Lesson 3: Seasons in the Philippines and Eclipses

INTRODUCTION AND FOCUS QUESTION(S):

Throughout history, man has developed great admirations, aspirations and inspirations from what has been observed in the heavens and beyond. Man has also gotten accustomed to the heavenly bodies and began dealing with them as life's natural companion. Fishermen and farmers and travelers are just few of the many people who in the past have relied on the sun, stars and the moon's messages before they went forward with their endeavors.

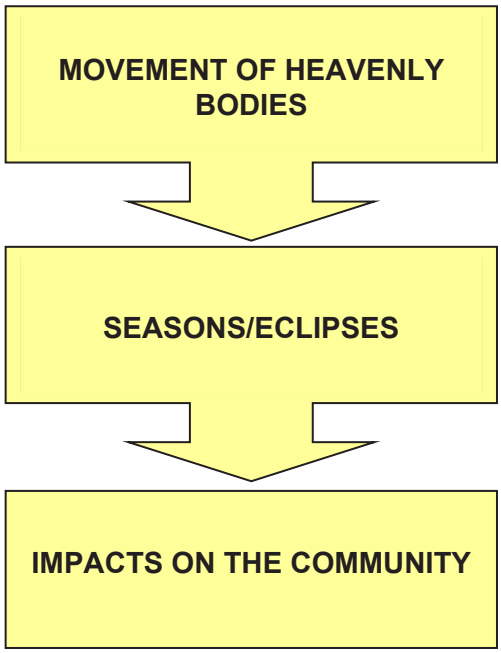
But until this day, man is still discovering a lot of things about the heavenly bodies. Their presence in the sky can no longer be denied to have an effect on our world. Take, for example, the eclipses and seasons. Just look at the regularity of their occurrences. Why do a lot of people still have a lot of different thoughts about them, both scientific and not so scientific? And so this module aims to unravel the facts through our focus question "Why do seasons and eclipses occur?" Remember to search for the answers to this question as we move along this module.

LESSON AND COVERAGE:
In this lesson, you will learn the following:

Lesson 3	using models, relate: • the tilt of the Earth to the length of daytime. • the length of daytime to the amount of energy received. • the position of the Earth in its orbit to the height of the Sun in the sky. • the height of the Sun in the sky to the amount of energy received. • the latitude of an area to the amount of energy the area receives. * determine the implications of the available solar energy in a given season. show what causes change of the seasons in the Philippines using models. * propose activities appropriate for the season.

	explain how solar and lunar eclipses occur. collect, record, and report data on the beliefs and practices of the community in relation to eclipses. * clarify misconceptions on seasons and eclipses.

Here is a simple map of the above lessons you will cover:



To do well in this module, you need to remember and do the following:

1. Answer the pre-test and take note of the unfamiliar concepts.
2. Read thoroughly the given reading materials and make summaries.
3. Study any given model and make a comprehensive analysis.
4. Comprehend well the guide questions and follow-up questions and let them be your guide for understanding.
5. Answer every question exhaustively.
6. Browse sites and read articles, play interactive games, watch videos and etc. for concept development and for assessment.
7. Take the post-test to measure how much you have learned.
8. Ask, post questions for clarifications in any case you have concerns regarding the lesson.
9. Cover all the activities on their respective times of completion.
10. Have fun learning!

PRE-ASSESSMENT:

Let's find out how much you already know about this module. Choose the letter that you think best answers the question. Please answer all items. Take note of the items that you were not able to correctly answer and look for the right answer as you go through this module.

1. In which month is the southern hemisphere experiencing longer days?

A. June
B. September
C. December
D. March

2. How does the length of daytime in the seasons relate to the net radiation a location receives?

A. The longer the days, the more solar energy the earth's surface receive.
B. The longer the days, the cooler is the earth's surface.
C. The same amount of energy is received by the earth's surface with whatever length of day a location experiences.
D. The longer the days, the more dangerous is the sun's radiations.

3. Which of the following statements is TRUE about the seasons?

A. During summer, the sun is seen lowest in the sky.
B. In spring, the sun doesn't shine as intense as in summer.
C. In winter, the sun moves the lowest across the sky.
D. During fall, the sun is not seen in the sky at all.

4. In what location are there four seasons?

A. In the North Pole. They have winter all the time.
B. In the temperate region of the southern and northern hemisphere.
C. In the equator portion of the earth. They only have wet and dry seasons as the sun doesn't shift much from its position in the sky in a year.
D. Everywhere on earth has four seasons.

5. Which arrangement will result in a solar eclipse?

A. sun – earth – moon (linear)
B. sun – earth - moon (perpendicular)
C. sun – moon – earth (linear)
D. sun – moon earth (perpendicular)

6. Which statement is TRUE about solar energy and the seasons?

A. Much energy is produced by the sun during the summer. That is why a lot of people got sunburns during this time.
B. The sun glows less during winter producing lesser solar energy. That explains why the sky is almost always gloomy in winter.
C. During the spring, the sun is producing greater solar energy but because of the cold surrounding we cannot feel the heat. Plants growing foliage again is a proof of this solar energy.
D. In summer where the sun is in its highest position in the sky and the days are longest, the location then receives the greatest solar energy.

7. How is outdoor clothing selected to fit the season?

A. The outdoor clothing is just based on the fad of the season, which is usually set by big clothing industries.
B. The choice of the outdoor clothing is anybody's choice. There are just those choices that are copied by many making it a trend.
C. The outdoor clothing is following designer's trends, but is primarily dictated by the temperature brought about by resulting temperature, which, in turn, is brought about by the intensity of solar radiation and the length of the day.
D. The choice of outdoor clothing has been carried through generations by customs and traditions.

8. Which of the following is scientifically true about the occurrence of an eclipse?

A. A celestial snake swallows the sun or moon during an eclipse causing it to disappear.
B. The dark side of the moon or sun is showing-up in this battle of inner self of the celestial bodies shown as the darkening of the surface or the moon or sun.
C. The earth or moon is casting its darker or lighter shadow on either of them when they block the sun's light or reflected light appearing to be a dark overlap.
D. The heaven's is giving mankind a sign of an upcoming global scale of misfortune manifested by the darkening of the surface of the sun or moon.

9. The next lunar eclipse will happen on April 4, 2015 and will be followed on September 22, 2015. In the Philippines the sun rose at 6:18 a.m. on Christmas day 2014 and is at 5:25 a.m. on Father's Day on June 2015. What is causing the difference of these events?

A. They are caused by the shift of the direction of the earth's axis.
B. They are due to the movement of heavenly bodies in relation to each other.
C. They are due to the difference of the intensity of sun's radiation in different times of the year.
D. They are caused by the changing of distance between heavenly bodies.

10. Trees entirely lose their leaves and grow them again year after year in some places. The moon in the night sky at times seems to disappear and then reappears after a while. Why do these phenomena occur?

A. They are due to the change of the tilt of the earth's axis
B. They are happening because of the movement heavenly bodies in relation to each other.
C. They are due to difference of the intensity of sun's radiation in different times of the year
D. They are caused by the changing of distance between heavenly bodies

11. What made human celebrations possible, such as the spring festival, winter fashion trends and the abstaining from food and drink during an eclipse?

A. They are due to the change of the tilt of the earth's axis
B. They are happening because of the movement heavenly bodies in relation to each other.
C. They are due to difference of the intensity of sun's radiation in different times of the year
D. They are caused by the changing of distance between heavenly bodies

12. When the season gets hotter, which can be the best inference about it?

A. The solar radiation has become intense in that time of the year.
B. The earth is already at the point of its orbit closest to the sun.
C. The orientation of the earth's axis has allowed the place to become closer to the sun than the other places, making it hot.
D. The orientation of the tilt of the earth's axis has allowed the place to have longer days and have higher position of the sun in the sky.

13. Which of the following statement is TRUE about the tilt of the earth and the season?

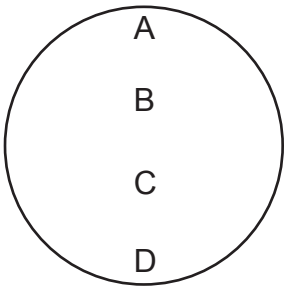
A. The tilt of the earth's axis is not the reason for the seasons.
B. The tilt of the earth changes every season causing places to change the position of the sun in the sky and the lengths of days.
C. The tilt of the earth does not change at all. Its orientation changes as it revolves around the earth causing places to change the position of the sun in the sky and lengths of days.
D. The tilt of the earth does not change at all. Its orientation changes as it revolves around the earth causing places to become closer or farther from the sun which is the reason for seasons.

14. How would you explain the disappearance of the moon or sun during an eclipse?

A. A giant snake in the sky eats and expels the moon or sun during the event.
B. A wizard so powerful slowly hides the moon or sun away and returns it back afterwards.
C. The moon or earth gets into the way where sunlight or moonlight is suppose to shine on earth.
D. These are moments where the light of the sun or moon slowly fades and returns back.

15. As an advocate of green energy, you would like to promote to the people free and very abundant solar energy. In what places would you likely establish a sustainable solar power plant?

A. A
B. B
C. C
D. D



16. In India, some innovators have introduced the solar cooker. A simple technology that uses a large mirrored-surface parabolic dish that brings sunrays to a focus where the cooking pot is placed. At what time of the day will you likely suggest to use it?

A. Never, it is designed to only work in India.
B. Anytime. This technology works in anytime as its surface can capture solar energy and release them whenever needed.
C. As long as it is daytime. Whenever there is light, the device will utilize them to cook food.
D. When the unobstructed sun is already high enough in the sky as the device needs to gather enough solar energy to cook food.

17. If you will organize an activity during the summer, will you recommend swimming? What can be its best reason?

A. Yes, it has become the trend activity for the summer.
B. Yes, the place is most warmed by the sun during summer due to the higher position of the sun in the sky. Water is a good alternative to cool oneself.
C. No, water is too cold for the body to handle during summer.
D. No. The position of the sun in the sky gives the highest amount of solar radiation among all seasons causing sunburns even at early morning or late afternoon swim.

18. A friend of yours in Greenland asked you if you would like to be sent a package of winter clothes and shoes. How will you respond to your friend?

A. Accept his offer and use the shoes and apparel anytime to please your friend.
B. Accept the offer but do not use the shoes and apparel as they are inappropriate for the seasons in the Philippines.
C. Thank him but refuse the offer. Explain to him that the Philippines will never have winter due to its location on earth.
D. Thank him but refuse the offer. Explain to him that you still prefer Philippine made shoes and apparel.

19. On December, your family plans to visit Korea; a temperate country in the northern hemisphere. Which activity will you let your younger siblings anticipate in?

A. swimming in the sea
B. fishing
C. outdoor picnic
D. snow man making

20. An Indian friend won't eat or drink a food on the day an eclipse happens as he is influenced by what many are practicing in India during an eclipse?

A. Invite him that both of you will read and research for information about eclipse. Convince him that you will look into how science provides proofs for the occurrence and implications of the eclipse.
B. Never mind him as he is entitled of his own beliefs.
C. Tease him by eating and drinking in front of him when the eclipse is happening to prove him wrong. Then show him the next day how active and fit you are while he is still probably weak after a day of not having food and water.
D. Unfriend him for being insistent of his misconception despite having an education.

EXPLORE:

Let's start the module by looking into the different scenarios of seasons and eclipses. As you go through this lesson, keep on thinking about this question: **Why do seasons and eclipses occur?**

ACTIVITY NO. 1: Dream Vacation

Juan has been wishing for a dream vacation, and the good heavens might have heard him. Somebody has sent him an envelope containing plane ticket, hotel accommodation and a vacation package under his name for a 3-days and two-nights stay in Boracay with all expenses paid. The vacation dates fall on the last week of April. He too is lucky to experience a solar eclipse during that time. If you got to help Juan prepare his things, then choose the things appropriate for Juan's vacation inside the luggage.

