

kingdom in peril



Kingdom in Peril

Middle School Common Core State Standards Alignment



WHAT STUDENTS DO: Explore the arrangement of Sun, Earth, and Earth's moon necessary to generate eclipses.

Students will assume the role of a 17th century monarch who must learn and understand eclipse phenomena to save the kingdom from revolt. Students will explore the arrangement of the Sun, Earth, Moon system, and inclination of the Moon's orbit necessary to generate solar and lunar eclipse patterns experienced on Earth. They will explore the shadow zones and likelihood of observing these phenomena.

NRC FRAMEWORK/NGSS CORE & COMPONENT QUESTIONS

WHAT IS THE UNIVERSE AND WHAT IS EARTH'S PLACE IN IT?

NGSS Core Question: ESS1: Earth's Place in the Universe

What are the predictable patterns caused by Earth's movement in the solar system?

ESS1.B: Earth and the Solar System

INSTRUCTIONAL OBJECTIVES (IO)

Students will be able to

IO1: Explain predictable eclipse patterns using a model to discover and demonstrate the evidence of phenomena at different scales such as the Moon's inclination (orbital plane) in combination with the position of the Sun, Earth, Moon system.

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1.0 About This Activity

How Students Learn: Science in the Classroom (Donovan & Bransford, 2005) advocates the use of a research-based instructional model for improving students' grasp of central science concepts. Based on conceptual-change theory in science education, the 5E Instructional Model (BSCS, 2006) includes five steps for teaching and learning: Engage, Explore, Explain, Elaborate, and Evaluate. The Engage stage is used like a traditional warm-up to pique student curiosity, interest, and other motivation-related behaviors and to assess students' prior knowledge. The Explore step allows students to deepen their understanding and challenges existing preconceptions and misconceptions, offering alternative explanations that help them form new schemata. In Explain, students communicate what they have learned, illustrating initial conceptual change. The Elaborate phase gives students the opportunity to apply their newfound knowledge to novel situations and supports the reinforcement of new schemata or its transfer. Finally, the Evaluate stage serves as a time for students' own formative assessment, as well as for educators' diagnosis of areas of confusion and differentiation of further instruction. The 5E stages can be cyclical and iterative.



2.0 Instructional Objectives, Learning Outcomes, Standards, & Rubrics

Visit <https://infiniscope.org/> for access to the digital learning experience, lesson plans, standards alignment documents, and additional resources.

Instructional objectives and learning outcomes are aligned with

- Achieve Inc.'s, *Next Generation Science Standards (NGSS)*
- National Research Council's, *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*
- National Governors Association Center for Best Practices (NGA Center) and Council of Chief State School Officers (CCSSO)'s, *Common Core State Standards for Mathematics*

The following chart provides details on alignment among the core and component NGSS questions, instructional objectives, learning outcomes, and educational standards.

- Your **instructional objectives (IO)** for this lesson align with the Common Core State Standards.
- You will know that you have achieved these instructional objectives if students demonstrate the related **learning outcomes (LO)**, also aligned with the Common Core State Standards.
- You will know the level to which your students have achieved the learning outcomes by using the suggested **rubrics**.

Quick View of Standards Alignment:

This alignment document provides full details of the way in which instructional objectives, learning outcomes, 5E activity procedures, and rubric assessments were derived through, and align with the Common Core State Standards. For convenience, a quick view follows:



WHAT IS THE UNIVERSE AND WHAT IS EARTH'S PLACE IN IT?

NGSS Core Question: ESS1: Earth's Place in the Universe

What are the predictable patterns caused by Earth's movement in the solar system?

