Getting to the Core

6th Grade Science: Cycles

Student Resources

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Teacher SAUSD Common Core Intermediate Science – Seasons

Contents: Space Systems: Seasons

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.

Essential Questions: What is meant by cyclic patterns?

Essential Questions: Where do cycles exist on Earth and in your daily life?

Essential Questions: How can the tilt of Earth explain seasons?

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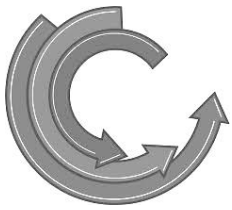
Quick Write on Cycles



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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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 that 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 is it 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.					

Language Supports for Agreeing

- I agree with the statement that …because…
- I agree with my classmate that …because…
- I share a similar belief to _____. (Explanation)

Language Supports for Disagreeing

- 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 _____
Date _____	Date _____	Date _____	Date _____
Date _____	Date _____	Date _____	Date _____
Date _____	Date _____	Date _____	Date _____
Date _____	Date _____	Date _____	Date _____

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?

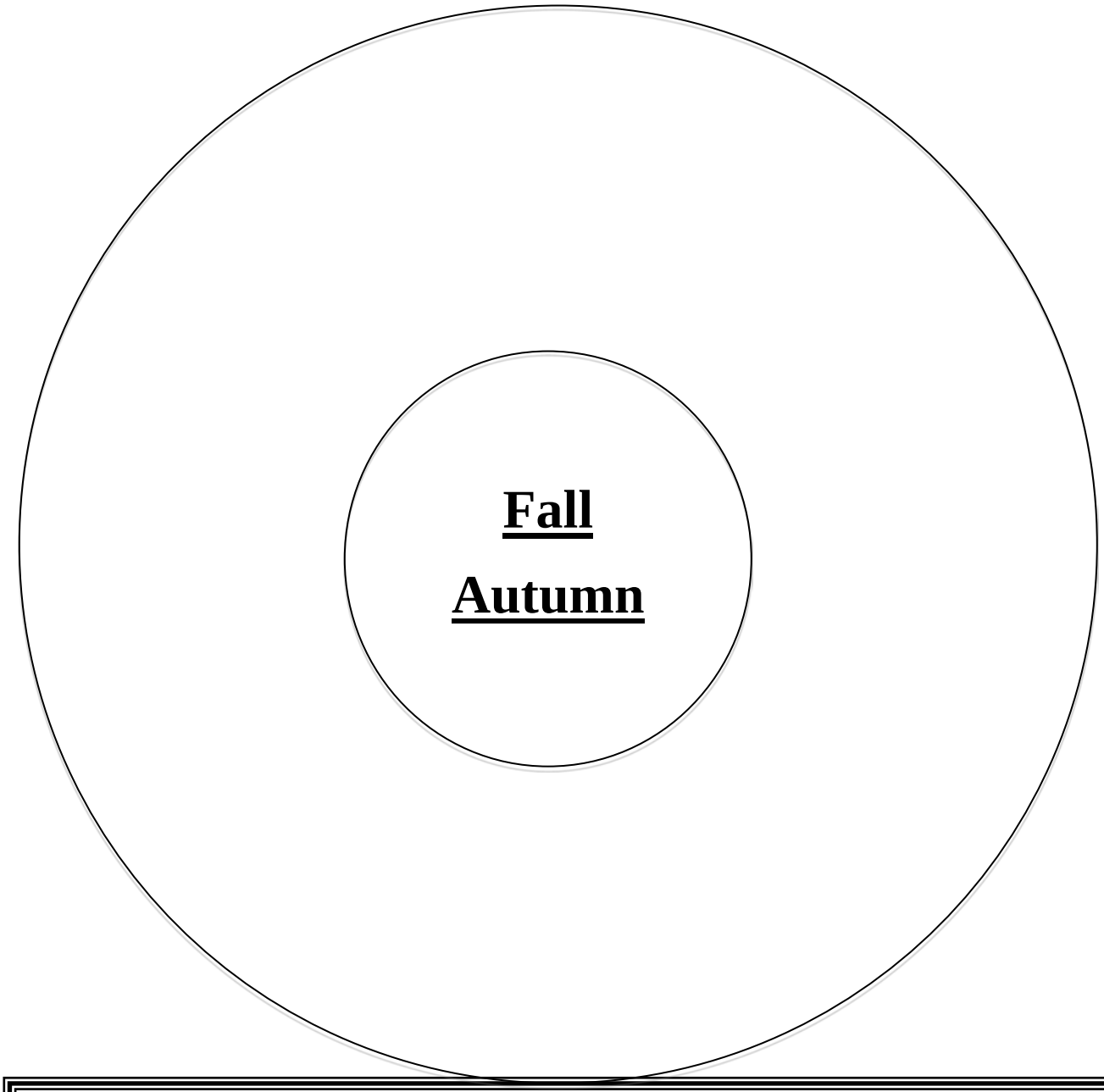
_____

_____

_____

_____

Season Circle Maps



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

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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.

