

**Cycles • Relationships • Cause and Effect**



**Unit Essential Questions**

- How do the Earth and its Moon move?
- What can we see in the sky?

**UNIT DESCRIPTION**

During this unit students will make scientific connections that are out of this world! Students will learn about Earth's cycle of day and night. They will also use visual arts and theatre to explore why seasons exist and how the tilt of Earth's axis affects them. Also in this unit, the phases of the moon will be explored along with their sequential order. Students will immerse themselves in sketching and designing a 3D stabile. We will also observe how technology allows scientists to observe and study distant objects in the sky.

**PROJECTS**

- Documenting Phases of the Moon
- Stable Model of Earth, Sun and Moon
- Seasons on Stage!

**[www.artsnowlearning.org](http://www.artsnowlearning.org)**

Units provide differentiated ideas and activities aligned to a sampling of standards.

The units do not necessarily imply mastery of standards, but are intended to inspire and equip educators.

Produced through the U.S. Department of Education: Arts in Education—Model Development and Dissemination Grants Program  
Cherokee County (GA) School District and ArtsNow, Inc.

Unit Description	Table of Contents
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**UNIT ESSENTIAL QUESTION**

How do the Earth and its Moon move?  
What can we see in the sky?

**CROSS-CUTTING INTERDISCIPLINARY CONCEPT**

Cycles  
Cause and Effect  
Relationships

**REAL WORLD CONTEXT**

Students must be able to recognize and understand how the tilt in the Earth's axis affects seasonal changes throughout the year. This concept helps us understand why daytime and nighttime exist as well as the passage of time and the four seasons over a course of a 365-day year. Students also gain a firmer understanding of the solar system and our proximity to the sun and the other planets.

**STANDARDS**

Curriculum Standards	Arts Standards
<p><b>S4E2</b> Students will model the position and motion of the earth in the solar system.</p> <p><b>a.</b> Explain the day/night cycle of Earth using a model.</p> <p><b>b.</b> Explain the sequence of the phases of the moon.</p> <p><b>c.</b> Demonstrate the revolution of the earth around the earth's tilt to explain seasonal changes.</p> <p><b>ELAGSE4RL5</b> Explain major differences between poems, drama, and prose, and refer to the structural elements of poems (e.g., verse, rhythm, meter) and drama (e.g., casts of characters, settings, descriptions, dialogue, stage directions) when writing or speaking about a text.</p>	<p><b>D4CR1</b> Demonstrates and understanding of creative and choreographic principles, processes, and structures.</p> <p><b>D5FD.3</b> Recognizes the anatomical and kinesiology concepts in movement.</p> <p><b>d.</b> Understands, explores, and sequences clear movements of body parts, body halves, and the body in planes in space.</p> <p><b>D5FD.4</b> Understands and applies music concepts to dance.</p> <p><b>D5CR.2</b> Demonstrates an understanding dance as a way to communicate meaning.</p>

**ELAGSE4RI3** Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

**ELAGSE4RI4** Determine the meaning of general academic language and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

**MGSE4.MD.2** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

**MGSE4.OA.5** Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. Explain informally why the pattern will continue to develop in this way.

**M4GM.10** Moving, alone and with others, to a varied repertoire of music.

**d.** Perform choreographed and non-choreographed movements.

**TAES4.7** Integrating various art forms other content areas, and life experiences to create theater.

**VA4MC1** Engages in the creative process to generate and visualize ideas.

**VA4PR.1** Creates artworks based on personal experience and selective themes.

**VA4PR.3** Understands and applies media, techniques, and processes of three-dimensional works of art (ceramics, sculpture, crafts, and mixed-media) using tools and materials in a safe and appropriate manner to develop skills.

## ASSESSMENTS

### Summative Assessments

- Pre/Post Test
- Documenting Phases of the Moon Rubric
- Stable Model of Earth, Sun and Moon Rubric
- Seasons on Stage Rubric

## APPENDIX (See Downloads)

- Pre/Post Test

## ADDITIONAL RESOURCES

### Website:

- [www.howstufworks.com](http://www.howstufworks.com)
- [www.visuallearningsys.com](http://www.visuallearningsys.com)

### Virtual Fieldtrips:

- [www.eyes.nasa.gov](http://www.eyes.nasa.gov)

**CREDITS**

U.S. Department of Education

Arts in Education--Model Development and Dissemination Grants Program

Cherokee County (GA) School District and ArtsNow, Inc.

