

# Earth and Space Science

## Project #2

**Introduction:** In our classes, we transitioned from the formation of a star and its stages in its evolution to our own solar system. Johannes Kepler came up with his three (3)-laws of planetary motion as well as Sir Isaac Newton who came up with his universal gravitation law. We connected these laws to the modern-day heliocentric model, which was first introduced by Nicolaus Copernicus. We have started to venture into the motions of our own planet and the effects of these motions that we can observe from the Earth's surface.

Here are your choices for the 2<sup>nd</sup> marking period project:

### 1. **My Zodiac Myth Connections**

- Description: In this project, you will explore the myth behind one **zodiac constellation**. You may choose the zodiac sign from your birthday or pick one that you find interesting. You will learn the story behind the constellation, discover a few scientific facts about it, and make a connection to one of three famous sky heroes such as: Orion, Hercules, or Jason and the Argonauts. You will show your learning by writing short summaries and creating a simple illustration.
- Goal: The goal of this project is to learn how a zodiac constellation connects to both its myth and real astronomy, and to show how it relates to Orion, Hercules, or Jason and the Argonauts.

### 2. **Solar Shadow Tracker**

- Description: Measure and record the length and direction of shadows at different times (e.g., morning, noon, and evening). Create a chart that shows how the shadow changes as the Sun moves across the sky. Draw a diagram or use a model to show how shadow length correlates with the Sun's position and time of day.
- Goal: To track the length and direction of their shadows throughout the day and map the Sun's movement based on shadow changes.

### 3. **Twilight Zone Episode Review and Reflection**

- Description: Rewatch the episode of *The Midnight Sun* and write a review that includes a summary of the plot, analysis of the characters, and how the episode builds suspense. Reflect on the central themes of the episode, such as fear, survival, and the human condition. Discuss the ending and how it plays into the twist that *The Twilight Zone* is famous for. End the review with a personal opinion on the episode—what worked, what didn't, and what made it stand out as a classic example of science fiction.
- Goal: Write a detailed review of *The Midnight Sun*, focusing on themes, character development, and the impact of the setting.

### 4. **Solar Nebular Theory**

- Description: In this project, you will explore how our solar system formed according to the Solar Nebula Theory. You will show the process of a giant cloud of gas and dust collapsing, forming the Sun, planets, and other objects. You can use drawings, models, diagrams, or a short story to explain each stage clearly and creatively.
- Goal: The goal of this project is to understand and explain how the Sun, planets, and other objects formed from a spinning cloud of gas and dust, and to show the key stages of the Solar Nebula Theory in a clear and creative way.

### 5. **Creating a Kepler's Laws Presentation or Poster**

- Description: Create a poster or slide presentation summarizing Kepler's First, Second, and Third Laws. Include diagrams to show examples of elliptical orbits, planet speeds, and the relationship between orbital period and distance.
- Goal: Synthesize information about Kepler's Three Laws of Planetary Motion into an engaging and educational format.

**Rubric: Constellation Storybook**

<b>Criteria</b>	<b>4-Advanced</b>	<b>3-Proficient</b>	<b>2-Developing</b>	<b>1-Beginning</b>
Myth Summary	Tells a complete, accurate myth in 5–6 sentences; easy to understand	Tells most of the myth; mostly clear and accurate	Myth is incomplete or has some errors; hard to understand	Myth is missing or mostly inaccurate
Scientific Facts	Includes 3 accurate facts about the constellation (visibility, brightest star, fun fact)	Includes 2 accurate facts	Includes 1 accurate fact	Facts missing or incorrect
Connection / Relevance	Explains a meaningful connection between the zodiac constellation and mythology, other constellations, or Greek heroes in 2–3 sentences	Connection mostly clear but could be stronger	Connection unclear or incomplete	No connection made
Illustration / Creativity	Neat, colorful, and clearly related to myth or constellation	Illustration shows myth or constellation, but less neat	Illustration is unclear or only partly related	No illustration or unrelated

Of note, I need to see a works cited and for you to **cite** your sources within the text of your project.

**Rubric: Solar Shadow Tracker**

Criteria	4-Advanced	3-Proficient	2-Developing	1-Beginning
Data Collection	Accurately measures and records shadow length and direction at multiple times (morning, noon, evening) with detailed observations.	Measures and records shadow length and direction at multiple times, but with minor inaccuracies or missing observations.	Records shadow length and direction but lacks accuracy or completeness in data collection.	Incomplete or inaccurate data; fails to measure shadow length and direction at all required times.
Chart/Graph	Creates a clear, well-organized chart that effectively shows changes in shadow length and direction over time.	Creates a chart that shows changes in shadow length and direction, but may lack clarity or organization.	Chart is present but poorly organized or difficult to understand, with minimal data points.	Chart is missing, unclear, or does not show meaningful data on shadow changes.
Diagram/Model	Provides a detailed and accurate diagram or model that clearly illustrates the relationship between shadow length, Sun position, and time of day.	Provides a diagram or model that shows the relationship between shadow length and Sun position, but may lack detail or accuracy.	Diagram or model is included but is minimal or unclear, with little connection to shadow length and Sun position.	Diagram or model is missing, incomplete, or does not accurately represent the relationship between shadow and Sun position.
Understanding and Explanation	Demonstrates a clear understanding of how shadow changes relate to the Sun's movement; explanation is thorough and insightful.	Shows understanding of how shadows change with Sun's movement, but the explanation lacks depth or detail.	Shows limited understanding of the relationship between shadow changes and the Sun's position, with basic or vague explanation.	Explanation is missing, unclear, or demonstrates a lack of understanding of shadow changes and Sun movement.

