Iowa Essential Elements for Science

Grade 11

Physical

PS1. PS1: Matter and Its Interactions PS1

A Structure and Properties of Matter PS1.A

2 Target Level: Make a claim supported by evidence to explain patterns of chemical properties that occur in a substance during a common chemical reaction. EE.HS-PS1-2

2 Precursor Level: Identify the changes that have occurred during a chemical reaction. EE.HS-PS1-2

2 Initial Level: Recognize that a change has occurred during a chemical reaction. EE.HS-PS1-2

PS2. PS2: Motion and Stability: Forces and Interactions PS2

A Forces and Motion PS2.A

3 Target Level: Evaluate the effectiveness of safety devices and design a solution that could minimize the force of a collision. EE.HS-PS2-3

3 Precursor Level: Use data to compare the effectiveness of safety devices to determine which best minimizes the force of a collision. EE.HS-PS2-3

3 Initial Level: Identify safety equipment devices that minimize force of a collision. EE.HS-PS2-3

PS3. PS3: Energy PS3

B Conservation of Energy and Energy Transfer PS3.B

4 Target Level: Investigate and predict the temperatures of two liquids before and after combining to show uniform energy distribution. EE.HS-PS3-4

4 Precursor Level: Compare the temperatures of two liquids of different temperatures before and after combining. EE.HS-PS3-4

4 Initial Level: Compare relative difference in temperature (warmth, coldness) of two liquids. EE.HS-PS3-4

Life

4 Waves and Their Applications in Technologies for Information Transfer PS4

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A Wave Properties PS4.A

5 Target Level: Make a claim supported by evidence that shows how some devices use light and sound waves to transmit and capture information. EE.HS-PS4-5

5 Precursor Level: Identify common devices which use light or sound waves to transmit information. EE.HS-PS4-5

5 Initial Level: Identify how common technological devices are used for different purposes. EE.HS-PS4-5

LS1. LS1: From Molecules to Organisms: Structures and Processes LS1

A Structure and Function LS1.A

2 Target Level: Use a model to illustrate the organization and interaction of major organs into systems in the body to provide specific functions. EE.HS-LS1-2

2 Precursor Level: Identify which organs work for a specific function. EE.HS-LS1-2

2 Initial Level: Recognize that different organs have different functions. EE.HS-LS1-2

B Growth and Development of Organisms LS1.A

4 Target Level: Use a model to illustrate how growth occurs when cells multiply. EE.HS-LS1-4

4 Precursor Level: Use a model to relate the number of cells to the size of a body. EE.HS-LS1-4

4 Initial Level: Recognize that organisms are composed of cells. EE.HS-LS1-4

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2 Ecosystems: Interactions, Energy, and Dynamics LS2

A Interdependent Relationships in Ecosystems LS2.A

2 Target Level: Use a graphical representation to explain the dependence of an animal population on other organisms for food and their environment for shelter. EE.HS-LS2-2

2 Precursor Level: Recognize the relationship between population size and available resources for food and shelter from a graphical representation. EE.HS-LS2-2

2 Initial Level: Identify food and shelter needs for familiar wildlife. EE.HS-LS2-2

LS3. LS3: Heredity: Inheritance and Variation of Traits LS3

B Variation of Traits LS3.B

2 Target Level: Defend why reproduction may or may not result in offspring with different traits. EE.HS-LS3-2

2 Precursor Level: Make a claim supported by evidence that parents and offspring may have different traits. EE.HS-LS3-2

2 Initial Level: Compare traits of parents and offspring. EE.HS-LS3-2

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4 Biological Evolution: Unity and Diversity LS4

C Adaptation LS4.C

2 Target Level: Explain how the traits of particular species that allow them to survive in their specific environments. EE.HS-LS4-2

2 Precursor Level: Identify factors in an environment that require special traits to survive. EE.HS-LS4-2

2 Initial Level: Match particular species to their various environments. EE.HS-LS4-2

Earth and Space

ESS1. ESS1: Earth's Place in the Universe ESS1

B Earth and the Solar System ESS1.B

4 Target Level: Use a model of Earth and the Sun to show how Earth's tilt and orbit around the Sun cause changes in seasons. EE.HS-ESS1-4

4 Precursor Level: Use a model of Earth and Sun to show how Earth's positions in its orbit around the Sun correspond with the four seasons. EE.HS-ESS1-4

4 Initial Level: Identify characteristics of the seasons. EE.HS-ESS1-4

2 Earth's Systems ESS2

A Earth's Materials and Systems ESS2.A

1 Target Level: Use a model to show how constructive forces (e.g., volcanoes) and destructive mechanisms (e.g., weathering, coastal erosions) change Earth's surface. EE.HS-ESS2-1

1 Precursor Level: Recognize if processes that change Earth's surface are constructive or destructive. EE.HS-ESS2-1

1 Initial Level: Recognize changes (e.g., mountain formation, erosion, and glacial changes) that occurred on Earth's surface. EE.HS-ESS2-1

ESS3. ESS3: Earth and Human Activity ESS3

A Natural Resources ESS3.A

1 Target Level: Construct an explanation based on evidence for how natural hazards have influenced human activity. EE.HS-ESS3-1

1 Precursor Level: Recognize how natural hazards (e.g., floods, earthquakes, tornadoes) influence human activity. EE.HS-ESS3-1

1 Initial Level: Recognize characteristics of natural hazards. EE.HS-ESS3-1

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D Weather and Climate ESS2.D

4 Target Level: Using a model, recognize how the effects of changes in climate can impact human lives. EE.HS-ESS2-4

4 Precursor Level: Recognize climate changes have occurred (e.g., a change in average temperature, precipitation patterns, glacial ice volumes, sea levels). EE.HS-ESS2-4

4 Initial Level: Recognize the differences between geographical climates (e.g., Minnesota versus Florida, desert versus rainforest). EE.HS-ESS2-4

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3 Earth and Human Activity ESS3

A Natural Resources ESS3.A

1 Target Level: Construct an explanation based on evidence for how natural hazards have influenced human activity. EE.HS-ESS3-1

1 Precursor Level: Recognize how natural hazards (e.g., floods, earthquakes, tornadoes) influence human activity. EE.HS-ESS3-1

1 Initial Level: Recognize characteristics of natural hazards (e.g., floods, earthquakes, tornadoes). EE.HS-ESS3-1

2 Target Level: Construct an argument for a strategy to conserve, recycle, or reuse resources. EE.HS-ESS3-2

2 Precursor Level: Describe the factors that would favor one strategy to conserve, recycle, or reuse resources over another. EE.HS-ESS3-2

2 Initial Level: Recognize strategies to manage objects (e.g., dispose, repurpose, or recycle). EE.HS-ESS3-2

C Human Impacts on Earth Systems ESS3.C

3 Target Level: Analyze data to determine the effects of a conservation strategy on the level of a natural resource. EE.HS-ESS3-3

3 Precursor Level: Organize data on the effects of conservation strategies (e.g., using less energy, using rechargeable batteries, recycling or repurposing materials). EE.HS-ESS3-3

3 Initial Level: Gather data on the effects of a local (e.g., class or school-wide) conservation strategy. EE.HS-ESS3-3