Ideas contributed and edited by:

Pam Lehman, Lisa McEachern, Cheryl McFarland, Shannon Green, Susie Spear Purcell, Jessica Espinoza

## **Out of This World! Unit Pre/Post-Test**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Part 1:** *Use the words in the Word Bank to complete the sentences below.*

rotate	orbit	revolve	eclipse
axis	pole		

1. The oval-shaped path Earth takes around the sun is called a/an \_\_\_\_\_.
2. Earth takes 24 hours to \_\_\_\_\_. It takes 365  $\frac{1}{4}$  days to \_\_\_\_\_ around the sun.
3. The moon takes about a month to \_\_\_\_\_ around Earth.
4. Earth spins around its \_\_\_\_\_.

**Part 2:** *Circle the correct answer.*

5. When Earth spins around on its axis, we say it
  - a. revolves
  - b. rotates
  - c. orbits
  - d. phases
6. To travel in a closed path is to
  - a. revolve
  - b. rotate
  - c. spin
  - d. move
7. When the moon changes shapes it is going through a
  - a. star
  - b. phase
  - c. orbit
  - d. comet

8. An eclipse occurs when
- the moon rises
  - the sun sets
  - one object in space hides another object in space
  - the moon rises while the sun is still out
9. What phase of the moon is shown in the diagram?



- waning gibbous
  - waxing gibbous
10. **True or False:** A natural satellite that orbits a planet of called a comet.

**Constructed Response (30 points)**

*Answer the following questions using complete sentences.*

- 1) Why does the appearance of the moon change?

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**Teacher Scoring Suggestions:**

Part 1 & Part 2= 70 points (7points each)

Constructed Response Section= 30 points total

#1) 14 points

#2) 8 points for day/night explanation & 8 points for seasonal explanation



## Documenting Phases of the Moon



### Project Essential Questions

- How do phases of the moon depend on relative positions of the sun, moon and earth?
- How can drawing be used to better understand the phases of the moon?

### PROJECT DESCRIPTION

In this project, students will design a field journal illustrating the eight phases of the moon to demonstrate understanding of the phases and cycles of the moon over time.

### LEARNING TARGETS

“I Can...”

- Illustrate the phases of the moon for one month
- Describe how the phases of the moon change over the duration of one month

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Project Description	Learning Targets
In this project, students will design a field journal illustrating the eight phases of the moon to demonstrate understanding of the phases and cycles of the moon over time.	<p>"I Can..."</p> <ul style="list-style-type: none"> <li>• Illustrate the phases of the moon for one month</li> <li>• Describe how the phases of the moon change over the duration of one month</li> </ul>

**ESSENTIAL QUESTIONS**

- How do phases of the moon depend on relative positions of the sun, moon and earth?
- How can drawing be used to better understand the phases of the moon?

**STANDARDS**

Curriculum Standards	Arts Standards
<p><b>S4E2</b> Students will model the position and motion of the earth in the solar system and will explain the role of relative position and motion in determining sequence of the phases of the moon.</p> <p><b>b.</b> Explain the sequence of the phases of the moon.</p>	<p><b>VA4MC1</b> Engages in the creative process to generate and visualize ideas.</p> <p><b>VA4PR.1</b> Creates artworks based on personal experience and selective themes.</p>