What made you select those things over the others? What are the chances that those things would be appropriate for the season on the date of the vacation? What are the bases of your prediction? How long will Juan be able to use the gadget appropriate for eclipse viewing? Can it still be used the next day after, next week or month? Why or why not?

ACTIVITY NO. 2: Believe It or Not!

Using the AR Guide, write agree or disagree for each statement given on the 'AFTER' column. Check how much you have improved in your answers on the seasons and eclipse module.

Let's find out more of your knowledge on seasons and eclipses by answering the ARG map of conceptual change. Write agree or disagree for each statement given in the 'BEFORE' column. You will be asked later to go back to this guide and check for any difference in your answer as you go through this module.

BEFORE Agree or Disagree		**AFTER** Agree or Disagree
	1. The axis of rotation of the Earth is tilted to some degree.	
	2. If the axis of rotation of the Earth tilts towards the sun, the northern hemisphere experiences longer daytime than the southern hemisphere.	
	3. If the same area experiences longer days, that may also mean hotter days.	
	4. Every place on earth experiences an overhead noontime sun.	
	5. Mid day sun is as intense as early morning or late afternoon sun.	
	6. The energy received from the sun increases as the increase in latitude in both north and south hemisphere.	
	7. The distance of the earth from the sun determines the seasons in the Philippines as well as the other places.	
	8. Beach Volleyball is an all-seasons game.	
	9. Eclipse is the turning-off of the light of sun or moon on certain times.	
	10. Eclipses symbolizes bad omen.	

End of EXPLORE:

You have just given your ideas about the reasons for seasons and eclipses. Find out in the next section if your initial ideas are correct. Keep a record of the important concepts that might help you affirm or revise your initial ideas and ultimately complete community based information dissemination project. Let's start by doing the next activity.

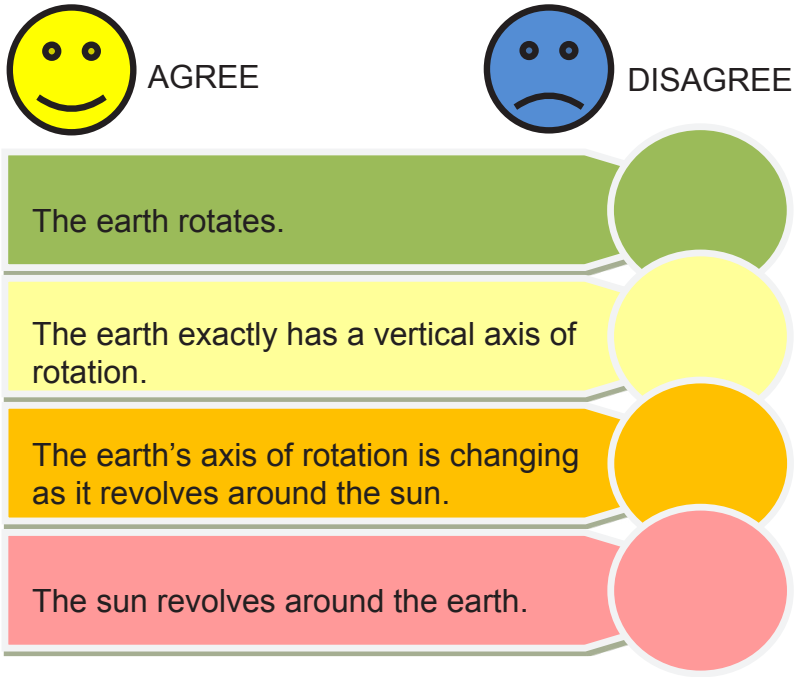
FIRM-UP

Your goal in this section is to learn and understand key concepts on the occurrence of seasons and eclipses. As you go through this section, you will do the different activities to find out the answers to the following questions:

1. How does the tilting of the earth affect the length of the daytime?
2. How does the position of the earth in its orbit relate with the height of the sun in the sky.
3. How do the length of the daytime and the height of the overhead sun in the sky affect the energy received by the surface of the earth?
4. How does the latitude affect the energy received by an area?
5. What causes the seasons in the Philippines to change?
6. What causes solar and lunar eclipse?
7. What are the common misconceptions on seasons and eclipses?

ACTIVITY NO. 3: Fact Files!

Before we get moving deep into the lesson, we need establish some facts to build the foundation for other ideas to anchor on. Watch the video by going to the link https://www.youtube.com/watch?v=wYWgvkwCf8o (this video shows the basic concepts of earth's tilt of axis, its rotation and its revolution around the sun). Answer the activity that follows. Draw the happy face to the circle where you agree on the given statement/illustration otherwise draw the sad face.



What concepts of astronomy were you able to recall? What are the implications of the earth's tilt of axis to its rotation and revolution? Can you already connect the idea of these movements of the earth to **how seasons and eclipse form?**

Now that you begin getting deeper with the lesson, always find means to check yourself of how much you are progressing. Accomplish the 3-2-1 chart by writing on the right column what is asked of the left column

3 important facts	
2 interesting ideas	
1 insight about yourself	

<u>Activity 4:</u> Seasons to Get to Know

Before you will go deeper into learning what caused seasons, you have to know what the seasons are. Click the given links to watch the videos on the seasons both in animation and reality. Afterwards, assess yourself on how familiar you already are about the seasons, then print and submit or print screen and paste file in word document and send your output to the teacher.

Visit http://www.turtlediary.com/kids-videos/seasons.html (this is an animation showing the characteristics of the different seasons)

Visit https://www.youtube.com/watch?v=_-rznxowu4o (this is a video showing how the place and the activities of people changes with seasons)

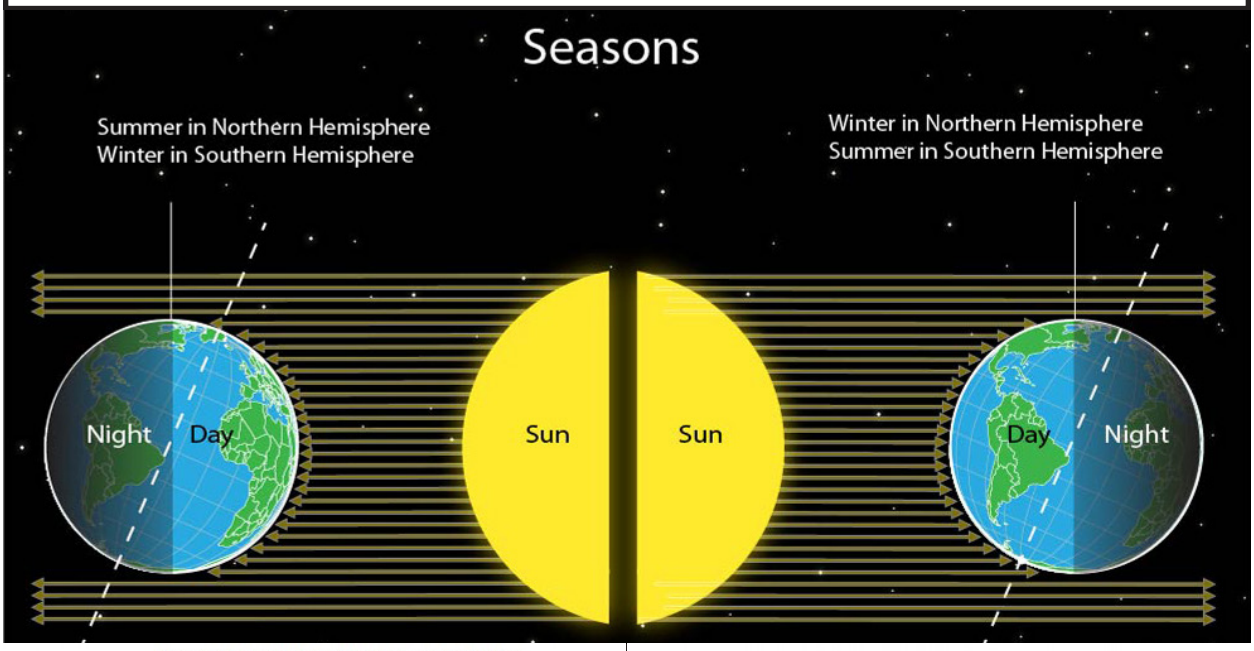
Visit http://www.playkidsgames.com/games/seasons/# (this is an interactive drag and drop seasons assessment) to assess yourself on how familiar you are about the seasons.

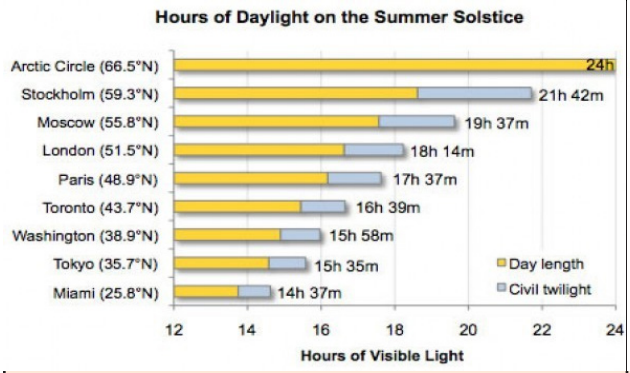
Visit also http://www.iboard.co.uk/iwb/Season-Scenes-77 (this is another drag and drop interactive assessment with printable output).

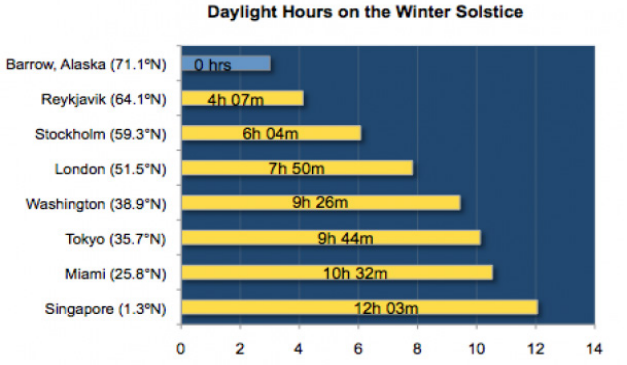
Do the seasons have the same charateristics? How does the changing seasons affect the way people dress and choose their activities? How about on how animals behave? What is the most distinct characterisic of every season? **Why does the same place have different seasons in a given year? What could have caused them?**

ACTIVITY NO. 5: Picture Perfect Seasons

Now that you have reviewed the movements of the Earth and the characteristics of the different seasons, the next activity will let you compare the lengths of daytime and nighttime. Study the given illustrations and graphs. Complete the statements by choosing the correct answer.







http://www.washingtonpost.com/rf/image_606w/WashingtonPost/Content/Blogs/capital-weather-gang/201206/images/Hours%20of%20visible%20light.jpg?uuid=iOm7_LrXEeGr1K7MgbRGbQ	http://www.washingtonpost.com/rf/image_606w/WashingtonPost/Content/Blogs/capital-weather-gang/201212/images/daylight%20comparo%20visual.png?uuid=2FUBgErMEeKmpqq6yF6ANg
1. The axis of the rotation of the earth points (towards) (away from) the sun. 2. The hemisphere that is most exposed to the sun is the (northern) (southern) hemisphere. 3. As the latitude towards north increases, the length of daytime (increases) (decreases).	1. The axis of the rotation of the earth points (towards) (away from) the sun. 2. The hemisphere that is most exposed to the sun is the (northern) (southern) hemisphere. 3. As the latitude towards north increases, the length of daytime (increases) (decreases).

What affects the length of daytime? Will the effect be the same had the earth's axis is not tilted? How about if the earth didn't revolve around the sun?

