



# Sparta Area School District

*Good people, great schools.*

## Course Outcome Summary

### Course Information: **Mission to Mars (Year B)**

**Description:** Students develop a sense of scale as it relates to our solar system while researching and creating a living space that could be located off of Earth's surface

**Instruction Level:** Grades 6-8

**Course Standards:** Science, Technology, Engineering, Math, ELA, Social Studies

### Units

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1. Sense of Scale
2. Exploration on Mars
3. Space Travel
4. Planets
5. Our Solar System
6. Earth- Sun - Moon Cycle
7. Challenge Based Learning Project

### Unit Outlines

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#### 1. Sense of Scale

##### Essential Question:

Students will be able to answer the question(s):

- How do we study and explore space?

##### Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students use scale to explore objects within our solar system.
- Students apply this knowledge to create a heliocentric model of their birthday.

#### 2. Exploration on Mars

##### Essential Question:

Students will be able to answer the question(s):

- What are the essential requirements to sustaining human life?

**Essential Knowledge:**

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students research the technologies necessary for deep space travel.

**3. Spacecraft Design**

**Essential Question:**

Students will be able to answer the question(s):

- How does science impact engineering designs?

**Essential Knowledge:**

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students learn about the components necessary to successfully travel through space.
- Design a protection system for a spacecraft to re-enter the Earth's atmosphere.

**4. Planets**

**Essential Question:**

Students will be able to answer the question(s):

- What is the relationship between the planets in our solar system?
- What is the relationship between mythology and the planets?

**Essential Knowledge:**

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students compare and contrast the size, composition, distance, and characteristics between the planets.
- Investigate the orbital speed, and atmospheric elements on the different planets.
- Create connections between Greek Mythology and the planets.

**5. Our Solar System**

**Essential Question:**

Students will be able to answer the question(s):

- How does Earth fit into the solar system?

**Essential Knowledge:**

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students explore the elements of our solar system and surrounding solar systems while learning about the solar nebular theory.

## 6. Earth-Sun-Moon Cycle

### Essential Question:

- How does our location within our solar system impact our life?

### Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students apply their knowledge of gravity along with the concepts of the Earth's rotation and revolution to determine a connection between the earth, sun and moon.

## 7. Challenge-Based Learning Project

### Essential Question:

- What are the essential requirements to sustaining human life off of Earth?

### Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students develop a plan to inhabit Mars, or to live in a spacecraft that would orbit the moon or a distant planet. This process includes researching, creating plans, and building a model that would best fit NASA expectations.

### Science Standards:

- Interpretation of Data
  - Select one piece of data from a simple data presentation (e.g., a simple food web diagram)
  - Find basic information in text that describes a simple data presentation
  - Understand basic scientific terminology
- Scientific Investigation
  - Find basic information in text that describes a simple experiment
  - Understand the tools and functions of tools used in a simple experiment
  - Understand the methods used in a simple experiment
- Evaluation of Models, Inferences, and Experimental Results
  - Identify implications in a model
  - Determine which models present certain basic information

### **Technology Standards:**

- Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.
- Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.
- Students publish or present content that customizes the message and medium for their intended audiences.
- Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
- Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

### **Engineering Standards:**

- Use tools to observe, measure, make things, and transfer information.
- Follow a set of instructions to produce a product using appropriate tools and materials.
- 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.
- Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- After testing, determine similarities and differences among several solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- Build a model that will be used for testing, and make modification so design outcomes can be achieved.

### **Math Standards:**

- Write positive powers of 10 by using exponents
- Perform operations with numbers in scientific notation
- Identify a digit's place value
- Solve one-step equations
- Compute the perimeter of polygons when all side lengths are given
- Compute the area and perimeter of triangles and rectangles in simple problems
- Solve multi-step real-life and mathematical problems with positive and negative rational numbers
- Construct simple equations and inequalities
- Represent proportional relationships by equations
- Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects

### **ELA Standards:**

- English

- Determine whether a simple essay has met a straightforward goal
- Determine the most logical place for a sentence in a paragraph
- Delete obviously redundant and wordy material
- Revise expressions that deviate markedly from the style and tone of the essay
- Recognize and correct marked disturbances in sentence structure
- Recognize and correct inappropriate shifts in verb tense and voice when the meaning of the entire sentence must be considered
- Ensure straightforward pronoun-antecedent agreement
- Use the appropriate word in frequently confused pairs
- Use appropriate punctuation in straightforward situations
- Writing
  - Generate reasons for a position that are vague or simplistic; show a little recognition of the complexity of the issue in the prompt by briefly noting implications and/or complications of the text.
  - Present a thesis that establishes focus on the topic issue, and/or briefly or unclearly responding to counterarguments to the writer's position.
  - Provide adequate development in support of ideas; clarify ideas by using some specific reasons, details, and examples
  - Use some appropriate transitional words and phrases
  - Present a somewhat developed introduction and conclusion
  - Show adequate use of language to communicate by correctly employing many of the conventions of Standard English grammar, usage, and mechanics, but with some distracting errors that may occasionally impede understanding, choosing words that are appropriate, and using some varied kinds of sentence structures to vary pace.
- Reading
  - Identify a clear central idea or theme in somewhat challenging passages or their paragraphs
  - Summarize key supporting ideas and details in somewhat challenging passages
  - Recognize a clear intent of an author or narrator in somewhat challenging passages
  - Locate simple details at the sentence and paragraph level in somewhat challenging passages
  - Draw simple logical conclusions in somewhat challenging passages
  - Draw a logical conclusions using information from two informational texts
  - Identify simple cause-effect relationships within a single paragraph in somewhat challenging and literary narratives
  - Analyze how one or more sentences in complex passages offer reasons for or support a claim

**Social Studies Standards:**

- Chronological Reasoning
- Sequencing - Design one's own sequential pattern of events and explain why they occurred in this manner
- Historical Connections

- Comparison - Categorize the traits of two items by placing them into "like" topics (grouping a list of traits)
- Analyzing Historical Sources
- Evidence - Describe details/ evidence that support a main idea/ argument statement