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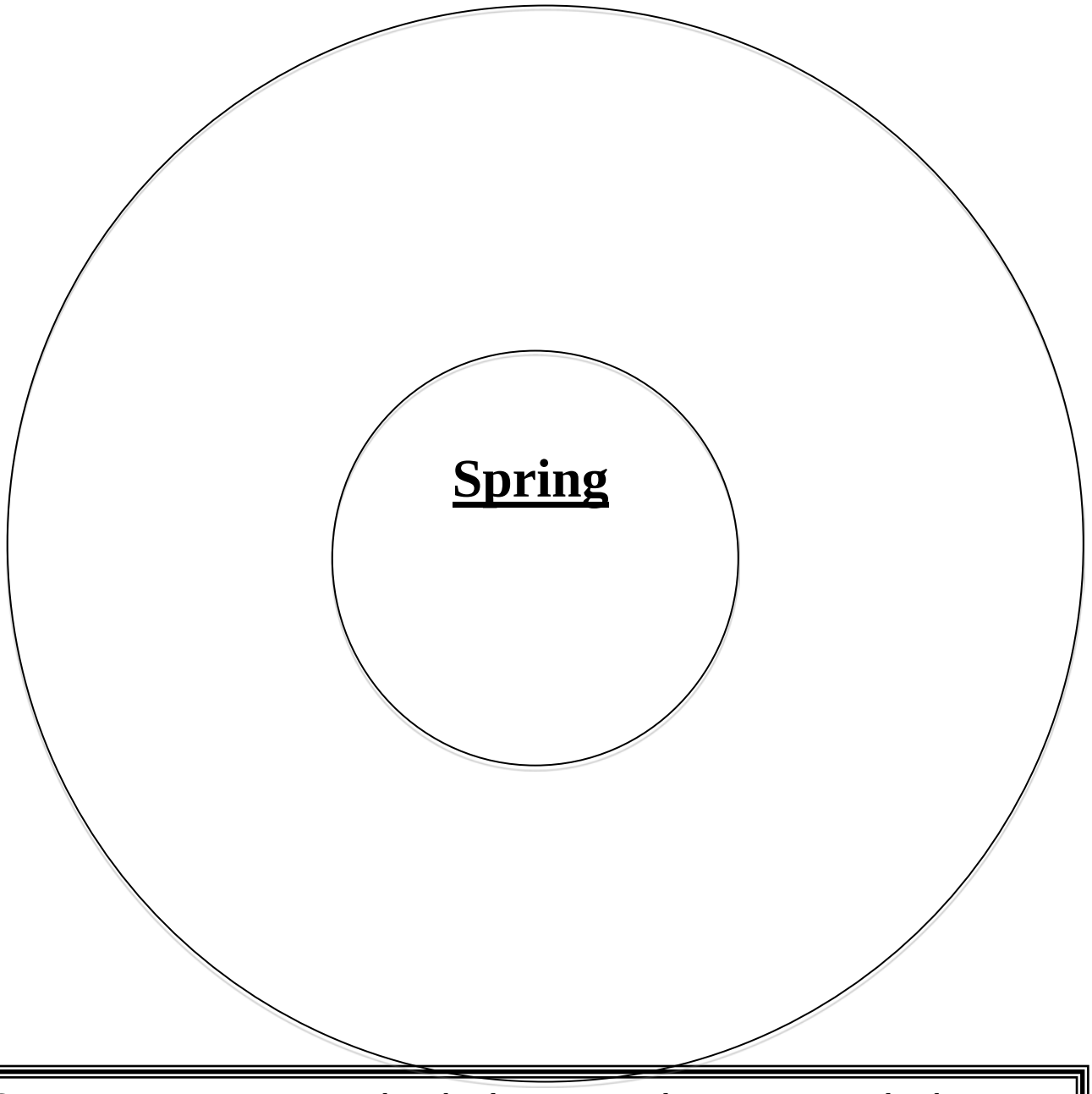
Season Circle Maps



