



Park Hill School District

Building Successful Futures • Each Student • Every Day

6th Grade Resource Science Curriculum

Course Description: Students will engage within three strands of content within 6th grade science: Life Science, Earth Science, and Physical Science. Units encompass ecology, human impact on the earth, force and motion, thermal energy, and electromagnetic forces. Students will engage in experiences that build foundational knowledge for future science coursework.

Scope and Sequence:

| Timeframe | Unit | Instructional Topics |
|-----------|--|---|
| 12 Weeks | Interdependent Relationships in Ecosystems | Topic 1: Competition in Ecosystems Topic 2: Organism Interactions in Ecosystems Topic 3: Relationships in Ecosystems Topic 4: Flow of Energy in Ecosystems Topic 5: Dynamic Nature of Ecosystems Topic 6: Ecosystem Biodiversity |
| 9 Weeks | Growth and Development of Organisms | Topic 1: Reproduction in Plants and Animals Topic 2: Growth of Organisms Topic 3: Introduction to Photosynthesis Topic 4: Energy Flow in Organisms |
| 5 Weeks | Potential and Kinetic Energy | Topic 1: Kinetic Energy Topic 2: Potential Energy |
| 10 Weeks | Forces and Motion | Topic 1: Newton's Third Law Topic 2: Changes in Force and Motion Topic 3: Electric and Magnetic Forces Topic 4: Gravitational Forces |

**This document contains the entire 6th Grade Science curriculum that is taught in a regular education setting. Items that are highlighted in yellow have been designated as priority information that should be taught in the 6th Grade Resource Science class.*

Unit 1: MS Life Bundle 3 - Interdependent Relationships in Ecosystems

Subject: Science

Grade: 6

Name of Unit: Interdependent Relationships in Ecosystems

Length of Unit: 11 weeks

Overview of Unit: Students will learn and explore how organisms interact in an ecosystem and the importance of biodiversity in an ecosystem. The students will take the learning from the unit to create a report that maps out the benefits and risks of building an oil pipeline through Yosemite National Park.

Priority Standards for unit:

- 6-8.LS2.A.1 Analyze and interpret data to provide evidence for the effects of resource availability on individual organisms and populations of organisms in an ecosystem.
- 6-8.LS2.A.2 Construct an explanation that predicts the patterns of interactions among and between the biotic and abiotic factors in a given ecosystem
- 6-8.LS2.B Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
- 6-8.LS2.C.1 Construct an argument supported by empirical evidence that explains how changes to physical or biological components of an ecosystem affect populations.
- 6-8.LS2.C.2 Evaluate benefits and limitations of differing design solutions for maintaining an ecosystem.

Supporting Standards for unit:

- MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- MS-ETS1-3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- ISTE - INNOVATIVE DESIGNER.4: Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions

| Unwrapped Concepts (Students need to know) | Unwrapped Skills (Students need to be able to do) | Bloom's Taxonomy Levels | Webb's DOK |
|--|--|-------------------------------|---------------|
| An explanation that predicts the patterns of interactions among in a given ecosystem. | Construct | Create | 2 |
| An explanation that predicts the patterns of interactions between the biotic and abiotic | Construct | Create | 2 |

| | | | |
|--|-----------------------|----------|---|
| factors in a given ecosystem. | | | |
| A model to describe the cycling of matter in an ecosystem. | Develop | Create | 3 |
| A model to describe the flow of energy among living and nonliving parts of an ecosystem. | Develop | Create | 3 |
| Data to provide evidence for the effects of resource availability on individual organisms in an ecosystem. | Analyze and interpret | Analyze | 3 |
| Data to provide evidence for the effects of resource availability on populations of organisms in an ecosystem. | Analyze and interpret | Analyze | 3 |
| An argument supported by empirical evidence that explains how changes to physical or biological components of an ecosystem affect populations. | Construct | Evaluate | 3 |
| benefits of differing design solutions for maintaining an ecosystem. | Evaluate | Evaluate | 4 |
| limitations of differing design solutions for maintaining an ecosystem. | Evaluate | Evaluate | 4 |

Essential Questions:

1. What factors can influence an organism’s survival in an ecosystem?
2. What are some limited resources that can affect an organism’s growth or population increase?
3. How can competitive, predatory, and mutually beneficial relationships affect organisms?
4. What do food webs demonstrate?
5. How do disruptions to components of ecosystems affect populations?
6. How can changes in biodiversity influence humans?

