

# LEARNING MODULE

Science G7 | Q4

## Earth and Space



## NOTICE TO THE SCHOOLS

This learning module (LM) was developed by the Private Education Assistance Committee under the GASTPE Program of the Department of Education. The learning modules were written by the PEAC Junior High School (JHS) Trainers and were used as exemplars either as a sample for presentation or for workshop purposes in the JHS In-Service Training (INSET) program for teachers in private schools.

The LM is designed for online learning and can also be used for blended learning and remote learning modalities. The year indicated on the cover of this LM refers to the year when the LM was used as an exemplar in the JHS INSET and the year it was written or revised. For instance, 2017 means the LM was written in SY 2016-2017 and was used in the 2017 Summer JHS INSET. The quarter indicated on the cover refers to the quarter of the current curriculum guide at the time the LM was written. The most recently revised LMs were in 2018 and 2019.

The LM is also designed such that it encourages independent and self-regulated learning among the students and develops their 21st century skills. It is written in such a way that the teacher is communicating directly to the learner. Participants in the JHS INSET are trained how to unpack the standards and competencies from the K-12 curriculum guides to identify desired results and design standards-based assessment and instruction. Hence, the teachers are trained how to write their own standards-based learning plan.

The parts or stages of this LM include Explore, Firm Up, Deepen and Transfer. It is possible that some links or online resources in some parts of this LM may no longer be available, thus, teachers are urged to provide alternative learning resources or reading materials they deem fit for their students which are aligned with the standards and competencies. Teachers are encouraged to write their own standards-based learning plan or learning module with respect to attainment of their school's vision and mission.

The learning modules developed by PEAC are aligned with the K to 12 Basic Education Curriculum of the Department of Education. Public school teachers may also download and use the learning modules.

Schools, teachers and students may reproduce the LM so long as such reproduction is limited to (i) non-commercial, non-profit educational purposes; and to (ii) personal use or a limited audience under the doctrine of fair use (Section 185, IP Code). They may also share copies of the LM and customize the learning activities as they see fit so long as these are done for non-commercial, non-profit educational purposes and limited to personal use or to a limited audience and fall within the limits of fair use. This document is password-protected to prevent unauthorized processing such as copying and pasting.

SCIENCE 7

# Module 4: Earth And Space

## ✓ INTRODUCTION AND FOCUS QUESTION(S):

Have you ever wondered why various places in our country have different means of living and lifestyle? For example, the people of Benguet and Baguio, aside from enjoying a cooler weather, rely greatly on their region's bountiful harvest of flowers and vegetables. They even celebrate it. Romblon boasts of its quality marble and marble products. On the other hand, people of Polilo Island, a place frequently visited by typhoons, struggle to progress despite their bountiful sea harvest. Why is this so? What calls for the difference among how people live on these places?

Man in past has abandoned its nomadic way of life and has chosen to settle down at certain locations. His immediate environment has shaped the way he lives and how he develops. It is not possible, therefore, that man can live separately with his environment. In this module, you will find out **How does where we live influence the way we live and how does location determine the growth of particular area?** Remember to search for the answer to these questions as we move along this module.

## ✓ LESSONS AND COVERAGE:

In this module, you will examine these questions when you take the following lessons:

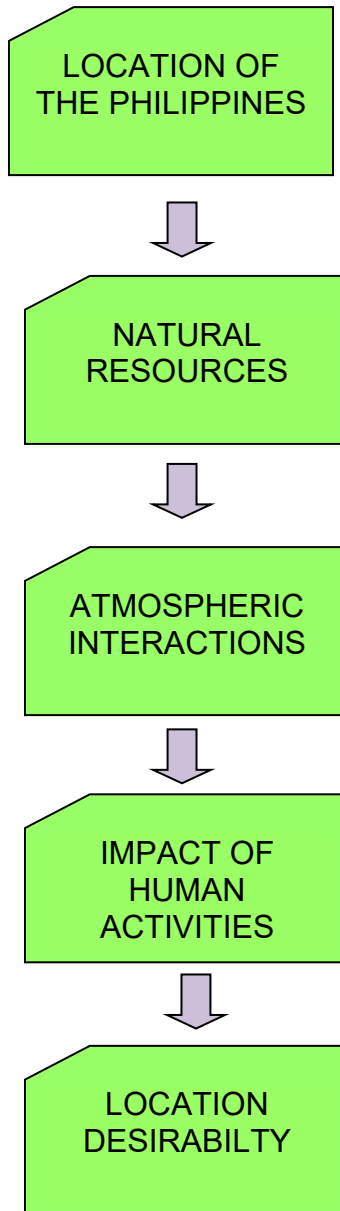
***Lesson 1 – The Philippine Environment***

***Lesson 2 – Interactions in the Atmosphere***

In these lessons, you will learn the following:

<b><i>Lesson 1</i></b>	<ul style="list-style-type: none"> <li>demonstrates how places on Earth may be located using a coordinate system</li> <li>relate the location of the Philippines with respect to the continents and oceans of the world</li> <li>recognizes that soil, water, rocks, coal, and other fossil fuels are Earth material resources</li> </ul>
<b><i>Lesson 2</i></b>	<ul style="list-style-type: none"> <li>discuss how energy from the Sun enters the atmosphere</li> <li>explain how some human activities affect the atmosphere</li> <li>account for the occurrence of land and sea breezes, monsoons and inter tropical convergence zone (ITCZ) describe the effects of certain weather systems in the Philippines</li> </ul>

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 unfamiliar concepts.
2. Read thoroughly the given reading materials and make summaries.
3. Comprehend well the guide questions and follow-up questions and let them be your guide for understanding.
4. Answer every question exhaustively.
5. Browse sites and read articles, play interactive games, watch videos and etc for concept development and for assessment.
6. Take the post test to measure how much you have learned.

7. Ask, post questions for clarifications in any case you have concerns regarding the lesson.
8. Cover all the activities on their respective times of completion.
9. Have fun learning!