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

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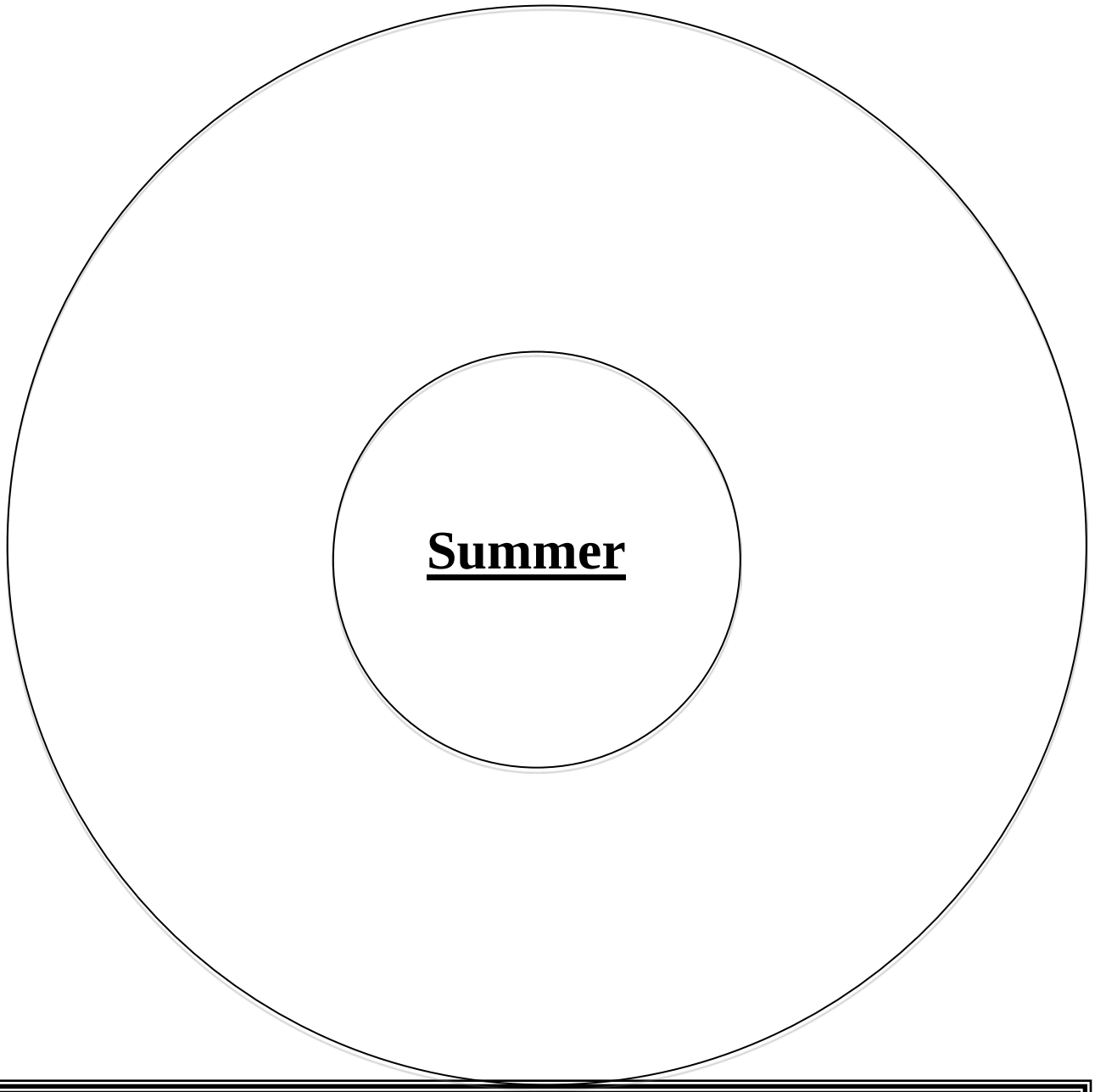
Season Circle Maps



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

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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?

_____
_____
_____
_____
_____

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Vocabulary Notebook: Reason for the Seasons

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

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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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.

