

Getting to the Core

6th Grade: Cycles Teacher Edition



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Teacher SAUSD Common Core Intermediate Science– Seasons

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Big Idea: Cycles are never-ending patterns.		
Enduring Understanding: Seasons are caused by the differential intensity of sunlight on different areas of Earth across the year, which result from Earth’s spin axis being tilted relative to its orbit around the sun.		
<i>Essential Questions:</i> What is meant by cyclic patterns?		
<i>Essential Questions:</i> Where do cycles exist on Earth and in your daily life?		
<i>Essential Questions:</i> How can the tilt of Earth explain seasons?		
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SAUSD Common Core Lesson Planner

Teacher:

Unit: SPACE SYSTEMS: SEASONS Day: 1 Lesson: 1	Grade Level/Course: 6 TH Grade Earth Science	Duration: 1 Class Period Date:
<p>Big Ideas: Cycles are never ending patterns.</p> <p>Enduring Understandings: Seasons are caused by the differential intensity of sunlight on different areas of Earth across the year, which result from Earth's spin axis being tilted relative to its orbit around the sun.</p> <p>Essential Questions: What is meant by cyclic patterns? Where do cycles exist on Earth? How does Earth's tilted axis explain seasons?</p>		
Common Core and Content Standards	<p>Content Standards: 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 moon, and seasons.</p> <p>ESS1.B Earth & the Solar System This model of the solar system can explain eclipses of the sun & the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year.</p> <p>Reading Standards for Literacy in Science and Technical Subjects: RST .6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.</p> <p>Writing Standards for Literacy in Science and Technical Subjects: WHST.6-8.4 Students produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.</p> <p>Speaking and Listening Standards: SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, details, and facts to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.</p>	

Materials/ Resources/ Lesson Preparation		Teacher Resource 1.1a: Ever Changing Phase Of The Moon Student Resource 1.1 : Quick Write Teacher Resource 1.1a: <i>What cause the phases of the moon</i> Video Clip Student Resource 1.2: Extended Anticipatory Guide Student Resource 1.3: Ever Changing Phase Of The Moon with Reflection Teacher Resource 1.4: Earth Paper Globe Template	
Objectives		Content: Students will use their observations of the changing moon to bridge the idea of cycles as never ending patterns.	Language: Students will collaborate to build a deeper understanding of discipline specific concepts. Students will read and comprehend pictorial and graphic images.
Depth of Knowledge Level		<input checked="" type="checkbox"/> Level 1: Recall <input checked="" type="checkbox"/> Level 2: Skill/Concept <input checked="" type="checkbox"/> Level 3: Strategic Thinking <input type="checkbox"/> Level 4: Extended Thinking	
College and Career Ready Skills		<input checked="" type="checkbox"/> Demonstrating independence <input checked="" type="checkbox"/> Building strong content knowledge <input checked="" type="checkbox"/> Responding to varying demands of audience, task, purpose, and discipline <input checked="" type="checkbox"/> Comprehending as well as critiquing <input checked="" type="checkbox"/> Valuing evidence <input checked="" type="checkbox"/> Using technology and digital media strategically and capably <input type="checkbox"/> Coming to understand other perspectives and cultures	
Common Core Instructional Shifts		<input checked="" type="checkbox"/> Building knowledge through content-rich nonfiction texts <input type="checkbox"/> Reading and writing grounded from text <input checked="" type="checkbox"/> Regular practice with complex text and its academic vocabulary	
Academic Vocabulary (General & Domain-Specific)	TEACHER PROVIDES SIMPLE EXPLANATION	KEY WORDS ESSENTIAL TO UNDERSTANDING	WORDS WORTH KNOWING
		Patterns Repetition	Phase Seasons
	STUDENTS FIGURE OUT THE MEANING	Cycles	

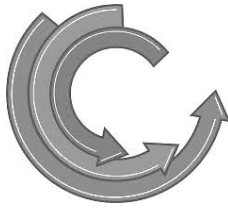
<p>Pre-teaching Considerations</p>	<p>Before the unit consider common misconceptions: This unit addresses one of the most common misconceptions in science that seasons are caused by distances, the Earth being closer or further away from the sun at different times of the year. This is inaccurate! The goal of the unit is for students to understand that cycles are repeating patterns that are found on Earth and in Space and that seasons are caused by the differential intensity of sunlight on different areas of Earth across the year, which result from Earth’s spin axis being tilted relative to its orbit around the sun.</p> <p>Students will need to be in groups for part of this lesson. Homogenous grouping may be an easier way to facilitate if you have a group that needs additional support or a group that is accelerated.</p> <p>By the end of Day 3 you want students to have cut out and if possible, already taped together their paper model of Earth. So if you find any down time during day 1 or day 2, you could have the students begin the cutting process.</p>	
<p>Lesson Delivery</p>		
<p>Instructional Methods</p>	<p>Check method(s) used in the lesson: <input checked="" type="checkbox"/> Modeling <input checked="" type="checkbox"/> Guided Practice <input checked="" type="checkbox"/> Collaboration <input checked="" type="checkbox"/> Independent Practice <input checked="" type="checkbox"/> Guided Inquiry <input checked="" type="checkbox"/> Reflection</p>	
<p>Lesson Continuum</p>	<p>Lesson Opening</p>	<p>Preparing the Learner Day 1 (~10 mins)</p> <ol style="list-style-type: none"> 1. Share a story with your students that highlight cycles and repetition. Ask students to listen and start to notice the patterns in the story. Emphasize the repetition when you tell the story 2. Ask students what they noticed about the story and highlight the idea of cycles and patterns and introduce the Big Idea “Cycles are never-ending patterns.” 3. Ask students to think about patterns or cycles in their own lives and do a three minute quick write to share about these. Students may want to write a story like the one shared. 4. Students should quickly share with a partner two or three things that are repeated in their own lives. Using popsicle sticks (or another non-bias name calling tool), call on a few students to share. 5. Explain that cycles in their daily lives are just like cycles on Earth.

<p>Lesson Continuum</p>	<p>Activities/Extensions/Technology Questioning/Engagement/Writing/Checking for Understanding</p>	<p>Interacting with the Text: Moon & Its Phases (~15 mins)</p> <ol style="list-style-type: none"> Have students take out their moon charts “The Ever Changing Phase of the Moon” and in teams of four compare charts. Point out that students may have started on different dates. For students who have a less than complete chart, have them fill in the blanks from their teammates. (Students can also predict what the different moon drawings would look like if needed). <p>To support discussion and comparison, students will use the language frames</p> <ul style="list-style-type: none"> “When I look at your drawings I notice...” “One interesting thing I see is...” “To add to what you said, I think...” <ol style="list-style-type: none"> After students observe and compare charts for 2-3 minutes, ask them to select one team members paper that “best” represents of the moon’s phases. As a group, students decide on one interesting observation or thing they notice and write it down on their moon chart. One student from each team will then come up and share the “best” representation (this does NOT need to be the student who drew the pictures). The student will show the drawing on the document camera and share the team observation with the class. Students will then watch a 5 min 14 second video clip on how the Moon, Sun and Earth are connected and what causes the different appearance of the moon throughout the month. <p>Seasons Extended Anticipatory Guide (~10min)</p> <ol style="list-style-type: none"> Have students independently complete the initial portion of the Seasons Extended Anticipatory Guide (EAG). You may wish to read the statements aloud to the class, then, have them complete the first column . Alternatively read one question at a time pausing for students to quietly select “agree or disagree” for each statement. Emphasize that it’s okay if students are unsure of their answer and need to guess. They will come back to this page throughout the unit and adjust their answers using evidence from the unit. Students will spend 3-4 minutes discussing their initial responses on the EAG. Model for students with another student how to use the “Language Supports for Agreeing” or “Disagreeing” at the bottom of the EAG. Remind students the point is not to criticize each other’s answers, but to listen to each other and to build on each other’s answers. 	<p>Students Who Need Additional Supports</p> <p>Allow extended time for quick write or provide students with questions ahead of time.</p> <p>Read the each EAG statement aloud and chunk the task into individual questions.</p> <p>Teacher proximity to provide immediate assistance.</p> <p>Homogeneous grouping to allow teacher to focus on specific groups of students needing more time.</p> <p>Heterogeneous grouping to provide immediate support</p>
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		<p>Extending Understanding (~15mins) Constructing the Globe</p> <p>9. With the additional time in class, have students in teams of four begin to cut out the Template of the Earth and tape them together. Each student should cut out one piece (a few extra templates have been included in case one is cut incorrectly). Refer students to additional instructions in the “Seasons Lab” in their student resource book.</p> <p>10. To help students connect the correct pieces together, they should look for the markings 1A , 2A, 3A, 4A, 1B, 2B, 3B, and 4B in the bottom corner of each cut out. 1A gets taped to 1A and so on so continents match up.</p> <p>**NOTE: Time is built into the lesson for this activity so pieces don’t go missing at home. However, adjust this to best fit your classroom. Additionally, if students want to take their portion home and color it, they may. BUT the globe MUST then be assembled on students’ time and not classroom time (assuming other students finish during classroom time).</p> <p>11. Make sure students put their name on individual pieces of the globe and somewhere in the South Pole before leaving class for the day.</p> <p>12. Give time for cleanup of scraps and storage of the globes in a safe location.</p>	<p>Peer assistance with cutting out Earth Paper Globe</p>
Lesson Reflection			
<p>Teacher Reflection Evidenced by Student Learning/ Outcomes</p>			

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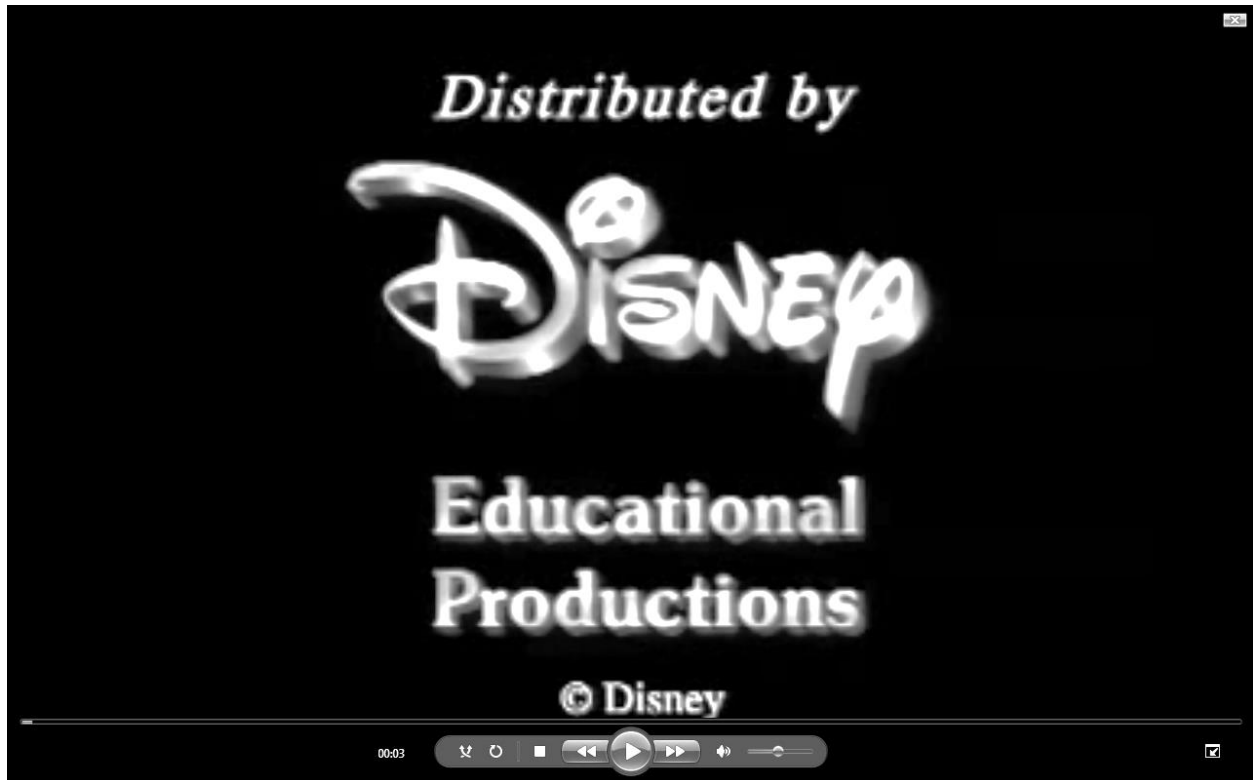
Quick Write on Cycles



Big Idea: *Cycles are never-ending patterns*

Directions: Describe patterns or cycles that pop up in your life on a daily, weekly, monthly, or even yearly basis!

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Summary: This Bill Nye Video Episode describes what causes the phases of the moon. The whole video is included, but it is suggested you only show your students min 0 to min 5:14 or the video gets off topic.

Start: 0:00 min

Stop 5:14 min.

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Seasons - Extended Anticipatory Guide

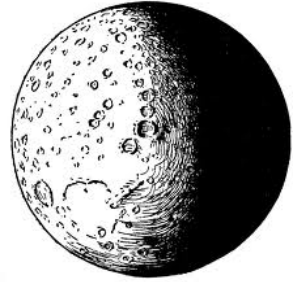
Questions	Opinions Day 2		Findings Day 7		Day 7: Evidence: Explain using your own words
	Agree	Disagree	Support	No Support	
1. The moon grows from a sliver to a full circle then shrinks back to a sliver every month.					
2. Direct sunlight has more energy and heats things up faster than indirect sunlight.					
3. Seasons are caused by the Earth's distance from the Sun. In the summertime Earth is closer to the Sun than in the wintertime.					
4. Seasons are the same all over the world; in December it is wintertime and in July it is summertime.					
5. Over the course of a year, the Earth's axis always points in the same direction.					
6. Cycles are events that only occur one time and then stop.					
<p><u>Language Supports for Agreeing</u></p> <ul style="list-style-type: none"> • I agree with the statement that ...because... • I agree with my classmate that ...because... • I share a similar belief to _____. (Explanation) <p><u>Language Supports for Disagreeing</u></p> <ul style="list-style-type: none"> • I disagree with the statement...because... • I disagree with _____. I believe that ... because... • Although _____makes a valid point, I still feel that ... because... 					

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Name _____ Teacher _____

The Ever Changing Moon

Directions: Stand outside when it is dark and take a look in the sky. Spend 1-2 minutes sketching what the moon looks like. Repeat this every night over the course of a month. It's okay if you're in a different spot each night!