## PRE-ASSESSMENT:

---



*Let's find out how much you already know about this module. Click on the letter that you think best answers the question. Please answer all items. After taking this short test, you will see your score. 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) Reinhard is in Eiffel Tower. Which of the following may be the closest registered value in his iPhone as the latitude and longitude of his location. Click this site to help you arrive at the answer: <http://ctrlq.org/maps/address/>
  - A. Latitude 35.15;Longitude -80.90
  - B. Latitude 29.98;Longitude 31.13
  - C. Latitude 48.86;Longitude 2.29
  - D. Latitude 38.36;Longitude -88.20
- 2) Janus has fishing vessels with licenses to sail in any Philippine waters. Where might he be NOT able to legally sail?
  - A. Sulu Sea
  - B. Celebes Sea
  - C. South China Sea
  - D. Dead Sea
- 3) Why is the Philippines considered as one on the countries with the longest shoreline?
  - A. because it is surrounded with large bodies of water
  - B. because the country as an archipelago is composed of many islands each with a stretch of shoreline
  - C. because of its many tourist-attracting beach resorts
  - D. because of most of the Filipinos are fishermen
- 4) Most of the Earth's processes get their energy source from the sun. Crop growing is an example. What is the main process by which energy from the sun enters the troposphere?
  - A. Radiation

- B. Convection
  - C. Conduction
  - D. Advection
- 5) What naturally occurring phenomenon is frequently formed in the Pacific Ocean and hits the Philippines and brings losses to life and damages to infrastructures?
- A. earthquake
  - B. tornado
  - C. typhoon
  - D. tsunami
- 6) Which of the following resources should the use be kept at the minimum as this resource can't be replenished in our geologic time?
- A. timber
  - B. geothermal
  - C. ethanol
  - D. natural gas
- 7) The resource base varies in different parts of the world because resources are not
- A. sufficient to meet the needs of developed countries.
  - B. needed in the same amounts by all people.
  - C. taken from both land and water in all countries.
  - D. evenly distributed on the earth.
- 8) This mineral mined from rocks is very essential in everyday life use. It is very valuable in building construction, bridges, bodies of cars and the like.
- A. iron
  - B. sand and gravel
  - C. salt
  - D. tin
- 9) What differentiates monsoon from land and sea breezes?
- A. Land and sea breezes develop during the day while the monsoon develops over a year.
  - B. Land and sea breezes are local wind patterns while monsoons are global wind patterns.
  - C. Land and sea breezes take place several times within the day while monsoons happen once in a year.
  - D. Land and sea breezes do not affect weather patterns while the monsoon does.

10) What is the main method by which heat is distributed in the troposphere?

- A. radiation
- B. conduction
- C. convection
- D. advection

11)



Given the illustration above, where will be the direction of the wind breeze?

- A. from its left side to the right
- B. from its right side to left
- C. reverses direction every now and then from its left and right
- D. the wind will be still

12) The deforestation rate in the Philippines is 157,000 ha per year. Slash and burn is still practiced in many remote agricultural communities in our country. What do you think is the common process by which the two practices contribute to Global warming?

- A. Bare land or surfaces as the outcome of deforestation and slash-and-burn increases atmosphere's ability to absorb energy from the sun.
- B. Burning and decomposition reintroduces a great amount of carbon dioxide back to the atmosphere.
- C. Nitrogen level in the atmosphere is reduced as there is reduced vegetation to produce them.
- D. With the decrease in vegetation, earth's ability to radiate heat energy back to the outer space is reduced.

13) Which of the following may NOT be an effect of weather system in the Philippines

- A.  and





B.



C.



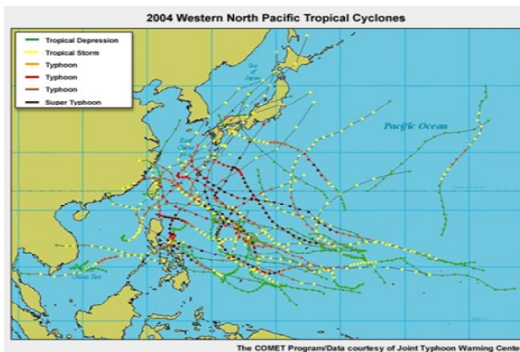
D.





14) Study each source and reflect on the given process questions. Choose the best conclusion you can derive from the sources.

A.



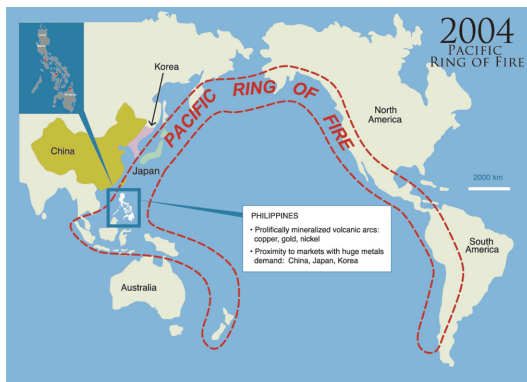
How is the Philippines situated in terms of the typhoon tracks in the West Pacific Ocean. What is the implication of this?

B. Click on the given website and read the article.

<http://cpscecotours.blogspot.com/2006/08/marine-biodiversity.html>

How does the Philippines benefit from the position presented by the idea of the article?

