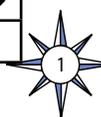


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Volume 1: Why Do We Explore?

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Dimension 1. Scientific and Engineering Practices																
1. Asking questions (for science) and defining problems (for engineering)	◆		•		◆	•	•	•	•	•	•	•	•		•	•
2. Developing and using models					•			◆	◆	◆				◆	•	◆
3. Planning and carrying out investigations			•								◆	◆	◆		◆	◆
4. Analyzing and interpreting data			•			◆	◆				◆	◆	◆		•	•
5. Using mathematics and computational thinking			•				•		•			•	•		•	
6. Constructing explanations (for science) and designing solutions (for engineering)	•		•		•	•	•	•	•	•		•	•			•
7. Engaging in argument from evidence	•		•		•	•	•	•	•		•	•	•	•	•	•
8. Obtaining, evaluating, and communicating information	◆	◆	◆	◆	•	◆	•	•	•	•	◆	•	◆	•	◆	•
Dimension 2. Crosscutting Concepts																
1. Patterns	•	•	•				•	•		•	•	•	•	•		
2. Cause and effect: Mechanism and explanation	•		•		•	•	◆		•	•	◆	◆	◆	•	•	◆
3. Scale, proportion, and quantity	•		•				•	•		•		•	•	•		
4. Systems and system models	◆						•	◆	•	◆				◆	◆	•
5. Energy and matter: Flows, cycles, and conservation					•	•		•	◆	•				◆	◆	•
6. Structure and function			◆		◆			•	•	•	•			•	•	
7. Stability and change	•		•		◆	◆	◆		◆			•		◆	◆	◆
Dimension 3. Disciplinary Core Ideas																
PHYSICAL SCIENCES																
Core Idea PS1: Matter and Its Interactions																
PS1.A: Structure and Properties of Matter	•		•				•	◆		◆						•
PS1.B: Chemical Reactions	•						◆	•		◆						◆
PS1.C: Nuclear Processes							•									



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PHYSICAL SCIENCES (CONTINUED)																
Core Idea PS2: Motion and Stability: Forces and Interactions																
PS2.A: Forces and Motion			•						•							
PS2.B: Types of Interactions									•							•
PS2.C: Stability and Instability in Physical Systems	•		•					•		◆						◆
Core Idea PS3: Energy																
PS3.A: Definitions of Energy	•								◆							
PS3.B: Conservation of Energy and Energy Transfer					•			•	◆	•						
PS3.C: Relationship Between Energy and Forces									◆							
PS3.D: Energy in Chemical Processes and Everyday Life									◆					•	•	
Core Idea PS4: Waves and Their Applications in Technologies for Information Transfer																
PS4.A: Wave Properties									•							
PS4.B: Electromagnetic Radiation																
PS4.C: Information Technologies and Instrumentation																
LIFE SCIENCES																
Core Idea LS1: From Molecules to Organisms: Structures and Processes																
LS1.A: Structure and Function		•			•			•			•	•	•	•	•	
LS1.B: Growth and Development of Organisms											•	◆	◆	•	•	
LS1.C: Organization for Matter and Energy Flow in Organisms								•		•		•		•	◆	
LS1.D: Information Processing															•	

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LIFE SCIENCES (CONTINUED)																
Core Idea LS2: Ecosystems: Interactions, Energy, and Dynamics																
LS2.A: Interdependent Relationships in Ecosystems	•					•		•		•		◆		◆	◆	
LS2.B: Cycles of Matter and Energy Transfer in Ecosystems						•		•		•				•	•	
LS2.C: Ecosystems Dynamics, Functioning, and Resilience	•				•	•	•	•						◆	◆	
LS2.D: Social Interactions and Group Behavior																
Core Idea LS3: Heredity: Inheritance and Variation of Traits																
LS3.A: Inheritance of Traits																
LS3.B: Variation of Traits																
Core Idea LS4: Biological Evolution: Unity and Diversity																
LS4.A: Evidence of Common Ancestry and Diversity					◆			•								
LS4.B: Natural Selection					◆			•								
LS4.C: Adaptation		•			•			•			•		◆	•	•	
LS4.D: Biodiversity and Humans	•							•			◆		◆			
EARTH AND SPACE SCIENCES																
Core Idea ESS1: Earth's Place in the Universe																
ESS1.A: The Universe and Its Stars																
ESS1.B: Earth and the Solar System						•										
ESS1.C: The History of Planet Earth					◆		◆									



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EARTH AND SPACE SCIENCES (CONTINUED)																
Core Idea ESS2: Earth's Systems																
ESS2.A: Earth Materials and Systems	•				•	•	•			◆				•		•
ESS2.B: Plate Tectonics and Large-Scale System Interactions					•			•		•						
ESS2.C: The Roles of Water in Earth's Surface Processes	•					•		•		•						•
ESS2.D: Weather and Climate	•				•	•	•	•		•						
ESS2.E: Biogeology						•										
Core Idea ESS3: Earth and Human Activity																
ESS3.A: Natural Resources	•				•			•	•	◆					•	•
ESS3.B: Natural Hazards					•			•		◆						
ESS3.C: Human Impacts on Earth Systems	•			•		•	•	•	•	◆		•			•	◆
ESS3.D: Global Climate Change	•				•	•	•	•		◆					•	◆
ENGINEERING, TECHNOLOGY, AND THE APPLICATIONS OF SCIENCE																
Core Idea ETS1: Engineering Design																
ETS1.A: Defining and Delimiting an Engineering Problem			◆						•							
ETS1.B: Developing Possible Solutions			◆						•							
ETS1.C: Optimizing the Design Solution			•													
Core Idea ETS2: Links Among Engineering, Technology, Science, and Society																
ETS2.A: Interdependence of Science, Engineering, and Technology	◆	◆	◆	◆					◆							
ETS2.B: Influence of Engineering, Technology and Science on Society and the Natural World	◆	◆	◆	◆					◆							