Enduring Understanding/Big Ideas:

1. Biotic and abiotic factors can affect an organism’s survival.
2. Limited resources can affect an organism’s growth or population increase.
3. Competitive, predatory, and mutually beneficial relationships affect organisms.
4. Food webs demonstrate the flow of energy in an ecosystem.
5. Disruptions to components of ecosystems can affect populations.
6. Changes in the biodiversity of an ecosystem can affect humans.

Unit Vocabulary:

| Academic Cross-Curricular Words | Content/Domain Specific |
|--|---|
| <p>Competition Consumers Dynamic Environmental Interactions Interdependent Limited Resources Nutrients Population Recycling Resilience Resources</p> | <p>Abiotic Factors Aquatic Atom Biodiversity Biotic Factors Competitive Interaction Decomposers Dependent Interaction Ecosystem Ecosystem Dynamics Energy Energy Transfer Food Web Matter Cycle Mutually Beneficial Interactions Oceanic Organism Predatory Interaction Primary Consumer Producers Secondary Consumer Species Terrestrial Trophic Level Water Pollution</p> |

Resources for Vocabulary Development:

STEMscopedia & Picture Vocabulary

Topic 1: Competition in Ecosystems Scope

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|-------------|--|-----------------------------|--|
| 6-8.LS2.A.1 | Engage: Investigative Phenomena | 15 | |
| 6-8.LS2.A.1 | Engage: Accessing Prior Knowledge | 15 | *Pick one Engage Activity to use |
| 6-8.LS2.A.1 | Engage: Hook | 30 | |
| 6-8.LS2.A.1 | Explore 1 Activity: Ecosystem Events and Relationships | 45 | |
| 6-8.LS2.A.1 | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.A.1 | Explore 2 Activity: Competition Concentration | 45 | |
| 6-8.LS2.A.1 | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.A.1 | Mission Log: Complete Class Mission Log page 2 | 20 | |

Topic 2: Organism Interactions in Ecosystems Scope

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|-------------|--|-----------------------------|--|
| 6-8.LS2.A.1 | Engage: Investigative Phenomena | 15 | |
| 6-8.LS2.A.1 | Engage: Accessing Prior Knowledge | 15 | *Pick one Engage Activity to use |
| 6-8.LS2.A.1 | Engage: Hook | 15 | |
| 6-8.LS2.A.1 | Explore 1 Activity: Ecosystem Interactions | 45 | |
| 6-8.LS2.A.1 | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.A.1 | Explore 2 Scientific Investigation: Finding Biotic and Abiotic Factors in the Schoolyard | 120 | |
| 6-8.LS2.A.1 | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.A.1 | Explore 3 Tuva: Wolf and Elk in Yellowstone | 45 | |
| 6-8.LS2.A.1 | Explain 3: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.A.1 | Mission Log: Complete Class Mission Log page 3 | 20 | |

Topic 3: Relationships in Ecosystems Scope

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|-------------|--|-----------------------------|--|
| 6-8.LS2.A.2 | Engage: Investigative Phenomena | 15 | |
| 6-8.LS2.A.2 | Engage: Accessing Prior Knowledge | 15 | Pick one Engage Activity to use |
| 6-8.LS2.A.2 | Engage: Hook - In More than One Relationship? | 30 | |
| 6-8.LS2.A.2 | Explore 1 Activity: Finding My Ecosystem Buddy | 120 | |
| 6-8.LS2.A.2 | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.A.2 | Explore 2 Activity: Ecosystem Relationships | 120 | |
| 6-8.LS2.A.2 | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.A.2 | Explore 3 Activity: Necessary or Nice? | 45 | |
| 6-8.LS2.A.2 | Explain 3: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.A.1 | Mission Log: Complete Class Mission Log page 4 | 20 | |

