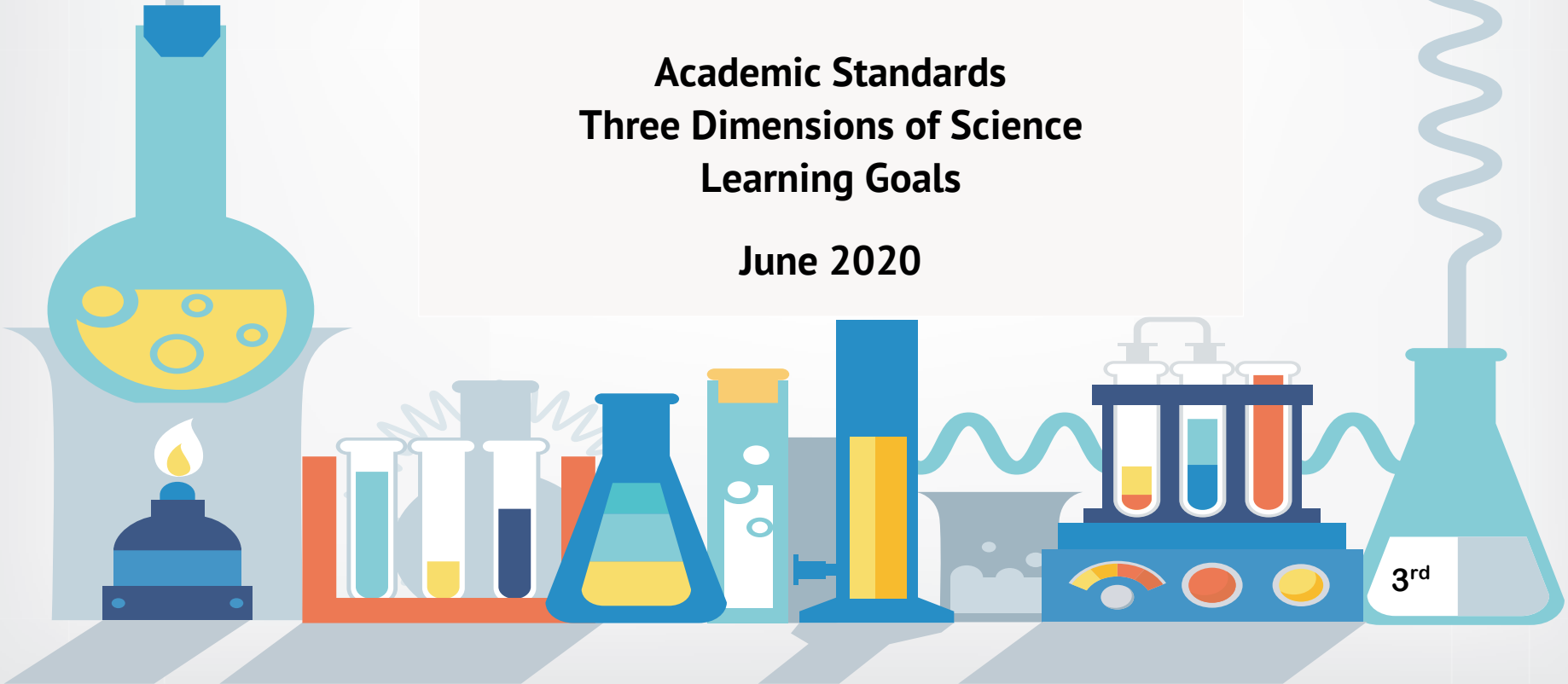
ENVISION 21

DEEP LEARNING • CFSD

SCIENCE

Academic Standards
Three Dimensions of Science
Learning Goals

June 2020



GRADE 3

CATALINA FOOTHILLS SCHOOL DISTRICT

GRADE 3 OVERVIEW

By the end of **third grade**, students will gain an understanding of how the Sun provides energy for life on Earth. Students apply their understanding of light and sound waves, how they travel, are detected, and transfer energy. Students learn that organisms have different structures and functions which increase their chances of survival. Student investigations focus on collecting and making sense of observational data and simple measurements using the science and engineering practices. While individual lessons may include connections to any of the crosscutting concepts, the standards in third grade focus on helping students understand phenomena through the crosscutting concepts of *systems and system models* and *structure and function*.

The third grade standards are grouped by area of science and topic. They are a *progression* of disciplinary core ideas. Some of the sub-ideas within the disciplinary core ideas (background information) overlap; there is not always a clear division between those ideas. Instead of focusing on distinctly different content or processes at each grade level, the standards engage students in similar topics to develop a progressively deeper understanding of each of the three science dimensions. Students continually build on and revise their knowledge and skills over time. In addition, there is a focus on a limited number of core ideas (content) both within and across the science disciplines. This was done intentionally to avoid the shallow coverage of a large number of topics, and to allow more time for teachers and students to explore each idea in greater depth.