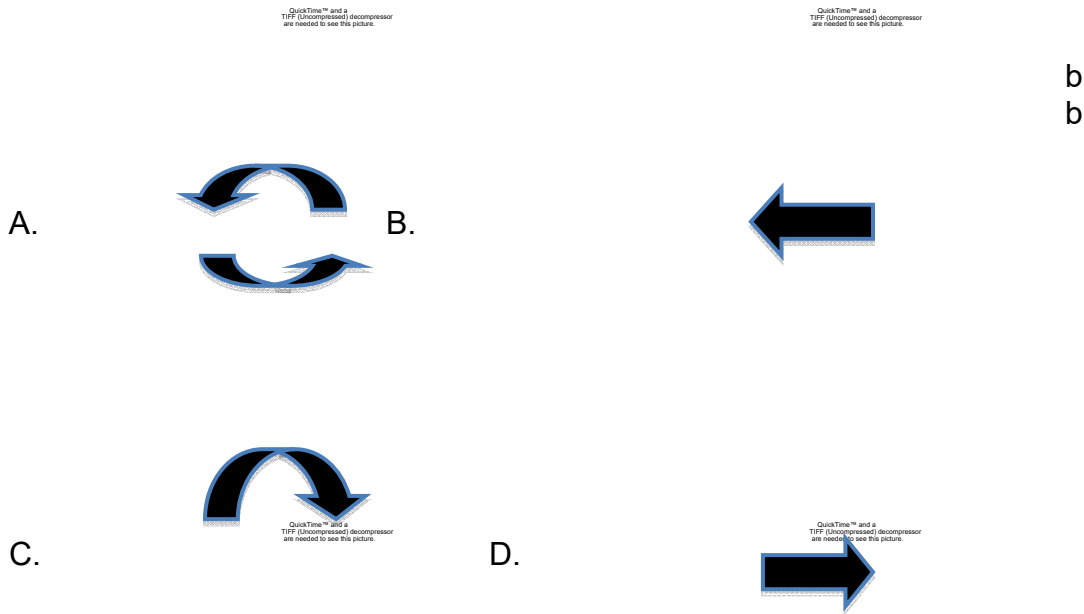
C.



Can we consider it as an advantage for the Philippines to be a part of the Pacific Ring of Fire?

- A. The Philippines is a hazard zone.
- B. The Philippines by its location and resources has its advantages and disadvantages.
- C. Calamities are inevitable if one lives in the Philippines
- D. There is really no safe place in the Philippines as in any part of the world.

15) Which diagram shows a sea breeze?



- 16) Which of the following is one of the causes of monsoons?
- A. jet streams strengthen in the summer
  - BB. polar easterlies bring contrasting air to the tropics
  - CC. oceans have large, seasonal temperature changes
  - D. continents heat and cool differently than oceans
- 17) Tacloban was really devastated with the super typhoon Yolanda. Which of the following efforts is NOT a sound action to re-establish communities?
- A. Conduct a study to better understand the nature of the threatening calamity.
  - B. Assess the existing and develop a comprehensive Disaster Management Risk Reduction Program based on studies.
  - C. Let people reclaim and re-establish their homes on their previous locations while encouraging them to build more sturdy homes.
  - D. Create city planning to totally relocate homes in hazard zones and enhance structural protection for the existing infrastructures
- 18) Maria, who lives in a city, goes for a daily morning walk to treat her asthma since according to her, morning air is a lot fresher. If you are Maria, will you also opt for the same practice?
- A. Yes, because mornings are colder preventing photochemical reaction from taking place.
  - B. No, because cities will always be contaminated by pollutants.

- C. Yes, because air pollutants have been circulated making mornings cleared of any contaminants.
  - D. No, because there might be pollutants trapped in the atmosphere in the morning.
- 19) In summer, you visited a cousin living near a coastal area. While enjoying the view of the water at night, you were refreshed by the cold breeze that has run passed you. What phenomenon could explain this experience?
- A. Sinking and rising of air
  - B. Rising and setting of the sun
  - C. Changing seasons
  - D. Warming of the planet
- 20) Most households in a local community use wood for cooking. You were tasked to convince the locals of the impact of burning fuel to the atmosphere's condition. You have to inform the locals about this in a manner they can comprehend. What is the correct manner of presenting the idea to the local community?
- A. Distribute leaflets detailing the different pollutants emitted in the atmosphere when burning wood.
  - B. Conduct a symposium explaining the damages of burning to their health and their environment.
  - C. Write a letter to the locals encouraging them to stop burning wood.
  - D. Present a case study about the harmful effects of burning wood.

## Lesson 1: THE PHILIPPINE ENVIRONMENT



### EXPLORE









Let's start the module by finding out how the Philippines is geographically located and the natural resources it bears. As you go through this lesson, keep on thinking about this question: **How does where we live influence the way we live? How does location determine the growth of a particular place?**

### ACTIVITY 1. It's More Fun in the Philippines



The Department of Tourism launched a jingle with the title "It's More Fun in the Philippines". This features the beautiful places and the celebrations around the Philippines that are worth visiting. We'll find out how much you know about the Philippines at this point in time before watching the video. Match the first column with the second column by drawing a line.

Play the video: <http://www.youtube.com/watch?v=FEE-PcNeLfo> (this presents Philippine tourism video)



As a Filipino, do you really believe that it's more fun here in the Philippines? Why? What places are often promoted to foreigners and investors interested in our place? What's present in those places that enticed them? How much do you know the places and the resources of our country? Let's find out more of your knowledge by answering the IRF Chart.

## ACTIVITY 2. Initial-Revised-Final



Using the IRF Guide, write your initial idea on the INITIAL row with regards to the question. You will be asked later to go back to this sheet and check for any difference in your answer as you go through the module.

**How does where we live influence the way we live?**

**Initial**

**Revised**

**Final**

### End of EXPLORE:



*You gave your initial ideas on the geographical setting of the Philippines, its topographical features and the atmospheric interactions affecting our country. You have also presented your ideas on the natural resources of our country on different places. Let's find out how others would answer the question and compare their ideas to our own. As you compare, you will also learn other concepts which will help you complete the required project. This project is about creating information dissemination in any media promoting the viability of a location for settlement and investment. We will start by doing the next activity*





## FIRM-UP


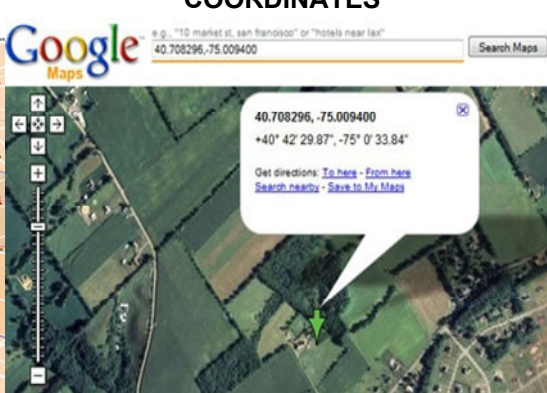


Your goal in this section is to learn and understand key concepts on locating places using a coordinate system and the geographical setting of the Philippines. You are also going to know the many natural resources that our country have and their impact to the Filipino people.