Topic 4: Flow of Energy in Ecosystems Scope

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|-------------|--|-----------------------------|--|
| 6-8.LS2.B | Engage: Investigative Phenomena | 15 | |
| 6-8.LS2.B | Engage: Accessing Prior Knowledge | 15 | Pick one Engage Activity to use |
| 6-8.LS2.B | Engage: Hook | 45 | |
| 6-8.LS2.B | Explore 1 Activity: Food Webs | 45 | |
| 6-8.LS2.B | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.B | Explore 2 Activity: Cycling of Matter and Energy | 45 | |
| 6-8.LS2.B | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.A.1 | Mission Log: Complete Class Mission Log page 5 | 20 | |

Topic 5: Dynamic Nature of Ecosystems Scope

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|-------------|---|------------------------------------|--|
| 6-8.LS2.C.1 | Engage: Investigative Phenomena | 15 | |
| 6-8.LS2.C.1 | Engage: Accessing Prior Knowledge | 15 | Pick one Engage Activity to use |
| 6-8.LS2.C.1 | Engage: Hook - What do fish breathe? | 30 | |
| 6-8.LS2.C.1 | Explore 1 Scientific Investigation: Modeling an Algae Bloom | 45 | |
| 6-8.LS2.C.1 | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.C.1 | Explore 2 Activity: Disruptive Events | 120 | |
| 6-8.LS2.C.1 | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.C.1 | Explore 3 Activity: So Squirrely! | 120 | |
| 6-8.LS2.C.1 | Explain 3: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 3 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.C.1 | Explore 4 Tuva: Bylot Island Ecology | 45 | |
| 6-8.LS2.C.1 | Explain 4: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 4 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.A.1 | Mission Log: Complete Class Mission Log page 6 | 20 | |

Topic 6: Ecosystem Biodiversity Scope

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|-------------|--|-----------------------------|--|
| 6-8.LS2.C.2 | Engage: Investigative Phenomena | 15 | |
| 6-8.LS2.C.2 | Engage: Accessing Prior Knowledge | 15 | Pick one Engage Activity to use |
| 6-8.LS2.C.2 | Engage: Hook - Parking Lot Diversity | 30 | |
| 6-8.LS2.C.2 | Explore 1 Scientific Investigation: Biodiversity | 120 | |
| 6-8.LS2.C.2 | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.C.2 | Explore 2 Activity: Ocean Biodiversity | 45 | |
| 6-8.LS2.C.2 | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.C.2 | Explore 3: Engineering Solution - Wetland Mitigation | 180 | |
| 6-8.LS2.C.2 | Explain 3: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.C.2 | Explore 4 Tuva: California Condors | 45 | |
| 6-8.LS2.C.2 | Explain 4: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS2.A.1 | Mission Log: Complete Class Mission Log page 7 | 20 | |

Engaging Scenario



Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

Using the Mission Log for Life Science Bundle 3, students will complete the Action Plan from STEMscopes.

Rubric for Engaging Scenario:

Use CCC and SEP Inventory of Skills to assess Action Plan.

Unit 2: MS Life Bundle 2 - Growth & Development of Organisms

Subject: Science

Grade: 6

Name of Unit: MS Life Bundle 2 - Growth & Development of Organisms

Length of Unit: 8 weeks

Overview of Unit: The focus of the unit centers on how organisms grow, adapt, and reproduce. Students will use the information from this unit to design a compost garden for a large company wanting to be environmentally friendly.

Priority Standards for unit:

- 6-8.LS1.B.1 Construct an explanation for how characteristic animal behaviors as well as specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
- 6-8.LS1.B.2 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
- 6-8.LS1.C Construct a scientific explanation based on evidence for the role of photosynthesis and cellular respiration in the cycling of matter and flow of energy into and out of organisms.