The third grade standards have been organized by area of science and suggested topics. However, this does not indicate the instructional sequence or how the standards will be organized for instruction. Educators will make decisions about instructional sequence and how standards will be grouped by units for classroom instruction and assessment to best meet student needs.

	Area of Science	Title	Content
1	Physical Science	Light and Sound	Students develop an understanding of the sources, properties, and characteristics of energy along with the relationship between energy transfer and the human body.
2	Earth and Space Sciences	Sun Energy	Students develop an understanding of how the Sun provides light and energy for Earth systems.
3	Life Science	Plant & Animal Structures	Students develop an understanding that plants and animals (including humans) have specialized internal and external structures and can respond to stimuli to increase survival. Students also develop an understanding of the flow of energy in a system beginning with the Sun to and among organisms.
4	Computer Science	Computational Thinking & Data and Analysis	Students develop a foundation of computer science knowledge and new approaches to problem solving that capture the power of computational thinking to become both users and creators of computing technology.

.

ENVISION 21
DEEP LEARNING • CFSD

Navigating the Science Standards: Abbreviated Version

The standards serve as the basis for the design of instruction and assessment of the district's science curriculum.

- **Standards** are what a student needs to know, understand, and be able to do by the end of each grade or course. They build across grade levels in a progression of increasing understanding and through a range of cognitive demand levels.
- **Curriculum** refers to the resources used for teaching and learning the standards (units, lessons, texts, materials, tech apps, assessments, etc.).
- **Instruction** refers to the methods or methodologies used by teachers to teach their students. Instructional techniques are employed by individual teachers in response to the needs of students in their classes to help them progress through the curriculum to achieve the standards.

Grade Level or Course and **Topic Area** for standard.

Standard – What is Assessed
Describes what students should be able to do at the end of instruction to show what they have learned. Combines Science and Engineering Practices, Core Ideas, and Crosscutting Concepts.

Learning Goals
Indicators or evidence of learning at the end of a lesson or unit as aligned to the standard.

Core Ideas for Knowing and Using Science
"Understandings" or big ideas for physical, earth and space, and life sciences that build in complexity across grade levels and students develop over time.

Background Information (Content) is provided under each Core Idea

Science and Engineering Practices
Skills and knowledge that scientists and engineers engage in to either understand the world or solve a problem.

Life Science
Description of what students will learn for the area of science under study (K-8 only.

KINDERGARTEN

LIFE SCIENCE: LIVING AND NON-LIVING THINGS

Students develop an understanding that the world is comprised of living and non-living things. They investigate the relationship between structure and function in living things; plants and animals use specialized parts to help them meet their needs and survive.

Science Standard: K.L2U1.8 Observe, ask questions, and explain the differences between the characteristics of living and non-living things.

Learning Goals

I can:

- Based on prior experiences, ask questions about living and non-living things.
- Make direct or indirect observations about living and non-living things:
  - Identify traits of living and non-living things.
  - Record observations (*e.g., through pictures and/or words*).
  - Make inferences about the characteristics of living and non-living things.
- List the characteristics of living things (*i.e., move, reproduce, react to stimuli*).
- Use evidence to explain how the characteristics of living things differ from the characteristics of non-living things.

Core Ideas

Knowing Science

L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.

- There is a wide variety of living things (organisms), including plants and animals. They are distinguished from non-living things by their ability to move, reproduce, and react to certain stimuli.

Using Science

U1: Scientists explain phenomena using evidence obtained from observations and/or scientific investigations. Evidence may lead to developing models and/or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.

- Students ask questions to frame their exploration of living and non-living things.
- Students make observations about living and non-living things.
- Students use the evidence from their observations to make inferences about the characteristics of living and non-living things.

Science and Engineering Practices

Asking Questions and Defining Problems

- Ask questions based on observations of the natural and/or designed world.

Constructing Explanations and Designing Solutions

- Use information from direct or indirect observations to construct explanations.
- Distinguish between opinions and evidence in one's own explanations.

Crosscutting Concepts

Patterns

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

Structure and Function

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

Systems and System Models

- Objects and organisms can be described in terms of their parts.

Three Dimensions (3-D) of Science:
The Practices, Core Ideas, and Crosscutting Concepts that were used to create the standards.

Crosscutting Concepts
Concepts that cut across all disciplines and help students deepen their understanding of core ideas.

PHYSICAL SCIENCE

CATALINA FOOTHILLS SCHOOL DISTRICT

GRADE 3 SCIENCE STANDARD

PHYSICAL SCIENCE: LIGHT AND SOUND

Students develop an understanding of the sources, properties, and characteristics of energy along with the relationship between energy transfer and the human body.