ACTIVITY NO. 6: Falling In-love with the Light

Now that you already know how tilting affects the lengths of days, you are now going to determine how people adopted to the phenomenon. Visit the given links to read and organize your thoughts by constructing a T-chart graphic organizer.

http://www.timeanddate.com/time/dst/daylight-saving-debate.html (this offers a reading on the pros and cons of daylight-saving time)

http://www.learninggamesforkids.com/graphic_organizers/writing/t-chart.html (this site provides an avenue for the student to construct a T-chart online).

Does it make sense to establish daylight saving time? Which argument would you side on? Can the same scheme be applicable here in our country? Why or why not? **What has caused the changing of the lengths of days of the seasons?**

Answer this question briefly on the space provided.

MUDDIEST POINT

What clarifications do you like to raise on the concept of different places having different lengths of days within the year? How about on Daylight Saving Time?

_____

_____

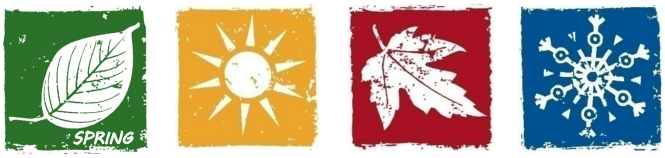
_____

ACTIVITY NO. 7: Seasons Interactive

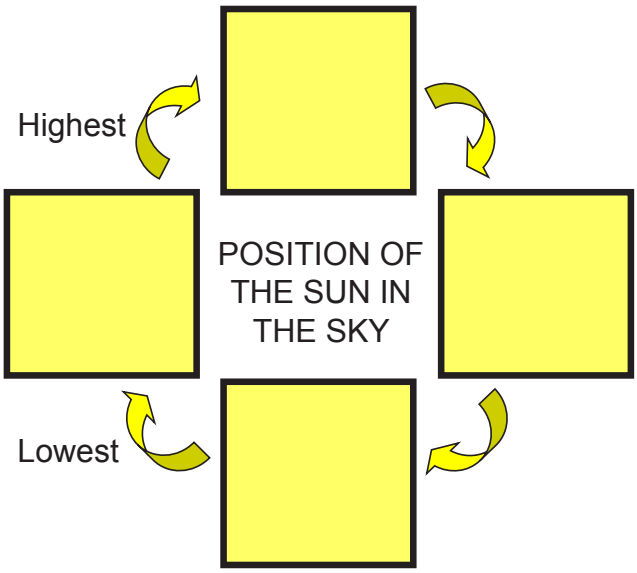
The length of daylight has its implications as presented by the previous activity. You will be working next on answering the following questions: **How does the position of the earth in its orbit relate with the height of the sun in the sky? How do the length of the daytime and the height of the overhead sun in the sky affect the energy received by the surface of the earth?**

Work on the interactive site. Set the earth's inclination to that of Earth. Observe the following in relation with the others: The Animation of Earth around the Sun, Seasons, Average Daily Temperature at Observation Site and Sunlight Angle. Answer the activity that follows. Illustrate the pictures to sequence the seasons.

Visit : http://highered.mheducation.com/olcweb/cgi/pluginpop.cgi?it=swf::800::600::/sites/dl/free/0072482621/78778/Seasons_Nav.swf::Seasons%20Interactive (this is an interactive site on seasons where data such as average daily temperature, angle of sun's rays, seasons and revolution of the earth can be viewed at the same time).

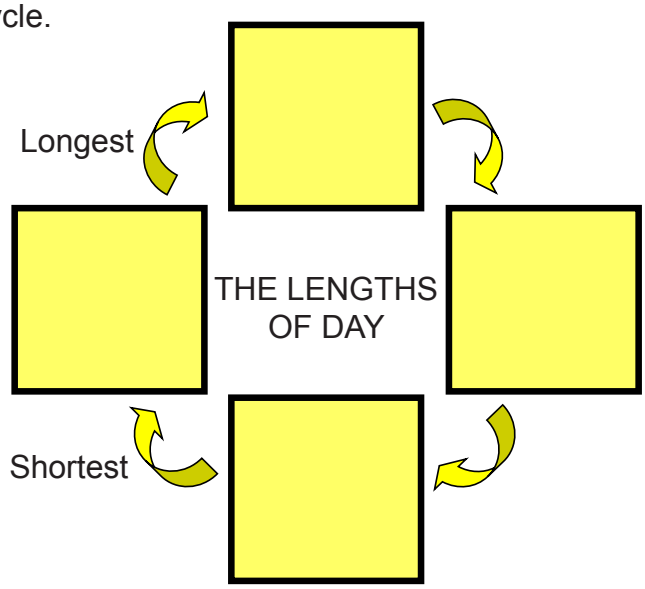


A. Arrange the pictures from the highest to the lowest position of the mid-day sun in the sky as the seasons change in the observed interactive activity. Please do not break the seasons' cycle.



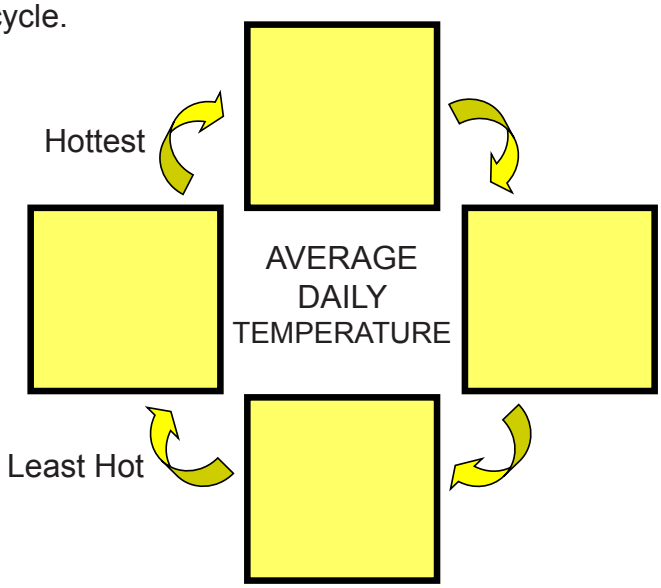
Therefore, the position of the mid-day sun is highest on _____ and lowest on _____

B. Arrange the pictures from the longest to the shortest length of day the sun is observed in the horizon as the seasons change in the observed interactive activity. Please do not break the seasons' cycle.



Therefore, the days are longest on _____and shortest on _____.

C. Arrange the pictures from the greatest to the least average daily temperature that an area gets as the seasons change in the observed interactive activity. Please do not break the seasons' cycle.



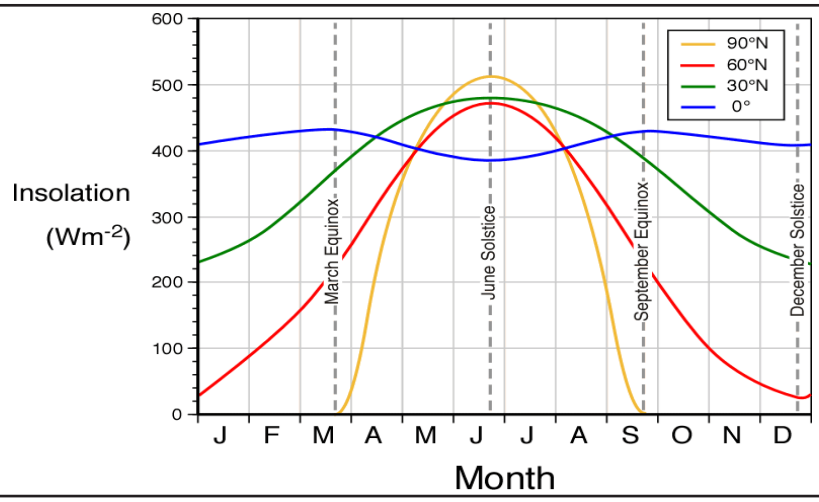
Therefore, the days are hotter on _____ and least hot on _____.

How do the height of the overhead sun in the sky and the length of daytime affect the energy received by the surface of the earth? What has caused the changing these differences?

In summary,_____
_____
_____

ACTIVITY NO. 8 : A Roller Coaster of Warm and Cold

After learning about the relation of the energy received by the surface of the earth with regards to the height of the sun in the sky and the length of day, there is one more aspect of energy received from the sun in relation to the changes of seasons you need to understand. The next activity will let you investigate how much energy the different latitudes receive from the sun. Go to https://www.youtube.com/watch?v=20carbgO45I (video on insolation and its effect on the different places on earth) and learn from the video. Refer to the graph and answer the questions that follow.



I. In relation to what the graph presents, click / button if you agree with the statement and x if you don't.

1. The 0° latitude refers to the areas in the equator and the 90° latitude refers to the areas in the poles.

2. Countries near the equator have four seasons since they have a great difference of temperature within the year.

3. June Solstice is the Summer Solstice and December Solstice is the Winter Solstice of the temperate countries.

4. Insolation or the amount of heat energy an area receives is greatest on Summer Solstice for all latitudes?

5. On the yearly average, the latitude that provides the greatest insolation is the 0° latitude or the equator.

6. As the latitude increases from 0° in the equator to 90° to the poles, the yearly average insolation increases as well.

II. Describe the relation between the latitude and average yearly insolation of the earth? Explain and Justify.

_____

_____

_____

_____

How does the angle of sun's rays vary with the latitudes? What happens to the energy of the sun's rays in relation to its angle of incidence? How would this explain the varying seasons of the different latitudes? **What could have caused the difference of the degree of insolation of the latitudes from season to season?**

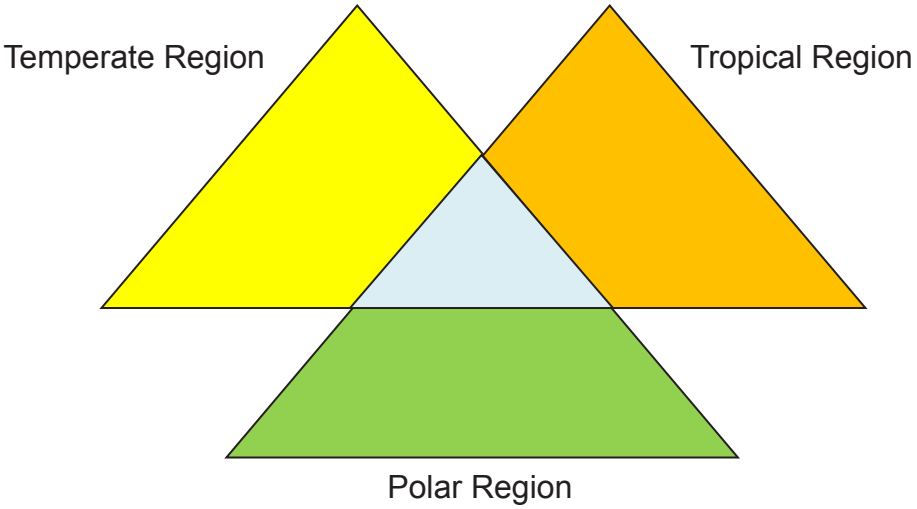
ACTIVITY NO. 9: Does Warm Matter?

Let us look into situations which show how the concepts of the previous activity impact the world. Using the graphic organizer below, compare and contrast the similarities and differences of the different locations in terms of seasons. Determine what similarities all of them experience in their change of seasons.

https://www.youtube.com/watch?v=CHU274MsvYc (a video presentation of seasons in the tropical areas);

http://polardiscovery.whoi.edu/poles/seasons.html (a text on the seasons at the poles); http://science.jrank.org/pages/6027/Seasons.html (a text on the seasons on the temperate region)

The Different Seasons



Why does the Philippines have different seasons compared to other countries? How does its location determine the length of day and the height of the overhead sun? **What has caused the difference of solar energy received by the different locations of the earth on the different seasons?**

Identify something in the Activity #6, #7 or #8 that you do not fully understand and word it as a statement or a question.

_____

_____

_____

_____

ACTIVITY NO. 10 : What's In Solar Insolation For Me?