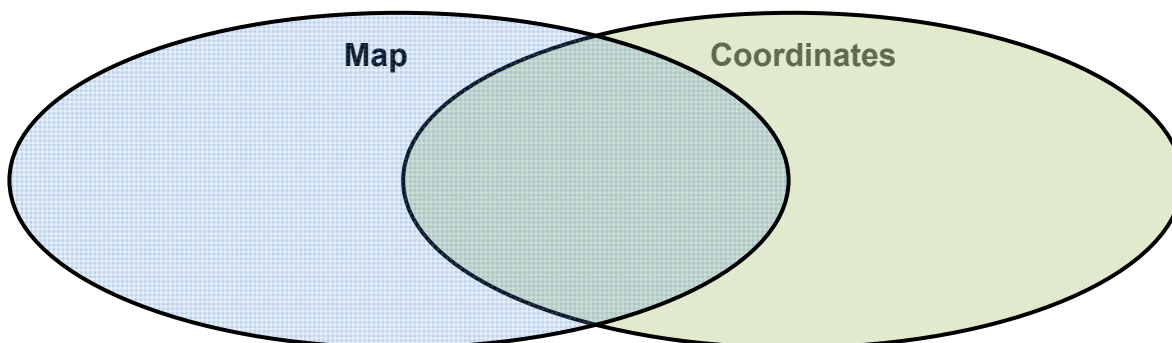
### ACTIVITY 3. Picture Analysis



Using the graphic organizer Venn diagram, compare and contrast the two methods of identifying the location of an object. Identify similarities and differences with which you are going to compare the illustrations. Click-on the following links to gain additional insights.

MAP	COORDINATES
 <p><a href="http://www.wikihow.com/Read-a-Map">http://www.wikihow.com/Read-a-Map</a> - (this presents the process in using a map)</p>	 <p><a href="http://www.maptools.com/tutorials/lat_lon">http://www.maptools.com/tutorials/lat_lon</a> - (this introduces coordinate system and its related concepts)</p>

### MODES OF LOCATING PLACES







How do you think each method works? How are they similar and different and in what aspects? What scientific processes are involved in each method? In what situations today does each method find its use?

#### ACTIVITY 4. The Coordinate System



Using the graphic organizer 'Sequence Chart', identify the sequence on how to locate a certain location with the use of coordinates. Click on the link below for information.

<http://geography.about.com/cs/latitudelongitude/a/latlong.htm> (this offers a reading on relevant concepts related to locating places using coordinates.)

#### Locating Places Using Coordinates



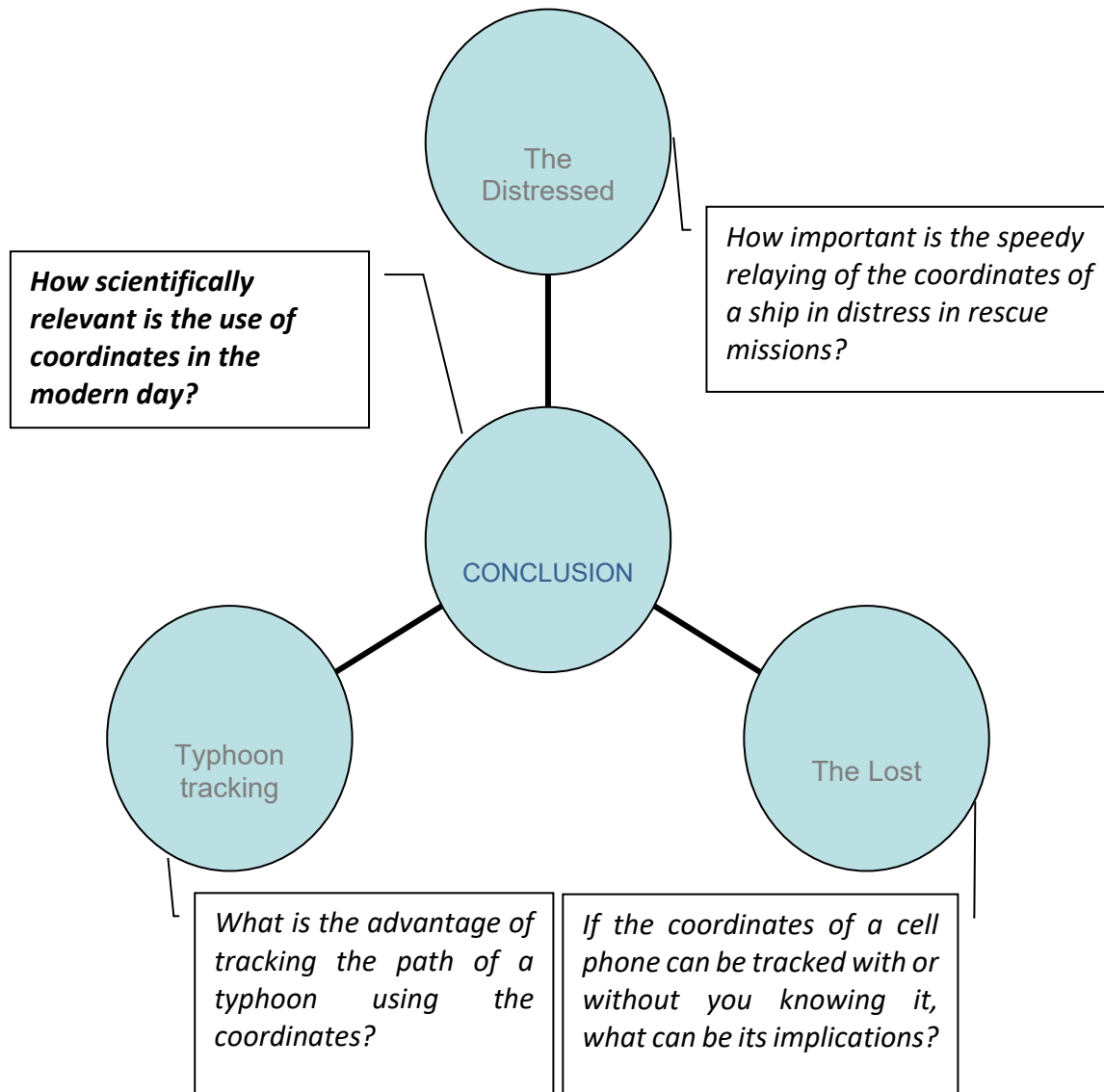


What concepts are necessary to be able to identify coordinates of a location? What are the processes involved in determining a place using a set of coordinates? How useful is this concepts and its applications?