Science Standard: 3.P2U1.1 Ask questions and investigate the relationship between light, objects, and the human eye.

Learning Goals

I can:

- Ask questions about the relationship between light, objects, and the human eye *(i.e., light, reflection, lenses, sight, color):*
  - Ask scientific (testable) questions based on careful observations of phenomena and information.
  - Ask questions to clarify ideas or request evidence.
- Investigate the relationship between light, objects, and the human eye *(e.g., through experimentation, texts, media, demonstrations):*
  - Formulate a reasonable prediction based on patterns such as cause and effect relationships.
  - Gather information from grade-level texts in response to the testable question(s).
  - Make direct and/or indirect observations about light, objects, and the human eye.
  - Collect appropriate data about the relationship between light, objects, and the human eye.
  - Identify patterns that provide evidence for an explanation of the phenomenon.

Core Ideas

Knowing Science

P2: Objects can affect other objects at a distance.

- Light is seen because it affects the objects it reaches, including our eyes. Sources give out light, which travels from them in various directions and is detected when it reaches and enters our eyes. Objects that are seen either give out or reflect light that human eyes can detect.
- An object can be seen when light reflected from its surface enters the eyes; the color people see depends on the color of the available light sources as well as the properties of the surface. Because lenses bend light beams, they can be used, singly or in combination, to provide magnified images of objects too small or too far away to be seen with the naked eye.

Using Science

U1: Scientists explain phenomena using evidence obtained from observations and/or scientific investigations. Evidence may lead to developing models and/or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.

- Students explore the phenomena of sight by examining the relationship between light, objects, and the human eye. Asking questions helps students frame their investigations.

Science and Engineering Practices

Asking Questions and Defining Problems

- Identify scientific (testable) and non-scientific (non-testable) questions.
- Ask questions based on careful observations of phenomena and information.
- Ask questions to clarify ideas or request evidence.

Planning and Carrying out Investigations

- Design and conduct investigations collaboratively, using fair tests in which variables are controlled and the number of trials considered.

Crosscutting Concepts

Cause and Effect: Mechanism and Prediction

- Cause and effect relationships are routinely identified, tested, and used to explain change.
- Events that occur together with regularity might not be a cause and effect relationship.

• Evaluate appropriate methods and tools for collecting data. • Make observations and/or measurements, collect appropriate data, and identify patterns that provide evidence for an explanation of a phenomenon or test a design solution. • Identify questions and make predictions based on prior experiences.	

CATALINA FOOTHILLS SCHOOL DISTRICT

GRADE 3 SCIENCE STANDARD

PHYSICAL SCIENCE: LIGHT AND SOUND

Students develop an understanding of the sources, properties, and characteristics of energy along with the relationship between energy transfer and the human body.

Science Standard: 3.P2U1.2 Plan and carry out an investigation to explore how sound waves affect objects at varying distances.

Learning Goals

I can:

- In collaboration with peers, design an investigation to explore how sound waves affect objects at varying distances:
  - Formulate scientific (testable) questions based on careful observations of phenomena and information.
  - Formulate a reasonable prediction based on patterns such as cause and effect relationships.
  - Design a procedure that will produce data in response to the testable question(s).
  - Identify controlled variables.
  - Determine an appropriate number of trials for the investigation.
  - Determine how observations and/or measurements will be made in order to answer the investigative question.
- In collaboration with peers, conduct a simple investigation to explore how sound waves affect objects at varying distances:
  - Follow a procedure with precision.
  - Make observations about how sound waves affect objects.
  - Collect and record appropriate data from the investigation.
  - Identify patterns to make meaning of the data.

Core Ideas

Knowing Science

P2: Objects can affect other objects at a distance.

- Sound comes from things that vibrate and can be detected at a distance from the source because the air or other material around is made to vibrate. Sounds are heard when the vibrations in the air enter our ears.
- Waves of the same type can differ in amplitude and wavelength. Waves can add or cancel one another as they cross, depending on their relative phase (i.e., relative position of peaks and troughs of the waves), but they emerge unaffected by each other.

Using Science

U1: Scientists explain phenomena using evidence obtained from observations and/or scientific investigations. Evidence may lead to developing models and/or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.

- Students explore the phenomenon of sound waves by designing and conducting an investigation. Their observations during the investigation will help them better understand how sound waves affect objects at a distance.