After learning the variations of insolation with latitudes, you will be presented with how you can take advantage of these variations.

http://solarinsolation.org/category/solar-insolation/page/3/ and read its content (this site offers a reading on the different solar insolation of the different areas in the globe and an application)

https://www.youtube.com/watch?v=CH8Z9nBrCBg . (this site offers a video on the taking advantage of solar insolation even if it's winter.)

Complete the task by summarizing in your own well-chosen words a key idea presented in the activity using the graphic organizer.

Read the contents of the article or watch the video presentation.

Ask yourself the following question: What were the main idea and details of these sources?

These materials are about or tell me about

_____

_____

_____

Put the main idea and details into your own words.

_____

_____

_____

_____

_____

_____

_____

Is there uniform distribution of solar radiation in the different latitudes? How about in a year? Does your place receive the same average daily heat energy? How do we deal with varying amount of heat energy in a year? **What have caused the variations of heat energy received by the surface from the sun on the different seasons?**

ACTIVITY NO. 11: The Enlightened

Go to https://bubbl.us/mindmap, (this is an online interactive site for constructing bubble maps) try navigating it and create your own mind map from what you learned in the past activities. Enrich your mind map by including a lot of concepts related to it. Save your work and send them to the teacher. Use the guide question "**What causes seasons**?"

What concepts about seasons your most comfortable with? What other concerns of the lesson season do you need to work on? **How confident are you now in explaining the reasons for seasons?**

ACTIVITY NO. 12: Checks and Balances

Now that you already able to cover the essentials of seasons, go to http://easyscienceforkids.com/fun-seasons-quiz-free-interactive-science-quiz-questions-for-kids/

Go to http://www.softschools.com/quizzes/science/seasons/quiz424.html (these are interactive quizzes of the seasons and its reasons) and take the interactive quizzes to check how much you have learned from the past activities. Save and email results to the teacher.

What concepts are you weak at? What is your plan of dealing with those concepts wherein you have some difficulties? **What must be done to gain more confidence explaining the reasons for seasons?**

Comfort Zone

Reflect and summarize your learning; create two lists: one labeled **Comfort Zone**, the other **Stretch**. Fill the table with as much concepts as you can possibly recall on the activities related to seasons.

Comfort Zone	Stretch

ACTIVITY NO. 13: CPRE: Casting Shadows

You will be leaving seasons for a while for you will be tackling another very familiar celestial phenomenon. You are to find out just the same with the seasons on what causes this phenomenon. Study the situations and complete the tasks.

A. **Concrete:** Refer to the following familiar situations and complete the following statements.

 http://www.visualphotos.com/photo/2x4816709/young_man_watching_tv_woman_blocking_view_is0990011.jpg	 https://farm3.staticflickr.com/2924/14014500597_f633b87391.jpg
Situation: Someone blocks your vision while you're watching a television on a dark room.	**Situation:** You are looking for a small thing in front of you with the light at your back.
Who cast a shadow to whom? What will you see in front of you?	Who cast a shadow on what? What will you see in front of you?

What happens when the light source you're watching is blocked? How about when you are the one blocking the light source? **How do these situations help explain how eclipses are formed?**

B. **Picture:** Refer to the following pictures of situations and complete the following statements.

 http://farm9.staticflickr.com/8338/8183493340_0815e8380e_z.jpg	 http://images.nationalgeographic.com/wpf/media-live/photos/000/305/cache/total-lunar-eclipse-winter-solstice-2010_30579_990x742.jpg
What is happening to the sun in the sky? What cast shadow on earth in this situation? What are the heavenly bodies involved in this situation and what could be their arrangement in the sky?	What is happening to the moon in the sky? What cast shadow on moon in this situation? What are the heavenly bodies involved in this situation and what could be their arrangement in the sky?

What usually can block the sun as we view it on earth? How about the moon? How do we individually call these phenomena? **Why are these phenomena happening?**

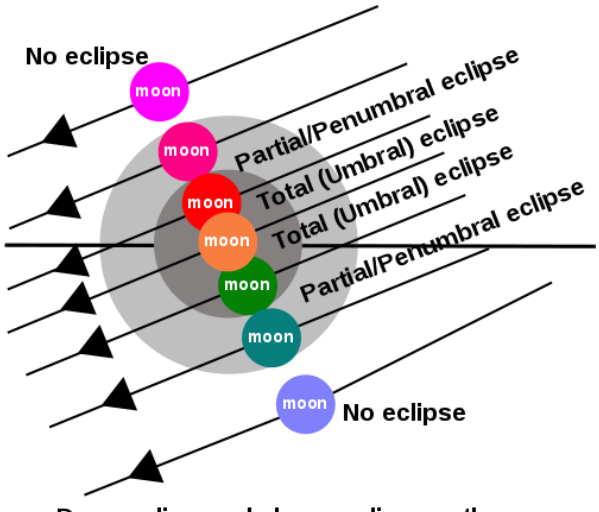
C. Representation: https://www.youtube.com/watch?v=zTVhNGGFEos (a video on the occurrence of solar and lunar eclipse) and watch the video. Summarize the concept using the Frayer's Model graphic organizer.

FRAYER'S MODEL

Definition	Conditions of occurrence
ECLIPSE	
Examples	Non-examples
(illustrations of the arrangements of sun-earth-moon)	*(illustrations of the arrangements of sun-earth-moon)*

What is the difference between solar and lunar eclispe? What are the different views one can observe a solar or lunar eclipse? Why are people in different parts of the world view the eclipse differently? **How are eclipse formed?**

D. **Abstract:** Go to http://www.newworldencyclopedia.org/entry/Lunar_eclipse and read the contents of the article. Study the given picture and answer the question that follows.



Descending node lunar eclipse paths

Guide Question:

If the moon's position can be in-between the earth and sun as well as the earth can be in-between the moon and sun once a month, then why can't we have a monthly solar and lunar eclipse?

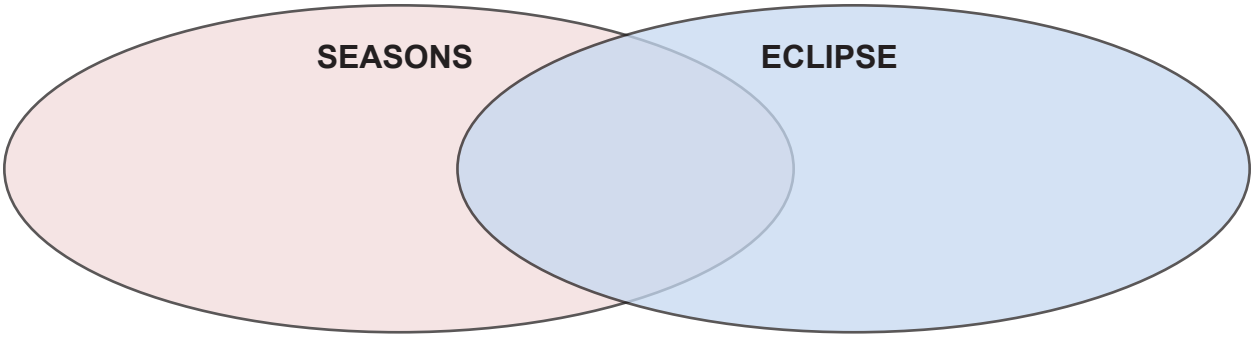
Summary Frames

Eclipses happen because . . . . .

Is the orbital plane of the moon the same as the orbital plane of the earth? How does this determine the occurrence of an eclipse? **How are eclipse formed?**

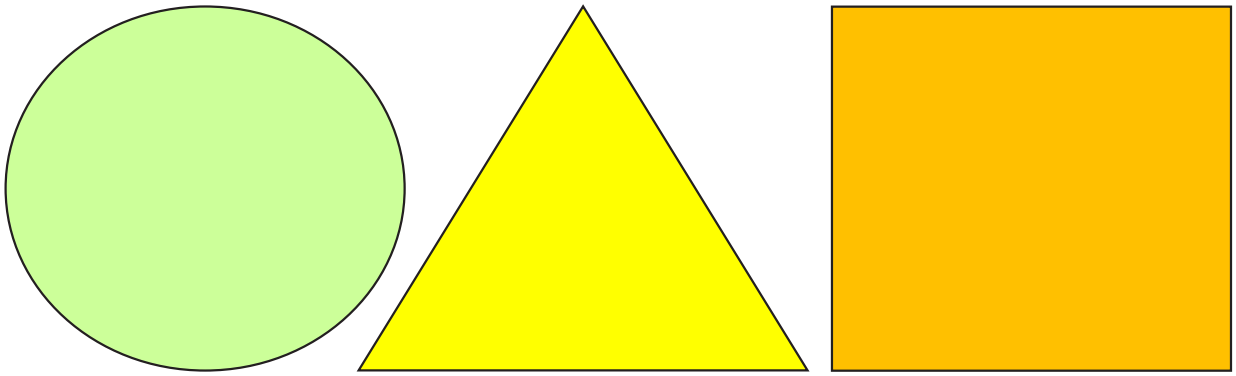
<u>ACTIVITY NO. 14:</u> Compare and Contrast

Let us recall the concepts of the previous activities using the graphic organizer Venn diagram to compare and contrast the similarities and differences seasons and eclipses. You may once again browse the related links and diagrams of the past activities to help you enrich your summary.



How are the two alike? How are they different? **Does your answer lead to the answer of why both of them occur?**

Now that you have covered all the learning competencies, have a check on yourself on how far have you have grown in learning on this lesson. Write inside the circle concepts that are still going around your head. Write inside the triangle concepts that are something pointed that stood out in your mind and on the square the concepts that agreed with your thinking.



End of FIRM UP:

In this section, the discussion was about seasons: their related positioning of the sun in the sky, length of day and energy variations with latitude were covered. The topic of eclipses was also taken. The two topics shared the same common characteristics on why they occur.

Go back to the previous section and compare your initial ideas with the discussion. How much of your initial ideas are found in the discussion? *Which ideas are different and need revision?*

Now that you know the important ideas about this topic, let's go deeper by moving on to the next section.

DEEPEN

Your goal in this section is to recall and apply the concepts on seasons and eclipses to analyze situations and misconceptions. Check your progress and be guided with the questions we reserve for this module.
Why do seasons and eclipses occur?

ACTIVITY NO. 15: Reasons!

