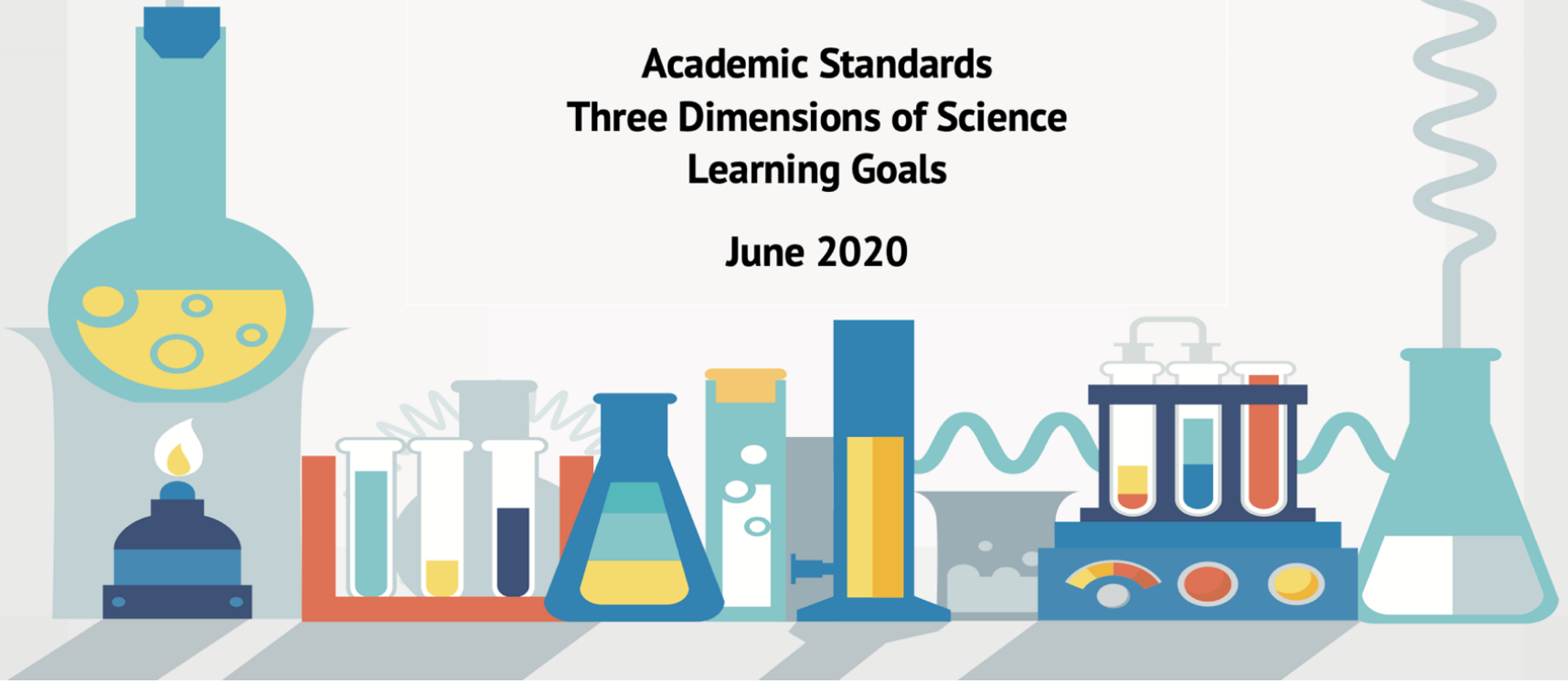
ENVISION 21

DEEP LEARNING • CFSD

SCIENCE

Academic Standards
Three Dimensions of Science
Learning Goals

June 2020



CATALINA FOOTHILLS SCHOOL DISTRICT
GRADE 1 SCIENCE STANDARDS

OVERVIEW

By the end of first grade, students explore plants and animals, learning about their structures and functions and exploring ways in which plants and animals are similar to and different from their offspring. They examine relationships between vibration and sound and light and sight and make observations about the sky to identify patterns and make predictions. Student investigations focus on collecting and making sense of observational data and simple measurements using the science and engineering practices: ask questions and define problems, develop and use models, plan and carry out investigations, analyze and interpret data, use mathematics and computational thinking, construct explanations and design solutions, use evidence, and obtain, evaluate, and communicate information. While individual lessons may include connections to any of the crosscutting concepts, the standards in first grade focus on helping students understand phenomena through the crosscutting concepts of *structure and function* and *stability and change*.

