**ESSENTIAL ELEMENT, LINKAGE LEVELS, AND MINI-MAP**

**SCIENCE: HIGH SCHOOL**

**SCI.EE.HS-LS1-2**

<table>
<thead>
<tr>
<th>State Standard for General Education</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| HS-LS1-2                            | EE.HS-LS1-2 Use a model to illustrate the organization and interaction of major organs into systems (e.g., circulatory, respiratory, digestive, sensory) in the body to provide specific functions | **Initial:** • Recognize that different organs have different functions  
**Precursor:** • Identify which organs work for a specific function  
**Target:** • Use a model to illustrate the organization and interaction of major organs into systems (e.g., circulatory, respiratory, digestive, sensory) in the body to provide specific functions |

A diagram showing the relationship of linkage levels in the mini-map appears below.

*Key to map codes in upper right corner of linkage level boxes:*

- I Initial
- P Precursor
- T Target

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Use a model to illustrate the organization and interaction of major organs into systems (e.g., circulatory, respiratory, digestive, sensory) in the body to provide specific functions.
### State Standard for General Education

- HS-LS2-2: Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales

### DLM Essential Element

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

### Linkage Levels

<table>
<thead>
<tr>
<th>Linkage Levels</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial:</strong></td>
<td>Identify food and shelter needs for familiar wildlife</td>
</tr>
<tr>
<td><strong>Precursor:</strong></td>
<td>Recognize the relationship between population size and available resources for food and shelter from a graphical representation</td>
</tr>
<tr>
<td><strong>Target:</strong></td>
<td>Use a graphical representation to explain the dependence of an animal population on other organisms for food and their environment for shelter</td>
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Use a graphical representation to explain the dependence of an animal population on other organisms for food and their environment for shelter.
## State Standard for General Education

**HS-LS4-2**  
Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

## DLM Essential Element

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

## Linkage Levels

### Initial:
- Match particular species to their various environments

### Precursor:
- Identify factors in an environment that require special traits to survive

### Target:
- Explain how the traits of particular species allow them to survive in their specific environments

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A diagram showing the relationship of linkage levels in the mini-map appears below.
Explain how the traits of particular species allow them to survive in their specific environments.

Sci-72
Match particular species to their various environments.

Sci-71
Identify factors in an environment that require special traits to survive.

Sci-70
Explain how the traits of particular species allow them to survive in their specific environments.
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<tr>
<td>HS-PS1-2</td>
<td>EE.HS-PS1-2</td>
<td></td>
</tr>
<tr>
<td>Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties</td>
<td>Make a claim supported by evidence to explain patterns of chemical properties that occur in a substance during a common chemical reaction (e.g., baking soda and vinegar)</td>
<td>Initial:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Recognize that a change has occurred during a chemical reaction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Precursor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Identify the changes that have occurred during a chemical reaction (e.g., metal-rust, paper-burn)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Target:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Make a claim supported by evidence to explain patterns of chemical properties that occur in a substance during a common chemical reaction (e.g., baking soda and vinegar)</td>
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Key to map codes in upper right corner of linkage level boxes:

I Initial
P Precursor
T Target
Make a claim supported by evidence to explain patterns of chemical properties that occur in a substance during a common chemical reaction (e.g., baking soda and vinegar).
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<tr>
<td>HS-PS2-3</td>
<td>EE.HS-PS2-3 Evaluate the effectiveness of safety devices and design a solution that could minimize the force of a collision</td>
<td>Initial:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Identify safety equipment devices that minimize force of a collision (e.g., floor mats, helmets, or steel-toed boots)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Precursor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use data to compare the effectiveness of safety devices to determine which best minimizes the force of a collision</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Target:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Evaluate the effectiveness of safety devices and design a solution that could minimize the force of a collision</td>
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T  Target
Evaluate the effectiveness of safety devices and design a solution that could minimize the force of a collision.

Sci-60
Identify safety equipment devices that minimize force of a collision (e.g., floor mats, helmets, or steel-toed boots).

Sci-59
Use data to compare the effectiveness of safety devices to determine which best minimizes the force of a collision.

Sci-58
Evaluate the effectiveness of safety devices and design a solution that could minimize the force of a collision.
### ESSENTIAL ELEMENT, LINKAGE LEVELS, AND MINI-MAP

**SCIENCE: HIGH SCHOOL**

**SCI.EE.HS-PS3-4**

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| HS-PS3-4 Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system | EE.HS-PS3-4 Investigate and predict the temperatures of two liquids before and after combining to show uniform energy distribution | **Initial:**  
- Compare relative difference in temperature (warmth, coldness) of two liquids  

**Precursor:**  
- Compare the temperatures of two liquids of different temperatures before and after combining  

**Target:**  
- Investigate and predict the temperatures of two liquids before and after combining to show uniform energy distribution  

A diagram showing the relationship of linkage levels in the mini-map appears below.

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- **I** Initial  
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SCI.EE.HS-PS3-4 Investigate and predict the temperatures of two liquids before and after combining to show uniform energy distribution.

Sci-57 Qualitatively compare the temperatures of two liquids.

Sci-56 Compare the temperatures of two liquids before and after combining.

Sci-55 Investigate and predict the temperatures of two liquids before and after combining.
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| HS-ESS1-4 Use mathematical or computational representations to predict the motion of orbiting objects in the solar system | EE.HS-ESS1-4 Use a model of Earth and the Sun to show how Earth’s tilt and orbit around the Sun cause changes in seasons | Initial:  
  • Identify characteristics of the seasons  
Precursor:  
  • Use a model of Earth and sun to show how Earth’s positions in its orbit around the Sun correspond with the four seasons  
Target:  
  • Use a model of Earth and the Sun to show how Earth’s tilt and orbit around the Sun cause changes in seasons |

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

- **Sci-102** Identify characteristics of the seasons.
- **Sci-101** Use a model to show how the Earth's position corresponds with the four seasons.
- **Sci-100** Use a model to show how the Earth's tilt and orbit changes in seasons.
### State Standard for General Education

Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios

### DLM Essential Element

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

### Linkage Levels

**Initial:**
- Recognize strategies to manage objects (e.g., dispose, repurpose, or recycle)

**Precursor:**
- Describe the factors that would favor one strategy to conserve, recycle, or reuse resources over another

**Target:**
- Construct an argument for a strategy to conserve, recycle, or reuse resources

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Construct an argument for a strategy to conserve, recycle, or reuse resources.

Sci-99
Recognize strategies to manage objects

Sci-98
Describe what would favor one strategy to conserve, recycle, or reuse resources.

Sci-97
Construct an argument for a strategy to conserve, recycle or reuse resources.
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</table>
| HS-ESS3-3  
Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity | EE.HS-ESS3-3  
Analyze data to determine the effects of a conservation strategy on the level of a natural resource | Initial:  
- Gather data on the effects of a local (e.g., class or school-wide) conservation strategy  
Precursor:  
- Organize data on the effects of conservation strategies (e.g., using less energy, using rechargeable batteries, recycling or repurposing materials)  
Target:  
- Analyze data to determine the effects of a conservation strategy on the level of a natural resource |

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Analyze data to determine the effects of a conservation strategy on the level of a natural resource.