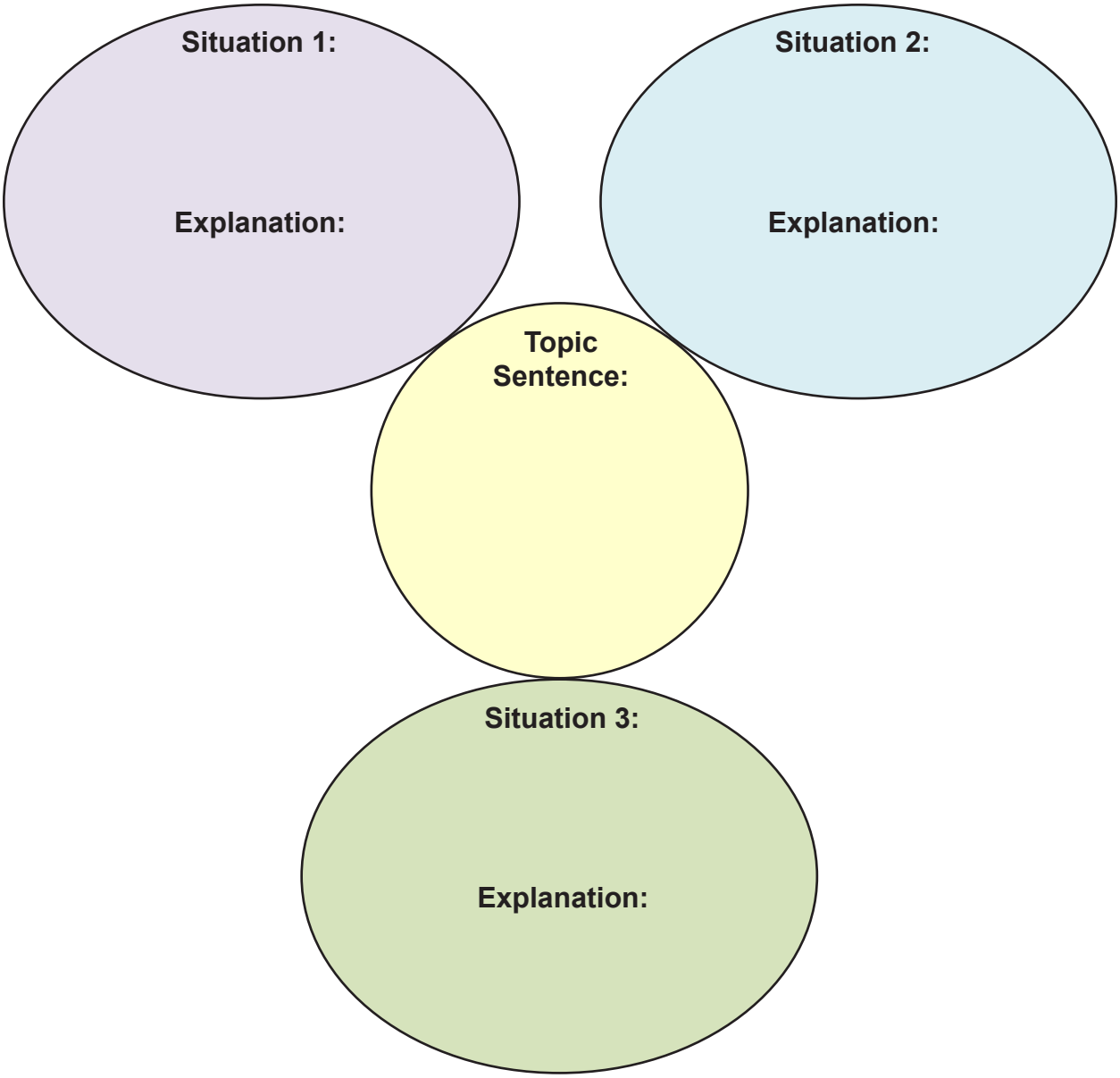
Study the contents of the following given links:

https://www.youtube.com/results?search_query=midnight+sun
(a video of the midnight sun phenomenon);

https://www.youtube.com/watch?v=t3LQyuTm8Lo
(a video on growing vegetable indoors during winter);

https://www.youtube.com/watch?v=MAk3fQx6K5o
(a video showing Japanese watching annular eclipse). Complete the graphic organizer.

Describe the nature of each situation in the individual circles by placing in the situations and explanations of why the event happen. Identify what is common among the contents of the circles and write the topic sentence in the middle circle. Write your conclusion statement at the bottom of the graphic organizer.



Generalization:

What is happening in each situation? Is there any common reason that made those events happen? How is your answer in the previous question compare with the question: **Why do seasons and eclipses occur?**

ACTIVITY NO. 16: The Beliefs (Scaffold #1)

You have just gone through a series of activities that exposed you to the reasons for seasons and eclipses. In the next activity, you are to read historical and present accounts on the beliefs and practices on seasons and eclipses in the different places around the globe. Go to the given sites and read, watch or analyze their contents. Summarize the idea by completing the graphic organizer.

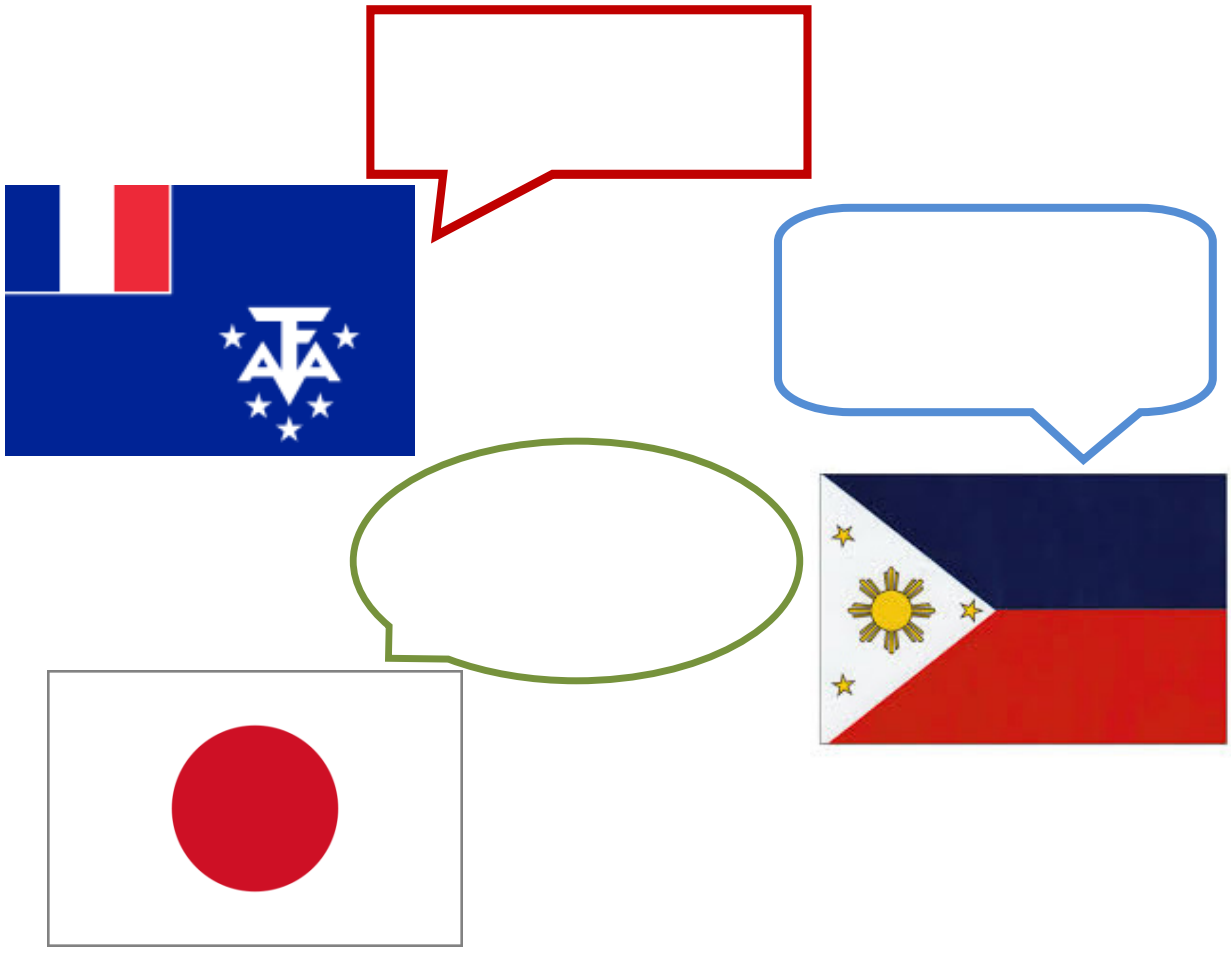
#1 Article: Indian Youths Defy Superstition, Eat During Eclipse http://science.gaeatimes.com/2010/01/15/indian-youth-defy-superstition-eat-during-eclipse-3667/ *(an article presenting India's practice on eclipse)*	
What do the Indian people believe about the eclipse?	
Why did some Indian youths defy what many were doing during the eclipse?	
What is the reason for the occurrence of the eclipse according to these youths?	
#2 Video: Does solar thermal work in very cold temperatures? https://www.youtube.com/watch?v=CH8Z9nBrCBg *(a video on harvesting solar energy to heat a home during winter)*	
What is the man trying to collect in the video?	
Why does he need it in his place at that time of the year?	
What have caused these different seasons that dictates the different needs of people in a season?	
#3 Graphs: Ultra violet radiation typical reading http://www.hpa.org.uk/Topics/Radiation/UnderstandingRadiation/UnderstandingRadiationTopics/UltravioletRadiation/uv_TypicalReadings/ *(a table of the intensity of UV rays during the day)* http://www.sunsmart.org.uk/UV-the-sun-and-skin-cancer/how-do-we-know/sunsmart-campaign-evidence-base#Reference 38 *(an article on a view on sun exposure and skin cancer)*	
What can cause skin cancer?	
When is this type of radiation greatest in quantity in a day?	

Why can there be different levels of this type or radiation within the day?	
Why do seasons and eclipses occur?	

What is the idea presented in every situation? What common reason is shared by the existence of those situations? How would that lead you to answer the question **"Why do seasons and eclipses occur?**

ACTIVITY NO. 17: Your Seasons Are Numbered (Misconception Check)

You were presented with activities in the past that helped you in determining lengths of days, height of the overhead sun, insolation of a place and etc. Present the possible points-of-view of the people in different parts of the globe. Express your perceived thoughts using voki.com. You may look into the latitude of these countries with the help from the website http://www.latlong.net/?lat=&lng=atlong.net (a website for finding longitude and latitude of a place.)



How did the activity help you determine the season of our country? What are the considerations to be made for identifying relocation sites to help the displaced citizens? How did the activity help you understand the relation between people and its environment.

ACTIVITY NO. 18: The Distance Between Us (Misconception Check)

Using the data you've gathered from the series of activities conducted on the reason for season, stress a position by debating on whether **DISTANCE BETWEEN THE EARTH AND THE SUN DETERMINES THE SEASONS.** Make sure to support your opinion with the needed information.

How confident are you in defending your arguments on the reason for seasons? What are the strong points of your argument? How do you plan to refute the statement regarding the distance between the earth and the sun?

ACTIVITY NO. 19: Stop, Look, Go

You have observed yourself grow in learning with all the activities that you were asked to do. You are going to track your own progress and assess whether you are ready to embark on the final tasks. Choose the color that corresponds to your level of performance of competencies on the chart below. Choose RED if you still need help to do it, ORANGE if you can perform the task by yourself and GREEN if you can perform the task by yourself in different ways. Go back to those past activities and work on those again until you will gain proficiency in doing the task.

Competencies	Status
• using models, relate the tilt of the Earth to the length of daytime	
• using models, relate the length of daytime to the amount of energy received	
• using models, relate the position of the Earth in its orbit to the height of the Sun in the sky	
• using models, relate the height of the Sun in the sky to the amount of energy received	
• using models, relate the latitude of an area to the amount of energy the area receives	
• show what causes change in the seasons in the Philippines using models	

• explain how solar and lunar eclipses occur	
• collect, record, and report data on the beliefs and practices of the community in relation to eclipses	
• * determine the implications of the available solar energy in a given season.	
• * propose activities appropriate for the season	
• * clarify misconceptions on eclipses	

In what competencies are you still having difficulties? What do you plan to do with those difficulties that you have pointed out?

ACTIVITY NO. 20: ANTICIPATION-REACTION GUIDE

Using the AR Guide, write agree or disagree for each statement given on the 'AFTER' column. Check how much you have improved in your answers on the seasons and eclipse module.

BEFORE Agree or Disagree		AFTER Agree or Disagree
	1. The axis of rotation of the Earth is tilted to some degree.	
	2. If the axis of rotation of the Earth tilts towards the sun, the northern hemisphere experiences longer daytime than the southern hemisphere.	
	3. If the same area experiences longer days, that may also mean hotter days.	
	4. Every place on earth experiences an overhead noontime sun.	
	5. Mid day sun is as intense as early morning or late afternoon sun.	
	6. The energy received from the sun increases as the increase in latitude in both north and south hemisphere.	
	7. The distance of the earth from the sun determines the seasons in the Philippines as well as the other places.	
	8. Beach Volleyball is an all-seasons game.	
	9. Eclipse is the turning-off of the light of sun or moon on certain times.	
	10. Eclipses symbolizes bad omen.	