Science and Engineering Practices	Crosscutting Concepts
Asking Questions and Defining Problems • Identify scientific (testable) and non-scientific (non-testable) questions. • Ask questions based on careful observations of phenomena and information.	**Cause and Effect: Mechanism and Prediction** • Cause and effect relationships are routinely identified, tested, and used to explain change. • Events that occur together with regularity might or might not be a cause and effect

• Ask questions to clarify ideas or request evidence. **Planning and Carrying out Investigations** • Design and conduct investigations collaboratively, using fair tests in which variables are controlled and the number of trials considered. • Evaluate appropriate methods and tools for collecting data. • Make observations and/or measurements, collect appropriate data, and identify patterns that provide evidence for an explanation of a phenomenon or test a design solution.	relationship. **Energy and Matter: Flows, Cycles, and Conservation** • Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and within systems. • Energy can be transferred in various ways and between objects.

CATALINA FOOTHILLS SCHOOL DISTRICT

GRADE 3 SCIENCE STANDARD

PHYSICAL SCIENCE: LIGHT AND SOUND

Students develop an understanding of the sources, properties, and characteristics of energy along with the relationship between energy transfer and the human body.

Science Standard: 3.P4U1.3 Develop and use models to describe how light and sound waves transfer energy.

Learning Goals

I can:

- Develop models (*e.g., diagrams, drawings, physical replicas, dioramas, dramatizations, or storyboards*) to show how light and sound waves transfer energy.
  - Develop models using an analogy, example, or abstract representation to show how sound and/or light waves transfer energy.
  - Represent how energy can be moved from place to place through sound or light waves.
  - Represent how the collision of objects can produce sound waves.
  - Represent the regular patterns of motion of light and/or sound waves.
  - Represent the role of heat in energy transfer.
  - Represent wavelength and amplitude in light and/or sound waves.
  - Compare models to identify common features and differences.
  - Use criteria to collaboratively revise models to improve their representation of how light and/or sound waves transfer energy.
- Use models to describe how light and sound waves transfer energy.
  - Use models to describe how energy can be moved from place to place through sound or light waves.
  - Use models to describe how the collision of objects can produce sound waves.
  - Use models to describe the regular patterns of motion of light and/or sound waves.
  - Use models to describe the role of heat in energy transfer.

Core Ideas

Knowing Science

P4: The total amount of energy in a closed system is always the same but can be transferred from one energy store to another during an event.

- Sound comes from things that vibrate and can be detected at a distance from the source because the air or other material around is made to vibrate. Sounds are heard when the vibrations in the air enter our ears.
- Waves of the same type can differ in amplitude and wavelength. Waves can add or cancel one another as they cross, depending on their relative phase (i.e., relative position of peaks and troughs of the waves), but they emerge unaffected by each other.

Using Science

U1: Scientists explain phenomena using evidence obtained from observations and/or scientific investigations. Evidence may lead to developing models and/or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.

- Students develop their understanding of energy and energy transfer through modeling with light and sound waves. Because light and sound waves cannot be observed directly, models help students make sense of energy transfer.

Science and Engineering Practices	Crosscutting Concepts
Asking Questions and Defining Problems • Identify scientific (testable) and non-scientific (non-testable) questions. • Ask questions based on careful observations of phenomena and information. • Ask questions to clarify ideas or request evidence. **Developing and Using Models** • Develop and revise models collaboratively to measure and explain frequent and regular events. • Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution. • Use simple models to describe or support explanations for phenomena and test cause and effect relationships or interactions concerning the functioning of a natural or designed system. • Identify limitations of models.	**Structure and Function** • Different materials have different substructures, which can sometimes be observed. • Substructures have shapes and parts that serve functions. **Energy and Matter: Flows, Cycles, and Conservation** • Matter is transported into, out of, and within systems. • Energy can be transferred in various ways and between objects.

EARTH AND SPACE SCIENCES

CATALINA FOOTHILLS SCHOOL DISTRICT

GRADE 3 SCIENCE STANDARD

EARTH AND SPACE SCIENCES: SUN ENERGY

Students develop an understanding of how the Sun provides light and energy for Earth systems.

Science Standard: 3.E1U1.4 Construct an explanation describing how the Sun is the primary source of energy impacting Earth systems.

Learning Goals

I can:

- Use evidence *(e.g., measurements, observations, patterns from texts, media, investigations, and/or demonstrations)* to construct a scientific explanation:
  - Explain how energy impacts solid and molten rock, soil, and sediments (geosphere).
  - Explain how the Sun's energy affects the water cycle (hydrosphere).
  - Explain how the Sun's energy impacts the air (atmosphere).
  - Explain how the Sun's energy impacts living things on Earth (biosphere).
  - Describe interactions among Earth's systems: geosphere, hydrosphere, atmosphere, and biosphere.

Core Ideas

Knowing Science

E1: The total amount of energy in a closed system is always the same but can be transferred from one energy store to another during an event.

- All Earth processes are the result of energy flowing and matter cycling within and among Earth's systems. This energy originates from the sun and from Earth's interior. Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes.