Date _____	Date _____	Date _____	Date _____
Date _____	Date _____	Date _____	Date _____
Date _____	Date _____	Date _____	Date _____
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Ever Changing Moon Summary

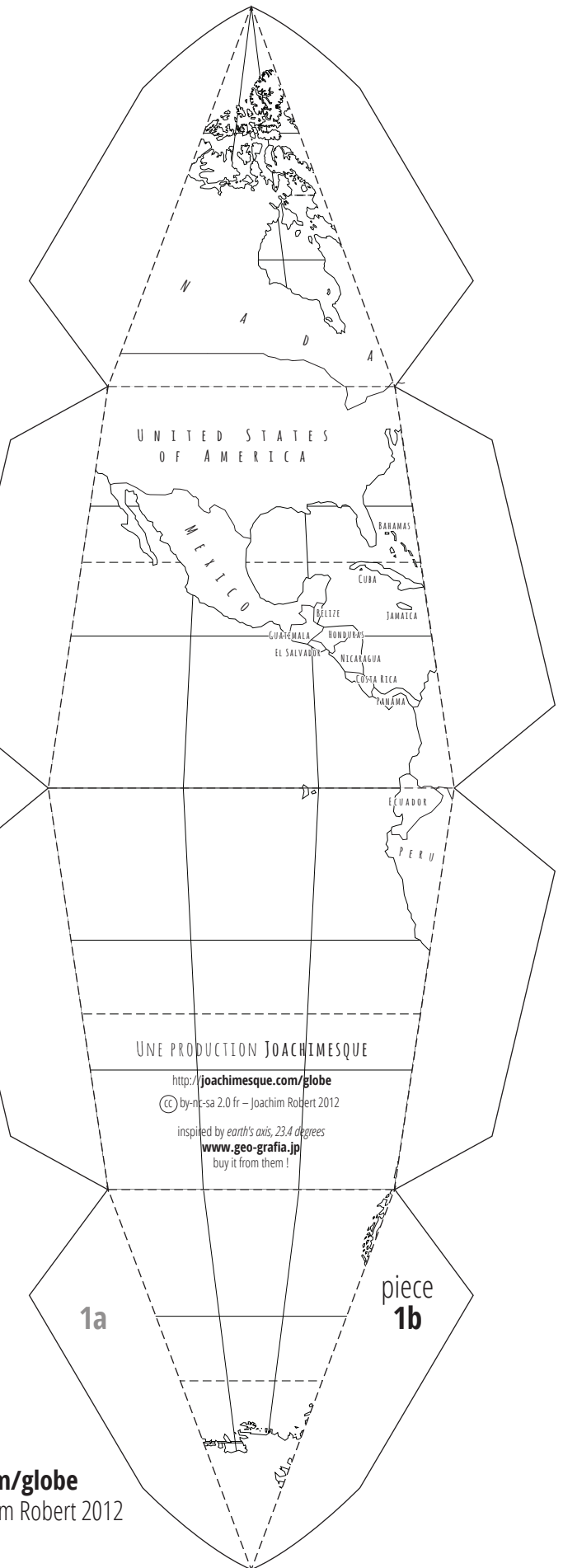
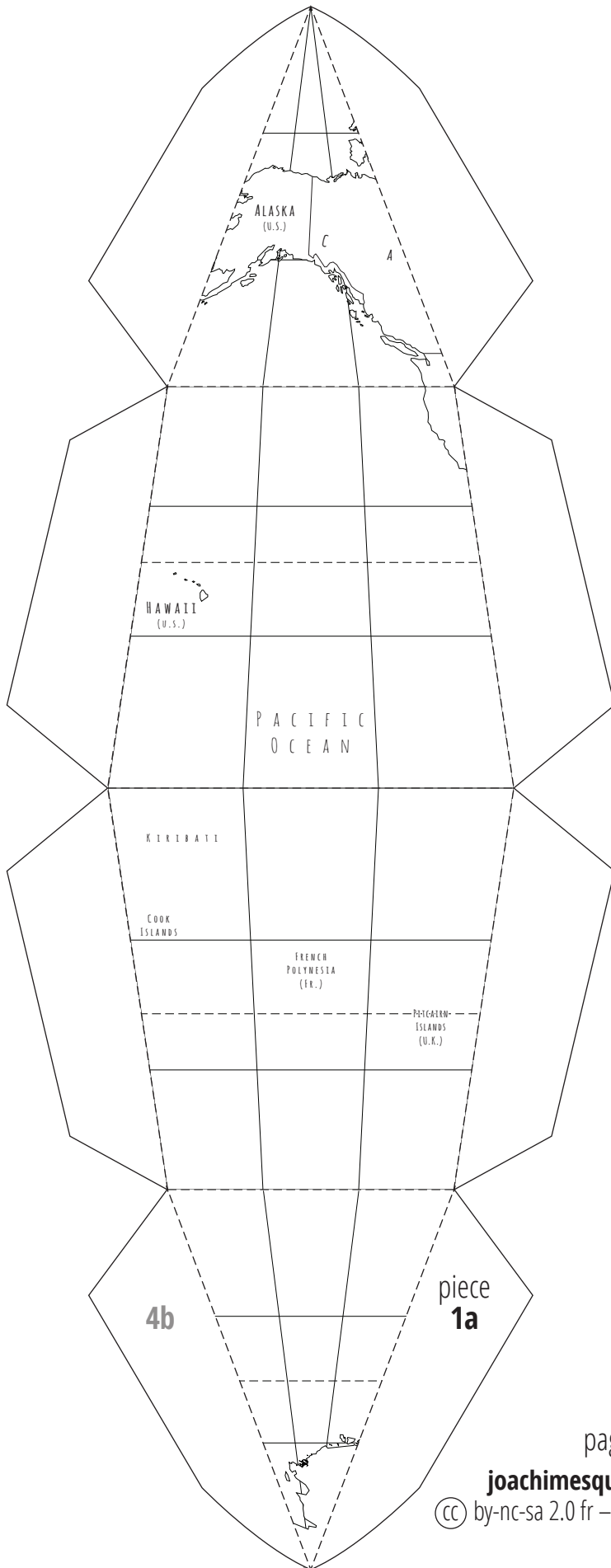
As your team is comparing your worksheets use the sentence starters to get conversation flowing.

- “When I look at your drawings I notice...”
- “One interesting thing I see is...”
- “To add to what you said, I think...”



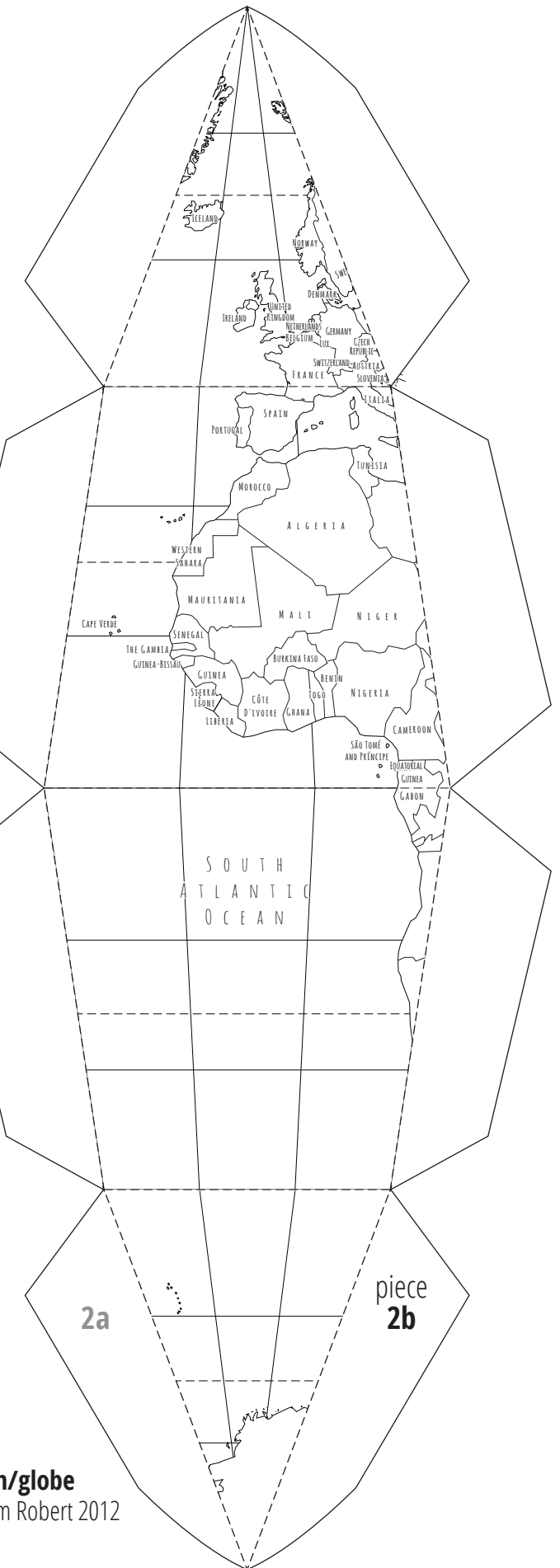
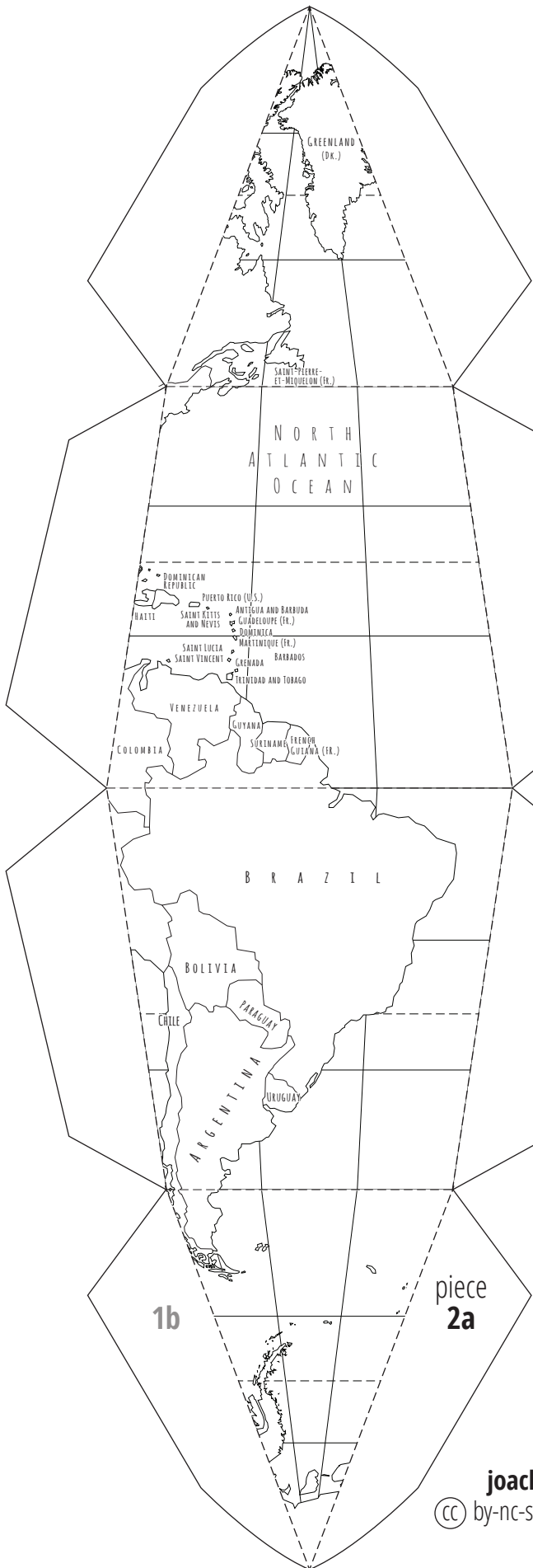
As a team, decide on a key observation and write it below.

What are two new insights you gained after watching the Bill Nye Video Clip?

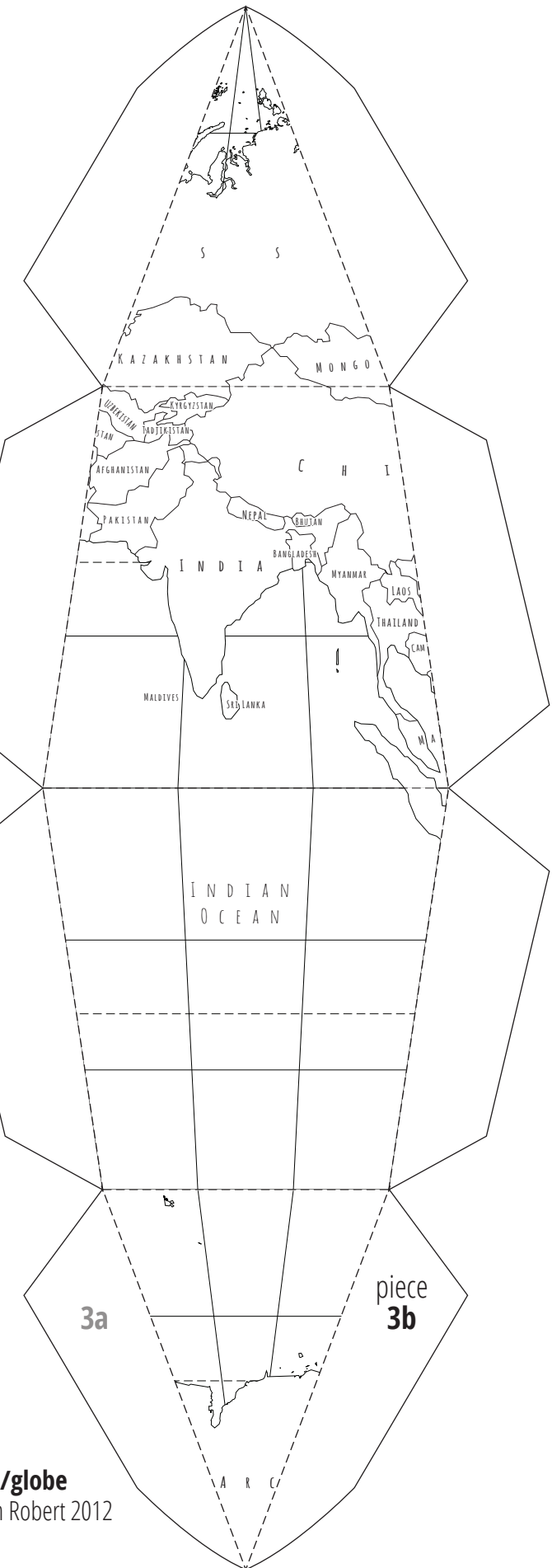
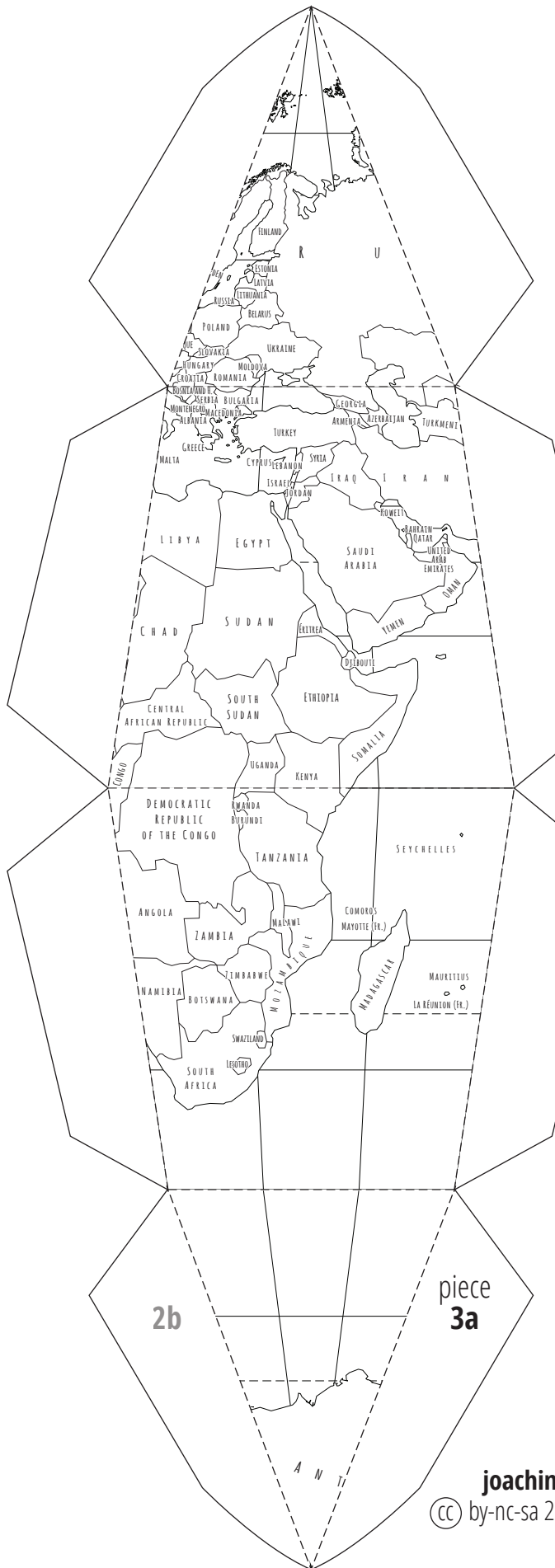