End of DEEPEN:

In this section, the discussion was about the geographical setting and the resources of our country and how they impact communities.

What new realizations do you have about the topic? What new connections have you made for yourself?

Now that you have a deeper understanding of the topic, you are ready to do the tasks in the next section.

TRANSFER

Having learned the common reason for seasons and eclipses, look into how you can utilize these concepts to help people be relieved of their wrong beliefs and practices related to seasons and eclipses. As you go through this part of the lesson, always make it your guide the question; **why do seasons and eclipses occur?**

ACTIVITY NO. 21: Let's Talk about S and E (Scaffold 2)

After learning how people around the world deal with eclipses and seasons, you are to conduct an interview among your neighbors on the beliefs and practices of the people in their own towns or provinces. Gather at least three distinct beliefs and or practices. Fill the prepared graphic organizer with your formulated questions. Let them answer the provided last two questions. Present your comments and your reaction of the outcome of your interview in a blog by having it done online through blogger.com.

QUESTIONS	Person A	Person B	Person C
Question 1			
Question 2			
Question 3			
What causes seasons in the Philippines?			
What causes eclipses?			

How do you find the answers of your interviewees? Where do you think did they base their beliefs from? Who could have influenced them? How can their beliefs possibly affect them? How confident are you now to explain **why do seasons and eclipses occur?**

ACTIVITY NO. 22: Powtoon Network (Scaffold #3)

You have just expressed in thoughts how you can possibly help the situation in the previous activity. You are to begin to acting on this next activity. As a member of Space Science Club in your school, you are tasked to submit a presentation as your club's promotional video to be used in your Club Day event. Go to www.powtoon.com and create a presentation to debunk the student's misconceptions on why seasons and eclipses occur. But , first, you need to conduct a survey among your schoolmates by using the following questions.

a. Why do seasons occur?
b. Why do eclipses happen?
c. What have influenced your beliefs of these concepts?

How do you feel about your task? How do you find using your knowledge in science to help free other students of their wrong beliefs? Can you now possibly do the same to a bigger group of people who might need your knowledge as well? How confident are you now in answering the question; **Why do seasons and eclipses occur?**

ACTIVITY NO. 23: Performance Task

The UNESCO launched a program with the theme "Liberating Communities from Misguided Beliefs and Practices for Progress in the 21st Century". As a UNESCO-affiliated social worker assigned in your community, you are tasked to conduct information dissemination in a medium of your choice. It must center on the wrong concepts and non-science based practices related to the motion of heavenly bodies. Your work will be presented to the Director of Social Work, Social Work Team and the Admin Staff prior to the actual community presentation. Your output will be reviewed based on content, organization, media efficacy, justification and impact.

RUBRIC: Information Dissemination

CRITERIA	EXEMPLARY (4)	SATISFACTORY (3)	DEVELOPING (2)	NEEDS IMPROVEMENT (1)
CONTENT	Presents comprehensive scientific reasoning with detailed elaboration on its implications.	Presents a good number of scientific reasons.	Presents insufficient and inconsistent scientific evidences in some parts.	No scientific reasoning was presented.
ORGANI-ZATION	Order of ideas is apparent and has an interesting progression.	Order of ideas is apparent.	Order of ideas is confusing in some parts Some details are not specific to one central idea.	Order of ideas is not present. No supporting details were given.
MEDIA EFFICACY	Utilizes very pleasing to see effective font size, background color, image resolutions and video quality. Sound is of great quality as well.	Utilizes clear enough font size, background color, image resolutions and video quality. Sound is also audible enough.	The use of visual/aural aids was distracting in several parts.	The use of visual/aural makes the presentation confusing in most parts.
IMPACT	Evidences gathered from the data and relevant and updated information are presented clearly and concisely making the work reasonable compelling and highly convincing.	Evidences gathered from the data and relevant information are presented clearly and concisely making the work reasonable	Few evidences are presented and with very few references to the data; some information is not presented clearly making the work unconvincing in certain parts	Almost no evidences are presented and made no references to the data; many important information is presented in a confusing way. is not presented clearly making the work unconvincing

JUSTIFICATION	Establishes and communicates in an engaging and practical way the importance and relevance of the issue on personal and community levels.	Establishes and communicates the importance and relevance of the issue on personal and community levels. The importance and relevance are clear.	The importance and relevance to the personal and community level are not clearly established and communicated.	Does not relate the selected issue at all to the youth or their community.

How do you feel about your output? Do you think it can effectively change the thinking of the people in the community on their understanding of the seasons and eclipse? How did the task help you see the importance of the understanding of seasons and eclipse and how did it help people have functional beliefs and practices? Having gone through the whole module, what are now your thoughts regarding this question: **Why do seasons and eclipses occur?**

Now that you have done your performance task, go over the self-evaluation tool. Check on the appropriate column the evaluation of your project. Revise aspects of your project on the criteria that you missed.

Revision Checklist	YES	NO
Are there a good number of scientific reasons with sufficient elaboration of its implications included?		
Are the details well ordered, sufficient in number and are geared towards the central idea?		
Does the presentation of the number of data collected utilize adequately attractive tables/charts/graphs/models?		
Is the presentation of the evidences gathered from the data and relevant information clear, concise and reasonable?		
Are the importance and relevance of the issue on personal and community level clearly communicated?		

At this point, let's go back to your initial ideas and check whether you still stick to them or if you would like to change some of them after having undergone all the activities. Answer the AFTER column.

End of TRANSFER:

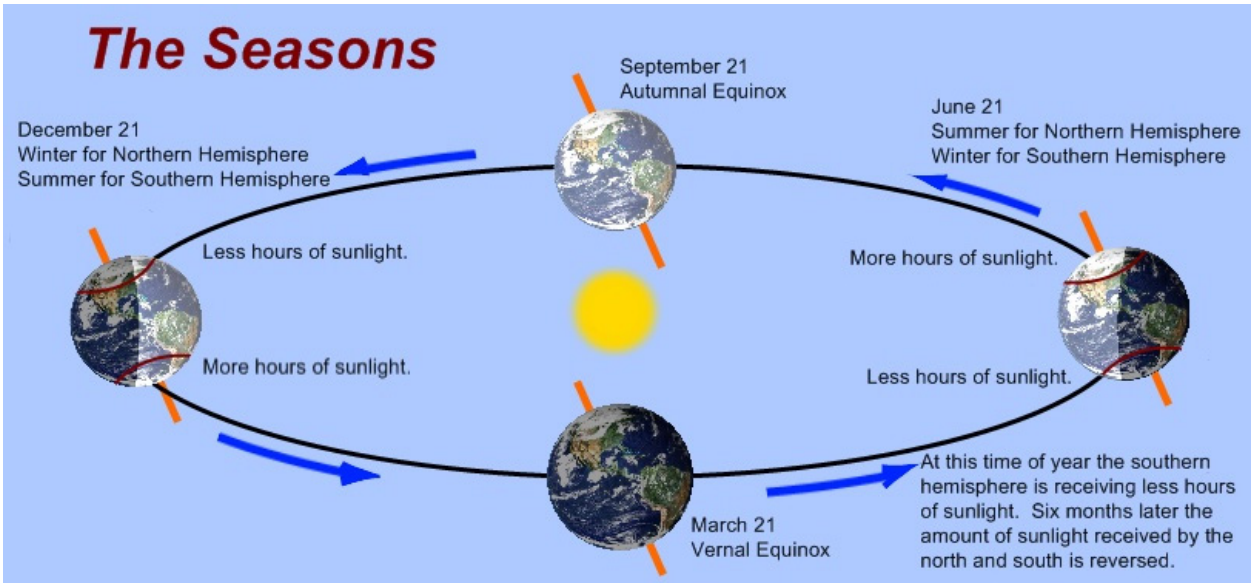
Now that you've completed the performance task, take time to recall the entire experience and write a reflective journal relating your experiences in completing the transfer task.

REFLECTIVE JOURNAL

Before I used to think . . . . . .
Now I realized . . . . . .

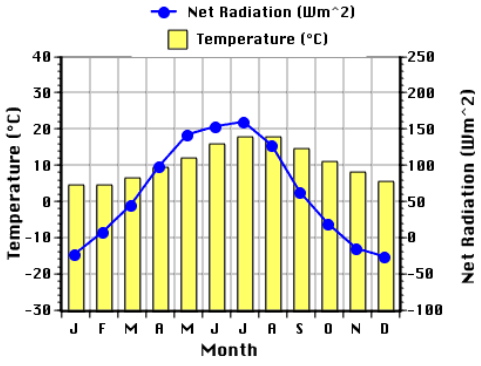
Try to answer the Post-Assessment now and see for yourself how much your understanding about the Earth's atmosphere has improved.

POST-ASSESSMENT:



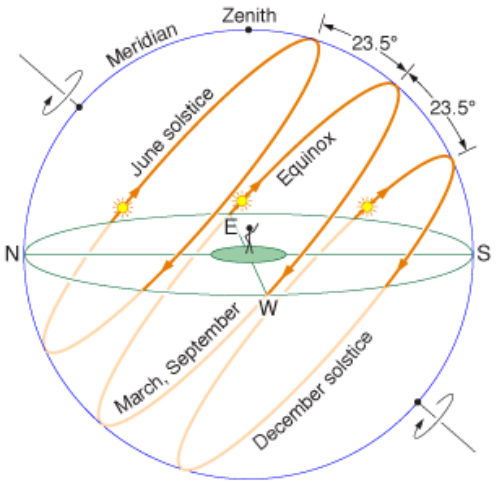
1. Refer to the diagram above. In which season is the northern hemisphere experiencing longer days?

A. summer
B. autumn
C. winter
D. spring



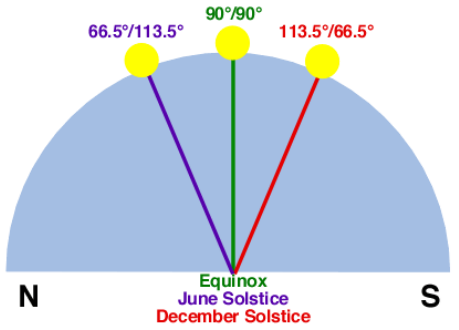
2. What is the best interpretation of the above shown graph?

A. The net radiation the area receives is the same throughout the year.
B. The greater the net radiation an area receives, the lesser is the resulting temperature.
C. The lesser the net radiation an area receives, the greater is the resulting temperature.
D. The greater the net radiation an area receives, the greater is the resulting temperature.



3. Which statement is TRUE about the position of the earth on its orbit in relation to the height of the sun in the sky?

A. The sun at all times of the year passes at the same path in the sky.
B. The sun moves lowest in the sky on equinoxes.
C. The sun moves highest in the sky during winter.
D. The sun moves highest in the sky during summer.