Using Science

U1: Scientists explain phenomena using evidence obtained from observations and/or scientific investigations. Evidence may lead to developing models and/or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.

- Students use evidence from different sources to build their understanding of the role of the energy in Earth's systems.

Science and Engineering Practices

Constructing Explanations and Designing Solutions

- Construct explanations of observed quantitative relationships (e.g., the distribution of plants in the backyard).
- Use evidence (e.g., measurements, observations, patterns) to construct a scientific explanation.
- Identify the evidence that supports particular points in an explanation.
- Distinguish among facts, reasoned judgment based on research findings, and speculation in an explanation.

Crosscutting Concepts

Systems and System Models

- A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.
- A system can be described in terms of its components and their interactions.

Energy and Matter: Flows, Cycles, and Conservation

- Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter.
- Matter is transported into, out of, and within systems.
- Energy can be transferred in various ways and between objects.

LIFE SCIENCE

CATALINA FOOTHILLS SCHOOL DISTRICT

GRADE 3 SCIENCE STANDARD

LIFE SCIENCE: PLANT AND ANIMAL STRUCTURES

Students develop an understanding that plants and animals (including humans) have specialized internal and external structures and can respond to stimuli to increase survival.

Science Standard: 3.L1U1.5 Develop and use models to explain that plants and animals (including humans) have internal and external structures that serve various functions that aid in growth, survival, behavior, and reproduction.

Learning Goals

I can:

- Develop models (*e.g., diagrams, drawings, physical replicas, dioramas, dramatizations, or storyboards*) to show the internal and external structures and functions of plants and animals to support growth, survival, behavior, and reproduction:
  - Use an analogy, example, or abstract representation to show the relationship between internal and external structures of plants and animals and the functions they serve.
  - Represent the relationship between internal structures of plants (*i.e., vascular system, roots)* and their functions (*i.e., for growth, survival, behavior, and reproduction*).
  - Represent the relationship between external structures of plants (*i.e., leaves, stems, flowers, seeds*) and their functions (*i.e., for growth, survival, behavior, and reproduction*).
  - Represent the relationship between internal structures of animals (*e.g.,, bones, organs, veins, nerves, etc.)* and their functions (*i.e., for growth, survival, behavior, and reproduction*).
  - Represent the relationship between external structures of animals (*e.g., shells, fur, feathers, skin, claws, gills, etc.)* and their functions (*i.e., for growth, survival, behavior, and reproduction*).
  - Compare models to identify common features and differences.
  - Use criteria to collaboratively revise models to improve the representation of the relationship between structure and function.
- Use models to explain how the internal and external structures and functions of plants and animals support growth, survival, behavior, and reproduction:
  - Use models to explain the relationship between structures and functions in plants and animals.
  - Use models to explain how internal and external structures support growth, survival, behavior, and reproduction in plants and animals.

Core Ideas

Knowing Science

L1: Organisms are organized on a cellular basis and have a finite life span.

- Animals and plants have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

Using Science

U1: Scientists explain phenomena using evidence obtained from observations and/or scientific investigations. Evidence may lead to developing models and/or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.

- Students use evidence to create models to examine the plant and animal structures that support survival.

Science and Engineering Practices	Crosscutting Concepts
Developing and Using Models • Develop and revise models collaboratively to measure and explain frequent and regular events.	**Structure and Function** • Different materials have different substructures, which can sometimes be observed. • Substructures have shapes and parts that serve functions.

• Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution. • Use simple models to describe or support explanations for phenomena and test cause and effect relationships or interactions concerning the functioning of a natural or designed system. • Identify limitations of models.	

CATALINA FOOTHILLS SCHOOL DISTRICT

GRADE 3 SCIENCE STANDARD

LIFE SCIENCE: PLANT AND ANIMAL STRUCTURES

Students develop an understanding that plants and animals (including humans) have specialized internal and external structures and can respond to stimuli to increase survival.

Science Standard: 3.L2U1.6 Plan and carry out investigations to demonstrate ways plants and animals react to stimuli.

Learning Goals

I can:

- In collaboration with peers, design an investigation to explore how plants and/or animals react to stimuli:
  - Formulate scientific (testable) questions based on careful observations of phenomena and information.
  - Formulate a reasonable prediction based on patterns such as cause and effect relationships.
  - Based on prior knowledge, formulate a prediction in response to the testable question(s).
  - Design a procedure that will produce data in response to the testable question(s).
  - Identify controlled variables.
  - Determine an appropriate number of trials for the investigation.
  - Determine how observations and/or measurements will be made in order to answer the investigative question.
- In collaboration with peers, conduct a simple investigation to explore how plants and/or animals react to stimuli:
  - Follow a procedure with precision.
  - Make observations about how plants and animals react to stimuli.
  - Collect data from the investigation.
  - Identify patterns to make meaning of the data.