PHYSICAL SCIENCE

1.P2U1.1 Investigate how senses can detect light, sound, and vibrations even when they come from far away; use the collected evidence to develop and support an explanation.

- Investigate (*e.g., through experimentation, texts, media, demonstrations*) how senses can detect light, sound, and vibrations even when they come from far away:
    - Identify questions relevant to the investigation.
    - Based on prior experiences, make predictions related to the investigative question.
    - Determine an appropriate method of observation in an investigation.
    - Make direct and/or indirect observations about light, sound, and/or vibrations in an investigation:
        - Use senses to identify features and details of a phenomenon (*e.g., color, size, shape, sound, movement, etc.*).
        - Make measurements of phenomena related to the detection of light, sound, and vibrations.
        - Collect and record (*e.g., through pictures and/or words*) relevant evidence in an investigation.
        - Make inferences based on observations.
- Use the collected evidence to develop and support an explanation:
    - Use evidence to explain which senses are used to observe and understand the world:
        - Explain that the eyes are used to see objects.
        - Explain that the ears are used to hear sounds.
        - Explain that our mouths are used to taste.
        - Explain that our noses are used to smell.
        - Explain that our skin is used to feel objects.
        - Explain that light allows us to see with our eyes.
        - Explain that sounds make vibrations that we can feel.

1.P2U1.2 Use models to provide evidence that vibrating matter creates sound and sound can make matter vibrate.

- Use evidence from models (e.g., diagram, drawing, physical replica, diorama, dramatization, or storyboard) to explain that sound creates vibration.
- Use evidence from models (e.g., diagram, drawing, physical replica, diorama, dramatization, or storyboard) to explain that vibrations can create sound.

1.P2U1.3 Plan and carry out an investigation to explore how sound waves affect objects at varying distances.

- 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.

1.P2U1.4 Plan and carry out investigations demonstrating the effect of placing objects made with different materials in the path of a beam of light and predict how objects with similar properties will affect the beam of light.

- With guidance, design an investigation to test the effect of placing objects made with different materials in the path of a beam of light (*e.g. from the Sun, flashlight, lightbulb, candle, etc.*):
    - Ask a testable question about the effect of a beam of light on objects made with different materials (*e.g., mirror, prism, paper, glass, wood, etc.*).
    - Based on prior knowledge, formulate a prediction about the effect of a beam of light on objects made with different materials.
    - In collaboration with peers, design a procedure that will produce data in response to the testable question.
    - In collaboration with peers, determine how observations and/or measurements will be made in order to answer the testable question.
- In collaboration with peers, conduct simple investigations to test the effect of placing objects made with different materials in the path of a beam of light:
    - Follow a procedure with precision.
    - Make observations about the objects and the beam of light.

    - Collect data about the objects and the beam of light.
    - Use evidence from the investigation to make inferences about how and why different objects affect the beam of light.
- Use an object's properties to make predictions about how an object will affect a beam of light (*i.e., some materials allow light to pass through them, others allow only some light through, others reflect light, and others still block all the light and create a dark shadow on any surface beyond them*).

1.P2U2.5 Design and evaluate a tool that helps people extend their senses.

- Use provided materials to design a tool to extend people's sense of sight, hearing, and/or touch:
    - Identify the design challenge.
    - Identify goals for the design.
    - Use a sketch, draft, and/or physical model to communicate the design.
    - Generate multiple potential design solutions.
- Evaluate a tool that helps people extend their senses:
    - Use criteria to evaluate the effectiveness of a tool to help extend the senses.
    - Discuss strengths and weaknesses of different designs.

