Introduction to Grades Three Through Five

> *Students in [third] through fifth grade begin to develop an understanding of the four disciplinary core ideas: physical sciences; life sciences; Earth and space sciences; and engineering, technology, and applications of science. In the earlier grades, students begin by recognizing patterns and formulating answers to questions about the world around them. . . .*
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> *The performance expectations in elementary school grade bands develop ideas and skills that will allow students to explain more complex phenomena in the four disciplines as they progress to middle school and high school. While the performance expectations shown in [third] through fifth grade couple particular practices with specific disciplinary core ideas, instructional decisions should include use of many practices that lead to the performance expectations.*
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> — NGSS Lead States 2013 , Next Generation Science Standards For States, By States

The upper elementary grades employ **science and engineering practices (SEP)** to explore the natural world. The SEPs, like all three dimensions of the California Next Generation Science Standards (CA NGSS), build in complexity in an age-appropriate manner and look very different in grades three through five than they do in grades six through eight and in high school. Appendix 1 of this framework outlines these progressions for each dimension. Students use these practices to understand everyday life events (*phenomena*), and CA NGSS-aligned instruction should begin with and be based around these real-world experiences. 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]**, and then beginning to **construct explanations [SEP-6]** and **models [SEP-2]** that generalize those findings.

The CA NGSS do not specify which phenomena to explore or the order to address topics because phenomena need to be relevant to the students

that live in each community and should flow in an authentic manner. This chapter illustrates one possible set of phenomena that will help students achieve the CA NGSS performance expectations. The phenomena chosen for this statewide document will not be ideal for every classroom in a state as large and diverse as California. Teachers are therefore encouraged to select phenomena that will engage their students and use this chapter's examples as inspiration for designing their own instructional sequence.

In this framework, overarching phenomena that frame entire sequences of instruction are called *anchoring phenomena* while smaller and more focused phenomena are called *investigative phenomena*. While all phenomena ideally should be relevant to each student's life, culture, and experience, sometimes instruction draws attention to specific events that occur as *everyday phenomena*. Some phenomena introduce challenges that require engineering solutions, and in these cases it makes sense to focus on the anchor, investigative, or everyday problem rather than the phenomenon itself.

In this chapter's examples, each year is divided into instructional segments (IS) centered on questions about observations of a specific phenomenon. Different phenomena require different amounts of time to investigate, explore, and understand, so each instructional segment should take a different fraction of the school year. As students achieve the performance expectations within each instructional segment, they uncover **disciplinary core ideas (DCIs)** from different fields of science (physical science, life science, and Earth and space science) and engineering. Students engage in multiple practices in each instructional segment, not only those explicitly indicated in the performance expectations. Students also focus on one or two **crosscutting concepts (CCCs)** as tools to make sense of their observations and investigations; the CCCs are recurring themes in all disciplines of science and engineering and help tie these seemingly disparate fields together. As students explore their environment during this grade span, they develop their growing understanding of the interconnections and interdependence of Earth's natural systems and human social systems as outlined in California's Environmental Principles and Concepts (EP&Cs). 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.

The SEPs, DCIs, and CCCs grow in sophistication and complexity throughout the K–12 sequence. While this chapter calls out examples of the three dimensions in the text using color-coding along with the three-letter abbreviations, each element should be interpreted with this grade-appropriate complexity in mind (appendix 1 of this framework clarifies the expectations at each grade span in the developmental progression).