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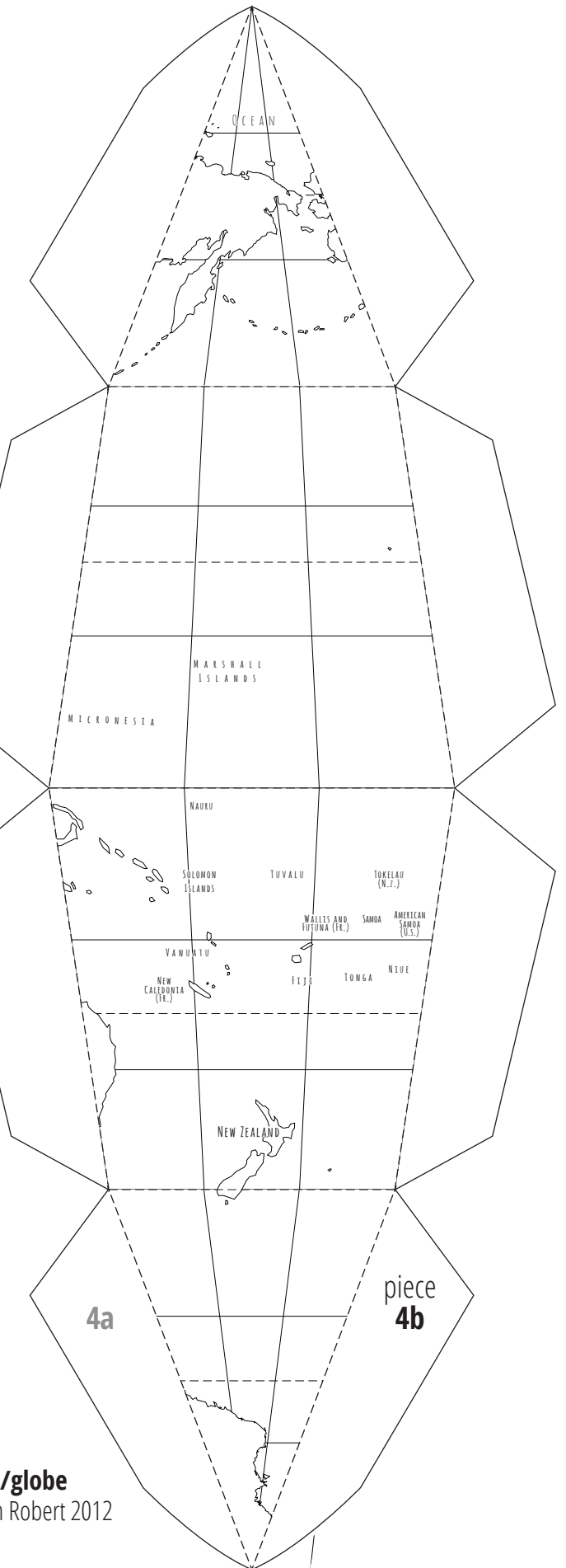
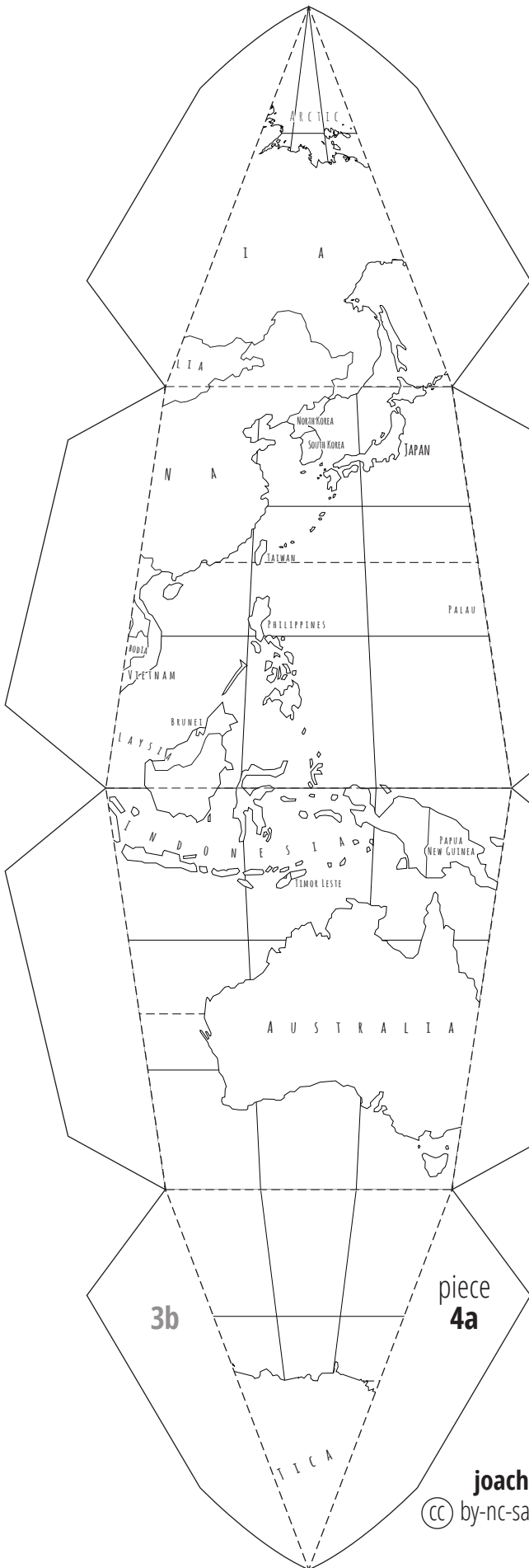


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inspired by « Sectional Globe - earth's axis, 23.4 degrees » — www.geo-grafia.jp
 geografia's globes are cheap and neat, you should really consider buying them one.



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SAUSD Common Core Lesson Planner

Teacher:

Unit: BIODIVERSITY Day: 2 Lesson: 2	Grade Level/Course: 6 TH Grade Earth Science	Duration: 1 Class Period Date:
<p>Big Ideas: Cycles are never ending patterns</p> <p>Enduring Understandings: Seasons are caused by the differential intensity of sunlight on different areas of Earth across the year, which result from Earth’s spin axis being tilted relative to its orbit around the sun.</p> <p>Essential Questions:</p> <p>What is meant by cyclic patterns? Where do cycles exist on Earth? How does Earth’s tilted axis explain seasons?</p>		
Common Core and Content Standards	<p>Content Standards: 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 moon, and seasons.</p> <p>ESS1.B Earth & the Solar System This model of the solar system can explain eclipses of the sun & the moon. Earth’s spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year.</p> <p>Reading Standards for Literacy in Science and Technical Subjects: RST .6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p> <p>Writing Standards for Literacy in Science and Technical Subjects: WHST.6-8.4 Students produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience. WHST .6.8.9 Draw evidence from informational text to support analysis, reflection, and research.</p> <p>Speaking and Listening Standards: SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, details, and facts to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.</p>	

Materials/ Resources/ Lesson Preparation		Student Resource 2.1: Circle Maps of Seasons Teacher Resource 2.1a: “If You Need to Know The Seasons” video Teacher Resource 2.2a: NBC Nightly News: Extreme Weather video Student Resource 2.2: Quick Write Teacher Resource 2.2b: Changing Seasons video	
Objectives		Content: Students will bridge their personal experiences and knowledge of daily routines and patterns to the term “cycles” as it will be used to describe never-ending patterns on Earth.	Language: Students will read and comprehend graphical, pictorial and informational texts. Students will use multimedia and scientific inquiry to be deepen understanding of content-specific terminology.
Depth of Knowledge Level		<input checked="" type="checkbox"/> Level 1: Recall	<input checked="" type="checkbox"/> Level 2: Skill/Concept <input checked="" type="checkbox"/> Level 3: Strategic Thinking
College and Career Ready Skills		<input checked="" type="checkbox"/> Demonstrating independence	<input checked="" type="checkbox"/> Building strong content knowledge <input checked="" type="checkbox"/> Responding to varying demands of audience, task, purpose, and discipline <input checked="" type="checkbox"/> Comprehending as well as critiquing
Common Core Instructional Shifts		<input checked="" type="checkbox"/> Building knowledge through content-rich nonfiction texts <input type="checkbox"/> Reading and writing grounded from text <input checked="" type="checkbox"/> Regular practice with complex text and its academic vocabulary	<input checked="" type="checkbox"/> Valuing evidence <input type="checkbox"/> Using technology and digital media strategically and capably <input checked="" type="checkbox"/> Coming to understand other perspectives and cultures
Academic Vocabulary (General & Domain-Specific)	TEACHER PROVIDES SIMPLE EXPLANATION	KEY WORDS ESSENTIAL TO UNDERSTANDING Cycles Seasons	WORDS WORTH KNOWING Hemisphere Compare/contrast Observation Evidence Earth-Sun –Moon
	STUDENTS FIGURE OUT THE MEANING	Phases Spring Winter Summer Fall	
Pre-teaching Considerations		By the end of Day 3 you want students to have cut out and if possible, already taped together their paper model of Earth. So if you find any down time during day 2, you could have the students begin the cutting process.	

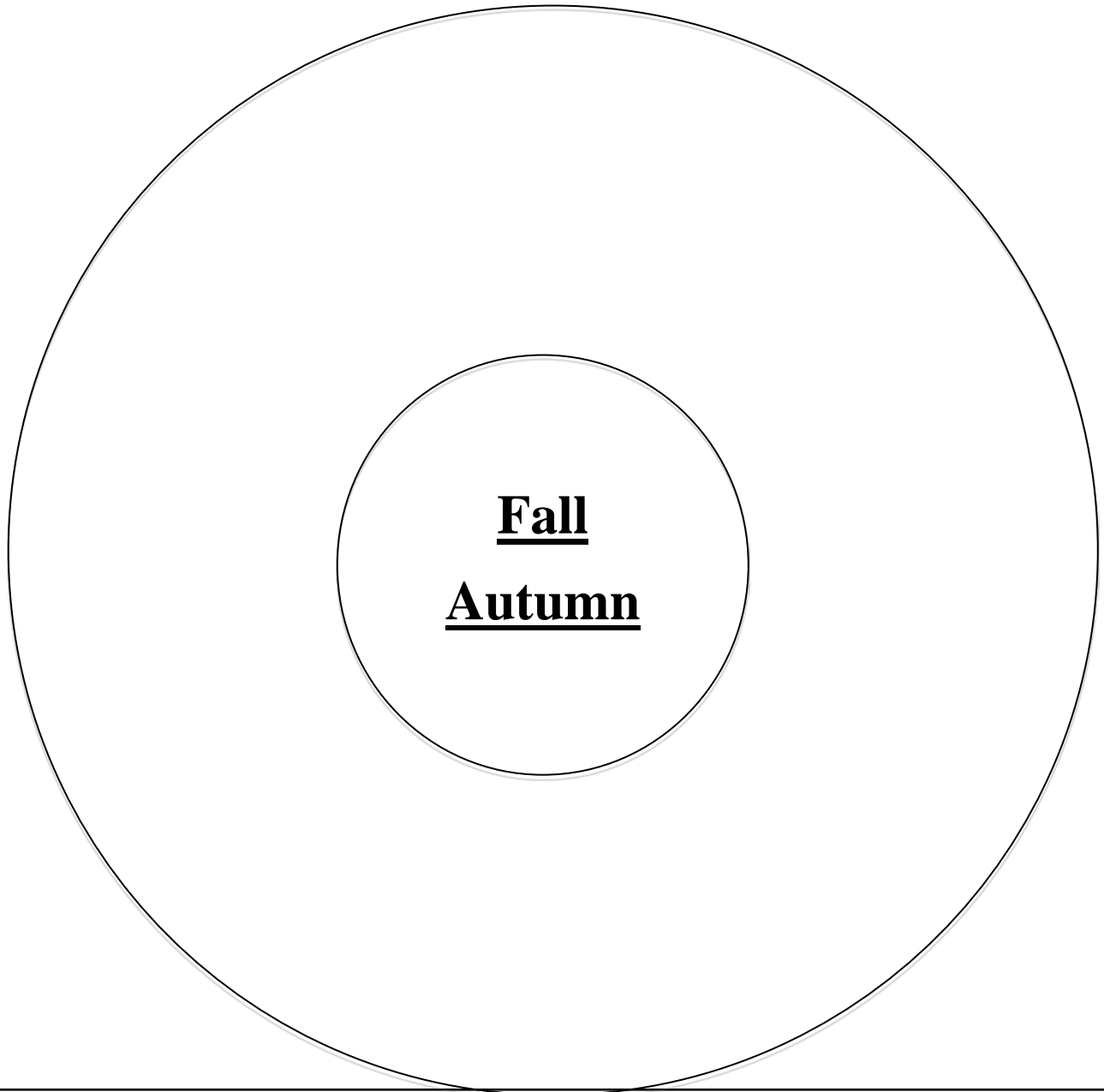
Lesson Delivery	
Instructional Methods	<p>Check method(s) used in the lesson:</p> <p><input checked="" type="checkbox"/> Modeling <input checked="" type="checkbox"/> Guided Practice <input checked="" type="checkbox"/> Collaboration</p> <p><input checked="" type="checkbox"/> Independent Practice <input checked="" type="checkbox"/> Guided Inquiry <input checked="" type="checkbox"/> Reflection</p>
Lesson Continuum	<p>Lesson Opening</p> <p><u>Preparing the Learner: (~20 mins)</u></p> <ol style="list-style-type: none"> In a group of four, each student will select a different season to focus on for the next ten minutes. If you have a group 5, have students double up on a season. Students begin by independently taking 1-2 minutes to write down words or memories they connect with that season. They could also draw season-related pictures. Ask students to watch the short video clip on seasons and think about the seasons. Play the video “If You Need to Know the Seasons” video for students to get them thinking about the four seasons and making connections. <p>**NOTE: Students may have very limited background knowledge of Spring and Fall. Additionally, many students have never experienced snow or think of summer as a foggy time because we are a costal beach community).</p>
	<p><u>Interacting with the text: (~15 mins)</u></p> <ol style="list-style-type: none"> Students will now work with their groups to build on their information. Each student will share their initial ideas about the season and the other three team members will add ideas. Each student should add at least one idea. Students only need to record information when they are the recorder. Give students 2 minutes max to add words and concepts to each season. After 2 minutes, tell students to switch to the next season. When everyone has added to their circle map, students will independently synthesize their season in one or two sentences. This sentence should describe the overall feeling or weather associated with the season. This sentence should go in the box below the circle map. <p>**Note: Walk around while students write this. If you are worried your class will struggle here, two students with the same season could pair up to write this synthesizing sentence or students could write each sentence as a team.</p> <ol style="list-style-type: none"> When all students are finished, have them share with their team and then use popsicle sticks (or another non-bias name caller) to ask a few students to share. <p>**Note: If you are willing to enforce it in your class, instruct students to stand up when addressing the class. Standing when speaking is an effective public speaking habit students need to develop. Instruct the class to physically turn their bodies to face the speaker.</p>

<p>Lesson Continuum</p>	<p>Activities/Tasks/ Strategies/Technology/ Questioning/Engagement/Writing/Checking for Understanding</p>	<p>Quick write & Discussion: (~15 mins)</p> <ol style="list-style-type: none"> 1. Prime student understanding using the short video on “Extreme Weather.” Tell students this video will help them think of seasons on a more global level outside of Santa Ana. This video is from October, 2013 and shows a tornado, a snow storm, and flooding rain all on the same few days in the United States. While the weather is caused by the same storm system, because of Earth’s tilt, it rains near Florida and snows in South Dakota. 2. Students will spend 4 minutes doing a quick write to give a quick, gut-level reaction to prompts: Describe the seasons in Santa Ana. What are seasons like in other parts of the world? What do you think creates the seasons? <p>**NOTE: Focus of this activity is to capture first impressions, memories, or feelings. Linguistic correctness is not important. Students should cite evidence from their own lives, circle maps created on day one or the video from day 1.</p> <ul style="list-style-type: none"> • What are our seasons like? (Weather, temperature, precipitation, length of day might all pop into this answer) • What are seasons like in other parts of the world? (Students may know that some parts of the world are warmer or colder. They may also know that some places are in darkness for most of the winter.) • What do you think causes the seasons? (Students may come up with all sorts of suggestions, some of which may be wrong. Do not confirm or criticize their ideas, but ask them to elaborate, or reason out their ideas.) <ol style="list-style-type: none"> 3. Ask students to share out about the first 2 questions Students can turn to their elbow partner and share what they wrote by paraphrasing or reading what they wrote. 4. Now ask students to think about the 3rd question. Did both partners have the same idea about what causes the seasons? Listen to a few responses, being careful to listen to all responses rather than dismissing ideas as correct or incorrect. 5. While you aren’t explaining what creates seasons right now, get students thinking as it is highly likely someone said seasons are connected to how close Earth is to the Sun. <p>Address The Misconception! Students will likely toss out the idea that seasons are connected to how close Earth is to the Sun (closer we are, warmer it is).</p>	<p>Students Needing Additional Supports</p> <p>Designate specific tasks and jobs to provide a speaking opportunity for all students</p> <p>Enlarge conversation starters and print out for students as a portable resource</p> <p>Teacher proximity to provide immediate assistance.</p> <p>Allow extended time for quick write or provide students with questions ahead of time</p> <p>Allow students to preview the video at home or watch it with head phones.</p>
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<p>Lesson Continuum</p>	<p>Activities/Tasks/ Strategies/Technology/ Questioning/Engagement/Writing/Checking for Understanding</p>	<p>6. Ask students to consider if their initial answer makes sense in light of this information? <i>During the January in Santa Ana, the Earth is actually 3.1 million miles (5,000,000 kilometers) CLOSER to the sun than it is in the summer.</i></p> <p style="text-align: center;">Alternatively</p> <p><i>When it is summer here in Santa Ana, it is winter south of the equator in places like Chile, Argentina, and Australia.</i></p> <p>7. If students don't seem to see the significance of this right away, repeat it or write it down and ask them to keep thinking about it over the next few days. Does their initial answer make sense in light of this information?</p> <p>8. To wrap up, make the connection with students that seasons are part of the Big Idea that "Cycles are never ending patterns." The quick write addressed the first two Essential Questions "What is meant by cyclic patterns?" and "Where do cycles exists on Earth and in your daily life?"</p> <p><u>Extending Understanding</u> Exit Slip: (4 mins)</p> <ol style="list-style-type: none"> On a small piece of paper, have students answer the following question to connect back to the Big Idea of this unit. "Explain how seasons are an example of a cycle on Earth." <p>Paper Earth Template (~15 minutes)</p> <ol style="list-style-type: none"> With the remaining time in class, have students continue working to assemble the paper Earth model. Put the 5 minute video clip on about "Changing Seasons" to give students a preview of what's to come. Be sure to give students a few minutes to clean up before the bell rings and safely store their paper models. 	
<p>Lesson Reflection</p>			
<p>Teacher Reflection Evidenced by Student Learning/ Outcomes</p>			

