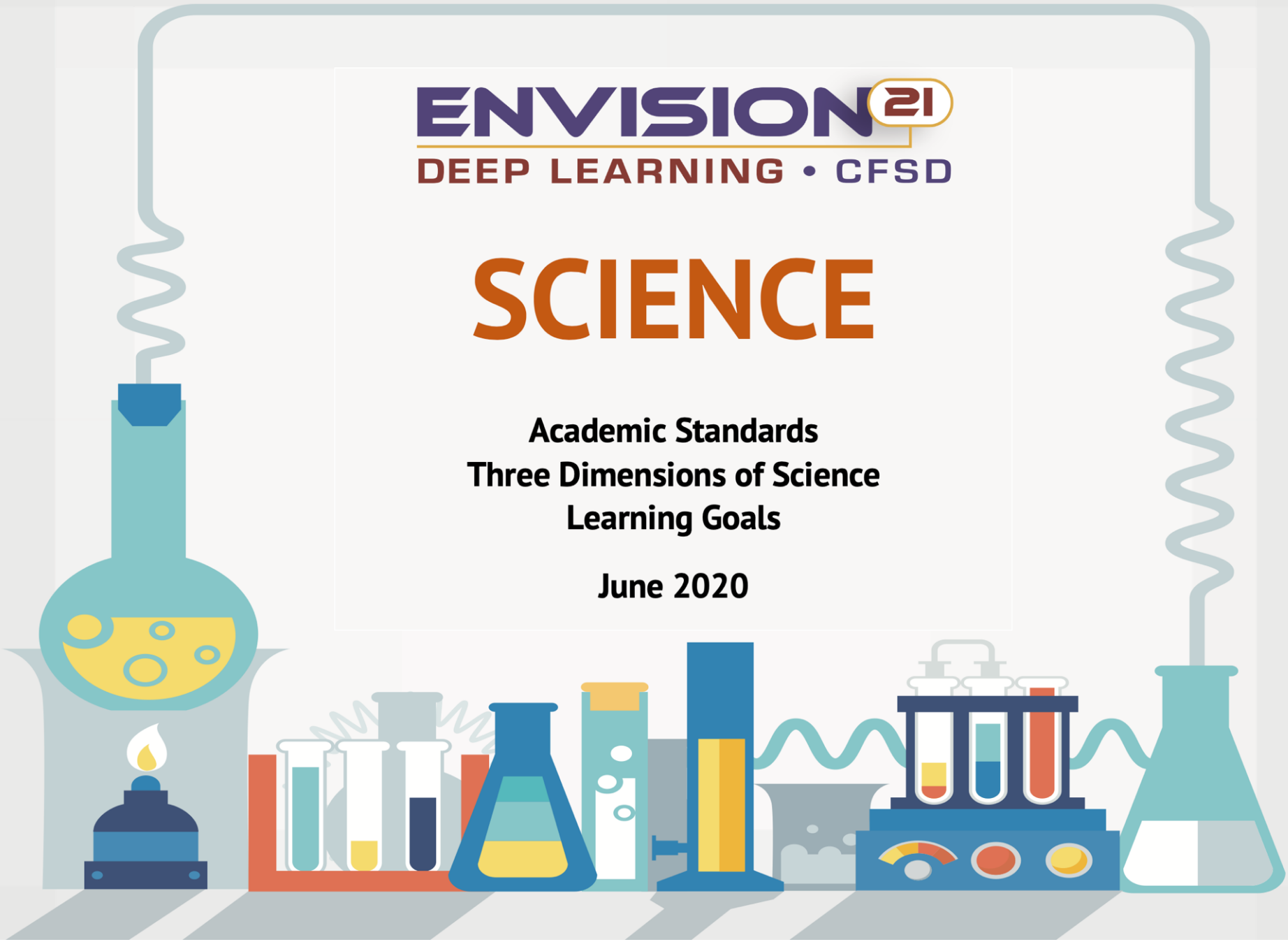
ENVISION 21

DEEP LEARNING • CFSD

SCIENCE

Academic Standards
Three Dimensions of Science
Learning Goals

June 2020



CATALINA FOOTHILLS SCHOOL DISTRICT
GRADE 3 SCIENCE STANDARDS

OVERVIEW

By the end of third grade, students learn about relationships between forces, energy, and motion; the ways in which organisms grow, develop, and survive within an ecosystem; and patterns and changes in weather and climate. 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 systems models*, *energy and matter*, and *stability and change*.