### ACTIVITY 5. The Need for Coordinates



After learning the coordinate system, you are going to determine the relevance and importance of the use of coordinates in the present times. Click on the following sites to gain insights. Answer the follow-up questions for every link given. Place your generalization at the center of the graphic organizer.



[http://www.tutor2u.net/blog/images/uploads/temp\\_file\\_Capture11.PNG](http://www.tutor2u.net/blog/images/uploads/temp_file_Capture11.PNG)

(it shows a table of typhoon tracks from the time a typhoon develops till it dissipated)

[http://www.nytimes.com/2011/03/26/business/media/26privacy.html?\\_r=0](http://www.nytimes.com/2011/03/26/business/media/26privacy.html?_r=0)

(this is a reading article on how a man's location is tracked)

<http://www.uscg.mil/hq/cg5/cg534/MassRescueOps/MRO-GoodSamaritanAlaskaGuide.pdf>

(this presents a guide in responding a ship in distress)

## ACTIVITY 6. Coordinate Map Match Games

### DESCRIPTION:



Now that you have worked with coordinate system in finding locations, click on the following links of interactive games to assess your learning:

<http://www.kidsgeo.com/geography-games/latitude-longitude-map-game.php> (an online-interactive game of locating a place in an area using coordinates)

<http://www.purposegames.com/game/longitude-and-latitude-quiz> (an online interactive game of determining the place on earth given with coordinates)



How well do you apply your learning on coordinates in finding locations; developing, proficient, excellent? How will your self-rating determine the learning-interventions that will you initiate?

## ACTIVITY 7. Google Mapping the Philippines



Now that you know how to interpret the coordinates of a location, click on the link <http://ctrlq.org/maps/address/>. Navigate through the application and study the geographical setting of the Philippines. Use a map of a Philippines as an illustration and express your observation in a two-minute dialogue using [blabberize.com](http://blabberize.com).



Hi, I'm the Philippines....



How would you describe the land that comprise the country? What borders our country based on your observation? What are its neighboring landmasses and how distant are they? What countries could they be? What can be the general advantages and disadvantages of the Philippine geographical setting?

## ACTIVITY 8. The Philippine Archipelago Fun Trivia



With your stock knowledge about the geographical setting of the country and the previous activity, have fun taking this online interactive quiz, "Philippine Archipelago Fun Trivia". Click on this website and enjoy <http://www.funtrivia.com/html5/index.cfm?qid=143552> (*this is an interactive quiz on Philippine archipelago*)



How much have you learned about your country geographically? How does it feel to have known that much about your country? What feedback may the result of the trivia provide to yourself?

## ACTIVITY 9. The Philippine Resources



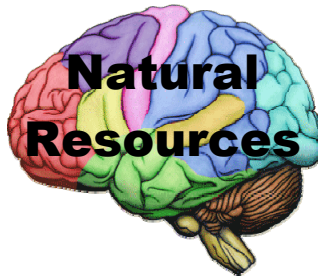
You already have familiarized yourself with the geographical setting of our country. The next activity will let you know the many natural resources of our country. Organize and summarize the information you will find in the number of sources you'll read. Using the template, write down the answers to the questions by going through the text on the various links provided. When done answering all the questions, write a summary for the information gathered. Follow the links below to complete the template.

SOURCES	QUESTIONS	ANSWERS
<a href="http://www.nscb.gov.ph/peenra/results/mineral/">http://www.nscb.gov.ph/peenra/results/mineral/</a>	Why are these listed minerals considered as a resource in comparison with other similarly abundant minerals. What are their possible uses? What are its possible impacts to the places that possesses them?	
<a href="http://en.worldstat.info/Africa/Philippines/Land">http://en.worldstat.info/Africa/Philippines/Land</a>	Do the lands in our country have similar use? What is most abundant use of the land in the Philippines? How are these affecting the lives of the Filipinos on this certain area?	
<a href="http://www.doe.gov.ph/fossil-fuels/coal">http://www.doe.gov.ph/fossil-fuels/coal</a>	In what parts of the country are coal and other fossil fuels found? What is the significance of these resources? How can the living conditions of the people dwelling on these locations be possibly affected?	
<b>SUMMARY:</b> How does where we live influence the way we live? How does location determine the growth of a particular place?		

## ACTIVITY 10. Natural Resources Mind-map



You have just learned some of the resources of the Philippine Archipelago. Are you confident now in determining the natural resources in your own community? The next activity will at least scientifically equip you in identifying natural resources and its potential. Using a mind-map, summarize the idea presented by the given link.  
[http://www.epa.gov/osw/education/quest/pdfs/unit1/chap1/u1\\_natresources.pdf](http://www.epa.gov/osw/education/quest/pdfs/unit1/chap1/u1_natresources.pdf)



Can you already determine potential resources in your community? Can you determine the extent of how long can these resources be utilized? What can be the possible outcome of the harvesting of these resources? Being scientifically aware of it, what can you possibly do about them?

### End of FIRM UP:



In this section, the discussion was about locating places with the use of coordinate systems, determining the geographical setting by which the Philippines is bounded and recognizing the earth resources that our country bears.

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 apply the learned concepts on coordinate system, the place's resources and its impact to the living condition of the people of the community. Let us then check our progress and be guided with the questions we reserve for this module.