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Season Circle Maps



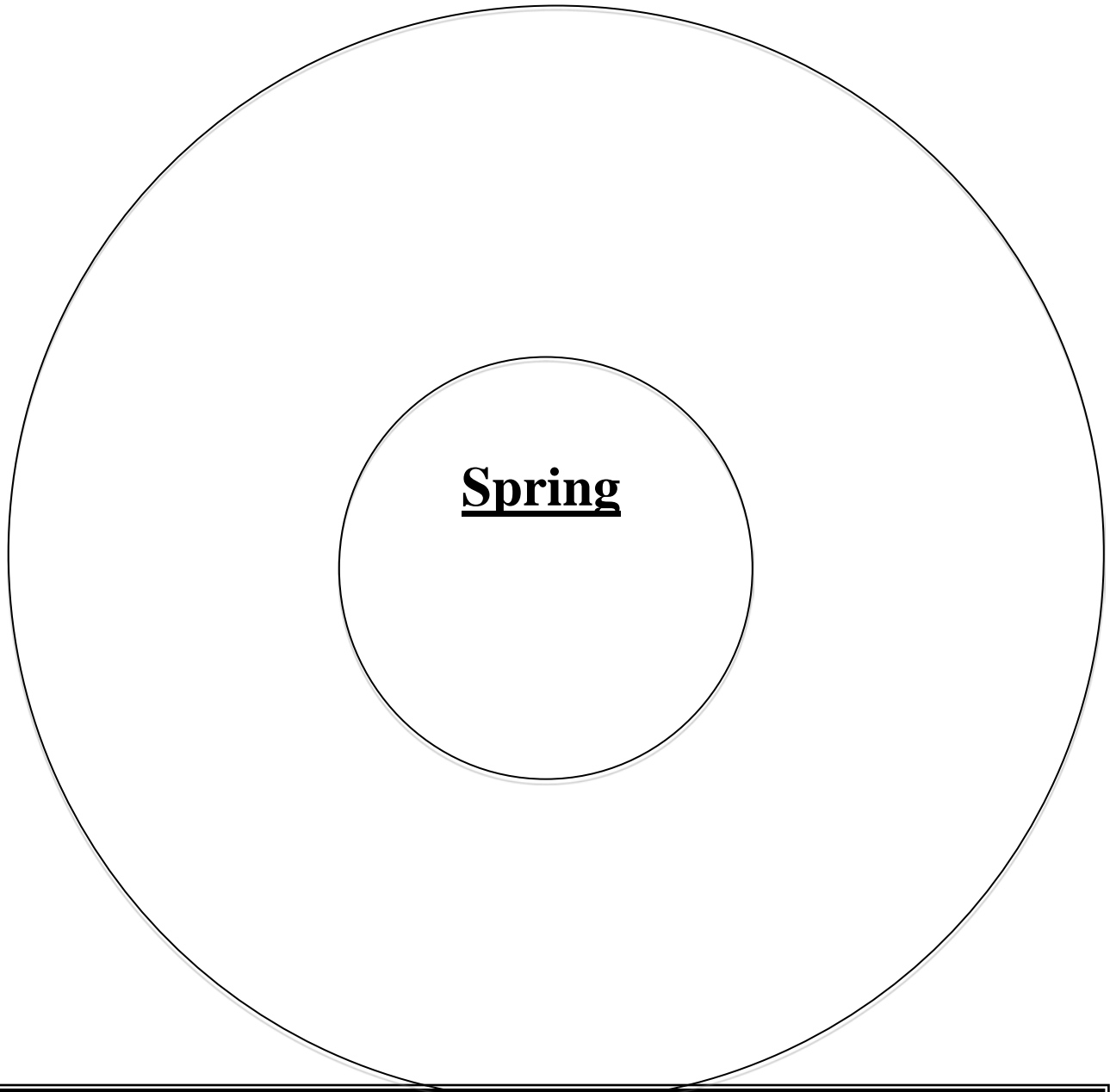
Summarize in one to two sentences how the ideas in your circle map are connected to the season.

Season Circle Maps



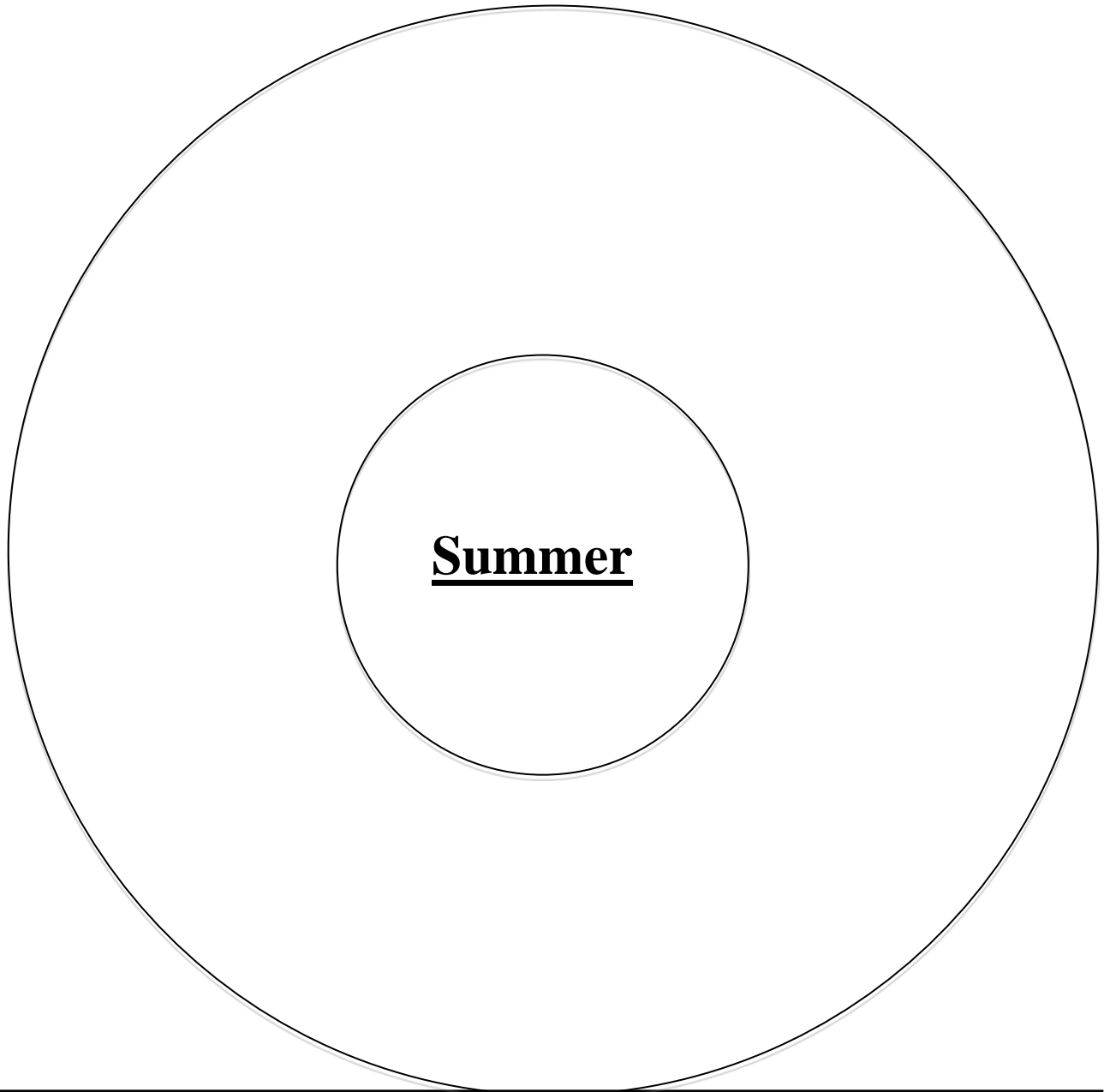
Summarize in one to two sentences how the ideas in your circle map are connected to the season.

Season Circle Maps



Summarize in one to two sentences how the ideas in your circle map are connected to the season.

Season Circle Maps



Summarize in one to two sentences how the ideas in your circle map are connected to the season.

SPACE SYSTEMS: SEASONS Instructional Video Clips

Day 1 “If you need to know the Seasons” time 1:27



Quick Write on Seasons

Directions: Share your initial reactions to the three questions below. Don't worry if you aren't exactly sure about an answer. Make your best educated guess. Please use complete sentences.

1. Describe the seasons in Santa Ana.

2. Describe what seasons are like in other parts of the United States or World.

3. What causes the seasons and WHY do you think this?



Summary: This video clip will help students think of seasons on a more global level outside of Santa Ana. This video is from October, 2013 and shows a tornado, a snow storm, and flooding rain all on the same few days in the United States. While the weather is caused by the same storm system, because of Earth's tilt, it rains near Florida and snows in South Dakota.



Summary: This video comes from shots of Planet Earth and shows nature changing throughout the seasons. Hopefully it will peak students interest about both the seasons and other parts of the world.

SAUSD Common Core Lesson Planner

Teacher:

Unit: BIODIVERSITY Day: 3 Lesson: 3	Grade Level/Course: 6 TH Grade Earth Science	Duration: 1 Class Periods Date:
<p>Big Ideas: Cycles are never ending patterns that repeat</p> <p>Enduring Understandings: Seasons are caused by the differential intensity of sunlight on different areas of Earth across the year, which result from Earth’s spin axis being tilted relative to its orbit around the sun.</p> <p>Essential Questions:</p> <p>What is meant by cyclic patterns?</p> <p>Where do cycles exist on Earth and in your daily life?</p> <p>How can the tilt of Earth explain seasons?</p>		
Common Core and Content Standards	<p>Content Standards:</p> <p>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 moon, and seasons.</p> <p>ESS1.B Earth & the Solar System</p> <p>This model of the solar system can explain eclipses of the sun & the moon. Earth’s spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year.</p> <p>Reading Standards for Literacy in Science and Technical Subjects:</p> <p>RST .6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.</p> <p>RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p> <p>Writing Standards for Literacy in Science and Technical Subjects:</p> <p>WHST.6-8.4 Students produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.</p> <p>WHST .6.8.9 Draw evidence from informational text to support analysis reflection, and research.</p> <p>Speaking and Listening Standards:</p> <p>SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, details, and facts to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.</p>	

Materials/ Resources/ Lesson Preparation		Teacher Resource 3.1a: Ted Talk “Reason for The Seasons” Student Resource 3.1: Vocabulary Notebook Student Resource 3.2: Shades of Meaning: Sunlight & Heat Article Student Resource 3.3 Shades of Meaning: Sunlight & Heat Definitions Key Teacher Resource 3.3a: Shades of Meaning: Sunlight & Heat Definitions Key Teacher Resource 3.4 Card Sort: Shades of Meaning Sunlight & Heat	
Objectives		Content: Students will determine shades of meaning to compare and contrast different heat-related terms as they connect to the sun and cycles.	Language: Students will read and comprehend graphical, pictorial and informational texts. Students will use multimedia and scientific inquiry to be begin developing content-specific terminology.
Depth of Knowledge Level		<input type="checkbox"/> Level 1: Recall	<input checked="" type="checkbox"/> Level 2: Skill/Concept <input checked="" type="checkbox"/> Level 3: Strategic Thinking <input checked="" type="checkbox"/> Level 4: Extended Thinking
College and Career Ready Skills		<input checked="" type="checkbox"/> Demonstrating independence <input checked="" type="checkbox"/> Building strong content knowledge <input checked="" type="checkbox"/> Responding to varying demands of audience, task, purpose, and discipline <input checked="" type="checkbox"/> Comprehending as well as critiquing <input checked="" type="checkbox"/> Valuing evidence <input type="checkbox"/> Using technology and digital media strategically and capably <input type="checkbox"/> Coming to understand other perspectives and cultures	
Common Core Instructional Shifts		<input checked="" type="checkbox"/> Building knowledge through content-rich nonfiction texts <input type="checkbox"/> Reading and writing grounded from text <input checked="" type="checkbox"/> Regular practice with complex text and its academic vocabulary	
Academic Vocabulary (General & Domain-Specific)	TEACHER PROVIDES SIMPLE EXPLANATION	KEY WORDS ESSENTIAL TO UNDERSTANDING Seasons Weather Sunlight	WORDS WORTH KNOWING Compare/contrast Observation Evidence Earth-Sun System Direct (becomes essential later) Indirect (becomes essential later)
	STUDENTS FIGURE OUT THE MEANING	Tilt Axis (axial) Rotation Revolution/Revolves Ellipse/Elliptical Orbit	Annual Spin Seasonal

Pre-teaching Considerations	By the end of day 3 you want students to have cut out and if possible, already taped together their paper model of Earth. With any extra time during the lesson, have students start cutting out each template or taping the pieces together.	
Lesson Delivery		
Instructional Methods	Check method(s) used in the lesson: <input checked="" type="checkbox"/> Modeling <input checked="" type="checkbox"/> Guided Practice <input checked="" type="checkbox"/> Collaboration <input type="checkbox"/> Independent Practice <input checked="" type="checkbox"/> Guided Inquiry <input checked="" type="checkbox"/> Reflection	
Lesson Continuum	Lesson Opening	<p><u>Preparing the Learner:</u> (~8 min)</p> <ol style="list-style-type: none"> 1. Tell students that today you will start to unravel the mystery of how it is possible for Santa Ana is closer to the Sun in winter. 2. Students will watch “Ted Talk: Reason for the Seasons.” Let students know that they will likely not understand the whole video the first time through and that’s okay and expected so the pressure is off! This is an unencumbered viewing. 3. Ask for students to share one interesting thing they heard or observed in the video with their elbow partner or table team. 4. If students feel comfortable sharing, ask for a few volunteers to share their interesting fact or observation with the class.
	Activities/Tasks/ Strategies/Technology/ Questioning/Engagement/Writing/ Checking for Understanding	<p><u>Interacting with the Text</u> Vocabulary Notebook & Video Clip (~13 mins)</p> <ol style="list-style-type: none"> 1. Before completing the second viewing of “Reason for the Seasons,” have students turn to the Vocabulary Notebook: Reason for the Seasons in their resource book and look at the vocabulary terms. 2. Instruct students that as they watch the video for the second time, they will be listening for these key vocabulary terms (they may already be familiar with several of the terms). 3. Students will watch the video and define two of the terms with a partner based on the context of the word in the video. If students struggle to define the term with words, they can draw a picture to illustrate the concept. **NOTE: Students should use pencils in case their definition needs to be revised! 4. After partners have created a definition or picture for the concept, partners need to find another group that defined the same words and check that they have a similar meaning. If not, they should discuss what is different about their definitions and which is more accurate. 5. If no other pair defined a term, the pair could look up the definition or compare with the teacher. 6. After 1-2 minutes of checking definitions or pictures, have students find a second group to check their second term.