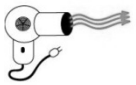
Therefore, you can conclude that the amount of heat felt depends on both the distance from the heat source and the angle at which your hands are inclined toward that source. If your hands become too warm, there are effective ways to cool them passively. They can be moved farther from the heat, or the 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!

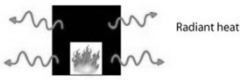
How Heat Travels

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.

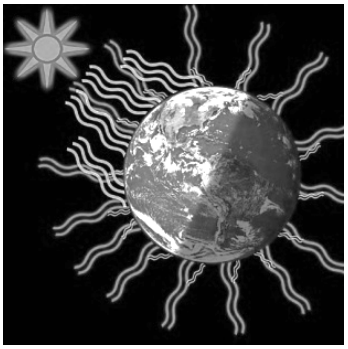
The third mechanism of heat transfer is **conduction**. This is essentially heat transfer through particle collisions.





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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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

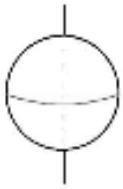
The Earth is a sphere. It can be divided into two hemispheres, the Northern and Southern Hemispheres. The best way to understand this is to make a model.

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.

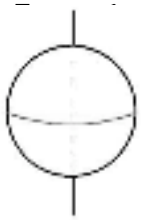
1. Use the colored marker to highlight the line drawn around the middle of the Paper Globe, dividing it into a top and bottom half. The line represents the Equator, the top half is the Northern Hemisphere, and the bottom half is the Southern hemisphere.
2. Find the United States and then where California 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 <u>top to bottom</u>. 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:



Adapted from: http://www.learninghaven.com/science/articles/seasons.htm and 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?

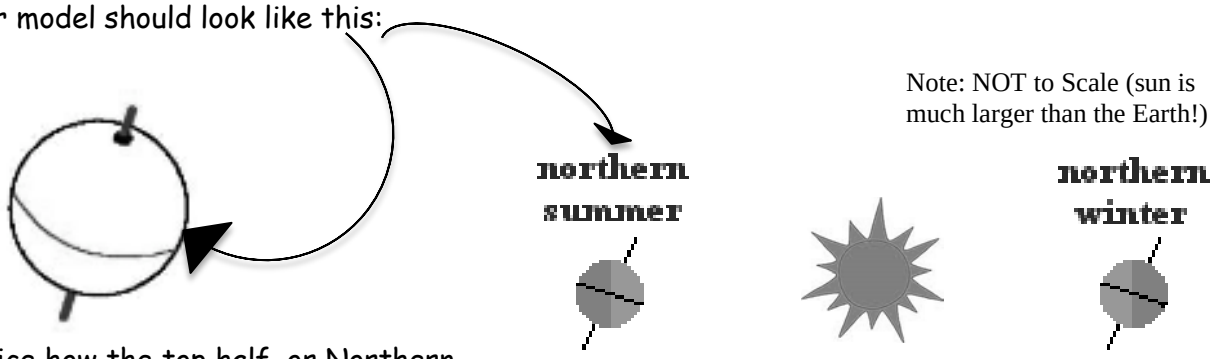
6. Write what you believe causes the seasons below:

_____

_____

_____

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:



Note: NOT to Scale (sun is much larger than the Earth!)

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!

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 →	
2. Have your partner trace this circle. Label this line "direct light."	
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.	
4. Have your partner trace this circle.	
5. Repeat one more time, tiling the top of the flashlight even farther away from you to exaggerate the change in your circle of light.	
6. Have your partner trace this circle. Label this line "Indirect light."	

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 _____

_____

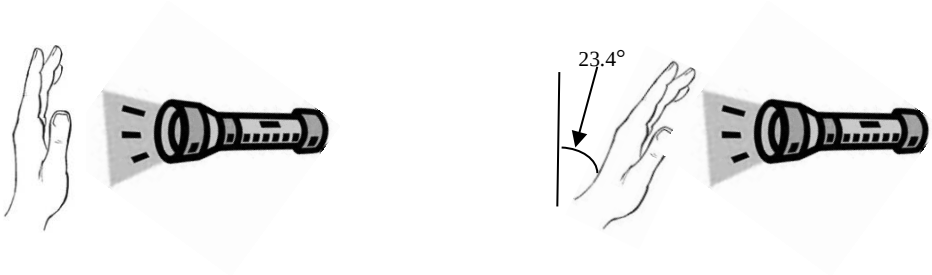
_____

_____

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

for it to heat up).

9. 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.