EARTH AND SPACE SCIENCES

1.E2U1.6 Observe and ask questions about patterns of the motion of the sun, moon, and stars in the sky.

- Ask questions based on prior experiences with the Sun, Moon, and stars.
- Make observations about the apparent motion of objects in the sky (*i.e., Sun, Moon, stars*).
    - Identify the position(s) of objects in the sky.
    - Record observations (*e.g., through pictures and/or words*).
    - Make inferences about patterns of apparent motion of the Sun, Moon, and stars in the sky.
- Use data from observations to identify patterns in the apparent motion of objects in the sky (*e.g., using shadows at different times of day to identify patterns of movement of the sun, a time lapse video, etc.*):
    - Compare the apparent position of objects over time.
    - Describe the apparent motion of the Sun, Moon, and stars over time.

1.E2U1.7 Observe and explain the Sun's position at different times during a twenty-four-hour period and changes in the apparent shape of the Moon from one night to another.

- Observe the Sun's position and the apparent shape of the Moon:
    - Make observations about the Sun's position at different times during a twenty-four hour period.
    - Make observations about apparent changes in the shape of the Moon from one night to another.
    - Record observations through pictures and/or words.
- Explain the sun's position and the apparent shape of the moon:
    - Use observations to explain the Sun's position at different times during a twenty-four hour period.
    - Use observations to explain apparent changes in the shape of the Moon from one night to another.

LIFE SCIENCE

1.L1U1.8 Obtain, evaluate, and communicate information about how organisms use different body parts for survival.

- Obtain and evaluate information (*e.g., from texts, media, demonstrations, and/or investigations*) about how organisms use different body parts for survival:
    - Ask questions about organisms' body parts to frame the search for information.
    - Use text features (*e.g., headings, tables of contents, glossaries, electronic menus, icons*) to obtain information.
    - Record information (*e.g., through pictures and/or words*) from texts and/or media.
    - Explain how visual images (*e.g., diagrams*) help clarify ideas in the text.
- Communicate (*e.g., through discussion, writing, and/or drawing*) how plants and animals use their external parts for survival:
    - Explain how plants have different parts (*i.e., roots, stems, leaves, flowers, fruits*) that help them survive, grow, and produce more plants.
    - Explain how animals have body parts (*i.e., eyes, ears, skin*) that capture and convey different kinds of information needed for growth and survival.
    - Explain how different organisms use their parts in different ways (*i.e. to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air*) in order to grow and survive.

1.L1U1.9 Observe, ask questions, and explain how specialized structures found on a variety of plants and animals (including humans) help them sense and respond to their environment.

- Based on prior experiences, ask questions about how plants and animals use their body parts to sense and respond to their environment.
- Make direct or indirect observations about how plants and animals (including humans) use different parts of their body:
    - Identify structures of various plants and animals.
    - Identify the functions of various plant and animal structures.
    - Take measurements of specialized structures found on plants and animals.
    - Record observations (*e.g., through pictures and/or words*).
    - Make inferences about the relationship between plant and animal structures and their functions.
- Use evidence from observations to explain how animals (including humans) use their body parts (*i.e., eyes, ears, skin*) to help them sense their environment.
- Use evidence from observations to explain how plants use their body parts (*i.e., roots, stems, leaves*) to sense their environment.
- Use evidence from observations to explain how plants use their body parts to help them respond to their environment.
- Use evidence from observations to explain how animals (including humans) use their body parts to help them respond to their environment (*i.e., run from a predator, seek shelter, find food*).

1.L3U1.10 Obtain, evaluate, and communicate information to support an evidence-based explanation that plants and animals produce offspring of the same kind, but offspring are generally not identical to each other or their parents.