ESS1.B: Earth and the Solar System

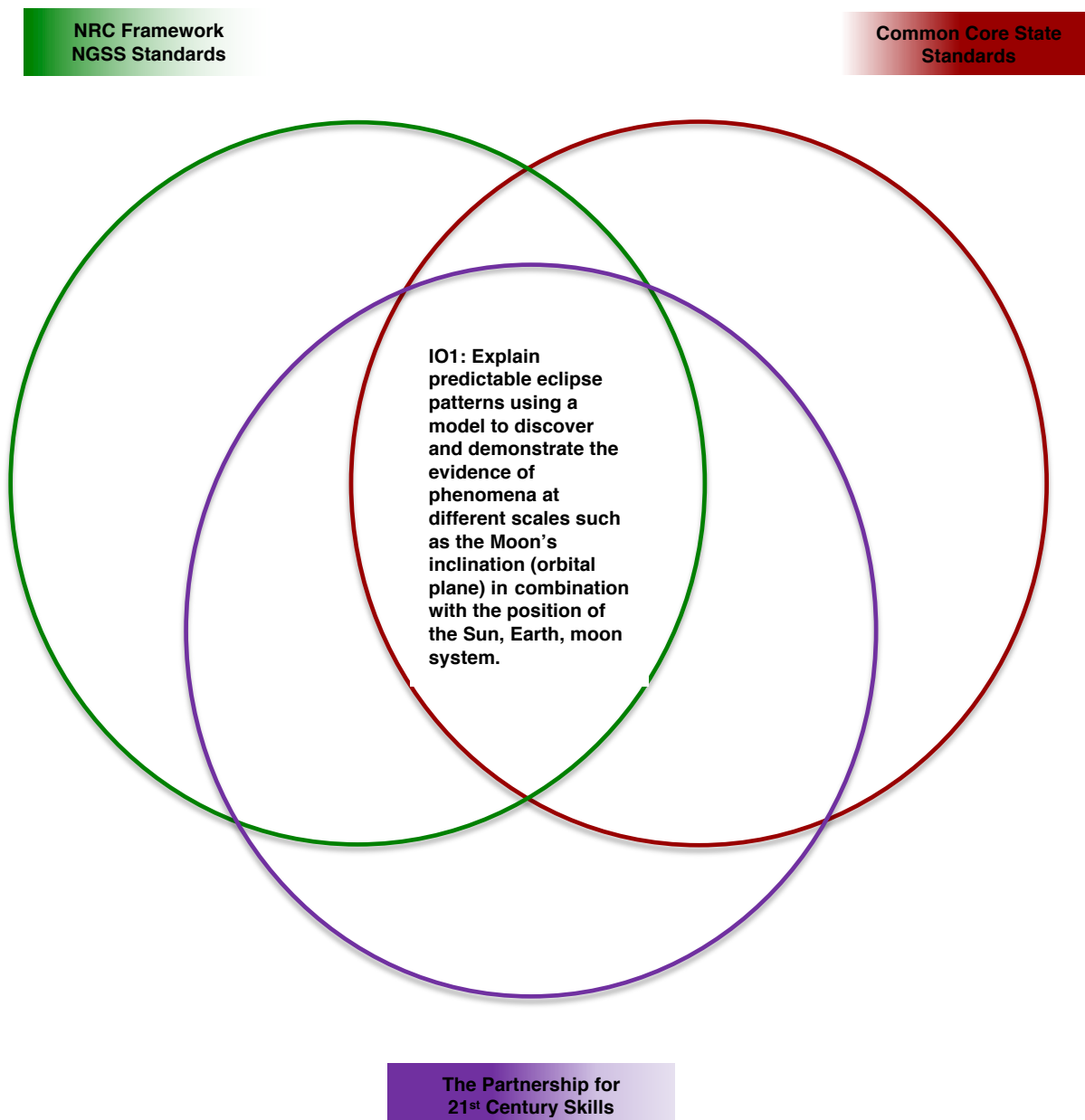
Instructional Objective <i>Students will be able to</i>	Learning Outcomes <i>Students will demonstrate the measurable abilities</i>	Standards <i>Students will address</i>
IO1: Explain predictable eclipse patterns using a model to discover and demonstrate the evidence of phenomena at different scales such as the Moon's inclination (orbital plane) in combination with the position of the Sun, Earth, Moon system.	<p>LO1a: Use a model to discover and explain the arrangement of the Sun, Earth, Moon system to generate eclipses</p> <p>LO1b: Evaluate the credibility of arguments provided by advisory for the cause of solar and lunar eclipses based on ways of knowing.</p> <p>LO1c: Use a model to discover and explain the relationship between umbral diameter and likelihood of viewing an eclipse from Earth.</p> <p>LO1d: Use a model to investigate and explain the relationship of the Moon's inclination and the pattern of observed solar eclipses over time.</p>	<p>ELA STANDARDS:</p> <ul style="list-style-type: none"> Text Types and Purposes CCSS.ELA-LITERACY.W.6.2 - 8.2 Grades 6-12 Literacy in History/Social Studies, Science, & Technical Subjects CCSS.ELA-LITERACY.RST.6-8.7

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3.0 Learning Outcomes, NRC Framework, NGSS, Common Core, & 21st Century Skills Connections

The connections diagram is used to organize the Instructional Objective addressed in the lesson to establish where each will meet the Next Generation Science Standards, Common Core Standards, and the 21st Century Skills and visually determine where there are overlaps in these documents. See NGSS Alignment Document and Common Core State Standards Alignment Document for details on their specific alignments.