Core Ideas

Knowing Science

L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.

- Animals and plants have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

Using Science

U1: Scientists explain phenomena using evidence obtained from observations and/or scientific investigations. Evidence may lead to developing models and/or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.

- Students formulate questions to frame their investigations. They then make observations to investigate phenomena of plant and animal behavior in response to stimuli.

Science and Engineering Practices

Asking Questions and Defining Problems

- Identify scientific (testable) and non-scientific (non-testable) questions.
- Ask questions based on careful observations of phenomena and information.

Planning and Carrying out Investigations

- Design and conduct investigations collaboratively, using fair tests in which variables

Crosscutting Concepts

Cause and Effect: Mechanism and Prediction

- Cause and effect relationships are routinely identified, tested, and used to explain change.
- Events that occur together with regularity might or might not be a cause and effect relationship.

are controlled and the number of trials considered. • Evaluate appropriate methods and tools for collecting data. • Make observations and/or measurements, collect appropriate data, and identify patterns that provide evidence for an explanation of a phenomenon or test a design solution. • Make measurements of two different models of the same proposed object, tool or process to determine which better meets criteria for success.	**Structure and Function** • Different materials have different substructures, which can sometimes be observed.

CATALINA FOOTHILLS SCHOOL DISTRICT

GRADE 3 SCIENCE STANDARD

LIFE SCIENCE: PLANT AND ANIMAL STRUCTURES

Students develop an understanding of the flow of energy in a system beginning with the Sun to and among organisms. They also understand that plants and animals (including humans) have specialized internal and external structures and can respond to stimuli to increase survival.

Science Standard: 3.L2U1.7 Develop and use system models to describe the flow of energy from the Sun to and among living organisms.

Learning Goals

I can:

- Develop system models (*e.g., diagrams, drawings, physical replicas, dioramas, dramatizations, or storyboards*) to show the flow of energy from the Sun to and among living organisms:
  - Use an analogy, example, or abstract representation to show the flow of energy from the Sun to and among living organisms.
  - Represent interrelationships and dependencies among plants and animals in an ecosystem (*i.e., consumers, decomposers*).
  - Represent how animals' food can be traced back to plants.
  - Represent the balance of a healthy ecosystem.
  - Represent how matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die.
  - Represent how organisms obtain gases, water, and minerals from the environment and release waste matter (gas, liquid, or solid) back into the environment
  - Compare models to identify common features and differences.
- Use system models to describe the flow of energy from the Sun to and among living organisms:
  - Use models to describe how energy in animals' food was once energy from the Sun.
  - Use models to describe the balance of a healthy ecosystem.
  - Use models (e.g., food webs) to describe relationships among plants and animals in an ecosystem.
  - Use models to explain how matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die.
  - Use models to explain how organisms obtain gases, water, and minerals from the environment and release waste matter (gas, liquid, or solid) back into the environment.

Core Ideas

Knowing Science

L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.

- The Sun is a source of energy for life on Earth. Plants get energy from the sun, and the food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants. Either way, they are "consumers." Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil for plants to use.
- Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, water, and minerals from the environment and release waste matter (gas, liquid, or solid) back into the environment.

Using Science

U1: Scientists explain phenomena using evidence obtained from observations and/or scientific investigations. Evidence may lead to developing models and/or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.

- Students make observations and develop models to explain the flow of energy from the sun to Earth's living organisms. Models help students understand the relationships among various parts of the system.

Science and Engineering Practices	Crosscutting Concepts
Developing and Using Models • Develop and revise models collaboratively to measure and explain frequent and regular events. • Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution. • Use simple models to describe or support explanations for phenomena and test cause and effect relationships or interactions concerning the functioning of a natural or designed system. • Identify limitations of models. • Develop a diagram or simple physical prototype to convey a proposed object, tool or process.	**Systems and System Models** • A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. • A system can be described in terms of its components and their interactions. **Energy and Matter: Flows, Cycles, and Conservation** • Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. • Energy can be transferred in various ways and between objects.

CATALINA FOOTHILLS SCHOOL DISTRICT

GRADE 3 SCIENCE STANDARD

LIFE SCIENCE: PLANT AND ANIMAL STRUCTURES

Students develop an understanding that plants and animals (including humans) have specialized internal and external structures and can respond to stimuli to increase survival.

Science Standard: 3.L2U1.8 Use evidence to prove that organisms are interdependent.

Learning Goals

I can:

- Select and explain scientific evidence *(e.g., from texts, media, investigations, demonstrations, observations, etc.)* of interdependencies among organisms.
- Compare and refine explanations based on the strengths and weaknesses of the evidence presented.
- Refine explanations in response to peer critique.