**KEY VOCABULARY**

Content Vocabulary
<ul style="list-style-type: none"> <li>• Phase</li> <li>• Cycle</li> <li>• Orbit</li> <li>• Waxing</li> <li>• Waning</li> <li>• Gravity</li> <li>• Tides</li> <li>• Full moon</li> <li>• Quarter moon</li> <li>• Crescent</li> <li>• Illuminate</li> <li>• Fractions</li> <li>• Data collection</li> </ul>
Art Vocabulary
<ul style="list-style-type: none"> <li>• Line: An element of art which refers to the continuous mark made on some surface by a moving point. It may be two dimensional, like a pencil mark on a paper or it may be three dimensional (wire) or implied (the edge of a shape or form) often it is a outline, contour or silhouette.</li> <li>• Shape: An enclosed space defined by other elements of art. (Shapes may take on the appearance 2 or 3 objects).</li> <li>• Form: An element of art that is three-dimensional and encloses volume (cubes, spheres, and cylinders are examples of various forms).</li> <li>• Sphere: A round solid figure, or its surface, with every point on its surface equidistant from its center.</li> <li>• Value: This describes the lightness or darkness of a color. Value is needed to express volume.</li> </ul>

- Drawing: A picture or diagram made with a pencil, pen, or crayon rather than paint, especially one drawn in monochrome.
- Illustration: A picture illustrating a book, newspaper, etc.
- Bookbinding: The process of physically assembling a book from an ordered stack of paper sheets that are folded together into sections or sometimes left as a stack of individual sheets. The stack is then bound together along one edge by either sewing with thread through the folds or by a layer of flexible adhesive.

**TECHNOLOGY INTEGRATION**

<https://www.youtube.com/watch?v=AQ5vty8f9Xc>

**ASSESSMENTS**

Formative	Summative
<ul style="list-style-type: none"> <li>• Assess the calendar weekly using a sentence frame: "This week I observed..."</li> </ul>	<ul style="list-style-type: none"> <li>• Pre/Post-Test (before and after unit)</li> <li>• <b>Documenting Phases of the Moon Rubric</b> (See Downloads)</li> </ul>

**MATERIALS**

- Calendar for data collection; Art pencils H, 2b, 4b, 6b; 1 rubberband per student; hole punch; five pieces of copy paper per student; 1 sheet of cardstock per student; 1 pencil or bamboo skewer per student

**Activating Strategy (5-10 min)**

Share PBS moon phase video with class <https://www.youtube.com/watch?v=AQ5vty8f9Xc>. Introduce Sketching pencils. Allow students to experiment with the 4 different pencils. Discuss how the pencils are different. Create a value scale sketch demonstrating the value range of the 4 pencils.

- Each student will be given a calendar to record moon phase observations for one month.
- Each student will create a field journal.
- They will use this journal and their recordings on their calendar to create illustrations depicting the phases of the moon, adding a written description.

**Main Activity****PROCESS:**

In this project each student will be given a calendar to record moon phase observations for one month. Each student will create a field journal. They will use this journal and their recordings on their calendar to create illustrations depicting the phases of the moon, adding a written description.

**Part 1**

- Distribute the moon phase calendar and discuss the process of data collection over the course of a month.

**Part 2**

- Create a field journal by introducing this simple book binding technique. (Books may be pre assembled due to time constraints if necessary.)
- Materials Needed: 8 ½ x 11 copy paper (4 sheets), 8 ½ x 11 cardstock (1 piece), rubber band, Pencil or bamboo skewer

- Tools: scissors, hole punch
- Fold copy paper and cardstock in half horizontally.
- Stack your folded paper, sandwiching the text paper in between the cardstock creating a book.
- Punch two holes along the spine of the book – approximately 1/2 inch from the spine edge and 1 inch from the top and bottom (this can vary but making the holes too close to the edges puts them at risk to rip out)
- Thread the rubber band through the holes and capture the pencil or skewer – this will hold the cover and pages together.
- Now you have created a field journal!

**Part 3**

- Facilitate a whole group discussion sharing the completed data on the calendars. Highlight the eight phases of the moon and explain the process of illustrating the field journal using the 4 sketching pencils. Explain the difference between the quick sketches collected on the calendars and the illustrations. Explain the difference between a circle (shape) and a sphere (form).

**Part 4**

- Allow students to complete their field journals illustrating the 8 phases of the moon using their knowledge of form and value along with data collected from the direct observations recorded on their calendars.