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3.0 Evaluation/Assessment

Use the *(N) Kingdom in Peril Alignment Rubric* as a summative assessment, providing final assessment of learning activities. The rubric evaluates the activities using the Common Core State Standards (CCSS).

4.0 References

- Achieve, Inc. (2013). *Next generation science standards*. Achieve, Inc. on behalf of the twenty-six states and partners that collaborated on the NGSS.
- Bybee, R., Taylor, J., Gardner, A., Van Scotter, P., Carson Powell, J., Westbrook, A., Landes, N. (2006) *The BSCS 5E instructional model: origins, effectiveness, and applications*. Colorado Springs: BSCS.
- Donovan, S. & Bransford, J. D. (2005). *How Students Learn: History, Mathematics, and Science in the Classroom*. Washington, DC: The National Academies Press.
- Miller, Linn, & Gronlund. (2009). *Measurement and assessment in teaching*. Upper Saddle River, NJ: Pearson.
- National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010). *Common Core State Standards*. Washington, DC: Authors.
- National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas*. Committee on a Conceptual Framework for New K-12 Science Education Standards. Board on Science Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

**(N) Teacher Resource. Kingdom in Peril Common Core State Standards Alignment**

You will know the level to which your students have achieved the **Instructional Objective(s)**, by using the suggested **Rubric** below.

	Common Core State Standards
Instructional Objective	Writing Standards for Literacy in Science and Technical Subjects (6-8)
IO1: Explain predictable eclipse patterns using a model to discover and demonstrate the evidence of phenomena at different scales such as the Moon's inclination (orbital plane) in combination with the position of the Sun, Earth, Moon system.	<p>Text Types and Purposes: CCSS.ELA-LITERACY.W.6.2 - 8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.</p> <ul style="list-style-type: none"> a. Introduce a topic; organize ideas, concepts, and information, using strategies such as definition, classification, comparison/contrast, and cause/effect; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate transitions to clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style. <p>Grades 6-12 Literacy in History/Social Studies, Science, & Technical Subjects CCSS.ELA-LITERACY.RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).</p>



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Related Rubrics for the Assessment of Instructional Objective Associated with the Above Standard(s):



Common Core State Standards

	Expert	Proficient	Intermediate	Beginner
CCSS.ELA-LITERACY.W.6 - 8.2	Introduces topic clearly, provides key concepts, and groups related information logically; Develops the explanation with facts, definitions, concrete details and evidence; Links ideas using words, phrases, and clauses; Uses domain-specific vocabulary to support the explanation and evidence; Provides a concluding statement related to the explanation.	Introduces topic clearly, provides key concepts, and groups related information logically; Develops the explanation with details or other examples related to the explanation; Uses domain-specific vocabulary to support the explanation and evidence; Provides a concluding statement related to the explanation.	Introduces topic, provides a general description; Develops the explanation with details, or other examples related to the explanation; Links ideas using words or phrases; Uses domain-specific vocabulary to support the explanation.	Introduces topic; attempts to provide details or unrelated examples; Uses day to day vocabulary to support the explanation.
CCSS.ELA-LITERACY.RST.6-8.7	Explanation is enhanced with diagrams accurately depicting arrangements of the Sun, Earth, Moon system resulting in lunar and solar eclipses including inclination of the Moon's orbit. Appropriate labels are provided. Celestial bodies and shadows depicted appropriately reflect relative sizes with the indication that the diagrams are not to scale.	Explanation is enhanced with diagrams accurately depicting arrangements of the Sun, Earth, Moon system resulting in lunar and solar eclipses. Appropriate labels are provided. Celestial bodies and shadows depicted appropriately reflect relative sizes.	Explanation includes a diagram depicting arrangements of the Sun, Earth, Moon system and resulting shadows resulting in lunar and solar eclipses.	Explanation attempts to include a diagram depicting the arrangements of the Sun, Earth, Moon system resulting in lunar or solar eclipses.