California Science

NGSS Crosscutting Concepts Grades 6, 7, 8

Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them. CC-1	**1-i** Macroscopic patterns are related to the nature of microscopic and atomic-level structure. CC-1-I
	1-ii Patterns in rates of change and other numerical relationships can provide information about natural and human designed systems. CC-1-II
	1-iii Patterns can be used to identify cause and effect relationships. CC-1-III
	1-iv Graphs, charts, and images can be used to identify patterns in data. CC-1-IV
Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering. CC-2	**2-i** Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. CC-2-I
	2-ii Cause and effect relationships may be used to predict phenomena in natural or designed systems. CC-2-II
	2-iii Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. CC-2-III
Scale, Proportion, and Quantity – In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change. CC-3	**3-i** Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. CC-3-I
	3-ii The observed function of natural and designed systems may change with scale. CC-3-II
	3-iii Proportional relationships (e.g., speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes. CC-3-III
	3-iv Scientific relationships can be represented through the use of algebraic expressions and equations. CC-3-IV
	Phenomena that can be observed at one scale may not be observable at another scale CC-3-V

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Systems and System Models – A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems. CC-4	**4-i** Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. CC-4-I
	4-ii Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems. CC-4-II
	4-iii Models are limited in that they only represent certain aspects of the system under study CC-4-III
Energy and Matter: Flows, Cycles, and Conservation – Tracking energy and matter flows, into, out of, and within systems helps one understand their system's behavior CC-5	**5-i** Matter is conserved because atoms are conserved in physical and chemical processes. CC-5-I
	5-ii Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. CC-5-II
	5-iii Energy may take different forms (e.g. energy in fields, thermal energy, energy of motion). CC-5-III
	5-iv The transfer of energy can be tracked as energy flows through a designed or natural system. CC-5-IV
Structure and Function – The way an object is shaped or structured determines many of its properties and functions CC-6	**6-i** Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts; therefore, complex natural and designed structures/systems can be analyzed to determine how they function. CC-6-I
	6-ii Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. CC-6-II
Stability and Change – For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand. CC-7	**7-i** Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales, including the atomic scale. CC-7-I
	7-ii Small changes in one part of a system might cause large changes in another part. CC-7-II
	7-iii Stability might be disturbed either by sudden events or gradual changes that accumulate over time. CC-7-III
	7-iv Systems in dynamic equilibrium are stable due to a balance of feedback mechanisms. CC-7-IV