Core Ideas

Knowing Science

L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.

- Animals and plants depend on one another in many ways (e.g., pollination, shelter, food, fuel, etc.). We can represent these interdependencies through food chains and food webs.
- Animals and plants alike generally need to take in air and water, animals must take in food, and plants need light and minerals. Plants acquire their material for growth chiefly from air and water and process matter they have formed to maintain their internal conditions (e.g., at night). Animals need food that they can break down, which comes either directly by eating plants (herbivores) or by eating animals (carnivores) which have eaten plants or other animals. Animals are ultimately dependent on plants for their survival.

Using Science

U1: Scientists explain phenomena using evidence obtained from observations and/or scientific investigations. Evidence may lead to developing models and/or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.

- Students use evidence to explore interdependencies among organisms. They then use scientific evidence and reasoning to prove the existence of these interdependencies.

Science and Engineering Practices

Engaging in Argument from Evidence

- Construct and/or support scientific arguments with evidence, data, and/or a model.
- Compare and refine arguments based on the strengths and weaknesses of the evidence presented.
- Respectfully provide and receive critiques on scientific arguments with peers by citing relevant evidence and posing specific questions.

Crosscutting Concepts

Systems and System Models

- A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.
- A system can be described in terms of its components and their interactions.

Energy and Matter: Flows, Cycles, and Conservation

- Energy can be transferred in various ways and between objects.

COMPUTER SCIENCE

(Note: The Computer Science Standards will be taught by the STEM Integration Specialist in collaboration with the classroom teachers.)

CATALINA FOOTHILLS SCHOOL DISTRICT

GRADES 3-5

COMPUTER SCIENCE STANDARDS: COMPUTATIONAL THINKING

Concept: Computational Thinking (Algorithms and Programming)

Subconcepts:

- **Algorithms (A)**
- **Variables (V)**
- **Control (C)**
- **Modularity (M)**
- **Program Development (PD)**

Computer Science Standards:

3-5.AP.A.1 Compare, test, and refine algorithms for the same task and determine which is the most efficient.

Learning Goals

I can:

- Select the most efficient algorithm to accomplish a task.
- Accomplish a programming task using the most efficient algorithm(s).

3-5.AP.V.1 Identify variables in applications where data is stored and modified to accomplish a task.

Learning Goals

I can:

- Identify a count or score as variables that can be programmed to change in a digital game.

3-5.AP.C.1 Create programs that include sequences, loops, and conditionals to express ideas or solve a problem.

Learning Goals

I can:

- Create a program to accomplish a task that requires a repeated sequence of commands (i.e., loop).
- Create a program to accomplish a task that requires execution of a portion of code when a specific condition,(i.e., sensor) is true.

3-5.AP.M.1 Decompose problems into smaller, manageable subproblems to facilitate the program development process.

Learning Goals

I can:

- Identify the steps required to solve a problem.
- Code the multiple small steps to solve a problem in order one by one.
- Create command sequences (i.e., subroutines) that can be reused or combined to accomplish a complex task.

3-5.AP.M.2 Modify, remix, or incorporate portions of an existing program into one's own work to add more advanced features.

Learning Goals

I can:

- Make use of examples and text features on the assignment sheets to develop the subroutines for a multi-step program.
- Reuse programming sequences to accomplish new tasks.

3-5.AP.PD.1 Use an iterative process to plan the development of a program (i.e., soliciting feedback, others' perspectives, user preferences).

Learning Goals

I can:

- Use command cards and diagrams to discuss and plan a program with my partner.
- Review code with partner to check for programming errors before testing.
- Make and test improvements until the program works as intended.

3-5.AP.PD.2 Observe intellectual property rights and give attribution when remixing programs or utilizing the work of others.

Learning Goal

I can:

- Share ideas and programming strategies to facilitate learning.
- Credit others when their ideas and work is utilized.

3-5.AP.PD.3 Test and debug (identify and fix errors) a program/app or algorithm to ensure it runs as intended.

Learning Goal

I can:

- Establish a routine to isolate and analyze errors during testing.
- Evaluate accuracy of input values (parameters).

3-5.AP.PD.4 Describe choices made during program development using code comments, presentations, and demonstrations.

Learning Goal

I can:

- Discuss decisions throughout the process of planning, testing and refining a program with a partner.
- Use comments to document a section of code to identify and explain it to others.
- Reflect on the solutions to problems encountered and the number of trials needed to reach the programming goal.

Computer Science Practices

Fostering an Inclusive Computing Culture

- Build an inclusive and diverse computing culture using strategies that incorporate perspectives from people of different genders, ethnicities, and abilities.