1. ***How does where we live influence the way we live?***
2. ***How does location determine the growth of a particular place?***

### ACTIVITY 11. Initial-Revised-Final



After going through series of activities, visit the IRF Guide once again, write your revised idea on the REVISED row with regards to the question. Is there any difference between your recent answer and with that of your initial answers?

How does where we live influence the way we live?	
<b>Initial</b>	
<b>Revised</b>	
<b>Final</b>	



## ACTIVITY 12. You Are Where You Are (Scaffold 1)



Now that you have the idea of what are resources, how people may utilize them and what can be their possible impact to an area, you are going to study communities and their resources. Click on the links <http://www.youtube.com/watch?v=sRnsTxIjQRk>, <http://www.youtube.com/watch?v=SI0IO-fjXc4>, <http://www.youtube.com/watch?v=tEE8nR7tjRU> and watch the videos. Complete the graphic organizer Contrast-and-Compare afterwards.

QUESTIONS	Fishing Village	Farming Village	Mining Community
How will you describe the geographical feature of the area?		,	
What major resource is found in the area?			
Why is this resource a demand?			
What mostly are the means of living of the people in the area?			
How would you describe the economic condition of the community?			
<b>How does where we live determine the way we live?</b>			



How did the activity help you understand the relation between resources and of a place and the livelihood? Can you already determine what may be the fate of your community in the future? Can you be sure that what may the people enjoy now in their places may still be enjoyed by the next generation? What may be the course of action to this issue?

### ACTIVITY 13. Cause and Effect

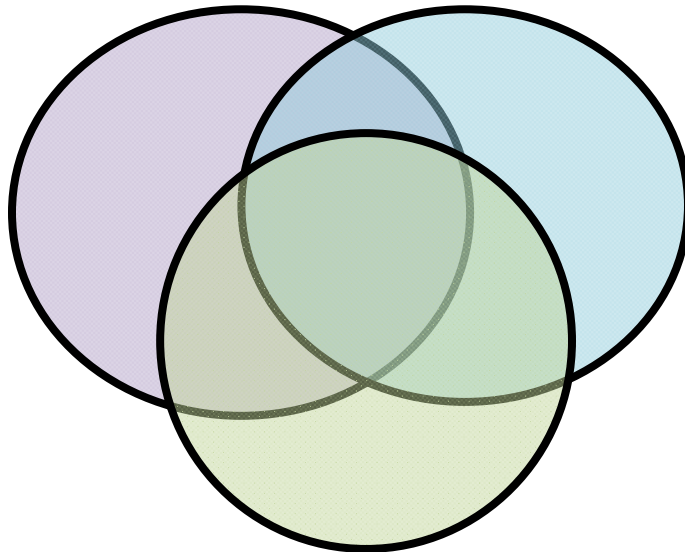


The previous activity led you to understand how people are affected with where they live and the resources they have. The next activity will let you understand the fate of communities with how people utilize resources. You will identify the different effects of resource utilization in various places in our country. Study the contents of the following given links. Complete the graphic organizer. Describe the nature of each situation in the individual circles. Identify what is common among overlapping circles and place your conclusion at the convergence of the three circles.

<http://lutopanmining.blogspot.com/> - copper mining effect of the area in Cebu

[http://www.iohsad.org/11/06/mining/mining-philippines-and-effects-occupational-health-and-safety-mine-workers\\*](http://www.iohsad.org/11/06/mining/mining-philippines-and-effects-occupational-health-and-safety-mine-workers*) - presents occupational hazards of mining

<http://www1.american.edu/ted/PHILWOOD.HTM> - presents impact of deforestation



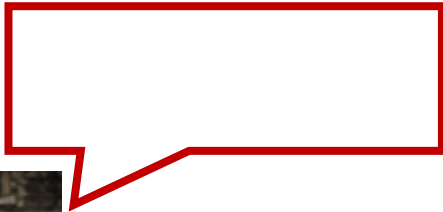
What are the fates of the different communities? How would the type of resource determine the future of the community? What are the considerations that local government units would look into in assuring longevity of the existence of the community?

## ACTIVITY 14. The Relocation Misconception



You were presented with activities in the past that aids you in determining the relation of the area, its resources and the people as well as the possible fate of an area with how people utilize its resources. Present the possible points-of-view of the following people with the given statement. Express your perceived thoughts using voki.com.

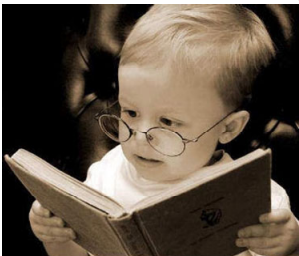
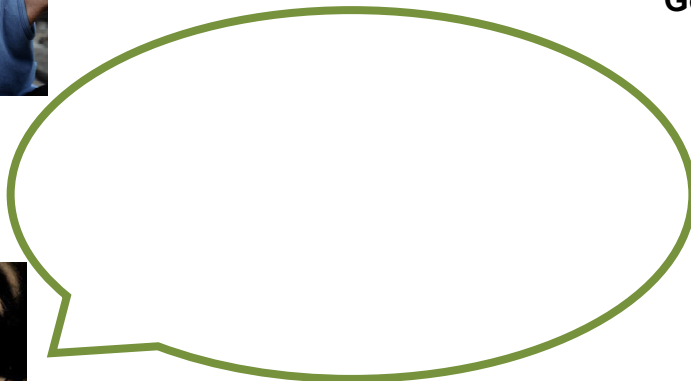
**“The government can easily relocate any displaced families as long as there is a safe and vacant location somewhere”**



**“The Settler”**



**“Government”**



**“Scientifically Aware: YOU”**



How did the activity help you determine what makes an area desirable for settlement? 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.

### 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

#### ACTIVITY 15. Initial-Revised-Final



After going through series of activities, visit the IRF Guide once again, write your final idea on the FINAL row with regards to the question. What can you say about the development of your answer? Can you see yourself developing strategic reasoning?