PHYSICAL SCIENCE

3.P2U1.1 Construct an explanation using evidence to demonstrate that objects can affect other objects even when they are not touching.

- Construct an explanation using observed quantitative relationships (*e.g., relationships between mass and speed; how fast or far objects move in response to forces*).
- Use evidence (*e.g., measurements, observations, patterns*) to demonstrate the effects of forces between objects in contact (*e.g., friction, elastic pushes and pulls, etc.*).
- Use evidence (*e.g., from investigations, demonstrations, texts, media, and/or models) to demonstrate the effects of forces between objects at a distance (i.e., sound, light*).
- Select evidence to support particular points in the explanation.
- Distinguish among facts, reasoned judgment based on research findings, and speculation in an explanation.

3.P2U1.2 Develop and use a model to demonstrate magnetic forces.

- Develop a model *(e.g., diagrams, drawings, physical replicas, dioramas, dramatizations, or storyboards)* to demonstrate magnetic forces:
    - Develop models using an analogy, example, or abstract representation to demonstrate magnetic forces.
    - Represent how magnetism increases/decreases based on the distance of the magnet.
    - Represent how magnetism increases/decreases based on the orientation of the magnet(s) and/or objects.
    - Represent how magnetism increases/decreases based on the properties of the objects.
    - Represent how magnetism can be used to produce motion and electric current.
    - Compare models to identify common features and differences.
    - Use criteria to collaboratively revise models to improve their representation of how a system transfers energy from one object to another.
    - Identify limitations of models.
- Use models to demonstrate magnetic forces:

- Use evidence from models to explain magnetic forces.
- Use evidence from models to explain how magnetism increases/decreases based on the distance of the magnet.
- Use evidence from models to explain how magnetism increases/decreases based on the orientation of the magnet(s) and/or objects.
- Use evidence from models to explain how magnetism increases/decreases based on the properties of the objects.
- Use evidence from models to explain how magnetism produces motion and electric current.
- Identify the evidence from the model that supports particular points in the explanation.

3.P3U1.3 Obtain, analyze, and communicate evidence of the effects that balanced and unbalanced forces have on the motion of objects.

- Obtain and analyze evidence (*e.g., from texts, investigations, demonstrations, models, media, etc.*) of the effects that balanced and unbalanced forces have on the motion of objects:
  - Ask questions about the effects of forces on the motion of objects to frame the collection of evidence.
  - Compare and/or combine information across complex texts and/or other reliable media to acquire appropriate scientific and/or technical information about the effects of forces on the motion of objects.
  - Determine the main idea of a scientific text and explain how it is supported by key details; summarize the text.
  - Combine information in written text with that contained in corresponding tables, diagrams, and/or charts.
  - Use multiple sources to generate scientific and/or technical information, including various forms of media and may include tables, diagrams, and charts.
  - Use data to identify patterns of an object's motion in various situations.
- Communicate evidence of the effects that balanced and unbalanced forces have on the motion of objects:
  - Use multiple sources to communicate scientific information orally and/or in written formats, including various forms of media.

3.P4U1.4 Develop and use a model to demonstrate how a system transfers energy from one object to another even when the objects are not touching.

- Develop a model (*e.g., diagrams, drawings, physical replicas, dioramas, dramatizations, or storyboards*) to show how a system transfers energy from one object to another even when the objects are not touching.
  - Develop models using an analogy, example, or abstract representation to show how a system transfers energy from one object to another.
  - Represent energy transfer from one object to another when the objects are touching (*i.e., collisions*).
  - Represent energy transfer from one object to another when the objects are not touching (*i.e., magnetism, electricity*).
  - Compare models to identify common features and differences.
  - Use criteria to collaboratively revise models to improve their representation of how a system transfers energy from one object to another.
  - Identify limitations of models.

- Use models to demonstrate how a system transfers energy from one object to another.
    - Use models to demonstrate how energy transfers from one object to another when the objects are touching (*i.e., collisions*).
    - Use models to demonstrate how energy transfers from one object to another when the objects are not touching (*i.e., magnetism, electricity*).
    - Use models to demonstrate the relationship between movement and energy.

3.P3U2.5 Define problems and design solutions pertaining to force and motion.

- Define problems pertaining to force and motion:
    - Use prior knowledge to describe solvable problems pertaining to force and motion.
    - Ask questions to clarify the constraints of solutions to a problem.
    - Define the design problem by establishing several criteria for success and constraints on materials, time, or cost.
- Design solutions to problems pertaining to force and motion:
    - Use tools and materials to develop multiple designs that meet the established criteria and constraints.
    - Communicate designs through sketches, drawings, and/or physical models.
    - Apply scientific knowledge about force and motion to design solutions.
    - Generate and compare multiple solutions to the problem based on how well they meet the criteria and constraints of the problem.

EARTH AND SPACE SCIENCES

3.E1U1.6 Collect, analyze, and interpret data to explain weather and climate patterns.

- Collect weather and climate data:
    - Formulate scientific questions about weather and climate patterns.
    - Collect (*e.g., through data centers, and/or investigations*) and record data in response to the investigative questions.
    - Select and record data across different times and locations.
- Analyze and interpret data to explain weather and climate patterns:
    - Organize data using categories.
    - Display weather and climate data in tables and graphs, using digital tools when feasible, to reveal patterns that indicate relationships.
    - Use weather and climate data to evaluate cause and effect relationships.
    - Compare data collected by different groups in order to discuss similarities and differences in their findings.
    - Interpret data to make sense of and explain weather and climate phenomena, using logical reasoning, mathematics, and/or computation.

3.E1U2.7 Analyze patterns in weather conditions of various regions of the world and design, test, and refine solutions to protect humans from severe weather conditions.

- Analyze patterns in weather conditions of various regions of the world:
    - Ask questions about weather conditions to frame the analysis.
    - Make direct or indirect observations (*e.g., from texts, media, demonstrations, investigations*) of weather conditions.

    - Record observations in pictures, drawings, and/or writing.
    - Describe weather data from various regions of the world (*e.g., calculate quantities, create categories for data, compare data points, etc.*).
    - Use data from observations to identify patterns in weather conditions over time within and across various regions of the world.
    - Describe patterns in weather conditions over time and within and across various regions of the world.
- Design, test, and refine solutions to protect humans from severe weather conditions:
    - Use tools and materials to design solutions to protect humans from severe weather conditions.
    - Communicate designs through sketches, drawings, or physical models.
    - Test multiple designs (*e.g., using simulations or criteria*) to determine if it functions as intended.
    - Describe the strengths and weaknesses of different designs.
    - Compare two or more designs based on strengths and weaknesses.
    - Refine designs based on results of tests and comparisons.

LIFE SCIENCE

3.L1U1.8 Observe, describe, and predict life cycles of animals and plants.

- Make direct and/or indirect observations about the life cycle of different plants (*e.g., from models, videos, diagrams, classroom gardens, live plants, etc.).*
- Use evidence from observations to describe the life cycle of different plants.
- Make direct and/or indirect observations about the life cycle of different animals *(e.g., from models, videos, diagrams, live animals, etc.).*
- Use evidence from observations to describe the life cycle of different animals.
- Use evidence from observations to make predictions about the life cycles of animals and plants.

3.L3U1.9 Obtain, evaluate, and communicate information about patterns between the offspring of plants, and the offspring of animals (including humans); construct an explanation of how genetic information is passed from one generation to the next.

- Obtain and evaluate information (*e.g., from texts, investigations, demonstrations, models, media, etc.*) about patterns between the offspring of plants, and the offspring of animals (including humans):
    - Ask questions to frame the collection of information about patterns in plant and animal offspring.
    - Compare and/or combine information across complex texts and/or other reliable media to acquire appropriate scientific and/or technical information about plant and animal offspring.
    - Determine the main idea of a scientific text and explain how it is supported by key details; summarize the text.
    - Combine information in written text with that contained in corresponding tables, diagrams, and/or charts.
    - Use multiple sources to generate scientific and/or technical information, including various forms of media and may include tables, diagrams, and charts.

    - Use data to make predictions based on patterns of traits in plants and animals.
- Communicate information about patterns between the offspring of plants, and the offspring of animals (including humans):
    - Use multiple sources to communicate scientific information orally and/or in written formats, including various forms of media.
- Construct an explanation of how genetic information is passed from one generation to the next:
    - Use evidence to explain that a mix of traits is inherited through parents from one generation to the next.
    - Use evidence to explain variations in physical traits and functions among offspring from the same parents.

3.L3U1.10 Construct an explanation based on evidence that the changes in an environment can affect the development of the traits in a population of organisms.

- Use evidence *(e.g., measurements, observations, patterns)* to explain the relationship between changes in the environment and the traits a population of organisms develops.
- Use evidence *(e.g., from investigations, demonstrations, texts, media, and/or models)* to explain how interactions with the environment (*i.e., diet, temperature, learning, resources*) can affect traits in a population of organisms.
- Use evidence to explain how changes in the environment can lead organisms to survive and reproduce, move to new locations, or die.
- Use evidence to explain the relationship between an organism's genetics and changes in its environment in the development of the organism's traits.
- Use evidence to compare behaviors and physical traits of related organisms that live in different environments.
- Select evidence to support particular points in the explanation.
- Distinguish among facts, reasoned judgment based on research findings, and speculation in an explanation.

3.L4U1.11 Analyze and interpret environmental data to demonstrate that species either adapt and survive, or go extinct over time.

- Formulate scientific questions to frame environmental data analysis and interpretation.
- Organize data (*e.g., from data centers, and/or investigations*) into meaningful categories based on the investigative questions.
- Display environmental data in tables and graphs, using digital tools when feasible, to reveal patterns that indicate relationships.
- Use environmental data to evaluate cause and effect relationships with regard to adaptation, survival, and extinction.
- Compare data collected by different groups in order to discuss similarities and differences in their findings.
- Compare fossils with one another and to living organisms to make inferences about organisms that lived long ago and about the nature of their environments.
- Interpret data to make sense of and explain environmental data, using logical reasoning, mathematics, and/or computation.

3.L4U3.12 Obtain, evaluate, and communicate evidence about how natural and human-caused

changes to habitats or climate can impact populations.

- Obtain and evaluate evidence (*e.g., from texts, investigations, demonstrations, models, media, etc.*) about how natural and human-caused changes to habitats of climate can impact populations:
    - Ask questions to frame the collection of evidence regarding changes to habitats or climate and their impact on populations.
    - Compare and/or combine information across complex texts and/or other reliable media to acquire appropriate scientific and/or technical information about how changes to habitats or climate can impact populations.
    - Determine the main idea of a scientific text and explain how it is supported by key details; summarize the text.
    - Combine information in written text with that contained in corresponding tables, diagrams, and/or charts.
    - Use evidence to determine how changes to climate or habitats can impact populations.
    - Use evidence to determine the impact of human-caused changes to populations.
- Communicate evidence about how natural and human-caused changes to habitats or climate can impact populations:
    - Use multiple sources to communicate scientific information orally and/or in written formats, including various forms of media.

3.L4U3.13 Ask questions and explain how factors can cause species to go extinct.

- Ask questions about factors that cause extinction.
- Base questions on direct or indirect observations of the natural world (*e.g., from text or media, visits to zoos or museums, etc.*).
- Use evidence to explain how factors (environmental or human impact) can cause species to go extinct.

3.L4U3.14 Construct an argument based on evidence that inherited characteristics can be affected by behavior and/or environmental conditions.

- Describe the effects of behavior and/or environmental conditions (*e.g., food, exercise, temperature, water, light, etc.*) on inherited characteristics (*e.g., pigmentation, size, shape, etc.*).
- Use scientific evidence, data, and/or models to construct and support explanations of the relationship between inherited characteristics and behavior and/or environmental conditions.
- Compare and refine explanations based on the strengths and weaknesses of the evidence presented.

COMPUTER SCIENCE: COMPUTATIONAL THINKING

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

- 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.

- 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.

- 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.

- 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.

- 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).*

- 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.

- 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.

- 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.

- 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: DATA AND ANALYSIS

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

- Collect data for an investigation using a digital tool *(i.e., table, spreadsheet, digital camera, cell phone, IPAD app or simulation).*
- Create a table 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.

- Create a visual representation of a data set using a digital tool *(e.g., graph, photo, video, slide show, simulation).*
- Use a digital tool to generate a graphical representation *(e.g., 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.

- 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.