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| **Science and Engineering**  **Practices**   * Asking questions (for science) and defining problems (for engineering) * Developing and using models * Planning and carrying out investigations * Analyzing and interpreting data * Using mathematics, information and computer technology, and computational thinking * Constructing explanations (for science) and designing solutions (for engineering) * Engaging in argument from evidence * Obtaining, evaluating, and communicating information | **Crosscutting Concepts**  ***Patterns.***  Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.  ***Cause and Effect: Mechanism and Explanation.*** Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.  ***Scale, Proportion, and Quantity.***In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system’s structure or performance.  ***Systems and System Models.***Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.  ***Energy and Matter: Flows, Cycles, and Conservation.***Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems’ possibilities and limitations.  ***Structure and Function.***The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.  ***Stability and Change.***For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of the system are critical elements of study. | **Disciplinary Core Ideas**  **Physical Sciences**  PS1 Matter and its interactions  PS2 Motion and stability: Forces and  interactions  PS3 Energy  PS4 Waves and their applications in  technologies for information transfer  **Life Sciences**  LS1 From molecules to organisms: Structures and processes  LS2 Ecosystems: Interactions, energy, and dynamics  LS3 Heredity: Inheritance and variation of traits  LS4 Biological evolution: Unity and diversity  **Earth and Space Sciences**  ESS1 Earth’s place in the universe  ESS2 Earth’s systems  ESS3 Earth and human activity  **Engineering, Technology, and Applications of Science**  ETS1 Engineering design  ETS2 Links among engineering, technology, science and society |
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