Supporting Standards for unit:

- ISTE - INNOVATIVE DESIGNER.4: Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions

| Unwrapped Concepts (Students need to know) | Unwrapped Skills (Students need to be able to do) | Bloom's Taxonomy Levels | Webb's DOK |
|---|---|-------------------------|------------|
| an explanation for how characteristic animal behaviors as well as specialized plant structures affect the probability of successful reproduction of animals and plants respectively | Construct | Apply | 2 |
| a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. | Construct | Apply | 2 |
| a scientific explanation based on evidence for the role of photosynthesis and cellular respiration in the cycling of matter and flow of energy into and out of organisms. | Construct | Apply | 2 |

Essential Questions:

1. What characteristics do plants and animals have to increase reproduction?
2. What factors can affect the growth of a plant?
3. How do plants create their own food?
4. How does energy move through organisms?

Enduring Understanding/Big Ideas:

1. Plants and animals possess adaptations and behaviors that help them reproduce.
2. Genetic as well as environmental factors can affect the growth of plants and animals.
3. Plants use energy from the Sun, carbon dioxide, and water to create their own chemical energy.
4. Animals consume this energy and, through digestion and cellular respiration, break it down into molecules they can use for energy, and remove waste and carbon dioxide that are produced during the process.

Unit Vocabulary:

| Academic Cross-Curricular Words | Content/Domain Specific |
|--|--|
| Behavior Environmental Factors Products Specialized | Adaptation Anther Chemical Reaction Chloroplast Energy Genetic Factors Glucose Growth Matter Cycle Microorganism Organism Ovary Petals Photosynthesis Phytoplankton Pistol Pollen Pollination Reactant Reproduction Stamen |

Resources for Vocabulary Development: STEMscopedia & Picture Vocabulary

Topic 1: Reproduction in Plants and Animals Scope

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|-------------|--|-----------------------------|--|
| 6-8.LS1.B.1 | Engage: Investigative Phenomena | 15 | |
| 6-8.LS1.B.1 | Engage: Accessing Prior Knowledge | 15 | Pick one Engage Activity to use |
| 6-8.LS1.B.1 | Engage: Hook - Observation Walk | 45 | |
| 6-8.LS1.B.1 | Explore 1 Activity: Which Behavior has more success? | 120 | |
| 6-8.LS1.B.1 | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS1.B.1 | Explore 2 Activity: Increasing the Odds | 120 | |
| 6-8.LS1.B.1 | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS1.B.1 | Explore 3 Engineering Solution: Design a Flower | 120 | |
| 6-8.LS1.B.1 | Explain 3: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 3 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS1.B.1 | Mission Log: Complete Class Mission Log page 2 | 20 | |

Topic 2: Growth of Organisms Scope

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|-------------|--|-----------------------------|--|
| 6-8.LS1.B.2 | Engage: Investigative Phenomena | 15 | |
| 6-8.LS1.B.2 | Engage: Accessing Prior Knowledge | 15 | Pick one Engage Activity |
| 6-8.LS1.B.2 | Engage: Hook | 45 | |
| 6-8.LS1.B.2 | Explore 1 Activity: What are the Chances? | 120 | |
| 6-8.LS1.B.2 | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS1.B.2 | Explore 2 Research: Growth of the Fittest | 180 | |
| 6-8.LS1.B.2 | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS1.B.1 | Mission Log: Complete Class Mission Log page 3 | 20 | |

Topic 3: Introduction to Photosynthesis Scope

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|-------------|--|-----------------------------|--|
| 6-8.LS1.C | Engage: Investigative Phenomena | 15 | |
| 6-8.LS1.C | Engage: Accessing Prior Knowledge | 15 | |
| 6-8.LS1.C | Engage: Hook - Soaking up the Sun | 45 | |
| 6-8.LS1.C | Explore 1 Activity: Modeling Photosynthesis | 45 | |
| 6-8.LS1.C | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS1.C | Explore 2 Scientific Investigation: Importance of Light | 120 | |
| 6-8.LS1.C | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS1.B.1 | Mission Log: Complete Class Mission Log page 4 | 20 | |