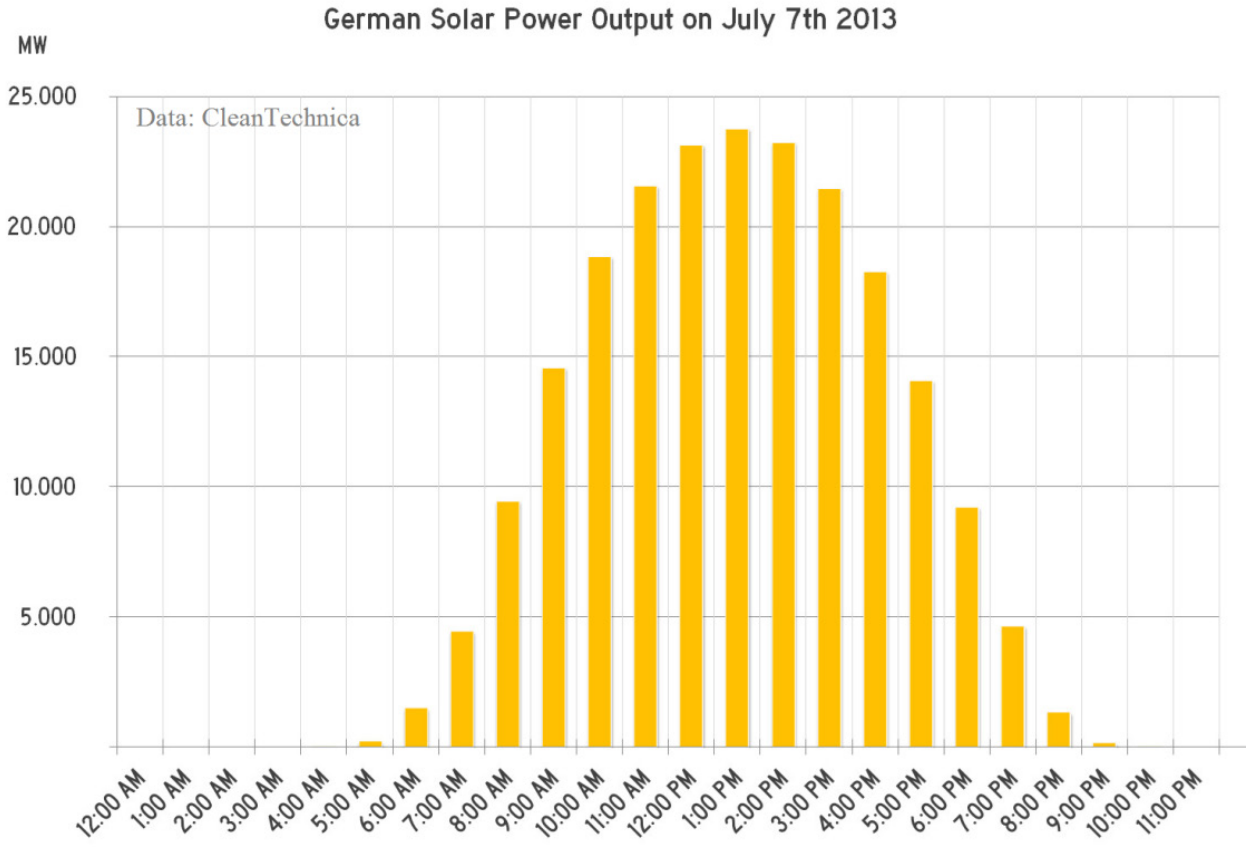
Note: first measurement represents the angle from the northern side of the horizon, while the second measurement is from true south.

Positioning of the Sun in the Equator throughout the Year

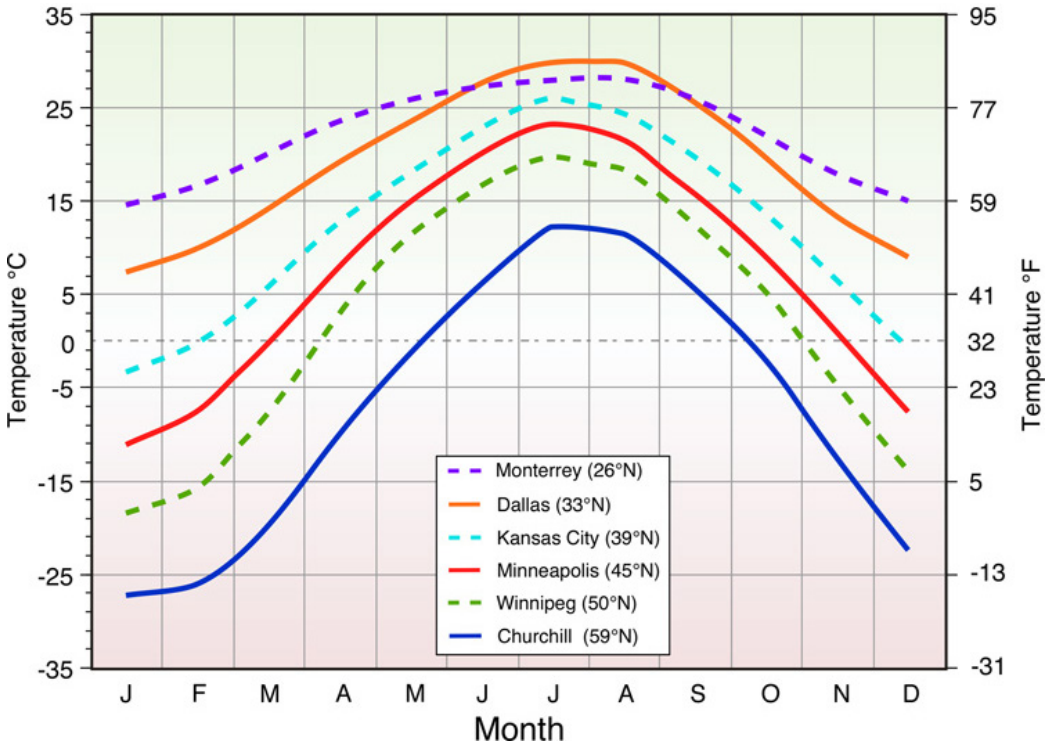
4. Refer to the above diagram. Why are there no four seasons in the places near the equator like the Philippines?
A. The sun does not change its path across the sky in the entire year.
B. There is no drastic drop and rise of temperature as the sun only shifts a little in its path in the sky within the year.
C. The places in equator part of the earth only gets a little closer and farther away from the sun unlike those places near the poles due to the earths' spherical shape.
D. The equator is facing directly at all times in the sun throughout the year, thus the energy is fairly constant at all times.

5. Which of the following is NOT a belief related to the occurrence of eclipse?

A. A demon or animal is believed to consume the moon or sun.
B. The event makes foods and drinks dirty.
C. The sun or moon is revealing its inner darkness during this event.
D. It is the time of coming together of the sun and moon resolving old feuds and anger



6. Which statement is the best interpretation of the above graph?
A. The area received the greatest solar energy on July 7, 2013.
B. Energy from the sun is greatest when the sun is highest in the sky.
C. The sun moves higher in the sky towards mid-day and sets afterwards.
D. The sun starts rising at 5:00 a.m. and sets at 9:00 p.m.



7. Which of the following activities is appropriate for a certain place on a particular month or season?

A. Basking in a picnic under the sun is a good activity on May in Dallas as the place is neither too hot nor too cold.
B. It will be snowing in Monterey on January, so ice skating is a good leisure activity.
C. It is great to shop for winter clothes in any of those places in the month of June in the height of winter season.
D. Outdoor basketball is best played in the warm days of Churchill on the month of February.

8. How do you compare the process of the occurrence of the lunar eclipse and the phases of the moon?

A. They both share the same process. The moon is casted upon by the shadow of the earth.
B. They both share the same process. The moon is being illuminated by the sun at different angles as it revolved around the earth as viewed from the earth.
C. The phases of the moon are due to the illumination of the sun on the revolving moon as viewed on the earth while the eclipse is due to the earth casting its shadow on the moon.
D. The eclipse is due to the illumination of the sun on the revolving moon as viewed on the earth while the phases o the moon are due to the earth casting its shadow on the moon.

Illustration A

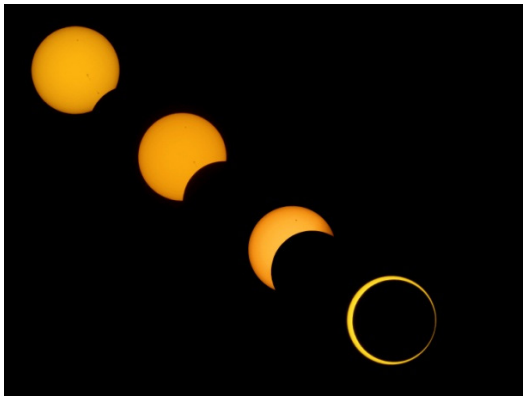


Illustration B

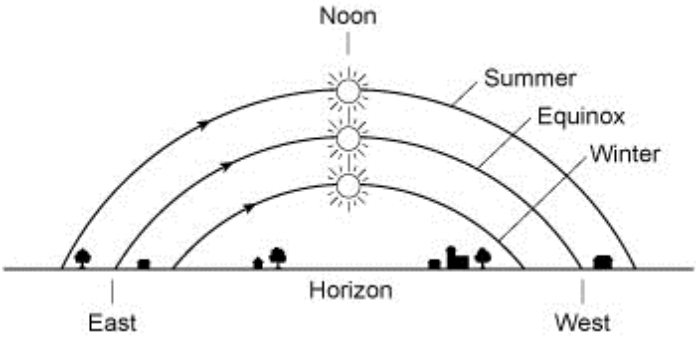
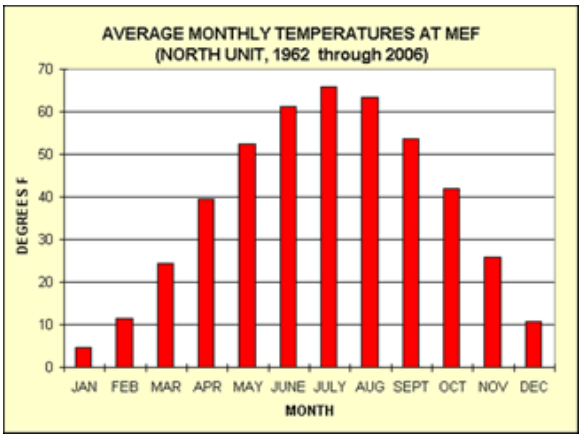


Illustration C



Guide questions:

What had caused the moon to a cast shadow on earth in illustration A?

What had caused the sun to shift its height in the sky as the seasons change in illustration B?

What had caused the temperature variation received by a place within a year?

9. Given the illustrations above, what have caused those events to occur?

A. They are due to the change of the tilt of the earth's axis.
B. They are due to the movement heavenly bodies in relation to each other.
C. Those are because of difference of the intensity of sun's radiation in different times of the year.
D. They are due to the changing of distance between heavenly bodies.

Illustration A

Illustration B

Illustration C

Guide questions:

What had caused the plant to increase or decrease its growing processes?

What could have caused the area to have changed how the sceneries look in a year?

Why are the phases of the moon a very regular sight whereas eclipse is not?

10. Given the illustrations above, what have caused those events to occur?

A. They are due to the change of the tilt of earth's axis.
B. They are due to the movement heavenly bodies in relation to each other.
C. Those are because of difference of the intensity of sun's radiation in different times of the year.
D. They are due to the changing of distance between heavenly bodies.

Skiing is a recreational activity and competitive winter sport in which the participant uses skis to glide on snow. Many types of competitive skiing events are recognized by the International Olympic Committee (IOC), and the International Ski Federation (FIS).

http://en.wikipedia.org/wiki/Skiing

Winter solstice is an astronomical phenomenon which marks the shortest day and the longest night of the year. Winter solstice occurs for the Northern Hemisphere in December and for the Southern Hemisphere in June.

Worldwide, interpretation of the event has varied from culture to culture, but many cultures have held a recognition of rebirth, involving holidays, festivals, gatherings, rituals or other celebrations around that time.[2]

http://en.wikipedia.org/wiki/Winter_solstice

Eclipse Chasers
What a different world we live in today. Not only is travel much more affordable and accessible, but it is also simple to obtain information about the location of each eclipse, complete with weather predictions and suggestions on what else to see and do whilst in the area. It has never been easier to be an eclipse chaser. Furthermore, there are hundreds of specialist travel companies who now arrange eclipse chasing tours, and demand for these continues to grow. Increasingly, people are pursuing interests and events that are out of the ordinary, and there appears to be a growing interest in seeing a total eclipse. No longer is eclipse chasing for scientists and esteemed individuals. Today, anyone can become an eclipse chaser.

http://www.sringer.com

What made ice-skiing an annual event?
Why winter solstice celebration is happens once a year only?
What has made eclipse chasing travels a rare event?

