**Why Do the Seasons Change?**

This lesson is designed for students in grades 5-8 studying the effects of Earth’s position in space. In this lesson, students will read an article and take notes about the effects of Earth’s tilt, rotation, and orbit on the seasons. Next, students will process this information by creating a visual representation. Students will use labels, symbols, arrows, and other creative ways to enhance their models so they are easier to understand. Finally, students will independently respond to a series of questions related to this concept.

**Standards:**

**Next Generation Science Standards:**

* **5th Grade**
  + **5-ESS1-1** – Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.
* **Middle School**
  + **MS-ESS1-1** – Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and mood, and seasons.
  + **MS-ESS2-5** – Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.
  + **MS-ESS2-6** – Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

**Common Core State Standards:**

* **5th Grade**
  + **CCSS.ELA-Literacy.RI.5.2** – Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
  + **CCSS.ELA-Literacy.RI.5.4** – Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a *grade 5 topic or subject area*.
  + **CCSS.ELA-Literacy.RI.5.9** – Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.
* **Grades 6-8**
  + **CCSS.ELA-Literacy.RST.6-8.2** – Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
  + **CCSS.ELA-Literacy.RST.6-8.4** – Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.
  + **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).

**Objectives:**

* Students will be able to describe how Earth’s tilt, rotation, and orbit influence the seasons we experience.
* Students will be able to create a visual representation to model this cause-and-effect relationship.

**Lesson Duration:** approximately 55-75 minutes

**Materials:**

* The Building Blocks of Geography series, Earth in Space
* Scratch paper
* Pencils
* Highlighters
* Seasons Detailed Article (1 per student)
* Optional: Seasons Simplified Article
* Change of Season Picture (project and/or provide 1 copy per student)
* Marking the Text Guide (1 per student and/or project a copy so students can see)
* Teacher Note-Taking Guide
* Why Do the Seasons Change? Worksheet

**Requisite Prior Knowledge:**

* Before engaging in this lesson, it would be beneficial for students to have read the Building Blocks of Earth in Space book. Depending on your students’ understanding of the Earth’s tilt, rotation, and orbit, consider re-reading pages 14-25 of that text prior to engaging in this lesson. It may also be beneficial to pull a small group to re-read these pages to help prepare them for the rest of the lesson.

**Assessments:**

* Notes and text markings from students’ article
* Why Do the Seasons Change? Worksheet

**Vocabulary:**

* Axis – an imaginary line through the North and South poles
* Degree – a position on Earth’s surface, broken down into minutes and seconds
* Equinox – either of the two times in the year when the sun crosses the equator, and day and night are of equal length in all parts of Earth
* Hemisphere – a half of Earth’s surface
* Latitude – a distance north or south of the equator, measured in degrees, minutes, and seconds
* Longitude – a distance east or west on Earth’s surface, measured in degrees, minutes, and seconds from the prime meridian
* Orbit – the path of Earth or any one of the planets around the sun
* Solstice – either of the two times in the year when the sun is at its greatest distance from the equator; marks both the longest and the shortest day in the year

**Differentiation Considerations:**

* Depending on your students’ background knowledge, consider pulling a small group of struggling students to review pages 14-25 of the Earth in Space text. In addition, keep these pages in mind for providing support as students work to create their own visual representations.
* Consider using the simplified article with struggling readers. Depending on your students’ needs, it might be best to read this version of the article in the small group setting.
* Use the included challenge questions on the Why Do the Seasons Change? Worksheet to provide enrichment and extension opportunities for students that need additional challenge.

**Lesson and Instruction:**

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| **Lesson Components and Time Guidelines** | **Teacher Actions** |
| **Introduction/Hook**  Approximately 8-10 minutes | Begin by asking students to think about their favorite season and why they like it so much. Have students respond using the think, pair, share strategy (students will first think independently for a minute, pair with someone near them, and take turns sharing their responses and rationales). Have 3-4 volunteers share their opinions and reasoning in the whole group setting.  Next, pose the question “what causes the seasons to change?” You do not need to solicit students’ responses here, as the goal is to pique their interest in today’s learning. Explain that today we will do some reading and create a visual model to help us better understand what causes Earth’s various seasons. |
| **Direct Instruction and Modeling**  Approximately 15-20 minutes | Pass out the article to students and model how to number each paragraph. As students number the paragraphs on their own article, explain that this will help us stay organized as we read and take notes together.  Read the introductory paragraph aloud, verbalizing your thoughts and modeling potential marks to include or notes to make in the margins of the text. Consider using the Teacher Note-Taking Guide as needed. Students should also mark the text and take notes in the margins.  Next, use the gradual release of responsibility framework to encourage students take responsibility for the reading and meaning-making experience. Begin to ask for their ideas for marking the text. As you continue to read the article, allow students to take control of the markings and the margin notes as you scribe their ideas. Depending on your students’ needs, consider reading the entire article together, or using the last section as an extension opportunity for learners who need additional challenge.  Finally, show students the Change of Season picture and caption. Use the picture to model and explain how the seasons change as different hemispheres are tilted toward the sun. Model adding and aha! moments, new learning, or questions to our article notes, using the back or scratch paper as needed. |
| **Application Activity**  Approximately 25-35 minutes | During this portion of the lesson, each student will be responsible for creating their own visual representation to show how the Earth’s tilt, orbit, and rotation influence the seasons we experience. Encourage students to work together as needed to accomplish their independent tasks. Students should feel comfortable and empowered seeking out assistance from and providing help to one another. Encourage students to use their peers for support as they engage in creating their visual representations.    Provide each student a copy of the Visual Representations worksheet and directions. Review the expectations for their work as well as the classroom expectations for on-task behavior and volume before starting work time. While students work, consider pulling a small group for additional support. |
| **Closure**  Approximately 7-10 minutes | Bring students back to the whole group setting. Before reviewing the lesson’s objectives and key takeaways, hold a brief discussion about how students felt about their work time today. What positives did they experience working independently with the ability to ask peers for support? What conversations did they have that strengthened their understanding? What negatives or challenges did they experience? What intention(s) can they set for any future, similar working conditions?  Review the objectives and summarize key takeaways: *today we dove deeper into understanding why Earth’s seasons change. Because Earth is tilted on its axis, the Northern and Southern hemispheres face the sun differently throughout the year. As Earth orbits the sun, the hemisphere facing it changes. We experience these changes as seasons!* |

**Next Steps and Reflection:**

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| What went well? |  |
| What changes might be beneficial? |  |
| Reteaching needs |  |
| Extension needs |  |