Topic 4: Energy Flow in Organisms Scope

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|-------------|--|-----------------------------|--|
| 6-8.LS1.C | Engage: Investigative Phenomena | 15 | |
| 6-8.LS1.C | Engage: Accessing Prior Knowledge | 15 | Pick one Engage Activity to use |
| 6-8.LS1.C | Engage: Hook - Energy Flow | 45 | |
| 6-8.LS1.C | Explore 1 Activity: Chemical Reactions in the Digestive System | 45 | |
| 6-8.LS1.C | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS1.B.2 | Explore 2 Activity: Cellular Respiration | 120 | |
| 6-8.LS1.B.2 | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS1.B.2 | Explore 3 Scientific Investigation: Measuring Energy from Food | 45 | |
| 6-8.LS1.B.2 | Explain 3: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 3 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.LS1.B.1 | Mission Log: Complete Class Mission Log page 5 | 20 | |

Engaging Scenario



Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

Using the Mission Log for Life Science Bundle 2, students will complete the Action Plan from STEMscopes.

Rubric for Engaging Scenario:

Use CCC and SEP Inventory of Skills to assess Action Plan.

Unit 3: Physical Bundle 4 - Potential and Kinetic Energy

Subject: Science

Grade: 6

Name of Unit: Potential and Kinetic Energy

Length of Unit: 4 weeks

Overview of Unit: In this unit, students will be learning about the difference between potential and kinetic energy and how they are related in a system. Students will use the knowledge from the unit to create a ski jump for use in the summertime.

Priority Standards for unit:

- 6-8.PS3.A.1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
- 6-8.6-8.PS3.A.2 Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.
- 6-8.PS3.B Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. [

Supporting Standards for unit:

- ISTE - INNOVATIVE DESIGNER.4: Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions

| Unwrapped Concepts (Students need to know) | Unwrapped Skills (Students need to be able to do) | Bloom's Taxonomy Levels | Webb's DOK |
|---|--|-------------------------------|---------------|
| a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. | Develop | Create | 3 |
| arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. | Construct | Evaluate | 4 |
| arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. | Use | Analyze | 2 |
| arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. | Present | Analyze | 2 |

| | | | |
|--|-----------|---------|---|
| graphical displays of data to describe the relationships of kinetic energy to the mass of an object. | Construct | Apply | 3 |
| graphical displays of data to describe the relationships of kinetic energy to the mass of an object. | Interpret | Analyze | 3 |

Essential Questions:

1. What is the difference between kinetic and potential energy?
2. What does kinetic energy depend upon?
3. What does potential energy depend upon?
4. What is the relationship between potential and kinetic energy?

Enduring Understanding/Big Ideas:

1. Kinetic energy is motion energy, and potential energy is stored energy.
2. Kinetic energy depends on the mass and speed of an object.
3. Potential energy depends on the mass and height of an object.
4. At each point in a system, the kinetic energy and potential energy add up to the same value.

Unit Vocabulary:

| Academic Cross-Curricular Words | Content/Domain Specific |
|---------------------------------|---|
| Speed System | Energy Force Kinetic Energy Law of Conservation of Energy Mass Motion Potential Energy Relative Position |

Resources for Vocabulary Development:

STEMscopedia & Picture Vocabulary

Topic 1: Kinetic Energy Scope

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|--------------------------|--|-----------------------------|--|
| 6-8.PS3.A.1 6-8.PS3.B | Engage: Investigative Phenomena | 15 | |
| 6-8.PS3.A.1 6-8.PS3.B | Engage: Accessing Prior Knowledge | 15 | |
| 6-8.PS3.A.1 6-8.PS3.B | Engage: Hook - Dominos | 30 | |
| 6-8.PS3.A.1 6-8.PS3.B | Explore 1 Activity: Speed and Motion | 45 | |
| 6-8.PS3.A.1 6-8.PS3.B | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS3.A.1 6-8.PS3.B | Explore 2 Scientific Investigation: The Effect of Mass | 120 | |
| 6-8.PS3.A.1 6-8.PS3.B | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS3.A.1 6-8.PS3.B | Explore 3 Tuva: NFL Helmet Physics | 45 | |
| 6-8.PS3.A.1 6-8.PS3.B | Explain 3: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 3 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS3.A.1 6-8.PS3.B | Mission Log: Complete Class Mission Log page 2 | 20 | |

Topic 2: Potential Energy Scope

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|-----------------|---|------------------------------------|--|
| 6-8.6-8.PS3.A.2 | Engage: Investigative Phenomena | 15 | |
| 6-8.6-8.PS3.A.2 | Engage: Accessing Prior Knowledge | 15 | Pick one Engage Activity to use |
| 6-8.6-8.PS3.A.2 | Engage: Hook - Rubber Band Energy | 30 | |
| 6-8.6-8.PS3.A.2 | Explore 1 Scientific Investigation: Potential Predictions | 45 | |
| 6-8.6-8.PS3.A.2 | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.6-8.PS3.A.2 | Explore 2 Scientific Investigation: Static Potential Energy | 120 | |
| 6-8.6-8.PS3.A.2 | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.6-8.PS3.A.2 | Explore 3 Activity: Energy in a Skate Park | 30 | |
| 6-8.6-8.PS3.A.2 | Explain 3: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 3 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.6-8.PS3.A.2 | Explore 4 Engineering Solution: Half Pipe Design | 120 | |
| 6-8.6-8.PS3.A.2 | Explain 4: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 4 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.6-8.PS3.A.2 | Mission Log: Complete Class Mission Log page 3 | 20 | |

Engaging Scenario



Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

Using the Mission Log for Physical Science Bundle 4, students will complete the Action Plan from STEMscopes.

Rubric for Engaging Scenario:

Use CCC and SEP Inventory of Skills to assess Action Plan.

Unit 4: Physical Bundle 3: Forces and Motion

Subject: Science

Grade: 6

Name of Unit: Forces and Motion

Length of Unit: 9 weeks

Overview of Unit: Students will learn about motion and how outside forces affect the motion of an object. Students will use the knowledge gained to design a 3D maze game that uses the principles of magnetism, electricity, and gravity to move a marble from its starting position to the finish line.

Priority Standards for unit:

- 6-8.PS2.A.1 Apply physics principles to design a solution that minimizes the force of an object during a collision and develop an evaluation of the solution.
- 6-8.PS2.A.2 Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
- 6-8.PS2.B.1 Analyze diagrams and collect data to determine the factors that affect the strength of electric and magnetic forces.
- 6-8.PS2.B.2 Create and analyze a graph to use as evidence to support the claim that gravitational interactions depend on the mass of interacting objects.
- 6-8.PS2.B.3 Conduct an investigation and evaluate the experimental design to provide evidence that electric and magnetic fields exist between objects exerting forces on each other even though the objects are not in contact.

Supporting Standards for unit:

- MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- ISTE - INNOVATIVE DESIGNER.4: Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions

| Unwrapped Concepts (Students need to know) | Unwrapped Skills (Students need to be able to do) | Bloom's Taxonomy Levels | Webb's DOK |
|--|--|-------------------------------|---------------|
| physics principles to design a solution that minimizes the force of an object during a | Apply | Create | 2 |

| | | | |
|---|----------|----------|---|
| collision | | | |
| an evaluation of the design a solution that minimizes the force of an object during a collision | Develop | Evaluate | 3 |
| an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. | Plan | Create | 4 |
| an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. | Conduct | Create | 4 |
| diagrams to determine the factors that affect the strength of electric and magnetic forces. | analyze | Analyze | 2 |
| data to determine the factors that affect the strength of electric and magnetic forces | collect | Apply | 2 |
| Gravitational interactions depend on the mass of interacting objects. | Create | Create | 3 |
| Gravitational interactions depend on the mass of interacting objects. | Analyze | Analyze | 4 |
| an investigation to provide evidence that electric and magnetic fields exist between objects exerting forces on each other even though the objects are not in contact. | conduct | Apply | 1 |
| the experimental design to provide evidence that electric and magnetic fields exist between objects exerting forces on each other even though the objects are not in contact. | evaluate | Evaluate | 3 |