- Obtain and evaluate information about how plant and animal offspring resemble, but are not identical to, their parents:
    - Ask questions about plant and animal offspring to frame the search for information.
    - Use text features (*e.g., headings, tables of contents, glossaries, electronic menus, icons*) to locate relevant information.
    - Record information (*e.g., through pictures and/or words*) from texts and/or media.
    - Explain how visual images (*e.g., diagrams*) help clarify ideas in the text.
    - Critique information (*e.g., peer evidence and explanations*) about plant and animal parents and their offspring.
- Communicate information (*e.g., through discussion, writing, and/or drawing*) to support an explanation of how plant and animal offspring resemble, but are not identical to, their parents:
    - Use evidence from observations and text to explain common characteristics among plants and animals of the same kind.
    - Use evidence from observations and text to explain ways in which offspring resemble and differ from their parents.
    - Use evidence from observations and text to explain how features can be similar from one generation to the next.
    - Develop explanations based on evidence rather than opinions.

1.L4U1.11 Develop a model to describe how animals and plants are classified into groups and subgroups according to their similarities.

- Develop a sketch, drawing, or physical model to show how plants and animals are classified into groups and subgroups:
    - Create a model to classify animals and plants into groups based on similarities.
    - Create a model to classify animals and plants into subgroups based on more narrow similarities.
    - Explain why a group of animals should or should not be grouped together based on similarities or differences.
    - Compare models to identify common features and differences.

COMPUTER SCIENCE: COMPUTATIONAL THINKING

K-2.AP.A.1 Model daily processes by following algorithms (sets of step-by-step instructions) to complete tasks.

- Follow a set of step-by-step instructions written in pseudo code.
- Use a map to model a program's step by step instructions.

K-2.AP.V.1 Model the way computer programs use symbols (e.g. numbers, arrows, colors, pictographs) to represent information.

- Use a set of command cards to create a logical sequence of actions.
- Read and act out a program constructed with command cards.

K-2.AP.C.1 Develop programs with sequences and simple loops, to express ideas or address a problem.

- Plan and develop a three-command sequence to accomplish a programming goal.
- Use a loop to repeat steps in a program.

K-2.AP.M.1 Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.

- Identify and count the steps required to accomplish a programming goal.
- Select and order the commands to accomplish the programming goal.
- Program a precise sequence of instructions to accomplish the programming goal.
- Use whole numbers and decimal fractions when inputting command values.

K-2.AP.PD.1 Develop plans that represent a program's sequence of events, goals, and expected outcomes (e.g. visual representation: storyboard, graphic organizer, map).

- Use visual representations (i.e., organized lists, maps, and command cards) to make a plan to accomplish a task.
- Determine and record values needed for each command in the plan before programming and testing.

K-2.AP.PD.2 Give credit when using the ideas and creations (e.g. pictures, music, code) of others while developing programs.

- Share ideas for programming solutions with others.
- Credit others when using their ideas and solutions.

K-2.AP.PD.3 Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops.

- Compare actual to intended programmed behavior.
- Identify the step(s) to correct when a programming goal is not accomplished.
- Correct commands for accuracy in accomplishing a programming goal.

K-2.AP.PD.4 Describe steps taken and choices made during program development.

- Discuss decisions with a partner throughout the process of planning, testing and refining a program.
- Reflect on the solutions to problems encountered and the number of trials needed to reach the programming goal.

COMPUTER SCIENCE: DATA AND ANALYSIS

K-2.DA.CVT.1a Collect and transform data using a digital device.

- Record data for a class data collection project using a digital device (i.e., digital camera, cell phone, iPad app, presentation software, spreadsheet).

K-2.DA.CVT.1b Display data for communication in various visual formats.

- Generate a visual display of a class data set using a digital tool (i.e., slide show, video, animation).
- Generate a graph of a class data set using a digital tool (i.e., spreadsheet, presentation software, application).

K-2.DA.IM.1 Describe patterns in data to make inferences or predictions.

- Identify a pattern in a displayed data set.
- Use a pattern to support an inference or prediction.
- Draw a conclusion from a collected and displayed data set.