**REFLECTION****Reflection Questions**

- *How did you use your knowledge of form and value along with data collected from the direct observations to complete the illustrations in your field journal?*
- *How do the phases of the moon correlate with the relative position and motion of the earth in the solar system?*

**DIFFERENTIATION****Accelerated:**

- These students could research how the moon would look in the different hemispheres (northern vs. southern) and could sketch the moon as it would look in the southern hemisphere.

These students could also compose a musical selection using found sounds that represent the phases of the moon. The sound's pitch should reflect the size of the moon – such as a full moon would be represented by a deep low sound (like a tuba or bass drum) and a new moon should be represented by a high pitched sound (like a piccolo).

**Remedial/EL Students:**

- Assist students with vocabulary and sketching by conferencing often throughout the project.

**APPENDIX (See Downloads)**

- **Documenting Phases of the Moon Rubric**

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### Documenting Phases of the Moon Rubric

**TASK: Eight Recorded Moon Phases and Informational Writing**

Task	4	3	2	1
<b>Accurately draw all eight phases of the moon in the correct sequence.</b>	All 8 phases of the moon are accurately drawn and shaded in the correct sequence.	Most (between 5-7) phases of the moon are accurately drawn and shaded in the correct sequence.	Some (between 3-5) phases of the moon are accurately drawn and shaded in the correct sequence.	Two or less phases of the moon are accurately drawn and shaded in the correct sequence.
<b>Use all vocabulary words for phases: <i>new moon, waxing crescent moon, first quarter moon, waxing gibbous moon, full moon, waning gibbous moon, third quarter moon, waning crescent moon, new moon</i></b>	Student uses appropriate language skills in the written descriptions of <u>all</u> 8 phases of the moon.	Student uses appropriate language skills in the written descriptions of most phases of the moon.	Student uses appropriate language skills in the written descriptions of some phases of the moon.	Student uses appropriate language skills in the written descriptions of a few phases of the moon.
<b>Accuracy of Science Content</b>	All facts presented about the phases of the moon are complete and correct.	Most facts presented about the phases of the moon are complete and correct.	Most science content is neither complete nor correct.	None of the science content is complete or correct.

Total Score: \_\_\_\_\_



## Making a Stabile of the Moon, Sun & Earth



### Project Essential Questions

- How can a stabile model the relationship between Earth and its moon?
- What is the cyclical process that results in day and night?

#### PROJECT DESCRIPTION

In this project, students will design and build a stabile model demonstrating the movement of the Moon, Sun and Earth. The Stabile design was first used by artist Alexander Calder. (He invented the mobile and the stabile). His artwork will be explored and used as an inspiration for this project!

#### LEARNING TARGETS

“I Can...”

- Design and construct a stabile model of the Sun, Moon and Earth
- Explain the day and night cycle of the earth using the stabile model
- Write a detailed description of the day to night cycle

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**DURATION: 2-3 days**

Project Description	Learning Targets
In this project, students will design and build a stabile model demonstrating the movement of the Moon, Sun and Earth. The Stabile design was first used by artist Alexander Calder. (He invented the mobile and the stabile). His artwork will be explored and used as an inspiration for this project!	<p>"I Can..."</p> <ul style="list-style-type: none"> <li>• Design and construct a stabile model of the Sun, Moon and Earth</li> <li>• Explain the day and night cycle of the earth using the stabile model</li> <li>• Write a detailed description of the day to night cycle</li> </ul>

**ESSENTIAL QUESTIONS**

<ul style="list-style-type: none"> <li>• How can a stabile model the relationship between Earth and its moon?</li> <li>• What is the cyclical process that results in day and night?</li> </ul>
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**STANDARDS**

Curriculum Standards	Arts Standards
<p><b>S4E2a</b> Explain the day/night cycle of Earth using a model.</p> <p><b>b.</b> Explain the sequence of the phases of the moon.</p> <p><b>c.</b> Demonstrate the revolution of the earth around the earth's tilt to explain seasonal changes.</p> <p><b>d.</b> Demonstrate the relative size and order from the sun of the planets in the solar system.</p> <p><b>ELAGSE4RI3</b> Explain events, procedures, ideas or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.</p> <p><b>MGSE4.MD.2</b> Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.</p>	<p><b>VA4PR.3</b> Understands and applies media, techniques, and processes of three-dimensional works of art (ceramics, sculpture, crafts, and mixed-media) using tools and materials in a safe and appropriate manner to develop skills.</p>