Essential Questions:

1. What is Newton's Third Law?
2. What is motion?
3. How can motion change?
4. What forces exist in our world?
5. How can forces impact objects without directly touching them?

Enduring Understanding/Big Ideas:

1. All objects that collide exert equal and opposite forces on one another.
2. The motion of an object is determined by the sum of the forces acting on it.

3. To change an object's motion, either the forces on the object and/or the mass of the object must change.
4. Fields exist between objects and exert forces on each other even when the objects are not touching.
5. Electric, magnetic, and gravitational forces all act at a distance between objects.

Unit Vocabulary:

| Academic Cross-Curricular Words | Content/Domain Specific |
|---------------------------------|--|
| <p>Attractive Direction</p> | <p>Accelerate Charged Object Charged Particle Collide/Collision Current Electric Charge Electric Force Electromagnetic Force Force Gravitational Force Interacting Object Magnetic Field Mass Motion Net Force Newton (N) Newton's Third Law Reference Frame Spring Scale Weight</p> |

Resources for Vocabulary Development:

STEMscopedia & Picture Vocabulary

Topic 1: Newton's Third Law Scope

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|-------------|--|-----------------------------|--|
| 6-8.PS2.A.1 | Engage: Investigative Phenomena | 15 | |
| 6-8.PS2.A.1 | Engage: Accessing Prior Knowledge | 15 | Pick one Engage Activity |
| 6-8.PS2.A.1 | Engage: Hook - What is a system? | 45 | |
| 6-8.PS2.A.1 | Explore 1 Activity: How can we measure forces? | 45 | |
| 6-8.PS2.A.1 | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS2.A.1 | Explore 2 Activity: Action-Reaction Contact Forces Lab | 120 | |
| 6-8.PS2.A.1 | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS2.A.1 | Explore 3 Engineering Solution: Shock Absorber | 180 | |
| 6-8.PS2.A.1 | Explain 3: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 3 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS2.A.1 | Mission Log: Complete Class Mission Log page 2 | 20 | |

Topic 2: Changes in Force and Motion

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|-------------|--|-----------------------------|--|
| 6-8.PS2.A.2 | Engage: Investigative Phenomena | 15 | |
| 6-8.PS2.A.2 | Engage: Accessing Prior Knowledge | 15 | Pick one Engage Activity to use |
| 6-8.PS2.A.2 | Engage: Hook - Newton Knew that Mass Matters | 45 | |
| 6-8.PS2.A.2 | Explore 1 Activity: Balanced and Unbalanced Forces | 120 | |
| 6-8.PS2.A.2 | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS2.A.2 | Explore 2 Inquiry Investigation: Newton's Second Law | 180 | |
| 6-8.PS2.A.2 | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS2.A.2 | Explore 3 Tuva: BMX Dirt Bike Racing | 120 | |
| 6-8.PS2.A.2 | Explain 3: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 3 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS2.A.2 | Mission Log: Complete Class Mission Log page 3 | 20 | |

