

5E Lesson Template

Lesson Author(s)	L Ochsie
Lesson Title	Day and Night Changes Versus Seasons
Lesson Source	Google Earth
Technology Needs (if any)	Computers with Google Earth downloaded
Date/Time Lesson to be Taught	
School	
Supervising Teacher	
Math or Science?	Science
Lesson Concepts	Observe in Google Earth the change in size and the length of time of the area of Earth that receives sunlight depending on the time of year, which causes seasons.
Objectives	Introduce the idea that seasons are caused by a decrease or increase in the amount of sunlight in 24 hours (which will then introduce a math-based lesson about the Earth's tilt as the cause in the next lesson).
CO State Standards	8 th grade Standard 3 Earth: Concept 4: The relative positions of Earth, Moon, and Sun can be used to explain observable effects such as seasons... a. Analyze and interpret data to explain why we have seasons (DOK 1-2)
Materials List and Advanced Preparation	Google Earth
Safety	Appropriate internet use
Accommodations for Learners with Special Needs	Visual: adjust screen resolution; supply screen cover for those with sensitivity causing migraines, etc.

5Es

1. ENGAGEMENT		Time: 8 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<p>(Note: individual student computers is not recommended, as very precise changes will be made & if students do not have the same view it may cause confusion)</p> <p>Using Google Earth on a Smartboard or other display device, show students the “Show sunlight across the landscape” feature that allows them to see the change from day to night as time passes. Using a current date, show the passage of sunlight/darkness for 24-48 hours (“click to toggle time slider animation”). Point out the approximate time of sunrise & sunset for the school’s/state location. (You can speed up or slow down the animation by clicking the “click to open the time options dialog” tool (looks like a wrench))</p>	<p>Does the sun always rise/set at this time?</p> <p>Describe when the sun rises/sets at a different time.</p>	<p>The sun always rises & sets at the same time.</p> <p>Summer days are longer so the sun rises earlier & sets later than in winter.</p>
Evaluation/Decision Point Assessment		Student Outcomes
Do students realize the sun rises & sets at different times, according to season?		Students recognize that the sun rises & sets at different times, according to the season.

2. EXPLORATION		Time: 15 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<p>Solicit dates from students of the first day of each season.</p> <p>With Earth positioned to see the continental US, set the “click to open the time options dialog” tool (looks like a wrench) to each of the dates in sequence, and ask students to watch for differences in the daylight/darkness they see as Earth rotates.</p> <p>NOTE: If student computers are available at this point, have them explore different dates & positions before bringing them together for 3. Explanation. Otherwise, let students take turn at the Smarboard trying different dates & viewpoints.</p>	<p>What is the first day of Spring? Summer? Fall? Winter?</p> <p>What changed between each date?</p> <p>What changed with different viewpoints?</p>	<p>Advanced: 3 months apart, the 3rd, 6th, 9th & 12th months.</p> <p>Summer showed more daylight, winter showed more darkness.</p>
Evaluation/Decision Point Assessment		Student Outcomes
<p>What is the first day of each season?</p>		<p>Students know the approximate dates of seasons.</p>

3. EXPLANATION		Time: 10 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<p>Change the position to view the North or South pole. Ask students to watch for differences in the daylight/darkness they see.</p> <p>Solicit from students the idea that more/less sunlight causes a temperature change = seasons.</p>	<p>If we moved the Earth so we saw the North or South pole, how would the daylight/darkness change?</p> <p>How did the daylight/darkness at the pole compare to here?</p> <p>What would the extended darkness or daylight cause?</p>	<p>At the poles, winter would have a lot more darkness, summer would have a lot more daylight.</p> <p>Lots of darkness causes colder temperatures & vice versa.</p>
Evaluation/Decision Point Assessment		Student Outcomes
<p>What causes the seasons?</p>		<p>More darkness causes colder temperatures & vice versa, causing seasons.</p>

4. ELABORATION		Time: 15 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<p>Add latitude/longitude lines (go to View: grid) to Earth. Point out the names of lines of latitude. Ask students for the number of degrees for each of these lines.</p> <p>Rewatch the darkness/daylight at both the poles, the continental US & the equator. Have students watch for patterns.</p> <p>Elicit ideas from students as to what causes days to get longer in the summer & shorter in the winter.</p>	<p>Do you know the number of degrees of the equator? How about the degrees of other named lines of latitude?</p> <p>How does the number of hours of darkness/daylight change as you move from the poles to the equator?</p> <p>At what line of latitude does the darkness/daylight stop during winter/summer?</p> <p>What causes the number of hours of daylight/darkness to change?</p>	<p>Advanced: Tropics of Cancer & Capricorn (23.5°), Arctic & Antarctic Circles (66.5°), N&S Poles (90°).</p> <p>The poles have the largest difference in daylight vs. darkness. The closer you get to the equator, the more even the number of hours becomes.</p> <p>24 hours of dark/day is above the Arctic/Antarctic Circles.</p> <p>We get closer to & further from the Sun.</p> <p>Advanced: Earth's tilt on its axis.</p>
Evaluation/Decision Point Assessment		Student Outcomes
<p>If more/less hours of daylight causes seasons, where would the change between seasons be most intense? Most moderate? Why?</p>		<p>Students recognize that 24 hours of dark/day is above the Arctic/Antarctic Circles so seasons will be more extreme. The equator has an equal 12 hours of dark/day so seasons/temperatures will be moderate. In between it changes gradually.</p>

5. EVALUATION		Time: 7 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
Exit ticket: Students will draw 4 views of Earth, one for the first day of each season, labeled above each with the season & date. On each diagram, roughly draw the continental US & Alaska and label each showing the approximate length of days	Bonus points!! Add to your exit ticket what you think causes the number of hours of daylight/darkness to change throughout the year/seasons.	Spring: March 20-something, equal number of hours Summer: June 20-something, longer days Fall: September 20-something, equal number of hours Winter: December 20-something, longer nights
Differentiation		Time: N/A
Students who are behind or need support	For advanced or gifted students	
Give hints for the exit ticket or prep a handout with the 4 seasons labeled & Alaska and continental US drawn, so they only need to add the dates & length of days. Use only views of the Northern Hemisphere;	Know the seasons are 3 months apart, the 3 rd , 6 th , 9 th & 12 th months. Tropics of Cancer & Capricorn (23.5°), Arctic & Antarctic Circles (66.5°), N&S Poles (90°).	