Collaborating Around Computing

- Collaborate around computing by working in pairs and on teams to perform a computational task, asking for the contributions and feedback of others to improve outcomes.

Recognizing and Defining Computational Problems

- Recognize and define computational problems, break them down into parts, and evaluate each part to determine whether a computational solution is appropriate.

Developing and Using Abstractions

- Identify patterns and extract common features from specific examples to create generalizations from abstractions.

Creating Computational Artifacts

- Create computational artifacts that embrace both creative expression and the exploration of ideas to create prototypes and solve computational problems. Create artifacts that are personally relevant or beneficial to the community and beyond.

Testing and Refining Computational Artifacts

- Test and refine computational artifacts using a deliberate and iterative process for improving a computational artifact.

Communicating About Computing

- Communicate clearly with others about the use and effects of computation and computational choices, and to exchange ideas with others.

Science and Engineering Practices	Crosscutting Concepts
Asking Questions and Defining Problems • Ask questions to clarify the constraints of solutions to a problem. **Developing and Using Models** • Develop a diagram or simple physical prototype to convey a proposed object, tool or process. **Analyzing and Interpreting Data** • Use data to evaluate and refine design solutions. **Obtaining, Evaluating, and Communicating Information** • Critique and/or communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers.	**Cause and Effect: Mechanism and Prediction** • Cause and effect relationships are routinely identified, tested, and used to explain change. **Systems and System Models** • A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. • A system can be described in terms of its components and their interactions.

CATALINA FOOTHILLS SCHOOL DISTRICT

GRADES 3-5

COMPUTER SCIENCE STANDARDS: DATA AND ANALYSIS

Concept: Data and Analysis

Subconcepts:

- **Collection, Visualization, and Transformation (CVT)**
- **Inference and Models (M)**

Computer Science Standards:

3-5.DA.CVT.1a Use a digital tool to collect, organize, manipulate data.

Learning Goals

I can:

- Collect data for an investigation using a digital tool (i.e., table, spreadsheet, digital camera, cell phone, iPad app or simulation).
- Create an organizational structure (e.g., table, spreadsheet) to sort and compare the values in a data set.

3-5.DA.CVT.1b Present data visually through multiple representations to highlight relationships and support a claim.

Learning Goals

I can:

- Create a visual representation of a data set using a digital tool (graph, photo, video, slide show, simulation).
- Use a digital tool to generate a graphical representation (pictograph, bar graph, pie chart, line plot) of a data set.
- Choose a graphical representation (type of graph and scale) to reveal the relationship between two variables.

3-5.DA.IM.1 Use a computational tool to make predictions, propose cause-and-effect relationships, draw conclusions, and answer questions from the data.

Learning Goals

I can:

- Read a visual or graphical display of data to make a prediction or inference.
- Analyze a graph generated from a data set for evidence to support a claim.
- Evaluate a claim using evidence from a graphical display to draw a conclusion.
- Compare the results of a simulation to a real-world observation.

Computer Science Practices

Fostering an Inclusive Computing Culture

- Build an inclusive and diverse computing culture using strategies that incorporate perspectives from people of different genders, ethnicities, and abilities.

Collaborating Around Computing

- Collaborate around computing by working in pairs and on teams to perform a computational task, asking for the contributions and feedback of others to improve outcomes.

Recognizing and Defining Computational Problems

- Recognize and define computational problems, break them down into parts, and evaluate each part to determine whether a computational solution is appropriate.

Developing and Using Abstractions

- Identify patterns and extract common features from specific examples to create generalizations from abstractions.

Creating Computational Artifacts

- Create computational artifacts that embrace both creative expression and the exploration of ideas to create prototypes and solve computational problems. Create artifacts that are personally relevant or beneficial to the community and beyond.

Testing and Refining Computational Artifacts

- Test and refine computational artifacts using a deliberate and iterative process for improving a computational artifact.

Communicating About Computing

- Communicate clearly with others about the use and effects of computation and computational choices, and to exchange ideas with others.

Science and Engineering Practices	Crosscutting Concepts
Planning and Carrying Out Investigations • Evaluate appropriate methods and tools for collecting data. **Analyzing and Interpreting Data** • Use data to evaluate and refine design solutions. **Using Mathematics and Computational Thinking** • Organize simple data sets to reveal patterns that suggest relationships. **Constructing Explanations and Designing Solutions** • Use evidence (e.g., measurements, observations, patterns) to construct a scientific explanation or design a solution to a problem. • Identify the evidence that supports particular points in an explanation.	**Patterns** • Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena and designed products. • Patterns of change can be used to make predictions. • Patterns can be used as evidence to support an explanation. **Cause and Effect: Mechanism and Prediction** • Cause and effect relationships are routinely identified, tested, and used to explain change.