**How does where we live influence the way we live?**

**Initial**

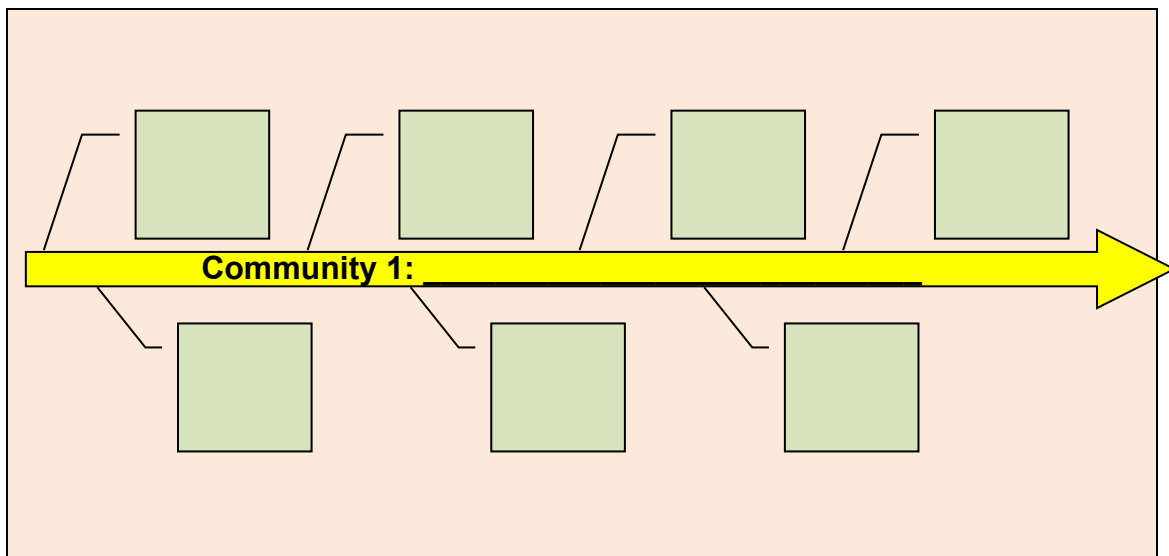
**Revised**

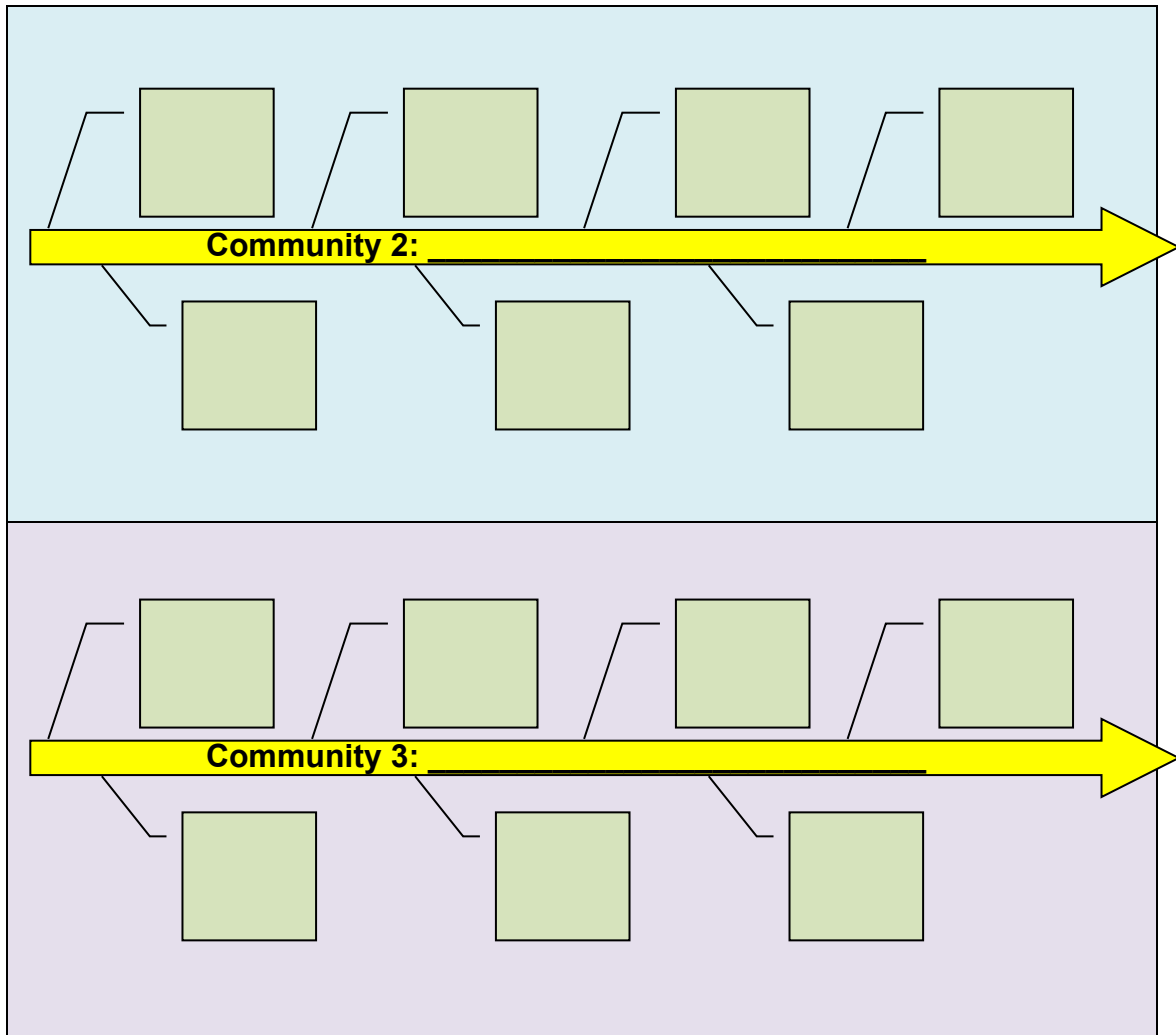
**Final**

## ACTIVITY 16. Comparative Study (Scaffold 2)



Now that you are well equipped with assessing the relationship between the resources, their location and the people in the community, you are going to conduct a case study on the scientific accounts of the development of your chosen communities. You are going to complete a CONTINUUM graphic organizer. You have to do community archive researches. Write on the boxes important scientific milestones in the history of the community. (e.g. discovery of the resource, rise and fall of the demand of the resource due to its use, economic and environmental impacts, population increase and decline until present situation)





**Generalization: From the researched three cases, generalize the effect of one's geographic location.**



When was the resource of the place discovered? What is the use of this resource? How long is this resource projected to last? How is this resource affecting the lives of the people in the community? What is its effect on the population growth of the community? What is the present impact of the resource utilization and recovery?