**KEY VOCABULARY**

Content Vocabulary
<ul style="list-style-type: none"> <li>• Planet</li> <li>• Solar system</li> <li>• Crater</li> <li>• Axis</li> <li>• Rotation</li> </ul>



- Orbit
- Revolution
- Satellite
- Tide
- Phase
- Telescope
- Astronaut
- Cycle
- Proportion
- Scale
- Rates of change
- Orientation
- Scale Model
- Informational text
- Topic sentence
- Main idea
- Key details
- Support
- Site example
- Summary
- Cause/effect

#### Art Vocabulary

- **Stabile:** a freestanding abstract sculpture or structure, typically of wire or sheet metal, in the style of a mobile but rigid and stationary
- **Sculpture in the round:** a three-dimensional art piece that is freestanding and is meant to be viewed from all sides
- **Balance:** refers to the ways in which the elements of visual art (lines, shapes, colors, textures, etc.) of a piece are arranged
- **Aluminum armature wire:** heavy, dark aluminium wire which is stiff, but can be bent and twisted into shape without much difficulty
- **Primary colors:** any of a group of colors from which all other colors can be obtained by mixing. Primary colors consist of red, yellow, and blue
- **Color mixing:** mixing together a number of colors to create new colors or shades
- **Shade/tint:** the darkness or coolness of a color

#### TECHNOLOGY INTEGRATION

- [www.eyes.nasa.gov](http://www.eyes.nasa.gov)
- [www.howstuffworks.com](http://www.howstuffworks.com)
- [www.visuallearningsys.com](http://www.visuallearningsys.com)

#### ASSESSMENTS

Formative	Summative
<ul style="list-style-type: none"> <li>• Monitoring progress on designing and constructing the stabile</li> <li>• Assess the calendar weekly using a sentence frame: "This week I observed..."</li> </ul>	<ul style="list-style-type: none"> <li>• Pre/Post-Test (beginning and end of unit)</li> <li>• Stabile model will be assessed based on completion and the student's ability to write a detailed explanation of day and night cycle using the rubric.</li> </ul>

**MATERIALS**

12 gauge armature wire, 3 sizes of Styrofoam balls, foam brushes, Tempera paint (primary colors and black and white), matchbox car

**Activating Strategy (5-10 min)**

Introduce the work of Alexander Calder using this site:

<http://the189.com/sculpture/mobiles-stables-and-sculptur>

Teacher can show an example of a completed Stabile using this site:

<https://www.brainpop.com/science/space/moon/>

**Main Activity****Part 1**

- Facilitate a whole group discussion of how day and night happen.
- Discuss the relationship between the Earth, Moon and Sun including relative proportion, size and distance.
- Discuss scale models and use a matchbox car as an example because it is 1/64 the size of the real car it represents (real world example). Explain that this is why the 3 Styrofoam balls need to be different sizes. Ask which ball would represent each element.
- Discuss the process of creating a model out of armature wire and styrofoam balls.
- Discuss the role of color in the sculpture and review color mixing.

**Part 2**

- Students will build the three dimensional stabile of the Earth, Moon and Sun using wire, paint and Styrofoam balls.
- Determine which ball will represent each element.
- Paint each ball to represent the Sun, Moon and Earth making thoughtful color choices and allow to fully dry.
- Build the structure using the armature wire adding the Styrofoam balls to represent the relationship between the elements.

**Part 3**

- Students will complete informational writing piece answering the following question: Should the Sun cease to exist, what is your predicted outcome for the Earth and the Moon?

**REFLECTION****Reflection Questions**

- *How did this project help you understand the relationship between Earth and the Moon?*
- *What was most challenging about creating your stabile?*
- *If you could do this project again, what would you do differently?*
- *Does your writing demonstrate understanding of the day/night cycle? (Conduct a peer review of each other's writing before asking this question.)*

**DIFFERENTIATION****Accelerated:**

- These students could create a virtual stabile for the Earth, Sun, Moon and the eight phases of the moon. Students can use Prezi to create the virtual model. With each segment students

must write an explanation of each process. Students will then present their Prezi's in class. A three-point rubric will be used to assess the presentation.