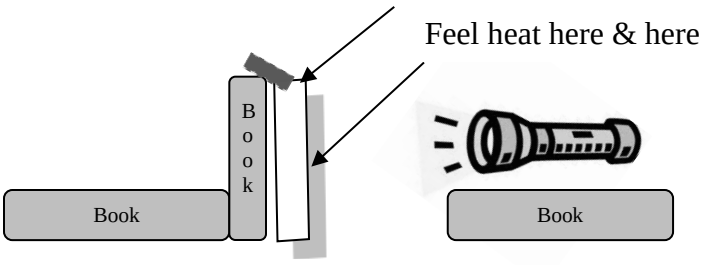
10. Write at least one complete sentence describing what you noticed when you tilted your hand toward the light. _____

_____

_____

_____

11. 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.
12. Keep feeling that bit. How long does it take to get warm? Does it get warm?



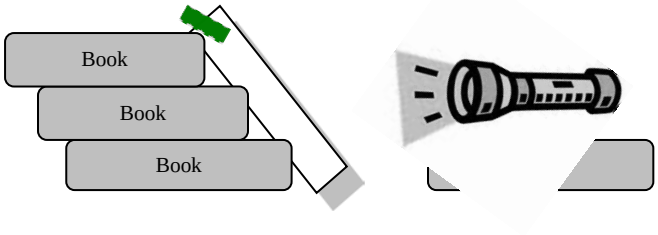
Record your observations:

_____

_____

_____

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:

_____

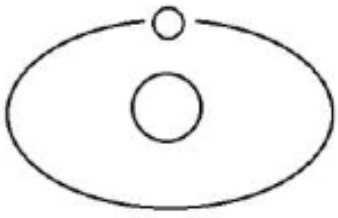
_____

_____

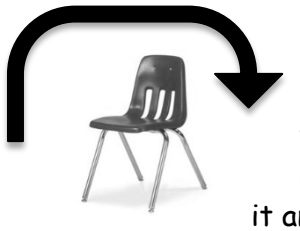
The reason that it was quicker the second time is that the light was falling directly onto the paper. The second time the light was hitting the paper at different angles. **Direct light is concentrated and heats up an area faster than indirect light, or when light strikes something at an angle**. This 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.



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?

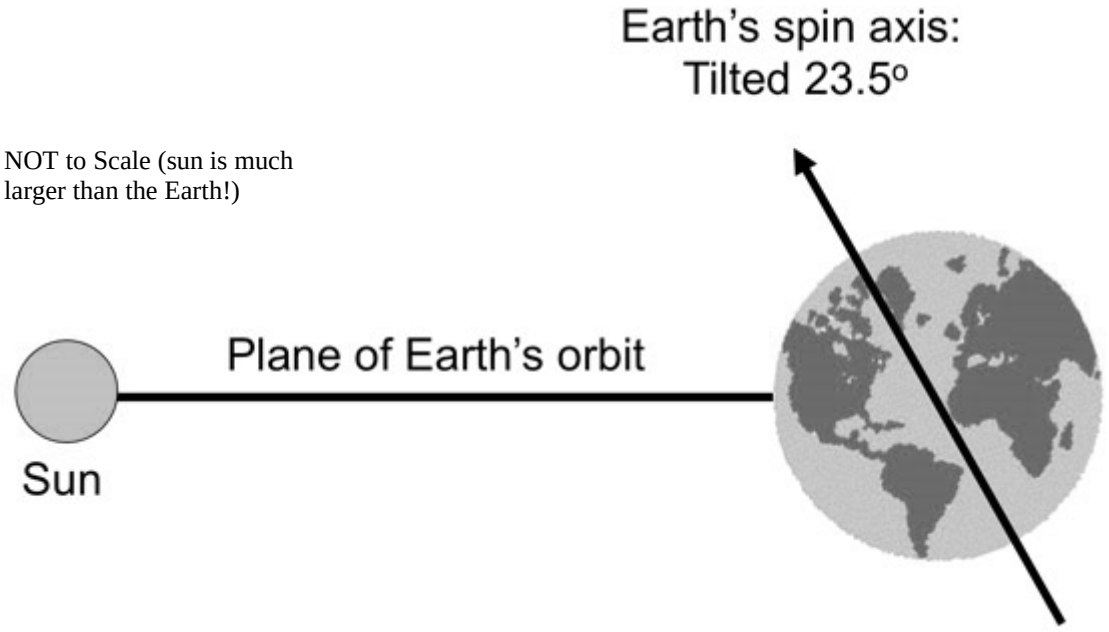
This is how it works. When the Northern hemisphere is pointing at the sun, sunlight falls most directly on it. This is summer in the Northern Hemisphere. As you get around to the side of the chair, neither hemisphere is pointing toward the Sun. The light strikes both equally and directly.