<p>Lesson Continuum</p>	<p>Activities/Tasks/ Strategies/Technology/ Questioning/Engagement/Writing/Checking for Understanding</p>	<p>7. Ask students to sit back down. As a class review the different terms and ask students to add to their chart. In lieu of writing the definition on the overhead, ask students to suggest an image to help define the words. Students must then listen closely to the discussion in order to write their definition.</p> <p>Shades of Meaning & Close Read “Sunlight & Heat” (~22min)</p> <p>**NOTE: This close reading strategy allows students to explore subtle differences between similar words or phrases. It works best in pairs to ensure each student is engaged in the activity and has an opportunity to speak and interact with the terms.</p> <ol style="list-style-type: none"> 1. Hand each pair of students an envelope containing the pre-cut word/definition strips related to the Sunlight & Heat Complex Text and instructs students to work together in groups. 2. Review the directions together and model how to analyze a word. “Absorb” is like a sponge absorbs water so it must mean to suck up or take in. 3. Pick a second word that will be more unfamiliar, such as “emit” or “radiate” and tell students that they don’t have to know the definition of every term yet. They should make an educated guess for now. Ex: <i>Emit as a big “E” like in “Exit,” so maybe emit also means to leave or to let go, in this case.</i> Students will revise this after reading the article on sunlight and heat. 4. Students should take turns reading the word strips aloud and sort them into general categories for now. Circulate throughout the classroom prompting groups that may have difficulty getting started. Give students ~3 minutes 5. FIRST READ: Instruct students that to spend the next 4 minutes reading the article silently. Students are reading to understand and do not need to annotate yet. Remind students it is okay if they do not finish the text (because they will have a 2nd and 3rd read). The goal is to understand everything that they do read. If a student finished early, ask them to re-read it. 6. SECOND READ: The second time reading the article, ask students to re-read independently and underline three or four important, new, or interesting facts from the article. Give students ~3 minutes. 	<p>Differentiated Instruction:</p> <p>Provide students with definitions for vocabulary terms in the supplemental PPT</p> <p>Homogenous grouping for struggling students to work with while others grapple with the text</p> <p>Provide visual supports to contextualize vocabulary</p> <p>Teacher proximity to guide students and provide immediate feedback</p> <p>Model sorting process and justification writing.</p>
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<p>Lesson Continuum</p>	<p>Activities/Tasks/ Strategies/Technology/ Questioning/Engagement/Writing/Checking for Understanding</p>	<ol style="list-style-type: none"> 7. Students need to now select just one underlined quote to share with their group. 8. <u>“Save the Last Word”</u> (~10 mins) Students will use this technique to share out in groups of three to five students and discuss their pulled quote. 9. The 1st student reads aloud their selected quote (identifying the paragraph for other students to follow along) and then stops. 10. The rest of the students respond to the quote in turn: <ul style="list-style-type: none"> • The student to the right of the 1st speaker responds to the quote, adding his/her thoughts, feelings, insight, or questions about the quote. • The remaining students respond to the quote. • LAST up, the 1st student shares WHY they picked that quote (hence save the last word for me). 11. The process repeats with the 2nd student in the group and the rest of the group responding to the quote. <p style="text-align: center;"><u>Extending Understanding (~8mins)</u></p> <ol style="list-style-type: none"> 12. THIRD READ: Now that students have sorted through the article and associated terms, they will return to their card sort and resort the terms using the article to help them define unknown terms. 13. Lastly they will justify how they differentiated between terms on line #1 and #2. Sorting patterns will likely differ. The focus is on student’s ability to justify how and why they sorted the terms as such, rather than one specific answer. 14. After reading the article and resorting, call on groups to share out their choice of word order and asks groups to raise their hands if they had the same order. Groups with different orders are asked to share what was different about their word order choice and explain their thinking as to their word order choice. There is no exactly correct word order. Tell students this. Any order is acceptable as long as students can <u>justify</u> their reasoning. 	
<p>Lesson Reflection</p>			
<p>Teacher Reflection Evidenced by Student Learning/ Outcomes</p>			

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Vocabulary Notebook: Reason for the Seasons

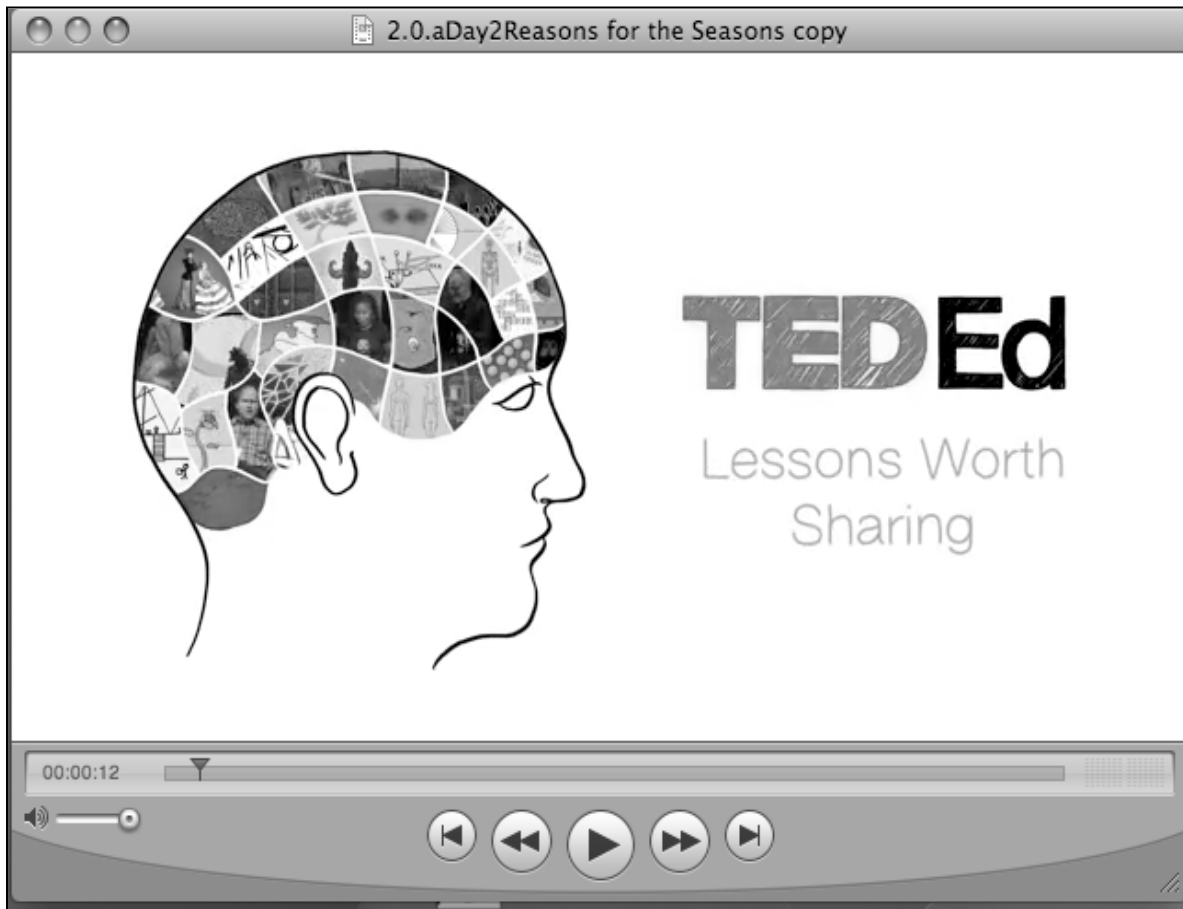
Word	Graphic/Image	Definition
<u>Axis (axial)</u>		
<u>Rotation</u>		
<u>Revolves (Revolution)</u>		
<u>Orbit</u>		
<u>Ellipse (elliptical)</u>		

Summary Warm Up: Write a sentence using 2 words from above to describe how the Earth is oriented and moves in relation to the sun.

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SPACE SYSTEMS: SEASONS Instructional Video Clips

Day 2 “Reasons for the Seasons” from TED Ed time 5:20



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Sunlight & Heat

There are many different ways to cope with heat. One obvious way is to move away from the heat source so that you do not feel the heat it **releases** as strongly. Another way is to change your position so that you do not face the hot object directly. It is also possible to use other cooling methods—such as air conditioning or a fan.

Passive heating is a great way to **trap** heat without having to give off very much energy. For example, if you hold your hands near a fire, they will passively warm up. The closer your hands are to the heat, the warmer they feel as they **absorb** the heat energy **emitted** from the fire. If your hands are turned at an angle or sideways to the fire, the heat received by your hands is less than if you were to hold your hands directly facing the fire.

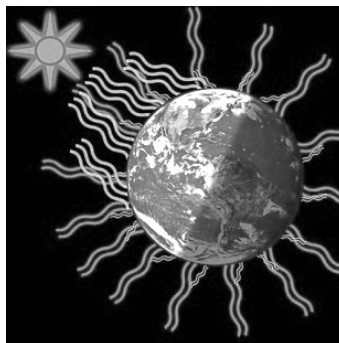


Therefore, you can conclude that the amount of heat felt depends on both the distance from the heat source and the angle at which your hands are inclined toward that source. If your hands become too warm,

there are effective ways to cool them passively. They can be moved farther from the heat, or the angle at which the hands are held can be increased. Or, you could remove your shoes and socks to **liberate** some of the heat energy from your feet!

How Heat Travels

Let's take a quick look at how heat can be transferred between particles, atoms, and molecules. The first way is through **radiation**. Radiation is essentially a source of energy giving off its heat in the form of light. Think light bulbs, stars, and even humans **radiating** heat. The hotter something is, the



more it radiates.

The second method is called **convection**. This method of heat transfer involves patterns of rising and falling gasses of different temperatures, and is very important in the transfer of heat near the surface of the sun! For those of you who like computers, convection is what we use to cool down our computer chips when they have **acquired** too much heat—the fan blows cool air over the chips, and the air **absorbs** some of the heat from the chips.

The third mechanism of heat transfer is **conduction**. This is essentially heat transfer through particle collisions.

On Earth, conduction plays a huge role in energy transfer because we live in a high particle density environment. Air is everywhere, so if you start heating up air in a room, it spreads out quickly—heat is easily transferred between air molecules.

But what about in space? There are very very few particles in space so conduction does not work there! Instead, the Sun gives off its energy through the vacuum of space via radiation, until sunlight enters Earth's atmosphere and conduction can begin. The atmosphere on earth **captures** some of the sun's energy. When sunlight interacts with particles of matter, its energy can be **absorbed** or **reflected**. For example, we can feel the warmth **generated** by sunlight on our skin when we stand outside on a sunny day.



Sunlight

Sunlight is the source of almost all energy on Earth. Sunlight keeps the earth warm enough for living things to grow and thrive. Sunlight is also a source of energy for plants.

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Sunlight & Heat Close Read

Shades of Meaning: words dealing with “taking in” or “letting go”

“Shades of Meaning” explores subtle differences between similar or related words & phrases. List the words from the “Sunlight & Heat Energy” reading in order from intensity of “taking in” to “letting go.”

Before reading the article “Sunlight and Heat,” sort the words generally into two categories.

Make an educated guess when you are unsure. After reading resort the words to be more specific.

First Sort	
Taking In -----	----- Letting Go

Second Sort
Word that most strongly means “To Take In”
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
Word that most strongly means “to let go” or give off

Justify (explain why) in writing how you determined the order of words on line #1 and #2.

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Sunlight & Heat Energy Close Reading: Shades of Meaning

Shades of Meaning explores subtle differences between similar words/phrases

Cut the word strips apart and have students rank them in order from words that “take in” with the most intensity to words that “let go”

Release = to free from confinement, bondage, obligation, pain, etc. - let go. *The batter released the baseball bat after making contact with the ball.*

Capture = to gain control of, the process in which an atomic or nuclear system acquires an additional particle. *The trap captured the mouse.*

Trap = to catch, take in or pen. *The dog was trapped in by the large fence.*

Emit = to send forth (liquid, light, heat, sound, particles, etc.); discharge. *He emitted one shrill cry and then was silent.*

Absorb = to suck up or drink in (a liquid); soak up: *A sponge absorbs water.*
–to take in without echo, recoil, or reflection: to absorb sound and light; to absorb shock

Liberate = to set free, as from imprisonment or bondage, to disengage; set free from combination, as a gas. *The prisoners were liberated when the war ended.*

Collect = to gather together; assemble, to accumulate: *The professor collected the students' exams.*

Acquire = to come into possession or ownership of; get as one's own: *to acquire property* –to gain for oneself through one's actions or efforts: *to acquire learning.*

Radiate = to extend, spread, or move like rays or radii from a center, to emit rays, as of light or heat; irradiate, to issue or proceed in rays, (of persons) to project or glow with *She simply radiates with good humor.*

Reflect = To throw or bend back (light, for example) from a surface. *The sunlight reflected off the mirror and back into his eyes.*

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Card Sort Terms:

To be cut out and sorted by students from terms meaning "to give off" or "to take in"

Release	Trap
Absorb	Emit
Acquire	Generate
Liberate	Radiate
Reflect	Capture

Card Sort Terms:

To be cut out and sorted by students from terms meaning "to give off" or "to take in"

Release	Trap
Absorb	Emit
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Reflect	Capture

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SAUSD Common Core Lesson Planner

Teacher:

<p>Unit: BIODIVERSITY Day: 4-6 Lesson: 4</p>	<p>Grade Level/Course: 6TH Grade Earth Science</p>	<p>Duration: 3 Class Periods Date:</p>
<p>Big Ideas: Cycles are never ending patterns that repeat Enduring Understandings: Seasons are caused by the differential intensity of sunlight on different areas of Earth across the year, which result from Earth’s spin axis being tilted relative to its orbit around the sun. Essential Questions: What is meant by cyclic patterns? Where do cycles exists on Earth? How does Earth’s tilted axis explain seasons?</p>		
<p>Common Core and Content Standards</p>	<p>Content Standards: 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 moon, and seasons. ESS1.B Earth & the Solar System This model of the solar system can explain eclipses of the sun & the moon. Earth’s spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. Reading Standards for Literacy in Science and Technical Subjects: RST .6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. Writing Standards for Literacy in Science and Technical Subjects: WHST.6-8.4 Students produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience. WHST .6.8.9 Draw evidence from informational text to support analysis reflection, and research. Speaking and Listening Standards: SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, details, and facts to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.</p>	

<p>Materials/ Resources/ Lesson Preparation</p>		<p>Student Resource 3.1: Vocabulary Notebook Student Resource 4.1: Seasons Lab & Data Table Teacher Resource 4.1a: Video “Summer vs. Winter” Student Resource 4.2: Academic Conversation Student Resource 4.3: Article 1: A Review of the Seasons Student Resource 4.4: Article 2: Seasons at the Extremes Student Resource 4.5: Collaborative Annotation Chart</p> <p>Lab Material: Paper Earth Template, wooden skewer, marker, tape, chair, table</p>	
<p>Objectives</p>		<p>Content:</p> <p>Students will experience the difference between direct and indirect light to determine that seasons are caused by the Earth’s tilt and the change in sunlight intensity.</p>	<p>Language:</p> <p>Students will orally collaborate to create an accurate and functional model of the Earth-Sun relationship.</p>
<p>Depth of Knowledge Level</p>		<p><input type="checkbox"/> Level 1: Recall <input checked="" type="checkbox"/> Level 2: Skill/Concept <input checked="" type="checkbox"/> Level 3: Strategic Thinking <input checked="" type="checkbox"/> Level 4: Extended Thinking</p>	
<p>College and Career Ready Skills</p>		<p><input checked="" type="checkbox"/> Demonstrating independence <input checked="" type="checkbox"/> Building strong content knowledge <input checked="" type="checkbox"/> Responding to varying demands of audience, task, purpose, and discipline <input checked="" type="checkbox"/> Comprehending as well as critiquing <input checked="" type="checkbox"/> Valuing evidence <input checked="" type="checkbox"/> Using technology and digital media strategically and capably <input type="checkbox"/> Coming to understand other perspectives and cultures</p>	
<p>Common Core Instructional Shifts</p>		<p><input checked="" type="checkbox"/> Building knowledge through content-rich nonfiction texts <input checked="" type="checkbox"/> Reading and writing grounded from text <input checked="" type="checkbox"/> Regular practice with complex text and its academic vocabulary</p>	
<p>Academic Vocabulary (General & TEACHER PROVIDES SIMPLE EXPLANATION)</p>	<p>KEY WORDS ESSENTIAL TO UNDERSTANDING</p>	<p>WORDS WORTH KNOWING</p>	
	<p>Seasons Weather Sunlight</p>	<p>Compare/contrast Observation Evidence Earth-Sun Moon</p>	

	STUDENTS FIGURE OUT THE MEANING	Direct Orbit Indirect Tilt Axis (axial) Revolution/Revolves Ellipse/Elliptical	Annual Spin Seasonal
Pre-teaching Considerations		If students have not completed assembling their model of the Earth, they will need to do so before beginning the lab. Full assembly of the paper model will likely take 15-20 minutes depending on how dexterous your students are with scissors and tape.	
Lesson Delivery			
Instructional Methods		Check method(s) used in the lesson: <input checked="" type="checkbox"/> Modeling <input checked="" type="checkbox"/> Guided Practice <input checked="" type="checkbox"/> Collaboration <input checked="" type="checkbox"/> Independent Practice <input checked="" type="checkbox"/> Guided Inquiry <input checked="" type="checkbox"/> Reflection	
Lesson Continuum		Lesson Opening	Day 4 and 5 <u>Prepare the Learner (~10 mins)</u> <ol style="list-style-type: none"> 1. Have students pull out the Vocabulary Notebook 2. At the bottom of the page, students work with a partner to write a sentence using 2 words from above to describe how the Earth is oriented and moves in relation to the sun. 3. Check with students to ensure they are using the terms correctly as you walk around. 4. Ask for volunteers to share and have classmates listen and check if students are using terms correctly. If a word is used incorrectly, ask if another student or group if they can help correct the meaning.
Activities/Tasks/ Strategies/Technology/ Questioning/Engagement/Writing/ Checking for Understanding		<u>Interacting with the Text</u> Seasons Lab (~70 minutes) ** Notes about the Lab: Today students are completing the Seasons Lab. The lab has a very detailed procedure and can be completed by students in teams of three or four students. Lab teams can complete this lab independently if you wish, but be prepared that students may rush past ideas imbedded in the text. Alternatively, students can complete the lab in chunks as guided by the teacher. If you choose this approach, have students read a portion of the text and then give them time to manipulate and explore each concept as it is introduced. Please note this lab is intended to be completed over two days, giving students ample time to read deeply and explore the concepts. <ol style="list-style-type: none"> 1. Lab teams retrieve their paper Earth model from safe storage area. 2. Students open up to “Seasons Lab” and follow teacher’s instructions for how to proceed. 	