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### Rubric: Twilight Zone Episode Review and Reflection

Criteria	4-Advanced	3-Proficient	2-Developing	1-Beginning
Plot Summary	Provides a clear and concise summary that covers key events without giving excessive detail, capturing the essence of the episode.	Provides a summary of the episode that covers most key events but may lack conciseness or clarity.	Summary includes some key events, but is either overly detailed, missing elements, or unclear.	Summary is incomplete, unclear, or does not capture key elements of the episode.
Character Analysis	Insightfully analyzes character motivations, growth, and relationships, with specific examples from the episode.	Provides character analysis with some examples, though lacking depth or clarity in parts.	Shows limited analysis of characters, mentioning basic traits without much depth.	Character analysis is missing, unclear, or lacks meaningful insight.
Theme Exploration	Thoroughly explores themes such as fear, survival, and the human condition, with clear connections to the episode's plot and setting.	Addresses themes with some understanding but lacks depth or specific connections to the plot and setting.	Mentions themes briefly, but lacks detail or clear connections to the episode.	Themes are either not mentioned or are vaguely referenced without connection to the episode.
Suspense and Twist Ending	Analyzes how suspense is built and the impact of the twist ending, connecting these elements to <i>The Twilight Zone</i> style.	Discusses suspense and twist ending, with some connection to <i>The Twilight Zone</i> style, but lacks depth.	Mentions suspense and twist ending briefly, without connection to <i>The Twilight Zone</i> style.	Lacks mention or understanding of suspense and twist ending, or how it relates to <i>The Twilight Zone</i> .
Personal Opinion	Provides a thoughtful personal opinion on the episode, discussing what worked well, what didn't, and its impact as a sci-fi classic.	Shares a personal opinion with some points about strengths and weaknesses, but lacks detail or depth.	Opinion is vague, with minimal mention of strengths, weaknesses, or the episode's impact as a sci-fi classic.	Opinion is missing or lacks relevance, showing little engagement with the episode.

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### Rubric: Solar Nebula Theory

Criteria	4-Advanced	3-Proficient	2-Developing	1-Beginning
Understanding of Theory	Clearly and accurately explains all key stages of the Solar Nebula Theory	Explains most key stages with minor errors	Explains some stages but misses important details	Shows little or no understanding of the theory
Visuals / Creativity	Illustrations, models, or diagrams are clear, colorful, and creative	Visuals are mostly clear and relevant	Visuals are unclear or partially relevant	No visuals or unrelated to the project
Visual Creativity	Uses creative visuals (charts, diagrams, or solar system model) that enhance understanding and engage the audience.	Includes visuals that aid understanding, though they may lack creativity or detail.	Limited or simplistic visuals that add minimal support to the presentation.	Lacks or uses ineffective visuals, with little to no contribution to understanding the topic.
Explanations / Labels	Each step is well-labeled and includes clear, accurate explanations	Most steps labeled and explained accurately	Some steps labeled or explained, but incomplete	Steps missing or not explained
Effort & Presentation	Project is neat, organized, and shows strong effort	Project is neat and organized with some effort	Project is somewhat messy or incomplete	Project is messy, incomplete, or shows little effort

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### Rubric: Creating a Kepler's Laws Presentation or Poster

Criteria	4-Advanced	3-Proficient	2-Developing	1-Beginning
Content Accuracy	Accurately explains Kepler's First, Second, and Third Laws with clear, detailed descriptions. Covers key concepts such as elliptical orbits, variable speeds, and orbital period-distance relationship.	Explains all three laws accurately, with minor details missing. Key concepts are covered but may lack some detail or clarity.	Provides basic explanations of each law, but contains inaccuracies or lacks clarity on some concepts.	Explanation of the laws is incomplete or inaccurate, missing major concepts or showing misunderstandings.
Diagrams and Visuals	Includes well-labeled, clear diagrams for each law (elliptical orbits, planet speeds, and orbital period-distance relationship) that enhance understanding.	Diagrams are included for each law, are mostly accurate, and support understanding of concepts, though some details may be unclear.	Diagrams are basic or lack labels; may only partially represent concepts and do not fully enhance understanding.	Lacks diagrams, or diagrams are inaccurate or unrelated to the laws, making it hard to understand the concepts.
Organization and Presentation	Poster/slide presentation is well-organized, visually appealing, and easy to follow. Information flows logically, supporting synthesis and comprehension.	Presentation is organized and easy to follow, though may lack some visual appeal or minor points may be unclear.	Presentation is somewhat organized, but lacks flow, making it difficult to follow; visuals or text may be cluttered or distracting.	Presentation is disorganized, difficult to follow, or visually unappealing; lacks logical flow, making it hard to understand.
Depth of Understanding	Demonstrates a thorough understanding of each law, clearly explaining the significance and implications of Kepler's Laws for planetary motion.	Shows understanding of the laws, though explanations may lack depth or miss subtle implications.	Shows basic understanding, but explanations lack depth or fail to connect the laws to their significance in planetary motion.	Demonstrates minimal understanding of Kepler's Laws; explanations are shallow or incomplete, failing to convey significance.

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