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.

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.

Data Table

Draw the path you took around the chair the first time. Please use arrows and several drawings of yourself.  Chair	**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.   Table Chair
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.	**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?

"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.

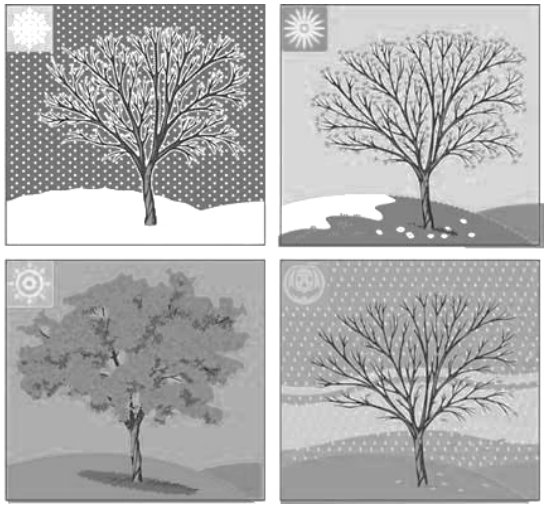
	Transition words	**Place a ✓ by word**	**Vocabulary words**	**Place a ✓ by word**	**Seasons-Related**	**Place a ✓ by word**
Partner 2 (Listener) tallies the words used by Partner 1 (Presenter)	First		Axis		Summer	
	Next		Tilt		Winter	
	Then		Direct light		Fall	
	Finally		Indirect light		Spring	
			Orbit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

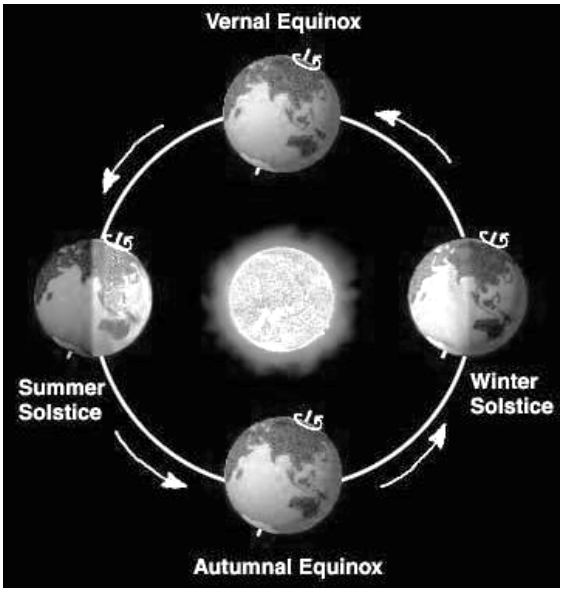


Symbol/ Section	Comment/ Question/ Response
*	▪ Key ideas expressed ▪ Author's main points ▪
!	▪ Surprising details/claims ▪ Emotional response
O	▪ Ideas/sections you connect with ▪ What this reminds you of

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

Adopted by SAUSD from http://www.universetoday.com/75843/why-are-there-seasons/#ixzz2lLewYBNC

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.