- These students could write a script that could be used by a tour guide of an exhibit that demonstrates the day and night cycle caused by the revolution of the Earth around the sun. The script should include statements referencing the stabile that was created for class addressing the standards.
- These students could write a song that describes the movement of the Moon, Sun, and Earth. The pitch of the music could change relative to the size of the object (for example – the Sun is the largest, so it would be represented by the lowest pitch since bigger instruments make lower sounds).
- These students could research how the days would be different on different planets in the solar system (longer/shorter) and write an informational essay to compare and contrast the day/night cycle of Earth vs. another planet.

**Remedial/EL Students:**

- These students will create a stabile using the provided materials. However, with teacher assistance, students will work in a group to complete a Circle Map discussing Rotation.

**ADDITIONAL RESOURCES**

- Prezi (accelerated accommodation)
- Alexander Calder Presentation:  
<https://the189.com/sculpture/mobiles-stables-and-sculptures-by-alexander-calder/>



**APPENDIX (See Downloads)**

- **Making a Stabile of the Moon, Sun and Earth Rubric**

**CREDITS**

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### Making a Stabile of the Moon, Sun, and Earth Rubric

**TASK: Eight Recorded Moon Phases and Informational Writing**

Task	4	3	2	1
Design and construct a stabile model that depicts the relationship between Earth, the Moon and the Sun. Use paint to depict the Sun, Moon and Earth.	All pieces are correctly assembled and painted.	Most pieces are correctly assembled and painted.	Some pieces are correctly assembled and painted.	Two or less pieces are correctly assembled and painted.
Explain how the rotation and revolution of the Earth and Moon impact the cycle of day and night. Respond to the prompt: "Should the Sun cease to exist, what is your predicted outcome for the Earth and the Moon?"	Student clearly communicates his/her ideas and stays on topic, addressing the prompt.	Student most of the time communicates his/her ideas clearly and stays on topic, addressing the prompt.	Student some of the time communicates his/her ideas clearly and stays on topic, addressing the prompt.	Student rarely communicates his/her ideas clearly or stays on topic, addressing the prompt.
Accuracy of Science Content and Use of Vocabulary	All facts presented about the day/night cycle are complete and accurate. The science vocabulary is integrated into the writing fully.	Most facts presented about the day/night cycle are complete and accurate. The science vocabulary is integrated into the writing most of the time.	Most science content was neither complete nor accurate. The science vocabulary was rarely integrated.	The science content was incomplete or inaccurate. Science vocabulary was not integrated into writing.

Total Score: \_\_\_\_\_



## Project Essential Questions

- How can we use theatre to depict the Earth's tilt and rotation and how they impact seasonal changes?
- What is the relative effect of the Earth's gravitational pull and the Sun's virtual position in regards to our seasonal changes?

### PROJECT DESCRIPTION

Students will create a theatrical representation of the four season cycle demonstrating their understanding of what causes the four seasons. Students will personify the Sun, Earth and the characteristics of each season. They will apply their knowledge by writing a script that explains and models how the earth's tilt and revolution affects the change in seasons.

### LEARNING TARGETS

"I Can..."

- Create a script that models how the tilt and rotation of Earth affect our seasonal changes
- Become a character in a play about seasons
- Create dialogue that personifies the Earth, Sun, and four seasons
- Describe how the rotation and tilt of the earth affect seasons

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**DURATION: 3-5 days**

Project Description	Learning Targets
Students will create a theatrical representation of the four season cycle demonstrating their understanding of what causes the four seasons. Students will personify the Sun, Earth and the characteristics of each season. They will apply their knowledge by writing a script that explains and models how the earth's tilt and revolution affects the change in seasons.	<p>"I can..."</p> <ul style="list-style-type: none"> <li>• Create a script that models how the tilt and rotation of Earth affect our seasonal changes</li> <li>• Become a character in a play about seasons</li> <li>• Create dialogue that personifies the Earth, Sun, and four seasons</li> <li>• Describe how the rotation and tilt of the earth affect seasons</li> </ul>

**ESSENTIAL QUESTIONS**

- How can we use theatre to depict the Earth's tilt and rotation and how they impact seasonal changes?
- What is the relative effect of the Earth's gravitational pull and the Sun's virtual position in regards to our seasonal changes?

**STANDARDS**

Curriculum Standards	Arts Standards
<p><b>S4E2.</b> Students will model the position and motion of the earth in the solar system.</p> <p><b>c.</b> Demonstrate the revolution of the earth around the sun and the earth's tilt to explain the seasonal changes.</p> <p><b>ELAGSE4RL5</b> Explain major differences between poems, drama, and prose, and refer to the structural elements of poems (e.g., verse, rhythm, meter) and drama (e.g., casts of characters, settings, descriptions, dialogue, stage directions) when writing or speaking about a text.</p> <p><b>ELAGSE4RI3</b> Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.</p> <p><b>ELAGSE4RI4</b> Determine the meaning of general academic language and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.</p> <p><b>MGSE4.OA.5</b> Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. Explain informally why the pattern will continue to develop in this way.</p>	<p><b>D5FD.3</b> Recognizes the anatomical and kinesiology concepts in movement.</p> <p><b>d.</b> Understands, explores, and sequences clear movements of body parts, body halves, and the body in planes in space.</p> <p><b>D5FD.4</b> Understands and applies music concepts to dance.</p> <p><b>D5CR.2</b> Demonstrates an understanding dance as a way to communicate meaning.</p> <p><b>M4GM.10</b> Moving, alone and with others, to a varied repertoire of music.</p> <p><b>d.</b> Perform choreographed and non-choreographed movements.</p>



**KEY VOCABULARY**

Content Vocabulary
<ul style="list-style-type: none"> <li>• Cycle</li> <li>• motion orbit</li> <li>• Rotate</li> <li>• Revolve</li> <li>• Position</li> <li>• Traits</li> <li>• Temperature</li> <li>• Order</li> <li>• Rates of change</li> <li>• Angle (axis angle)</li> <li>• Properties (of a season)</li> <li>• Orientation</li> <li>• Informational text</li> <li>• Topic sentence</li> <li>• Main idea</li> <li>• Key details</li> <li>• Summary</li> <li>• Cause/effect</li> </ul>
Art Vocabulary
<ul style="list-style-type: none"> <li>• Locomotor: movement that travels through space; examples of locomotor movements: walk, skip, jog, leap, slide, run, hop, gallop, glide</li> <li>• Nonlocomotor: stationary movement that does not travel through space; examples of non-locomotor movements: float, melt, push, reach, kick, pull, bend, sink, turn, wiggle, rise, swing, burst, twist, flick, dab, slash, punch</li> <li>• Soundscaping: sound effects</li> <li>• Tempo: the speed of the beat</li> <li>• Dynamics: refers to loud and soft sounds; volume</li> <li>• Pianissimo: very quiet</li> <li>• Piano: quiet</li> <li>• Mezzo piano: medium quiet</li> <li>• Mezzo forte: medium loud</li> <li>• Forte: loud</li> <li>• Fortissimo: very loud</li> <li>• Crescendo: gradually get louder</li> <li>• Decrescendo: gradually get quieter</li> <li>• Largo: very slow and broad</li> <li>• Adagio: slowly</li> <li>• Andante: walking speed</li> <li>• Moderato: medium speed</li> <li>• Adagio: fast</li> <li>• Presto: very fast</li> <li>• Vivace: very, very fast</li> <li>• Ritardando: gradually slow down</li> </ul>

**TECHNOLOGY INTEGRATION**

Consider encouraging students to select a playlist for underscoring their dramatization. Direct them to consider how the music may change for each season. The process of selecting a playlist can be done using various music apps.



**ASSESSMENTS**

Formative	Summative
<ul style="list-style-type: none"> <li>Monitor students working in groups</li> <li>Feedback during the rehearsal process</li> <li>Student questioning</li> </ul>	<ul style="list-style-type: none"> <li><b>Seasons Rubric</b> (see Downloads)</li> </ul>

**Activating Strategy (5-10 min)**

- Facilitate a class discussion about how the seasons change. Fold a piece of paper in fours and create a storyboard that shows how where we live on Earth is impacted in each season based on our proximity to the Sun.

**Main Activity****Part 1: Warm-up Our Bodies and Voices**

- Review the elements of drama, (body language, facial expression, locomotor and non-locomotor movement) and how to use sound for effect (called “soundscaping”). Groups will be given time to experiment these expressions. The teacher can give groups topic ideas for their practice:
  - Example 1: Happiness at a home run hit during a ballgame. How is this expressed by each character in the event: the batter, the people in the stands, the coach?
  - Example 2: Your dog ate your favorite pair of sneakers. Now you have no shoes to go outside and play. How would you show me with your body that you are angry or frustrated?
- Students work in groups experimenting with how to use drama to explain the cause/effect relationship of the earth rotating around Sun. Guide a discussion with the class so that the students understand that the Sun would use non-locomotor movement, the Earth would use locomotor motion to rotate and revolve around the sun. Students need to consider how they might represent the Earth’s tilt on its axis. Other features they might include characters representing the weather, or characters choosing particular clothing to express the weather during these seasons.

**Part 2: Creating a Script**

- Place students in small groups of 3-5 students.
- Students work together to create a script for their Season Play. The play should consist of various characters: Sun, Earth, a person/place on Earth, and seasonal changes (snow, wind, etc.)
- Using the rubric as guidance, students will theatrically represent the seasons conceptually in this dramatization by using the literary device personification.

**Part 3: Performing the Season Play**

- After each presentation, the class will discuss how the presentation represented how seasons change. They may also include peer feedback, such as adding more specific movement, facial expressions, sounds, etc., to help the presentation be more effective.

**REFLECTION****Reflection Questions**

- What might you say about your character’s experience through the four seasons? (Include where you are in position to the sun, and how you feel.)*
- What adjectives might you use when you are personifying the Earth during a particular season?*

- *What colors/types of music would help with the personification?*

**DIFFERENTIATION****Accelerated:**

- These students could write a compare/contrast paragraph about how the seasons would be different and the same in the southern hemisphere.

**Remedial/EL Students:**

- Consider doing the playwriting with a guided small group to help with connecting the science concept to the storytelling of the dramatization.

**ADDITIONAL RESOURCES**

- [www.howstufworks.com](http://www.howstufworks.com)
- [www.visuallearningsys.com](http://www.visuallearningsys.com)

**APPENDIX**

- **Seasons Rubric**

**CREDITS**

U.S. Department of Education

Arts in Education--Model Development and Dissemination Grants Program

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### Seasons on Stage Rubric

**TASK: Create a dramatization of the seasonal cycle.**

Task	4	3	2	1
<b>Use all elements of expression, such as body shape, gestures, movement and facial expressions to describe the seasons.</b>	Student uses all elements of expression to describe the seasonal cycle accurately.	Student uses most elements of expression to describe the seasons accurately.	Student uses some elements of expression to describe the seasons accurately.	Student uses one or less elements to describe the seasons.
<b>Use personification to explain how the seasons change due to the Earth's tilt during its revolution around the Sun.</b>	Student uses personification to clearly explain how the seasons change. The writing stays on topic the entire script.	Student most of the time uses personification to depict how the seasons change. Most of the time the writing stays on topic.	Student uses personification some of the time to depict how the seasons change. Some of the time the writing stays on topic.	Student did not use personification to depict the changes of the seasons. Rarely does the writing explain the concept.
<b>Accuracy of Science Content and Integration of Science Content Vocabulary</b>	All facts presented about the seasonal cycle are complete and correct. A great deal of science vocabulary was integrated effectively.	Most facts presented about the seasonal cycle are complete and correct. Some science vocabulary is integrated.	Most science content is neither complete nor correct. Little science vocabulary is integrated.	None of the science content is complete or correct. No science vocabulary is integrated.

Total Score: \_\_\_\_\_