11. What is likely the basis for the regularity of such events?

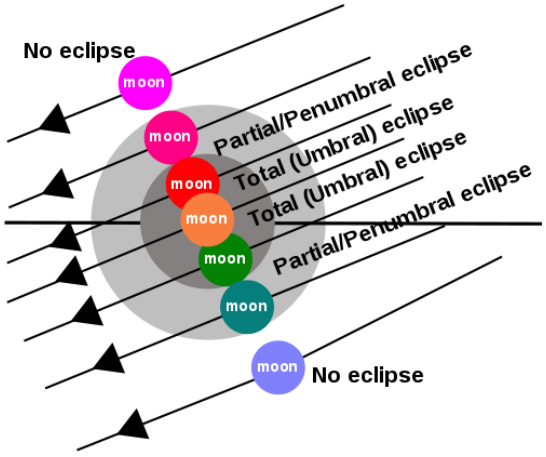
A. They are due to the change of the tilt of earth's axis.
B. They are due to the movement heavenly bodies in relation to each other.
C. Those are because of difference of the intensity of sun's radiation in different times of the year.
D. They are due to the changing of distance between heavenly bodies.

12. The difference on the distance between the sun and the earth is a common reason for the changes in season. What concept is the best to present to the people having this idea?

A. The distance between the sun and the earth remains unchanged all throughout the year which is approximately 1.5 x108 km, thus it is not the cause of seasons.
B. The seasons are not caused by the distance the Earth is from the sun, where the earth is hottest when its farthest from the sun but rather are caused completely by the fact that the Earth is tilted on its axis 23.5°
C. The seasons are caused by the regular increase and decrease of the sun's surface radiation and not by its distance from the sun.
D. The distance between the sun and the earth is truly the reason for the change in seasons. Same as the analogy that the closer you get to a fire, the greater is the tendency to get burned.

13. Which of the following activities is NOT a sound proposal and explanation on the summer months?

A. Swimming in the sea as the water is comfortably warm.
B. Kite flying as thunderstorms are not likely to happen.
C. Outdoor painting as there is less probability of having a rain.
D. Not to do any of the above activities, because of the earth's tilt, the hemisphere that is having summer has become nearer to the sun and its dangerous radiation.



Descending node lunar eclipse paths

14. Which of the following is the best interpretation of the above illustration?

A. An eclipse happens once in every one revolution of the moon around the earth.
B. Whether eclipses happen or not depends on the moon's path as it orbits around the earth.
C. The orientation of the moon's orbit around the earth is the same as the plane of earth's orbit around the sun
D. An eclipse is an accidental phenomenon that just randomly occurs.

15. As a seasoned farmer, you have known that the dragon fruit production is highly dependent on the length of daytime. In the natural setting. Its production ceases on the month of November where the length of days shorten and returns in May when the days are already much longer. What can be done to possibly have an off-season production?

A. Add more fertilizers around the base of the dragon fruits.
B. Place a lot of mulching around the base of the dragon fruits as they blanket the soil which stabilizes the soil temperature to induce flowering.
C. Water more the plants while light intensity in mid-day is greatest to maximize process within the plant to induce fruit production.
D. Provide LED lighting to extend daylight hours to satisfy daylight hours requirement.

16. Modern home constructions in temperate countries call for tapping of energy from the sun to sufficiently heat/cool homes in different times of the year. In the point of view of a scientifically informed architect, which practice may be deemed practical in terms of tapping solar energy?

A. The construction of houses to be mostly made up of glass. This is to allow solar energy in all seasons to enter yet not to escape.
B. The construction of windows facing where the sun rises and sets to allow enough but not too much heat energy to warm the house during winter and to allow air to circulate during summer.
C. The construction of home with no windows facing where the sun sets or rises but with the provision of a glass ceiling. This is to expose the house to mid-day solar energy in all seasons.
D. To construct houses with mirror like finish to reflect almost all the sun's light in order not to heat the inside of the building.

17. As a renowned dermatologist, people may seek for your advice. In relation to the height of the sun in sky and its energy, which of the following will you NOT RECOMMEND to the children?

A. Wear sun block if you can't avoid being out in the sun for a long time specifically in mid day.
B. Avoid being under the sun as much as possible right before, during and right after noon time hours.
C. Wear sun block even when your inside the house when the sun's rays are intense.
D. Stay under the shade of the umbrella when you're out under the sun.

18. As a respected meteorologist, a friend of yours in Canada is asking you if there is a possibility for the Philippines to soon experience snowing. Which statement will best explain to him the seasons in the Philippines?

A. There wouldn't b e a possibility. With global warming, the average temperature of the country will soon be even higher.

B. It will never snow, the Philippines is near the equator and a bit nearer to the sun than the countries in the temperate regions, thus it will always be hot.
C. No, the tilt of earth axis does not allow much displacement of the position of the sun in the sky from the vertical from where the Philippines is situated, thus the amount of solar radiation the country received throughout the year is high enough to prevent snowing.
D. Yes, the tilt of earth's axis is wobbling so there is a possibility for the Philippines to snow but not in our own time.

19. As an event organizer, you are to plan of activities for the delegates of an international youth organization to visit the Philippines on April. What outdoor activity are you LEAST LIKELY to suggest.

A. Activities by the bonfire during the night as rain will most likey not spoil it.
B. Hiking and river trekking as there will be no heavy rain to endanger every one of slipping and flooding.
C. Picnic and kite flying as the days would likely be sunny.
D. Badminton and indoor soccer as thunderstorms are expected to be frequent.

20. A neighbor has this belief that if you look into a solar eclipse, it will cause blindness. As an enthusiast of space phenomena, how would you comment on this scientifically?

A. The light during the eclipse has high levels of radiation; it has higher possibility of destroying the retina of the eyes.
B. The light in an eclipse is not pure thus it stains the eyes.
C. The sun's rays have in them rays harmful to the eyes with or without eclipse.
D. Not harmful at all as you can't see the sun's rays during the solar eclipse.

GLOSSARY OF TERMS USED IN THIS LESSON:

SEASON - a subdivision of the year, marked by changes in weather, ecology, and hours of daylight. Seasons result from the yearly revolution of the Earth around the Sun and the tilt of the Earth's axis relative to the plane of revolution

SOLAR ENERGY - light and heat energy that comes from the sun.

ROTATION - the turning around a center or axis

REVOLUTION - the movement of a body around another body

SOLSTICE- Either of two times of the year when the sun is at its greatest distance from the celestial equator.

EQUINOX – occurs twice a year (around 20 March and 22 September), when the plane of the Earth's equator passes the center of the Sun.

ANNULAR ECLIPSE - A solar eclipse in which the Moon's antumbral shadow traverses Earth (the Moon is too far from Earth to completely cover the Sun). During the maximum phase of an annular eclipse, the Sun appears as a blindingly bright ring surrounding the Moon.

is seen when an observer passes through the antumbra.

BESSELIAN ELEMENTS - The Besselian elements are a series of time dependent variables used to calculate various aspects of a solar eclipse. They describe the movement of the Moon's shadow with respect to the fundamental plane. This plane passes through the center of Earth and is oriented perpendicular to the Moon's shadow axis. Next, the shadow cone is projected onto Earth's surface including the effects of Earth's rotation, the flattening of Earth and the latitude, longitude and elevation of the observer. The local circumstances at the observer's position can then be calculated including the eclipse contact times, eclipse magnitude and the duration of totality (or annularity).

EYE SAFETY - The only time that the Sun can be viewed safely with the naked eye is during a total eclipse, when the Moon completely covers the disk of the Sun. It is never safe to look at a partial or annular eclipse, or the partial phases of a total solar eclipse, without the proper equipment and techniques. Even when 99% of the Sun's surface (the photosphere) is obscured during the partial phases of a solar eclipse, the remaining crescent Sun is still intense enough to cause permanent retinal damage, especially when viewed through binoculars or other optical aids.

HYBRID ECLIPSE - A solar eclipse in which the Moon's umbral and antumbral shadows traverse Earth (the eclipse appears annular and total along different sections of its path). Hybrid eclipses are also known as annular-total eclipses. In most cases, hybrid eclipses begin as annular, transform into total, and then revert back to annular before

the end of their track. In rare instances, a hybrid eclipse may begin annular and end total, or vice versa.

PARTIAL ECLIPSE - A solar eclipse in which the Moon's penumbral shadow traverses Earth (umbral and antumbral shadows completely miss Earth). During a partial eclipse, the Moon appears to block part (but not all) of the Sun's disk.
From the prospective of an individual observer, a partial eclipse is one in which the observer is within the penumbral shadow but outside the path of the umbral or antumbral shadows.

PENUMBRA - The penumbra is the weak or pale part of the Moon's shadow. From within the penumbra, the Sun is only partially blocked by the Moon as in the case of a partial eclipse. This contrasts with the umbra, where the Sun is completely blocked resulting in a total eclipse.

SAROS - The periodicity and recurrence of solar (and lunar) eclipses is governed by the Saros cycle, a period of approximately 6,585.3d (18yr 11d 8h). When two eclipses are separated by a period of one Saros, they share a very similar geometry. The eclipses occur at the same node with the Moon at nearly the same distance from Earth and at the same time of year. Thus, the Saros is a useful tool for organizing eclipses into families or series. Each series typically lasts 12 or 13 centuries and contains 70 or more eclipses.
For more information, see Eclipses and the Saros. The Saros Catalog of Solar Eclipses: Saros 0 - 180 provides complete details for all current Saros cycles.

TOTAL ECLIPSE - A solar eclipse in which the Moon's umbral shadow traverses Earth (Moon is close enough to Earth to completely cover the Sun). During the maximum phase of a total eclipse, the Sun's disk is completely blocked Moon. The Sun's faint corona is then safely revealed to the naked eye.

TOTALITY - The maximum phase of a total eclipse during which the Moon's disk completely covers the Sun. Totality is the period between second and third contact during a total eclipse. It can last from a fraction of a second to a maximum of 7 minutes 32 seconds.

UMBRA - The umbra is the darkest part of the Moon's shadow. From within the umbra, the Sun is completely blocked by the Moon as in the case of a total eclipse. This contrasts with the penumbra, where the Sun is only partially blocked resulting in a partial eclipse.

RESOURCES AND LINKS IN THIS MODULE:

Websites:

http://www.google.com.ph/imgres?hl=en&bih=741&biw=1517&tbm=isch&tbnid=YLuguV2PyTdVuM:&imgrefurl=http://bushwickartgallery.com/&docid=ttXhNQC-TQ4bUM&imgurl=http://bushwickartgallery.com/user_art/61CERDAUlanUlanSeries2.jpg&w=544&h=331&ei=Q7JwUojyBsbGkAWLz4HIBw&zoom=1&ved=1t:3588,r:47,s:0,i:224&iact=rc&page=4&tbnh=128&tbnw=211&start=45&ndsp=15&tx=149&ty=73
This site contains the picture that depicts children's activity under the rain

http://www.lonelyplanet.com/philippines/weather#ixzz2jYUgC5Lv
This site presents text on seasons on the Philippines

http://www.turtlediary.com/kids-videos/seasons.html
This is a youtube video showing four seasons

http://www.youtube.com/watch?v=_-rznxowu4o
This is a youtube video showing seasons in other parts of the world

http://www.playkidsgames.com/games/seasons/#
This site contains interactive games on seasons

http://www.iboard.co.uk/iwb/Season-Scenes-77
This is an interactive game on the four seasons

http://www.youtube.com/watch?v=DD_8Jm5pTLk
This you tube video presents a discussion on the reasons for seasons

http://www.shareyouressays.com/84292/short-article-on-rainy-season
This website offers a reading material on rainy seasons