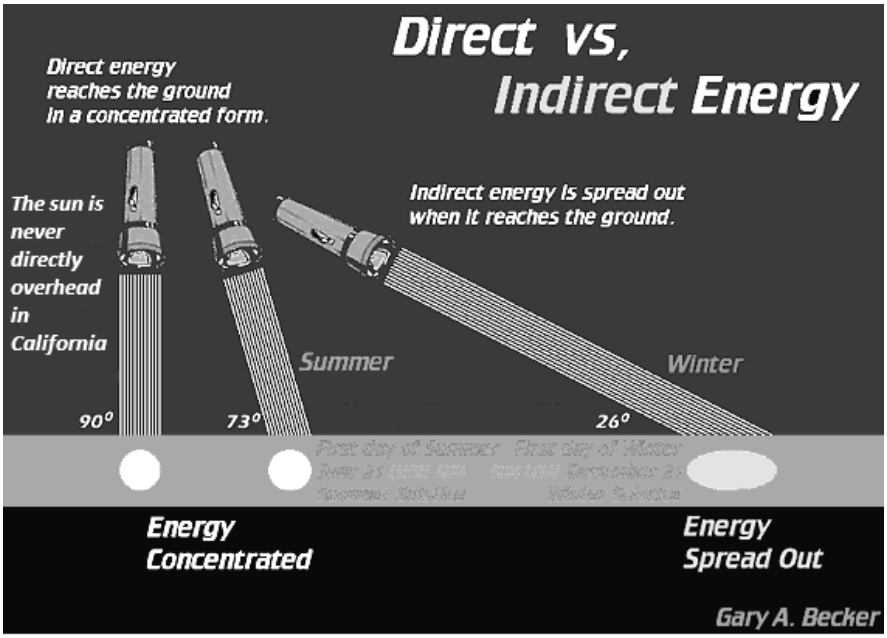


Figure 1: During winter when sunlight strikes Earth at a low or acute angle, the energy covers a very large area. So these areas get very little solar energy. When Earth's axis is pointed towards the Sun in the summer, sunlight is more concentrated.

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.

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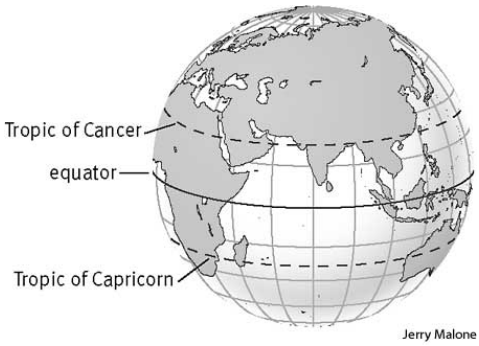
Seasons at the Extremes




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
*	▪ Key ideas expressed ▪ Author's main points ▪
!	▪ Surprising details/claims ▪ Emotional response
O	▪ 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!



<u>Seasons at the Poles:</u>

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."

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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!

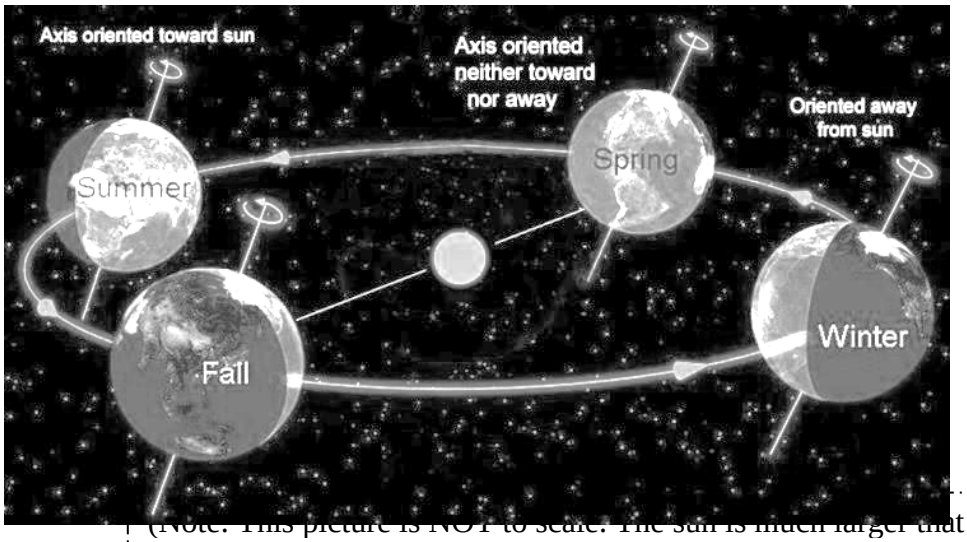
5. **The winter solstice**, by contrast, is the first day of winter and the shortest day of the year. As you might have guessed, the winter solstice in the Northern Hemisphere occurs when the North Pole is leaning away from the sun. When the North Pole is pointing away from the sun, the Northern Hemisphere 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 that the Earth)

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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
*	▪ Key ideas expressed ▪ Author's main points	▪ One significant idea in this text is… ▪ The author is trying to convey…
!	▪ Surprising details/claims ▪ Emotional response	▪ I was surprised to read that… ▪ How can anyone claim that…
O	▪ Ideas/sections you connect with ▪ What this reminds you of	▪ 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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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 father 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: