

CDE Science Tuesday: Grades 3–5



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Welcome

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California's 2018 Science Instructional Materials Adoption

- Kindergarten through Grade Eight Instructional Programs
- All the info: <http://www.cde.ca.gov/ci/sc/im/>
- Including:
 - Schedule of Events
 - Notices
 - Frequently Asked Questions
 - Prior Webinars
 - Evaluation Criteria
 - CA Science Framework

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The Bedrock of the California Next Generation Science Standards

- Phenomena
- Three Dimensions
- Performance Expectations and Instructional Segments

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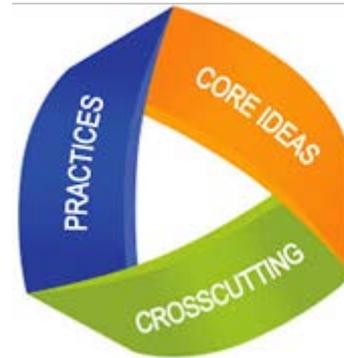
What is Phenomena?

- Anchoring phenomena
- Investigative phenomena
- Everyday phenomena
- Everyday problem (engineering)

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Three Dimensional Learning



- **Science and Engineering Practices (SEPs)**
- **Disciplinary Core Ideas (DCIs)**
- **Crosscutting Concepts (CCCs)**

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Performance Expectations & Instructional Segments 3–5

Instructional Segments:

- The performance expectations are bundled into instructional segments with the crosscutting concepts as the main thread that runs from one instructional segment to the next.
- In grade 3-5, there are Instructional Segment tables that provide an overview of relevant performance expectations and topics that will be covered and then developed more under each instructional segment.
- This is only one way to organize the grade level Performance Expectations.
- The intention of the instructional segments is to provide instructional support, suggestions, and possible models for the grade-level teachers; they can also help teachers make connections to the grade below or above.

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Evaluation Criteria Category 1, Criterion 12

Student assignments make linkages and are consistent with the grade-level appropriate expectations in the CA CCSS for ELA and Literacy in History/Social Studies, Science, and Technical Subjects (CA CCSS for ELA/Literacy), the CA ELD Standards, and CA CCSS Mathematics (CA CCSSM) and are consistent with the guidance in the CA Science Framework.

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Grade Three - Phenomena

Grade 3 How Does Weather Impact My Community?

Anchoring phenomenon: Weather conditions change each day over the course of the year.

Everyday phenomenon: The school faces certain hazards caused by weather conditions.

Investigative phenomenon: Features like the flow of water, the growth of plants and animals, and the wind patterns all vary by location on the schoolyard.

Investigative phenomenon: The temperature suddenly jumped 10°F in one day.

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Grade Three – Engineering through a Practice or Disciplinary Core Idea

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.*

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.*

3-PS2-4. Define a simple design problem that can be solved by applying scientific ideas about magnets.*

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Grade Three - Disciplinary Core Ideas

- 3-PS2 Motion and Stability: Forces and Interactions
- 3-LS1 From molecules to Organisms: Structures and Processes
- 3-LS2 Ecosystems: Interactions, Energy, and Dynamics
- 3-LS3 Heredity: Inheritance and Variation of Traits 3-LS4 Biological Evolution: Unity and Diversity
- 3-ESS2 Earth's Systems
- 3-ESS3 Earth and Human Activity
- 3-5-ETS1 Engineering Design



Grade Three - Disciplinary Core Ideas

In many cases, grade three returns to some of the same DCIs and phenomena as kindergarten but revisits them with a more sophisticated application of the SEPs.

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Revisiting Performance Expectations

I would like to mention that it is sometimes appropriate to revisit a PE later in the course sequence. In other words some of the PEs will be partially addressed at one point and then come back to be fully addressed at another point.



Grade Three - Crosscutting Concepts

- In particular, instruction in grades three through five focuses on describing specific evidence of patterns [CCC-1] in phenomena, linking those patterns to cause and effect relationships [CCC-2].

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Grade Three - Performance Expectations

Grade Three

Instructional Segment 1: Playground Forces

Instructional Segment 2: Life Cycles for Survival

*Instructional Segment 3: Surviving in Different
Environments*

Instructional Segment 4: Weather Impacts

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Connections to the Environmental Principles and Concepts

3-LS1-1

3-LS4-3

3-LS3-1

3-LS4-4

3-LS4-1

3-5 ETS1

3-LS4-2

Here are the performance expectations that fit naturally with the Environmental Principles and Concepts in grade 3. All three of the CA NGSS dimensions and the EP&Cs will prepare students to make decisions about California's future and become sources of innovative solutions to the problems the state may face in the future.

How are your materials incorporating the Environmental Principles and Concepts? In a few weeks we will have a training on this very important topic.



Grade Three - Engineering Connection Designing a Better Swing

To find an engineering connection in the CA Science Framework just look for the symbol of a light bulb.

Prompt for students: What if you could have a swing that made you go fast and high without any pushing or pulling by you or your friends? Can you figure out a way to use your understanding of magnets to design a swing that uses magnetic force to keep the swing moving?

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Grade Three – Math Connections

Opportunities for Math Connections

During the investigation on forces, students may need to measure and weigh different objects. Some students will need experience using the measurement tools. For example, students need to know that the scale should be balanced or zeroed out before beginning the measurement; to use a ruler, the end of the object being measured must line up at the zero mark on the ruler, etc.

CA CCSS Math Standards: 3.OA.1-7, MP 5, 6

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Grade Three – ELA/ELD Connections

Opportunities for ELA/ELD Connections

During the IS, provide age-appropriate definitions of domain-specific words and important academic vocabulary. In addition, select a few terms critical to understanding the concept. Have students use a graphic organizer so that they can gain a deeper understanding of these key concepts. One such organizer is the Frayer Model, which prompts students to write a definition, and allows for students to discuss specific characteristics of the word, examples, and non-examples. Sample words for this topic could include friction, gravity, forces, magnetic, and interactions. Students should be given opportunities in class to practice using these words in context. An example is being given a force diagram and placing the words in their correct locations in the diagram.

CA CCSS ELA/Literacy Standards: RI.3.4; L.3.4, 5

CA ELD Standards: ELD.PI.3.1, 12

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Grade Three – ELA/ELD Connections

Relevance to Science Instructional Materials: show the teachers what you mean. You might provide the actual graphic organizer in the TE and templates for students to use. This will support the acquisition of academic language.



Grade Four - Phenomena

GRADE FOUR VIGNETTE 4.2 STRUCTURES FOR SURVIVAL IN A HEALTHY ECOSYSTEM

Anchoring Phenomenon: Different animals and plants have different external parts.

Investigative phenomenon: Different animals and plants live in different sections of their neighborhood.

Investigative phenomenon: Students only observed a few animals on their nature walk.

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Grade Four – Engineering through a Practice or Disciplinary Core Idea

4-PS3-4 Energy

Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.*

4-PS4-3 Waves and Their Applications in Technologies for Information Transfer

Generate and compare multiple solutions that use patterns to transfer information.*

4-ESS3-2 Earth and Human Activity

Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.*

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Grade Four - Disciplinary Core Ideas

Grade four students focus on both tangible processes like the erosion of soil and, for the first time, develop abstract concepts like energy. They also seek to explain some processes that are not directly observable such as internal body systems.

Grade four students are passionate about discovery and adventure. How does your program capitalize on this energy? If possible, provide opportunities for students to play with cars or marbles crashing together, build towers, make up secret codes, go outside so that they can collect and observe insects, and play in the sand with stream tables. These concrete experiences allow students to connect their everyday experience to the abstract ideas that they are beginning to master.

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Grade Four - Crosscutting Concepts

In grade 4, “Structure and function” and “cause and effect” are the main crosscutting concepts that connected our instructional segments together.

How is your program using the crosscutting concepts to connect ideas and organize instructional segments?

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Grade Four - Performance Expectations

Grade Four

Grade Four Instructional Segment 1: Car Crashes

Grade Four Instructional Segment 2: Renewable Energy

Grade Four Instructional Segment 3: Sculpting Landscapes

Grade Four Instructional Segment 4: Earthquake Engineering

Grade Four Instructional Segment 5: Animal Senses

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Grade Four - Engineering Connections

While earthquakes are a part of life in California, people can protect themselves from harm. California communities have adopted and enforce strict building codes so that every new building constructed must be designed using earthquake-safe techniques and is inspected by trained engineers prior to being used. These building codes are the difference between life and death. Fewer than 75 people died in each of the last three large earthquakes near cities in California (1971, 1989, 1994). More people die of preventable heart disease in California every day than died from these three earthquakes that took place over a span of more than two decades (CDC 2015).

Here is a specific engineering connection on earthquakes. It's the type of engineering connection that really supports the goal of the CA NGSS. We're preparing California's future scientists and engineers, and at this early age we have the opportunity to develop student inquisitive nature and have them make connections to natural hazards in California.

How is your program making real world connections to engineering problems that Californians experience? Does your program allow students to engage in the engineering design process and where appropriate how to mitigate the effects of natural disasters?

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Grade Four - Math Connections

Opportunities for Math Connections

Draw lines of symmetry on different animals' faces, including humans. Discuss how the placement, size, and shape of eyes and ears on the head of each animal facilitate survival for prey species and for predator species in terms of sensing images and sounds. For example, predator species (cats) usually have eyes that are closer together for stereoscopic vision; while prey animals (horses) have eyes placed on the sides of their head to allow for a wider field of vision.

CA CCSS Math Standards: 4.G.3; MP. 2, 6

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Grade Four - ELA/ELD Connections

Opportunities for ELA/ELD Connections

Students view two to three different videos on waves and use a note-taking template, such as a T-chart, to capture key information. On the left hand side of the T, provide students with broad concepts for waves—light waves, sound waves, characteristics of waves, behaviors of waves (reflected, absorbed, transmitted), and examples of movement of energy. On the right hand side, prompt students to include details gleaned from the videos. Possible sources of videos include Vimeo, YouTube, or recognized science experts (e.g., Bill Nye).

CA CCSS ELA/Literacy Standards: SL.4.2; W.4.8

CA ELD Standards: ELD.PI.4.6, 11

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Grade Five - Phenomena

Grade Five Vignette 4.3 Pancake Engineering

Everyday phenomenon: Pancakes are fluffy, golden brown, and tasty.

Investigative phenomenon: The properties of batter depend on how much flour, baking powder, and water are combined.

Investigative problem: What combination of ingredients will produce the perfect pancake?

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Grade Five – Engineering through a Practice or Disciplinary Core Idea

In grade 5, no performance expectations are marked with an asterisk to identify that there is a connection with traditional science content and engineering through a Practice or Disciplinary Core Idea. However, the CA Science Framework provides examples of how engineering can be incorporated. In grade five, the entire year has an emphasis on developing and applying models [SEP-2] these are good opportunities to apply the engineering process.

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Grade Five – Disciplinary Core Ideas

Focus and coherence must be a priority. What this means to curriculum developers is that the same ideas or details are not covered each year. Rather, a progression of knowledge occurs from grade span to grade span that gives students the opportunity to learn more complex material, leading to an overall understanding of science by the end of high school.

The grade 3-5 span is a culminating year for concepts students have learned since Kindergarten. In the next slides you will see how the core ideas from past grades are connected through the other dimensions.

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Grade Five – Crosscutting Concepts

- CCC-4. Systems and system models
- CCC-5. Energy and matter: Flows, cycles, and conservation

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Grade Five - Performance Expectations

Grade Five

Instructional Segment 1: What is Matter Made Of? Instructional Segment 2: From Matter to Organisms Instructional Segment 3: Interacting Earth Systems Instructional Segment 4: Patterns in the Night Sky

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Grade Five – Engineering Connections

Engineering Connection:

Design a Simple Water Filtration Process

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Grade Five – Math Connections

Opportunities for Math Connections

Students create a map of storm water flow on their schoolyard. Where does the water go when it leaves the schoolyard? What contaminants might it pick up and wash into the local waterways? (CA EP&C II).

Using the area they measure [SEP-5] on a map of their schoolyard, students calculate the total volume of water that falls on their schoolyard or rooftop in a rainstorm. They calculate [SEP-5] how many 55-gallon rain barrels this water would fill up and how long this water would supply their school garden. Students then prepare a presentation to their school site council proposing the installation of a rainwater capture system on their schoolyard such as rain barrels or a cistern.

CA CCSS Math Standards: 5.MD.1; 5.MD.5b

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Grade Five - ELA/ELD Connections

Opportunities for ELA/ELD Connections

In small groups, students choose and verbally describe and physically demonstrate the interactions between two of these four systems—geosphere, biosphere, hydrosphere, and atmosphere—using multimedia and/or visual displays. These demonstrations could include students recreating the interaction (e.g., one student is water and another student is wind) to illustrate what happens to land and ecosystems through weather and climate when two systems interact in the atmosphere.

CA CCSS ELA/Literacy Standards: SL.5.1, 4, 5

CA ELD Standards: ELD.PI.5.1, 6

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3-5 Progressions

Appendix 1: Progression of the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts in Kindergarten Through Grade Twelve

Why are these important?

Why is this in the CA Science Framework?

<https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix1.pdf>

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Phenomena

Anchoring phenomenon
Investigative phenomenon
Everyday phenomenon

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Vignettes/Snapshots

Chapter 1- Overview Table 1.2 Instructional Shifts Required by the CA NGSS

Chapter 11- Instructional Strategies
Snapshot 11.3. Scientific Methods and the Nature of Science

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DATA

Just like in K-2, data is another area where teachers need support. While it's important to have students make their own field observations and collect data, it's also important for publishers to provide scientifically collected data that the students can analyze. Here's a few examples of the possibilities:

Grade 3 IS4: Weather Impacts: you might provide data on weather in a local region or data on how weather compares to other areas of California and the world. You might provide data by which students can explore weather patterns common for different seasons. Or you might provide data for weather-related hazards in different regions in California.

Grade 4: you might provide data on car crashes, or data related to renewable energy (solar panel output), data on earthquakes, or data on different types of building materials.

Grade 5: you might provide data on interacting earth systems, and or data to help students identify patterns in the night sky.

Provide actual data sets surrounding a phenomenon.



More Info

Integrating the CA ELD Standards into K–12 Mathematics and Science Teaching and Learning

<https://www.cde.ca.gov/sp/ml/documents/fnl1516agmnteldstndab899.doc>

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Questions

At this point, we'll answer the questions we can.

We may need to wait to answer other questions, so continue to monitor the FAQ Web page for updates.

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Next Steps

- ✓ “CDE Science Tuesday: Grades K-2” August 1, 2017, 1-2 p.m.
- ✓ “CDE Science Tuesday: Grades 3-5” August 8, 2017, 1-2 p.m.

- “CDE Science Tuesday: Grades 6-8” August 15, 2017, 1-3 p.m.
- “CDE Science Tuesday: Cal Recycle Environmental Principles and Concepts Presentation” August 29, 2017, 1–3 p.m.

(The final meeting may also be attended in person, in Sacramento, at 1500 Capitol Mall - conference rooms A, B, C)

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Information

All relevant information about the 2018 Science Instructional Materials adoption is posted online at the following CDE Web site:

<http://www.cde.ca.gov/ci/sc/im/>

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Thank you!

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