<p>Lesson Continuum</p>	<p>Activities/Tasks/ Strategies/Technology/ Questioning/Engagement/Writing/Checking for Understanding</p>	<p>3. When students get to the Cause 2 of the lab, they will need to record the path they walk around the chair in the data table. Help them find this page.</p> <p>4. There are 2 additional questions on the data table that students should answer after completing the lab activities and reading “What Causes The Seasons.”</p> <p>Academic Conversations (~20 minutes)</p> <ol style="list-style-type: none"> To present the lab information in another format, show students the very entertaining video “Summer versus Winter.” They will watch this again at the end of the lesson with a focus/writing task so this viewing can be to just watch. Students will diagram the seasons and carry out an academic conversation using specific terms to demonstrate their understanding of what causes seasons. Students should use their lab and other notes to help draw their model and hold their conversation. <p>Hint: Help students see that when Earth’s axis points towards the sun it is summer in the Northern Hemisphere.</p> <ol style="list-style-type: none"> Model how this conversation might look with you modeling the speaking portion and a student keeping track of how many times you use each term. Emphasize for students that the term must be used correctly and in context to count for a tally mark. Students then break into pairs and each takes a turn speaking and recording for their partner. After students have both explained what causes seasons (and they may want to try this a second time to improve their answer), they need to write out their conclusion paragraph using all of the terms provided. Give students about 5 minutes for this part. Once the paragraph is written, student should underline the key terms to make sure they are all there. Students could turn lab and/or their conclusion in for feedback and a grade. <p>Day 6</p> <p>Close Read “What Causes The Seasons” Articles (~45 mins)</p> <ol style="list-style-type: none"> Groups of four students should be divided into two dyads (A/ B, and C/D) to read two short articles related to the seasons. 	<p>Students Needing Additional Supports</p> <p>Guide small groups through individual task on the lab activity.</p> <p>Model for students procedure steps in lab</p> <p>Heterogeneous lab grouping to help guide struggling readers or students</p> <p>Homogenous grouping to provide focused support on a small group of students</p> <p>Model use of language frames sentence starters</p> <p>Allow students to watch video at home or with headphones</p>
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<p>Lesson Continuum</p>	<p>Activities/Tasks/ Strategies/Technology/ Questioning/Engagement/Writing/Checking for Understanding</p>	<table border="1"> <tr> <td style="text-align: center;">Student A (article 1)</td> <td style="text-align: center;">Student B (article 1)</td> </tr> <tr> <td style="text-align: center;">Student C (article 2)</td> <td style="text-align: center;">Student D (article 2)</td> </tr> </table>	Student A (article 1)	Student B (article 1)	Student C (article 2)	Student D (article 2)	
		Student A (article 1)	Student B (article 1)				
Student C (article 2)	Student D (article 2)						
		<ul style="list-style-type: none"> • The first article, A Review of the Season is a review for students who may still be struggling to understand how Earth’s tilt creates seasons. Lexile 1098 • The second article, Seasons at the Extreme is new information. This is a more challenging article because the concepts of equinox and solstice are new. Lexile 1178 <ol style="list-style-type: none"> 1. First Read: Instruct students that the first time reading the article they are reading without a pencil and just focusing on the content. Give students 6 minutes to read. Remind them that it’s okay if they do not finish; the goal is to understand everything they do read (so they may need to reread specific lines). 2. After students complete the first unencumbered read, they will pick up a pencil to complete the second read. <p>NOTE: Model this for students the first time using this technique so they understand that this is different than highlighting. When students highlight they often highlight arbitrarily or over highlight and forget why they marked part of the text. This technique helps them focus their markings and indicates why a part of the text was selected *=key point. != shocking/surprising point. O = personal connection</p> <ol style="list-style-type: none"> 3. Second Read: Students will using a * to indicate the Author’s main point, key ideas, or significant ideas. Give students an additional 6 minutes to read with this as their focus. 4. Third Read: For the last read of this article, students will read to look for pieces of information that are surprising or shocking (use a ! to mark these pieces), or for ideas that they connect with or remind them of a prior experience (use a O to mark these parts). 5. Independently students will select 4 of their markings and transfer them to their Collaborative Annotation Chart along with a quick note about why they selected that sentence or phrase (ex. <i>I don’t remember what “axial” means, or I remember a time when the daylight and night time were equal in length</i>). 					

		<ol style="list-style-type: none"> 6. Students will then share their annotations with their partner who read the same article using the “Sample Language Supports” (students can already be sitting next to this person or can be paired up after completing the reading). Again, model the use of conversation starters if students are unfamiliar with these. 7. Partners jot down each other’s response to their annotation marks. 8. Together the partners write a summary of their article focusing on the <u>key</u> elements of each piece. This summary should be clear and with enough detail that someone who did not read the article could understand it. 9. Dyads (A/B and C/D) now break up and reform (A/C and B/D) with students who read two different articles. 10. In the new dyads, each student will take a turn sharing their summary of the article they read. <p>Extending Understanding (~10 minutes)</p> <ol style="list-style-type: none"> 1. Tell students they are going to watch the “Summer versus Winter” video again. This time, give students the question before they watch to focus their viewing. <p><i>Why is it summer in Santa Ana but winter in New Zealand? Support your answer with evidence from the video clip.</i></p> <p>This clip can be an Exit Slip or a Warm Up question depending on time and where your class is.</p>	
Lesson Reflection			
Teacher Reflection Evidenced by Student Learning/ Outcomes			

Name _____

Period _____

Seasons Lab

Most places on Earth experience four seasons every year. These are spring, summer, fall (or autumn) and winter. The seasons are caused by a combination of things.

1. The Earth is tilted as it moves around the sun.
2. Direct sunlight produces more heat than indirect light.
3. The Earth moves around the sun in a way you may not expect.

We will look at each of these in turn, and then see how all three together produce the seasons!

Cause 1: The Earth is Tilted

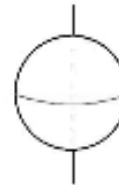
The Earth is a sphere. It can be divided into two hemispheres, the Northern and Southern Hemispheres. The best way to understand this is to make a model.

To be completed BEFORE beginning the lab:

- You will be working in a team of 4.
- Each person in the team will be responsible for cutting out 1 page of the Sectional Globe template.
- Cut carefully! When you have cut out your page, carefully fold the paper on the dotted lines. Tape your two pieces together.
- When all 4 team members have cut and taped their page, work together to make a complete globe by taping the four pieces together at the correct places.
- If you need help, refer to the Earth Paper Globe Model Construction page.

1. Use the colored marker to highlight the line drawn around the middle of the Paper Globe, dividing it into a top and bottom half. The line represents the Equator, the top half is the Northern Hemisphere, and the bottom half is the Southern hemisphere.
2. Find the United States and then where California is. Put a colored dot where Santa Ana to keep track of your location (this will be right where two pieces of your Earth model are taped together. Your teacher can help you if you get lost!
3. Take the skewer and carefully pass it right through the top center of the Paper Globe, from top to bottom. Where it enters the ball at the top is the North Pole, and where it comes out at the bottom is the South Pole.

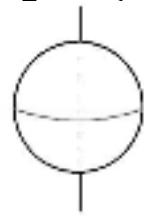
Now your Earth model should look like this:



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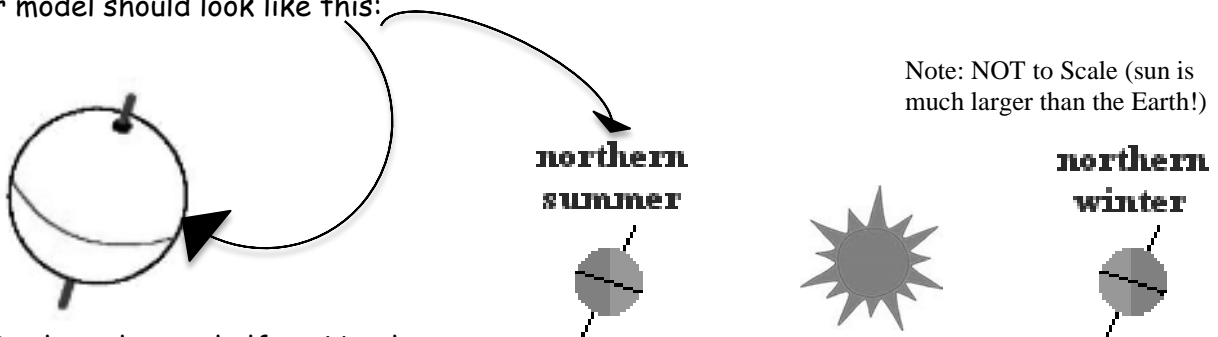
Adapted from: <http://www.learninghaven.com/science/articles/seasons.htm> and [EnchantedLearning.com](http://www.EnchantedLearning.com)
M. Poarch – 2001 <http://science-class.ne>

The stick represents the Earth's axis. The axis is an imaginary line running from the North to South poles. The Earth spins on this axis all the time, turning around completely once every 24 hours (a rotation). Take your Earth model and hold it by both ends of your stick.



4. Rotate the stick between your fingers. One full revolution takes 24 hours.
5. Take out the flashlight (the Sun) and shine it on Earth. Rotate Earth while keeping the Sun in the same place. What happens to you as you rotate Earth around? That is what gives us night and day. However, it has nothing to do with the seasons. So far we have only shown that the earth has night and day. So what makes the seasons happen?
6. Write what you believe causes the seasons below:

7. Right now you are holding your ball with the stick going straight up and down. This is not accurate. The Earth is actually **tilted relative to the sun**. Hold the ball in one hand and tip it, so that the top of the stick is nearer to you and the bottom of the stick points away from you. **THAT** is how the Earth is in space. We live in the Northern Hemisphere. Your model should look like this:



8. Notice how the top half, or Northern Hemisphere, is tipped toward you, with more of it showing than the Southern Hemisphere.

Cause 2: Direct Light Produces More Heat

To demonstrate this idea we will do some simple investigations. Materials needed are a flashlight, a pencil, a piece of paper, ruler, and a textbook. To begin with, you will need your flashlight and a pencil!



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<p>1. Hold your flashlight about 15cm above the box to the right. Shine your flashlight straight down on your paper. Make the circle of light line up at the top of the box →</p>	
<p>2. Have your partner trace this circle. Label this line "direct light."</p>	
<p>3. Keep the flashlight 15cm above the paper and tilt the top of the flashlight away from you just a little bit. The circle of light should change.</p>	
<p>4. Have your partner trace this circle.</p>	
<p>5. Repeat one more time, tilting the top of the flashlight even farther away from you to exaggerate the change in your circle of light.</p>	
<p>6. Have your partner trace this circle. Label this line "Indirect light."</p>	

7. The amount of light coming out of the flashlight did not change as you tilted it but the shape it made on your paper did change. Describe what happened to the shape of light made by the flashlight as you tilted it and the brightness of the light on your paper.

As I tilted the flashlight _____

8. Now put your hand up against the light source. Feel that it is warm (this may take a minute

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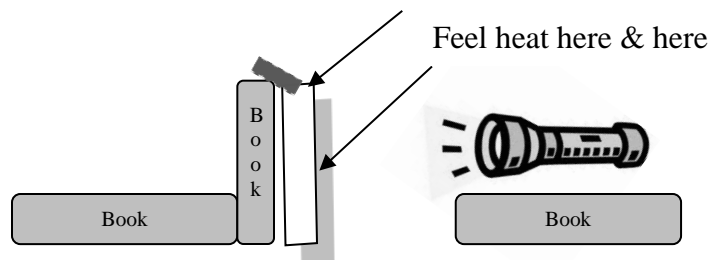
for it to heat up).

- Now move your hand about 3 inches away from the light to represent the space between Earth and the sun. But Earth is tilted, so let's tilt your hand. Keep the flashlight level and tilt your hand towards from the flashlight (make sure your fingertips are the still 3 inches from the flashlight).



- Write at least one complete sentence describing what you noticed when you tilted your hand toward the light. _____

- Now let's look at the way light produces heat using your paper. Prop two books up at a 90° angle and tape the piece of paper on it. Lay the flashlight on another book so that it shines onto the paper. Feel the paper in the center and the top corner and notice when it starts to get warm. Measure 10 cm up or down from the center of the light source and mark the spot on the paper.
- Keep feeling that bit. How long does it take to get warm? Does it get warm?

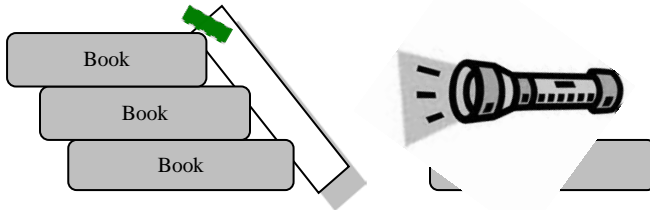


Record your observations:

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13. **Round 2:** Let your paper cool off. This time prop your book upright 10 cm away from the light. Fix your paper to it with a piece of tape. Check the area of the paper opposite the center of the flashlight. How long does it take the paper to get warm this time? Feel the area to the top of the paper. Which is warmer, the top or the center?

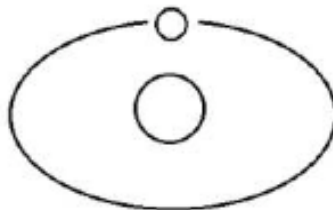


14. Record your observations here:

The reason that it was quicker the second time is that the light was falling directly onto the paper. The second time the light was hitting the paper at different angles. **Direct light is concentrated and heats up an area faster than indirect light, or when light strikes something at an angle.** This is also why the top of the paper around was not as warm as the center the second time.

Cause 3. How the Earth Moves Around the Sun

Remember that the Earth is tilted all the time that it is moving around the Sun. The Earth moves around the Sun once every year. It follows an elliptical orbit. This means that it goes almost in a circle around the sun, but gets a little further away at some times. The path it takes is like an oval.



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1. Now, take your ball again, tip it like before and hold it at arm's length, keeping it tipped. Slowly turn around in a circle. Notice how the tilt stays the same. The Northern hemisphere is always tipped toward you. This is **NOT** how the earth moves.



2. Put your ball down for a minute and walk around a chair. The way you would normally do it, you would walk around with one side of you facing the chair the whole time. I want you to do it a different way. Place the chair between you and a window. Leave enough space between it and the window so you can walk around it. Start on the opposite side to the window, facing the chair AND the window. Now walk around the chair, all the way, but keep facing the window. Don't turn round (this means you will be walking backwards at some point, so **be careful**). THAT is how the Earth moves around the sun.

3. Record your path in the data table at the end of the lab.
4. Now do it again, holding your Earth model at your side. Starting with the top of the Earth tilted towards the chair. As you walk around, notice that the part of the Earth facing the chair changes. First the Northern Hemisphere points to the chair (or Sun), then the tilt is sideways, with neither hemisphere pointing at the Sun, then the Southern hemisphere points at the Sun (when you are walking backwards) and finally neither hemisphere points at the Sun again. Then you are back to the beginning and the Northern hemisphere is pointing at the Sun again.
5. Record your path in the data table at the end of the lab.



What Causes the Seasons? A Review

As you have seen, the Earth is tilted and direct light causes more heat than indirect light. Remembering your walk around the chair, and how the tilt is at each point, can you work it out?

This is how it works. When the Northern hemisphere is pointing at the sun, sunlight falls most directly on it. This is summer in the Northern Hemisphere. As you get around to the side of the chair, neither hemisphere is pointing toward the Sun. The light strikes both equally and directly.

As the Earth moves around to the other side of the Sun the Northern Hemisphere is tilted away from the Sun. Now the light falls indirectly on it. It is winter. As it moves around to the fourth side, it the light again falls directly on it.

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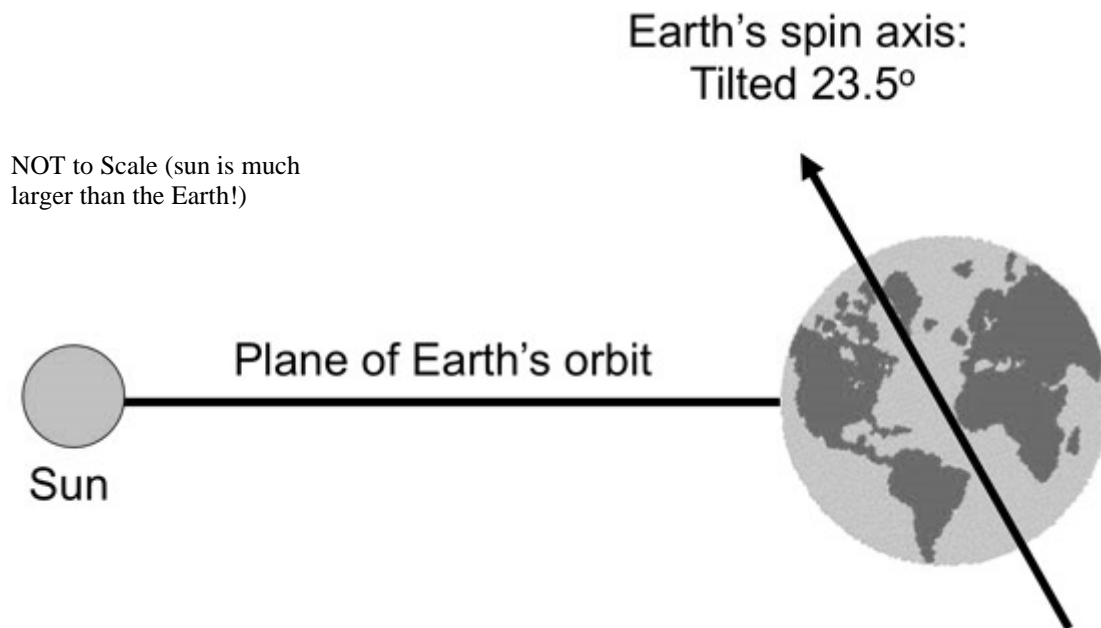
Adapted from: <http://www.learninghaven.com/science/articles/seasons.htm> and [EnchantedLearning.com](http://www.EnchantedLearning.com)
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Notice that the exact opposite is happening in the Southern hemisphere. When the Northern Hemisphere has summer, the Southern Hemisphere has winter, and the other way round. So, how do you decide which has spring and which has fall? That is simple. Spring follows winter and fall follows summer!

The Earth's seasons are not caused by the differences in the distance from the Sun throughout the year (these differences are extremely small). The seasons are the result of the tilt of the Earth's axis.



The Earth's axis is tilted perpendicular to the plane on which the Earth travels around the sun. This tilt is 23.45° . **This tilting is what gives us the four seasons of the year:** Summer, Spring, Winter and Autumn. Since Earth's axis is tilted, different parts of the globe get more direct, concentrated amounts of sunlight at different times of the year.



Summer is warmer than winter (in each hemisphere) because the Sun's rays hit the Earth at a more direct angle during summer than during winter and also because the days are much longer than the nights during the summer so Earth heats up longer than it cools each day.

During the winter, the Sun's rays hit the Earth at an extreme angle, and the days are very short without very concentrated sunlight. These effects are due to the tilt of the Earth's axis.

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Data Table

<p>Draw the path you took around the chair the first time. Please use arrows and several drawings of yourself.</p> <div style="text-align: center;">  <p>Chair</p> </div>	<p>Draw the path you took around the chair the second time, when you were facing the chair and the table the entire time. Please use arrows and several drawings of yourself.</p> <div style="text-align: center;">  <p>Table Chair</p> </div>
<p>Explain which path above is similar to the way the Earth moves around the sun (Earth's orbit). Justify your choice and explain why you picked this path.</p>	<p>Which light source would heat up your foot faster and why? A flashlight shining directly on your foot or a flashlight beam angled over your foot?</p>

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M. Poarch – 2001 <http://science-class.ne>

SPACE SYSTEMS: SEASONS Instructional Video Clips

Day 5/6 “Summer vs. Winter” from MIT Time 5:30mins



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"Academic Conversation"—What Causes the Seasons?

Using the information you have gained while learning about the cycles of the seasons, draw a scientifically accurate picture of the Sun and the Earth. Show the part of the Earth around the Sun. Indicate in your picture when it would be summer in the Northern Hemisphere.

With your partner, practice explaining what causes the seasons in the diagram you created. Every time your partner uses a word to explain how the seasons are created, place a check mark (✓) in the appropriate box. Your partner must use the word correctly in order to get a check mark. Try to use as many terms as you can in your explanation. Switch roles and repeat.

	Transition words	Place a ✓ by word	Vocabulary words	Place a ✓ by word	Seasons-Related	Place a ✓ by word
Partner 2 (Listener) tallies the words used by Partner 1 (Presenter)	First		Axis		Summer	
	Next		Tilt		Winter	
	Then		Direct light		Fall	
	Finally		Indirect light		Spring	
			Orbit		Cycle	
			Rotation			
Partner 1 (Listener) tallies the words used by Partner 2 (Presenter)	First		Axis		Summer	
	Next		Tilt		Winter	
	Then		Direct light		Fall	
	Finally		Indirect light		Spring	
			Orbit		Cycle	
			Rotation			

With your partner, write out your Academic Conversation using the following terms: *Earth, axis, tilt, rotation, direct light, indirect light, seasons, cycle*. Underline each term as you use it. This is your conclusion to your lab report.

What creates the seasons on Earth?

A Review of the Seasons

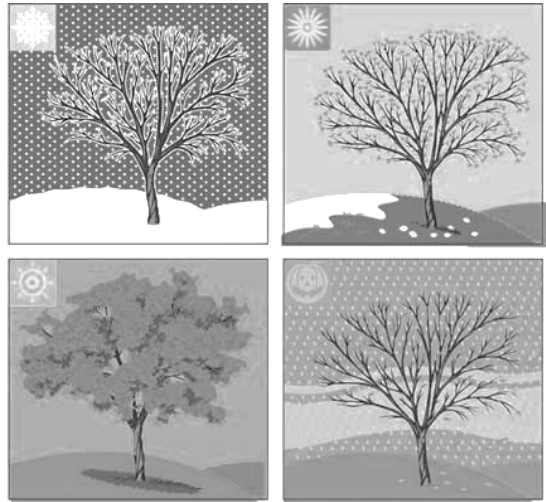
Directions:

1st Read: Read to understand

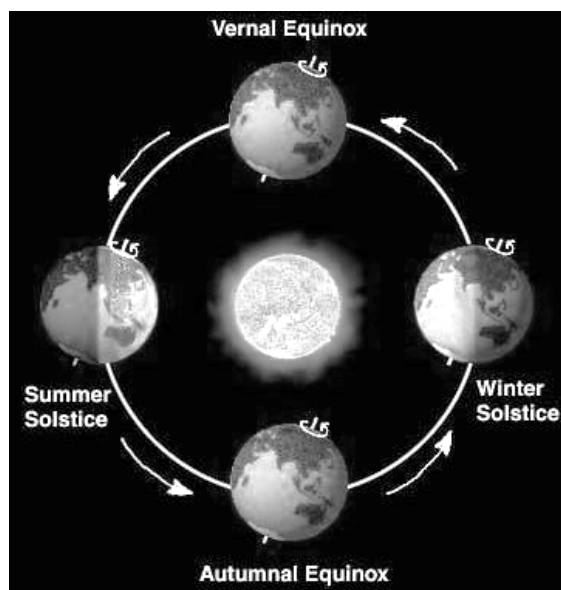
2nd Read: Use the * to mark key ideas

3rd Read: Use the ! or O to mark surprising ideas or things that you connect with.

Symbol/ Section	Comment/ Question/ Response
*	<ul style="list-style-type: none"> ▪ Key ideas expressed ▪ Author's main points ▪
!	<ul style="list-style-type: none"> ▪ Surprising details/claims ▪ Emotional response
O	<ul style="list-style-type: none"> ▪ Ideas/sections you connect with ▪ What this reminds you of



1. We're in the middle of Winter here in California. The Sun is out, but the air is cold, and the days are short and wet. Three months from now, it's going to be warming up and the days getting longer. Six months from now, it's going to be hot and dry and the daylight will stretch on well into the evening.
2. No matter where you live on Earth, you experience seasons, as we pass from Spring to Summer to Fall to Winter, and then back to Spring again. Why do we have variations in temperature at all? What causes the seasons?
3. If you ask people this question, they'll often answer that it's because the Earth is closer to the Sun in the summer, and further in the winter.



4. But this isn't why we have seasons. In fact, during Winter in the Northern Hemisphere, the Earth is actually at the closest point to the Sun in its orbit, and then farthest during the Summer. It's the opposite situation for the Southern hemisphere, and explains why their seasons are more severe.

5. So if it's not the distance from the Sun, why do we experience seasons?

6. We have seasons because the Earth's axis is tilted. Consider any globe you've ever used, and you'll see that instead of being straight up and down, the Earth is at a tilt of 23.5-degrees. The Earth's North Pole is actually pointed towards Polaris, the North Star, and the South Pole towards the

constellation of Octans. At any point during its orbit around the sun, the Earth is always pointed the same direction.

7. For six months of the year, the Northern hemisphere is tilted towards the Sun, while the Southern hemisphere is tilted away. For the next six months, the situation is reversed. Whichever hemisphere is tilted towards the Sun experiences more energy, and warms up, while the hemisphere tilted away receives less energy and cools down.

8. Consider the amount of solar radiation falling or shining on part of the Earth. When the Sun is directly overhead, each square meter of Earth receives about 1000 watts of concentrated energy (See Figure 1 below). But when the Sun is at a severe angle and light is indirect, that same 1000 watts of energy is spread out over a much larger area.

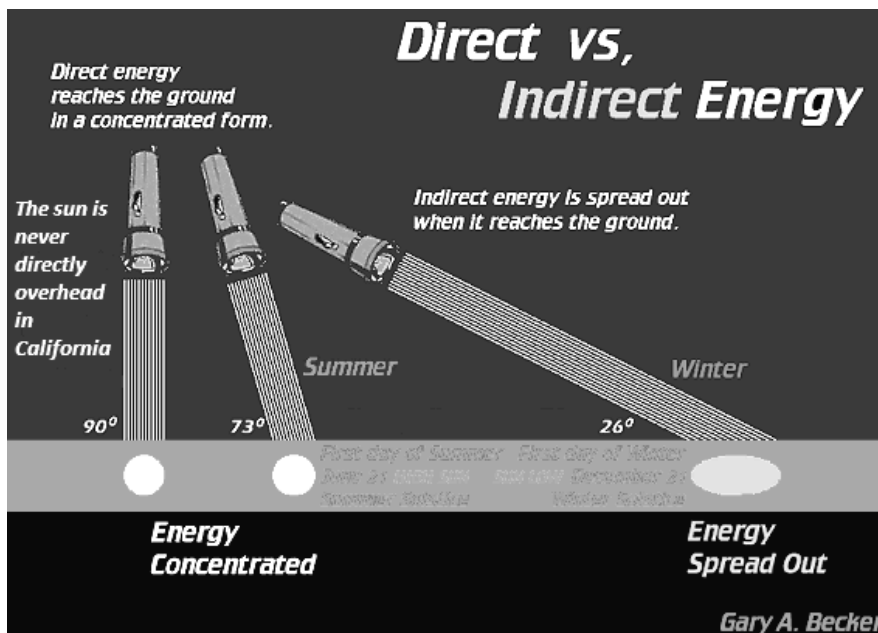


Figure 1: During winter when sunlight strikes Earth at a low or acute angle, the energy covers a very large area. So these areas get very little solar energy. When Earth's axis is pointed towards the Sun in the summer, sunlight is more concentrated.

9. This tilt also explains why the days are longer in the Summer, and then shorter in the Winter. The longest day of Summer, when the Northern Hemisphere is tilted towards the Sun is known as the Summer Solstice.

10. And then when it's tilted away from the Sun, that's the Winter Solstice. When both hemispheres receive equal amounts of energy, it's called the Equinox. We have a Spring Equinox, and then an Autumn Equinox, when our days and night are equal in length.

11. So how does distance from the Sun affect us? The distance between the Earth and has an effect on the intensity of the seasons. The Southern Hemisphere's Summer happens when the Earth is closest to the Sun, and their winter when the Earth is furthest. This makes their seasons even more severe.

Seasons at the Extremes



Directions

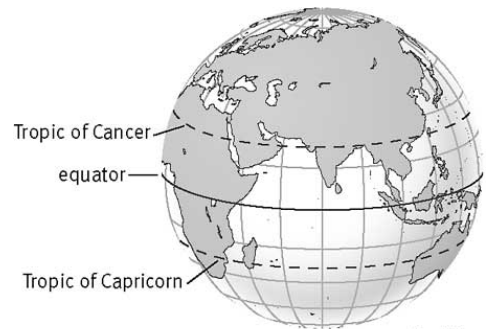
1st Read: Read to understand

2nd Read: Use the * to mark key ideas

3rd Read: Use the ! or O to mark surprising ideas or things that you connect with

Symbol/ Section	Comment/ Question/ Response
*	<ul style="list-style-type: none"> ▪ Key ideas expressed ▪ Author's main points
!	<ul style="list-style-type: none"> ▪ Surprising details/claims ▪ Emotional response
O	<ul style="list-style-type: none"> ▪ Ideas/sections you connect with ▪ What this reminds you of

1. What kind of effect does the earth's tilt and seasons have on our length of daylight (defined as sunrise to sunset)? Over the equator, the answer is not much. If you live on or very close to the equator, your daylight would be basically within a few minutes of 12 hours all year long. Using the Northern Hemisphere as our reference, the amount of daylight lengthens during the summer, with the days getting longer and longer the farther north you travel. The change in daylight length is subtle or less obvious in the tropics around the equator. Where we live (a little above the Tropic of Cancer), our daylight ranges from 15 hours around the summer solstice to only nine hours close to the winter solstice. The Arctic (north) and Antarctic (south) have long nights in the winter and long days in the summer. Above the Arctic Circle (66 °N), degrees north latitude, there is at least one day with no sun— polar night, and one day with no night— midnight sun!



Jerry Malone

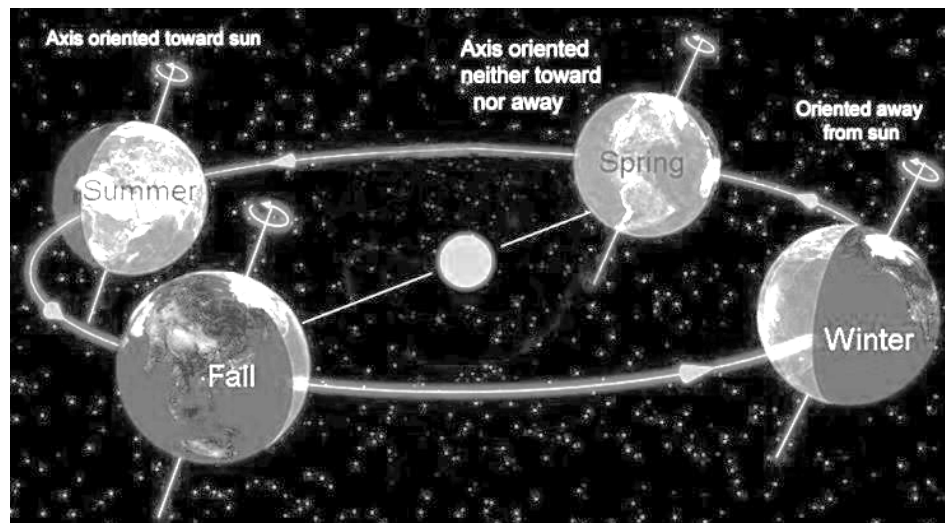
Seasons at the Poles:

2. **The summer solstice** is the first day of summer and the longest day of the year. In the Northern Hemisphere this is when the North Pole is leaning more directly toward the sun than it does on any other day (the opposite is true in the Southern Hemisphere). On the summer solstice, the Northern Hemisphere receives more sunlight than on any other day of the year—but that doesn't mean the first day of summer is also the hottest.
3. Earth's oceans and atmosphere act like heat sinks, absorbing and reradiating the sun's rays over time. Even though the planet is absorbing a lot of sunlight on the summer solstice, it takes several weeks to release it. As a result, the hottest days of summer usually occur in July or August. "If you think about turning up an oven, it takes it a long time to heat up," explained Robert Howell, an astronomer at the University of Wyoming. "And after you turn it off, it takes a while for it to cool down. It's the same with the Earth."

4. **Summer Solstice at the Poles:** Way up north in Barrow, Alaska at 71° north latitude, there is continuous sunlight from mid-May to early August! It never gets totally dark. Can you image? And what about the North Pole, or 90 degrees north latitude? The Sun rises in the early evening near the spring equinox (half way between summer and fall) and never sets again until just after the autumnal equinox. That is six months of continuous sunlight!
5. **The winter solstice**, by contrast, is the first day of winter and the shortest day of the year. As you might have guessed, the winter solstice in the Northern Hemisphere occurs when the North Pole is leaning away from the sun. When the North Pole is pointing away from the sun, the Northern Hemisphere receives only indirect sunlight; that is why winter is so much colder than summer. Brrrr!
6. **Winter Solstice at the Poles:** There becomes a shocking difference in the length of daylight heading north of the Arctic Circle. Barrow, Alaska sees two months of total darkness, as the Sun never rises for about a month on each side of the winter solstice. Go all the way up to the North pole and there is no sunlight at all for six long months!

Equinoxes

7. In between summer and winter, there are two times when the tilt of the Earth is zero, meaning that the tilt is neither away from the Sun nor toward the Sun; these days are marked by equal periods of light and darkness. These are the vernal equinox — the first day of spring — and the autumnal equinox – the first day of fall. *Equinox* means "equal." During these times, the hours of daylight and night are equal or very close to it.
8. The **autumnal equinox** is the first day of autumn (September 22) and occurs when the North Pole begins to lean away from the sun; the **vernal equinox** is the first day of spring (March 20) and occurs when the North Pole begins to lean toward the sun again.
9. **Equinox at the Equator:** Twice a year, during the spring and autumn equinoxes, the sun passes directly over the Equator. While there are seasons at the equator, the climate does not change significantly from winter to summer because the amount of daylight is about 12 hours all year long.



(Note: This picture is NOT to scale. The sun is much larger than the Earth)

Collaborative Annotation Chart:

Directions: The 1st time you read your article, put your pencil down and just read to understand. The 2nd time you read, use the * symbol to mark key ideas. The 3rd time you read, use the ! or O symbol to mark surprising ideas or things you connect with. Next, select 4 annotated sections and write them below with a quick comment about why you picked that sentence, word, or idea. Share your reasoning with your partner using the “Sample Language Support.” As your partner responds, paraphrase their thoughts and write them down.

Symbol/ Section	Comment/ Question/ Response	Sample Language Support
*	<ul style="list-style-type: none"> ▪ Key ideas expressed ▪ Author’s main points 	<ul style="list-style-type: none"> ▪ One significant idea in this text is... ▪ The author is trying to convey...
!	<ul style="list-style-type: none"> ▪ Surprising details/claims ▪ Emotional response 	<ul style="list-style-type: none"> ▪ I was surprised to read that... ▪ How can anyone claim that...
O	<ul style="list-style-type: none"> ▪ Ideas/sections you connect with ▪ What this reminds you of 	<ul style="list-style-type: none"> ▪ This section reminded me of... ▪ This connects with my experience in that...

Symbol/ Section	Paragraph #	Comment/Reason	Partner’s Comment/ Question/ Response

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SAUSD Common Core Lesson Planner

Teacher:

Unit: BIODIVERSITY Day: 7-10 Lesson: 5	Grade Level/Course: 6 TH Grade Earth Science	Duration: 4 Class Periods Date:
<p>Big Ideas: Cycles are never ending patterns that repeat</p> <p>Enduring Understandings: Seasons are caused by the differential intensity of sunlight on different areas of Earth across the year, which result from Earth's spin axis being tilted relative to its orbit around the sun.</p> <p>Essential Questions:</p> <p>What is meant by cyclic patterns? Where do cycles exist on Earth? How does Earth's tilted axis explain seasons?</p>		
Common Core and Content Standards	<p>Content Standards:</p> <p>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 moon, and seasons.</p> <p>ESS1.B Earth & the Solar System This model of the solar system can explain eclipses of the sun & the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year.</p> <p>Reading Standards for Literacy in Science and Technical Subjects:</p> <p>RST .6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.</p> <p>RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p> <p>Writing Standards for Literacy in Science and Technical Subjects:</p> <p>WHST.6-8.4 Students produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.</p> <p>WHST .6.8.9 Draw evidence from informational text to support analysis, reflection, and research.</p> <p>Speaking and Listening Standards:</p> <p>SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, details, and facts to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.</p>	

Materials/ Resources/ Lesson Preparation		Student Resource 1.2: Extended Anticipatory Guide Student Resource 5.1: Bust the Myth: Cause of Seasons **Teacher Resource 5.1: Review PowerPoint **For students continue to struggle or need additional support finding evidence in the text. Majority of the class should NOT need this resource.	
Objectives		Content: Students will create an engaging and scientifically accurate explanation of what causes the seasons through an interactive presentation.	Language: Students will collaborate to create text, graphics, or a script to explain what causes seasons. Students will listen to their peers and evaluate the scientific accuracy of their presentations.
Depth of Knowledge Level		<input type="checkbox"/> Level 1: Recall <input checked="" type="checkbox"/> Level 2: Skill/Concept <input checked="" type="checkbox"/> Level 3: Strategic Thinking <input checked="" type="checkbox"/> Level 4: Extended Thinking	
College and Career Ready Skills		<input checked="" type="checkbox"/> Demonstrating independence <input checked="" type="checkbox"/> Building strong content knowledge <input checked="" type="checkbox"/> Responding to varying demands of audience, task, purpose, and discipline <input checked="" type="checkbox"/> Comprehending as well as critiquing <input checked="" type="checkbox"/> Valuing evidence <input checked="" type="checkbox"/> Using technology and digital media strategically and capably <input type="checkbox"/> Coming to understand other perspectives and cultures	
Common Core Instructional Shifts		<input checked="" type="checkbox"/> Building knowledge through content-rich nonfiction texts <input type="checkbox"/> Reading and writing grounded from text <input checked="" type="checkbox"/> Regular practice with complex text and its academic vocabulary	
Academic Vocabulary (General & Domain-Specific)	TEACHER PROVIDES SIMPLE EXPLANATION	KEY WORDS ESSENTIAL TO UNDERSTANDING Cycles Seasons	WORDS WORTH KNOWING Hemisphere Compare/contrast Observation Evidence Earth-Sun –Moon
	STUDENTS FIGURE OUT THE MEANING	(All Review) Orbit Direct Indirect Tilt Axis (axial) Revolution/Revolves Ellipse/Elliptical	Annual Spin Seasonal
Pre-teaching Considerations		Before the unit If you plan on letting students use cell phones or iPad for creating	

		<p>presentations, double check with your principal for permission. The decision to allow cell phones in class for academic purposes is a site-level decision.</p> <p>If you want to have students create stop motion videos, explore these free apps options before students download them “Lapse It” “IMotion HD.” Have students download these at home a day ahead so they have the app ready to use in class.</p> <p>You may want to create a rubric for the final assessment task. Rubistart.org is a great resource for finding prefabricated (but editable) rubrics.</p> <p>It would be great to do a Gallery Walk of the final assessment projects with another 6th grade class. If classes complete their projects within 2 or 3 days of each other, try to arrange this interesting and eye-opening experience. One student from each team will need to stay behind to explain the project.</p>
Lesson Delivery		
Instructional Methods		<p>Check method(s) used in the lesson:</p> <p><input type="checkbox"/> Modeling <input checked="" type="checkbox"/> Guided Practice <input checked="" type="checkbox"/> Collaboration</p> <p><input type="checkbox"/> Independent Practice <input checked="" type="checkbox"/> Guided Inquiry <input checked="" type="checkbox"/> Reflection</p>
Lesson Continuum	Lesson Opening	<p><u>Preparing the Learner: ~10 mins</u></p> <p>1. If you did not have time for the second viewing of “Summer vs. Winter” use it as a warm up question. If students already answered the question, have them share their responses.</p> <p><i>Why is it summer in Santa Ana but winter in New Zealand? Support your answer with evidence from the video clip.</i></p>
	Activities/Tasks/ Strategies/Technology/ Questioning/Engagement/Writing/Checking for Understanding	<p>Interacting with the text:</p> <p>Review (~25 mins)</p> <p>1. Students will review for their final assessment by going back to the Extended Anticipatory Guide and adjusting their answers by finding supporting pieces of text in the student resource booklet.</p> <p>Students can work independently or in teams to find this evidence.</p> <p>Emphasize to students that they need to be writing the information in their OWN WORDS (paraphrasing) and not copying exact sentences from the book. Paraphrasing is not only more concise, but it demonstrates students understand and can process and transfer the text without losing its meaning. They should also cite their source.</p>
		<p>Students Needing Additional Supports</p> <p>Provide the prompt at the start of the unit for extended processing and brainstorming time</p> <p>Encourage students to work on presentation materials at home</p>

<p style="text-align: center;">Lesson Continuum</p>	<p style="text-align: center;">Activities/Tasks/ Strategies/Technology/ Questioning/Engagement/Writing/Checking for Understanding</p>	<p>Bust the Myth: Cause of Seasons It is envisioned that students will have two full class periods to work on this project (up to three days maximum).</p> <ol style="list-style-type: none"> 1. Have students turn to the final assessment task “Bust the Myth: Cause of Seasons.” Have students do a 1 minute silent close read of the directions and then go over them as a class. 2. Have students write in the due date for their project. 3. Have students look at the heading “An Excellent Project” and discuss those categories and have students brainstorm 2 or 3 other characteristics of an excellent projects. You may choose to focus specific content you want included an interactive component. Additionally, consider if you want students to all contribute orally to this or do a write up of their piece if they create a video or song. 4. Have students share their project or present it to the class. If it is a recording, show the video to the class. If videos are “trapped” on smartphones, you can show them on the document camera and plug the speakers into the phone. This can be done as a Gallery Walk or as individual team presentations. 5. If possible, arrange a Gallery Walk with another 6th grade class to see how projects and ideas differ in another classroom. Each group will need to leave behind one narrator to explain their project to the visiting class 6. Keep a close eye on student teams so they stay on task and meet the deadline. 	<p>Choose groups for students to balance ability and focus</p> <p>Provide PPT review slides to students struggling to find and cite evidence.</p> <p>Teacher proximity to ensure students are actively contributing and not stuck</p>
		Lesson Reflection	
<p>Teacher Reflection Evidenced by Student Learning/ Outcomes</p>			

Seasons & Cycles

Adapted from NASA

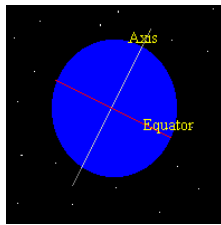
Seasons

A cyclic change in temperature that repeats itself every year, resulting from the earth's tilt with regard to the sun.



Space Vocabulary

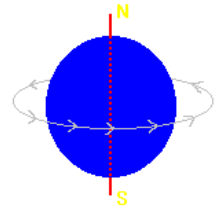
Axis - imaginary line around which Earth spins, causing day and night, and that is drawn from the north geographic pole through Earth to the south geographic pole



<http://vortex.plymouth.edu/sun/axis.gif>

Space Vocabulary

Rotation - spinning of Earth on its axis, which causes day and night; it takes 24 hours for Earth to complete one rotation



http://vortex.plymouth.edu/sun/rot8_an.gif

Space Vocabulary

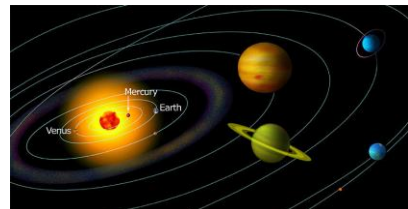
Revolution - the motion of Earth around the Sun, which takes about 365 1/4 days, or one year, to complete



<http://www.usoe.k12.ut.us>

Space Vocabulary

Orbit - curved path followed by Earth as it moves around the Sun

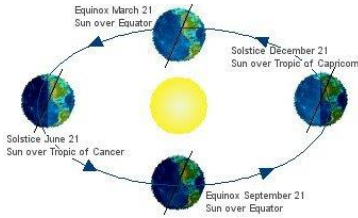


<http://www.vt-2004.org/mt-2003/mt-mercury-orbit.jpg>

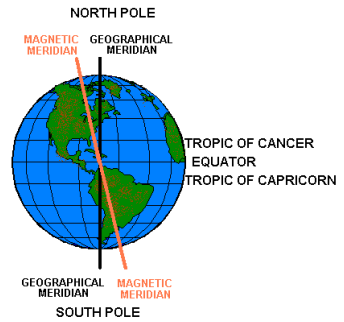
The Earth's Tilt

The Earth's axis is tilted by 23.45°

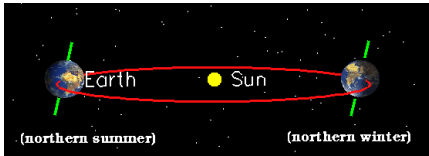
***Remember the "How the Earth Moves Around the Sun" lab -You stayed facing the same direction the entire time, and at certain times your right side, left side, front or back were facing the sun...just like the Earth!**



<http://www.orh.noaa.gov/fsd/astro/season.htm>



<http://www.cyberphysics.pwp.blueyonder.co.uk/topics/physics/magnets/meridians.gif>



As the Earth moves around the Sun, this axis stays always pointing in the same direction.

*Remember "SeasonsLab (chair lab)"

This means that, during part of the year, the northern part of the Earth will lean more directly to the sun, and during other parts of the year the southern part of the Earth will.

The Earth during one full year as you would see it if you looked straight at it from the Sun.



The part of the Earth that is directly facing the sun changes with the time of the year



Just like the "How the Earth Moves Around the Sun" lab, different parts of your body were directly facing the sun at different times of the year

The northern half faces the sun for a while, then moves south of the equator, only to move back to the north again.



This means that the same amount of light is distributed over a larger surface, and so these places receive less heat than the others.

* Remember the "Direct Light Produces More Heat" flashlight la



The southern hemisphere is experiencing Summer, the northern hemisphere has Winter



In half a year, the situation reverses, and it is now Winter in the southern hemisphere since that part of the earth is now leaning away from the sun.

The energy that hits the Earth by the Sun changes over of the year. The **angle** the Sun is above the horizon determines how much heat and light strike each square meter of ground.



<http://inkido.indiana.edu/a100/celestialSphere5.html>

In the winter the Sun's energy is weakened because the Sun's rays strike the ground rather indirectly as compared to the summer months when the Sun's rays strike the ground more directly.



<http://inkido.indiana.edu/a100/celestialSphere5.html>

more

energy (more heat)
summer

less energy during the winter (lower temperatures).

So, seasons are caused the tilt of the Earth's axis



Remember:

- The seasons are the result of this tilt of the Earth's axis.
- If the tilt of the Earth's axis was 0° there would be no difference in how the rays from the sun hit its different regions, and there would be no seasons.

The Earth's seasons are not caused by the differences in the distance from the Sun throughout the year.

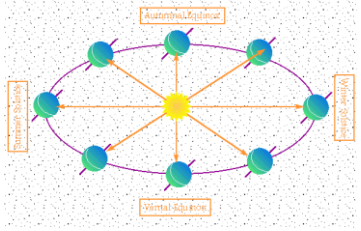


The seasons are the result of the tilt of the Earth's axis.

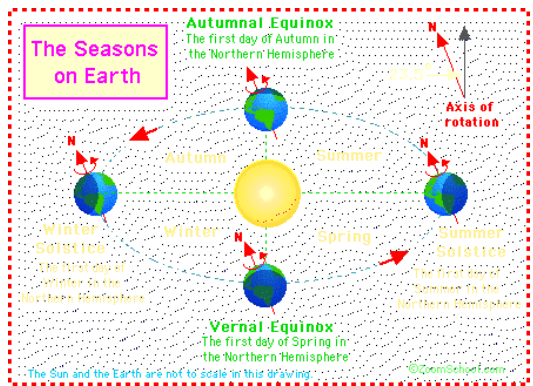
Many Americans, including Harvard graduates, do not know what causes seasons.

Review

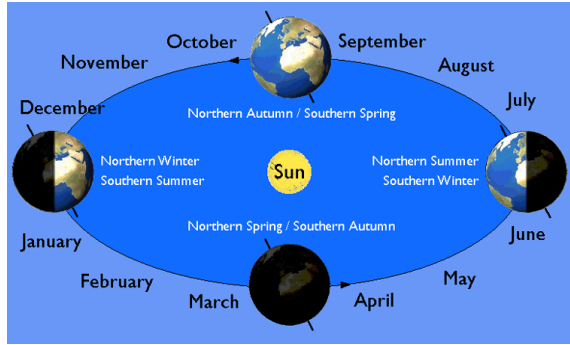
Look closely at where the Sun is hitting the Earth during each season:



Remember the chair lab... You were facing the same way the entire time, just like the Sun.



<http://www.enchantedlearning.com/subjects/astronomy/planets/earth/Seasons.shtml>



<http://www.nmm.ac.uk/uploads/gif/seasons-full.gif>

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Bust the Myth: Cause of Seasons

A second grade class thinks that the seasons are caused by the Sun being closer to the Earth in Spring and Summer and farther away in Fall and Winter. You know this is NOT true and want to teach them what REALLY causes the seasons.

Your task is to create an informational piece to dispel the myth! It needs to be interesting, engaging, and factually accurate. Include diagrams and color. Get creative!

When everyone is done, you will share or perform your presentation so get ready.

Timeline: 2 class periods

Due Date: _____

Ideas:

- Write a skit (be prepared to act it out)
- Make a stop motion video with a phone or ipad (ask your teacher if this one is okay)
- Write a story or puppet show
- Write a song and record it
- Make a poster or brochure
- Newscast presentation
- Write a talkshow interview
- Create a board game

An Excellent Project..

- Clearly and logically explains how the Earth is tilted and connects to seasons
- Uses pictures, diagrams or models to help clarify the concept
- Busts the misconception and makes sure it is clearly understood why distance to sun cannot explain the cause of the seasons
- Is colorful, neat, and well thought out
- _____
- _____
- _____

Team Members' Names: _____;
_____;

Brainstorm your ideas below:

What are the 3 things that cause the seasons on Earth?

How will you explain these things?

How will you prove that seasons are NOT caused by the distance of the Earth to the sun?

Other ideas:

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