Topic 3: Electric and Magnetic Forces

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|----------------------------|--|-----------------------------|--|
| 6-8.PS2.B.1 6-8.PS2.B.3 | Engage: Investigative Phenomena | 15 | |
| 6-8.PS2.B.1 6-8.PS2.B.3 | Engage: Accessing Prior Knowledge | 15 | Pick one Engage Activity to use |
| 6-8.PS2.B.1 6-8.PS2.B.3 | Engage: Hook - Electromagnetic Straw | 45 | |
| 6-8.PS2.B.1 6-8.PS2.B.3 | Explore 1 Activity: Magnetic Fields | 45 | |
| 6-8.PS2.B.1 6-8.PS2.B.3 | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS2.B.1 6-8.PS2.B.3 | Explore 2 Activity: Electrical Force | 45 | |
| 6-8.PS2.B.1 6-8.PS2.B.3 | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS2.B.1 6-8.PS2.B.3 | Explore 3 Scientific Investigation: Electromagnetic Strength | 120 | |
| 6-8.PS2.B.1 6-8.PS2.B.3 | Explain 3: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 3 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS2.B.1 6-8.PS2.B.3 | Mission Log: Complete Class Mission Log page 4 | 20 | |

Topic 4: Gravitational Forces

| Standard | Topic & Section | Suggested # of Minutes | Notes |
|-------------|--|-----------------------------|--|
| 6-8.PS2.B.2 | Engage: Investigative Phenomena | 15 | |
| 6-8.PS2.B.2 | Engage: Accessing Prior Knowledge | 15 | Pick one Engage Activity to use |
| 6-8.PS2.B.2 | Engage: Hook - How strong is Earth? | 30 | |
| 6-8.PS2.B.2 | Explore 1 Activity: Mass and Gravitational Force | 45 | |
| 6-8.PS2.B.2 | Explain 1: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 1 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS2.B.2 | Explore 2 Scientific Investigation: Gravitational Force Between Objects | 120 | |
| 6-8.PS2.B.2 | Explain 2: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 2 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS2.B.2 | Explore 3 Activity: Gravitational Forces in Space | 120 | |
| 6-8.PS2.B.2 | Explain 3: Choose from Vocabulary, STEMscopedia, linking literacy, and/or connection videos connected to Explore 3 | 45-90 depending on activity | *Consider doing whole group or small group to support with reading |
| 6-8.PS2.B.2 | Mission Log: Complete Class Mission Log page 5 | 20 | |

Engaging Scenario



Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

Using the Mission Log for Physical Science Bundle 3, students will complete the Action Plan from STEMscopes.

Rubric for Engaging Scenario:

Use CCC and SEP Inventory of Skills to assess Action Plan.

Unit of Study Terminology

Appendices: All Appendices and supporting material can be found in this course's shell course in the District's Learning Management System.

Assessment Leveling Guide: A tool to use when writing assessments in order to maintain the appropriate level of rigor that matches the standard.

Big Ideas/Enduring Understandings: Foundational understandings teachers want students to be able to discover and state in their own words by the end of the unit of study. These are answers to the essential questions.

Engaging Experience: Each topic is broken into a list of engaging experiences for students. These experiences are aligned to priority and supporting standards, thus stating what students should be able to do. An example of an engaging experience is provided in the description, but a teacher has the autonomy to substitute one of their own that aligns to the level of rigor stated in the standards.

Engaging Scenario: This is a culminating activity in which students are given a role, situation, challenge, audience, and a product or performance is specified. Each unit contains an example of an engaging scenario, but a teacher has the ability to substitute with the same intent in mind.

Essential Questions: Engaging, open-ended questions that teachers can use to engage students in the learning.

Priority Standards: What every student should know and be able to do. These were chosen because of their necessity for success in the next course, the state assessment, and life.

Supporting Standards: Additional standards that support the learning within the unit.

Topic: These are the main teaching points for the unit. Units can have anywhere from one topic to many, depending on the depth of the unit.

Unit of Study: Series of learning experiences/related assessments based on designated priority standards and related supporting standards.

Unit Vocabulary: Words students will encounter within the unit that are essential to understanding. Academic Cross-Curricular words (also called Tier 2 words) are those that can be found in multiple content areas, not just this one. Content/Domain Specific vocabulary words are those found specifically within the content.

Symbols:



This symbol depicts an experience that can be used to assess a student's 21st Century Skills using the rubric provided by the district.



This symbol depicts an experience that integrates professional skills, the development of professional communication, and/or the use of professional mentorships in authentic classroom learning activities.