## ACTIVITY 17. Checklist



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. Check on the chart below the competencies that you confidently understand already. Go back to those past activities and work on those again until you will gain proficient understanding.

Competencies	Status	Depth
▪ demonstrates how places on Earth may be located using a coordinate system		
▪ relate the location of the Philippines with respect to the continents and oceans of the world		
▪ recognizes that soil, water, rocks, coal, and other fossil fuels are Earth material resources		
▪ describe ways of using Earth's resources sustainably		



In what competencies are you still having difficulty? What do you plan to do with those inefficiencies that you have realized?

### End of TRANSFER:



In this section, your task was to conduct a mini investigation on the growth of certain locations, the factors that dictates it and its impact to the community. You will be embarking on another lesson before you will finally conduct your final output. Enjoy learning further.



## Lesson 2: Interactions in the Atmosphere



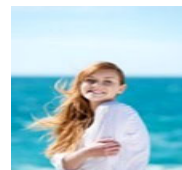
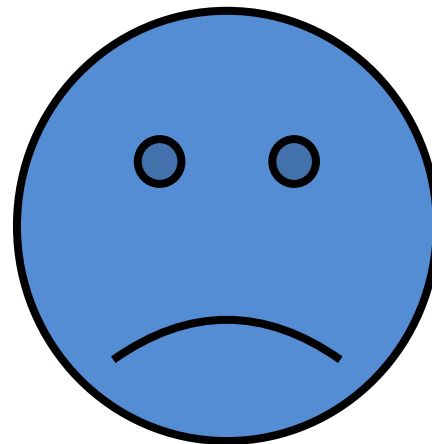
### EXPLORE



In the first lesson, you have learned how the geographical location and the resources determine the place's suitability for habitation, but a place can never be without its atmosphere, thus we use the same questions: **How does where we live influence the way we live? How does location determine the growth of a particular place?** Let these questions guide you through this lesson just as you were guided by them on the first lesson.

### ACTIVITY 1. Where Do I Belong?

Let's begin our journey of getting to know the atmosphere. Figure out whether the atmospheric phenomenon is desirable or not. We'll find out how much you know about the atmospheric activities at this point in time. Click the object, drag it and drop in the corresponding faces.





Based on the results, how much do you know about the occurrences in the atmosphere? Is your understanding enough to be able to proactively deal with atmospheric phenomenon?

## ACTIVITY 2. Anticipation-Reaction Guide



Let's find out some more by answering the Anticipation-Reaction Guide. Using the AR Guide, write agree or disagree for each statement given on 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 the module.

BEFORE Agree or Disagree		AFTER Agree or Disagree
	1. The layers of the atmosphere are arranged in the following order: mesosphere, troposphere, stratosphere, and thermosphere.	
	2. The temperature in each layer of the atmosphere increases as the layer progresses.	
	3. Clouds form in the troposphere.	
	4. Ozone layer is found in the mesosphere.	
	5. Convection accounts for the distribution of heat in the atmosphere.	
	6. Sea breeze forms when the warm air over the water is pushed by the cold air over the land.	
	7. Land and water heat and cool at the same time.	



How would you assess yourself in terms of understanding atmospheric phenomenon? How are these knowledge be applicable to day to day living?

**End of EXPLORE:**



You gave your initial ideas on the topic atmosphere. In the next section, we are going to know more about it as we go through a series of activities and some readings to gather information that might help you validate your answers on the ARG activity.



**FIRM-UP**



After giving your initial ideas on the topic atmosphere, let's find out how others would answer the question and compare their ideas to our own. As you compare, you will also learn other concepts which will help you complete the required project. This project is about creating information dissemination medium promoting the viability of a location for settlement and investment. We will start by doing the next activity.

**ACTIVITY 3. Video Presentation**



Watch the video,

<http://studyjams.scholastic.com/studyjams/jams/science/weather-and-climate/earths-atmosphere.htm>

Using the graphic organizer Comparison Notes, identify the characteristics of each layer of the atmosphere and cite evidences of their importance. In the horizontal heading, choose categories with which you are going to compare the different layers of the atmosphere.

### Comparison Notes

Category Layer of the Atmosphere				



What characteristics differentiates one layer of the atmosphere from the others? Are these characteristics giving any hint as to what possible atmospheric phenomenon may be occurring on them? Do you know how people may adapt with those phenomena?

### ACTIVITY 4. Getting to Know the Atmosphere



Organize and summarize the information you will find in the number of sources you'll read. Using the template, write down the answers to the questions by going through the text on the various links provided. When done answering all the questions, write a summary for the information gathered.

Follow the links below to complete the template.

[http://education.nationalgeographic.com/education/encyclopedia/atmosphere/?ar\\_a=1&ar\\_r=3#page=2](http://education.nationalgeographic.com/education/encyclopedia/atmosphere/?ar_a=1&ar_r=3#page=2). This contains discussion on the composition of the atmosphere as well as the various phenomena taking place in its different layers.

<http://www.enchantedlearning.com/subjects/astronomy/planets/earth/Atmosphere.shtml> This site describes the different layers of the atmosphere in terms of altitude, temperature and the likes.

QUESTIONS	SOURCES	ANSWERS
How are the different layers of the atmosphere classified?		
What characteristic/s identifies/identify one layer from another layer of the atmosphere?		
How do the characteristics of each layer influence the various activities possibly taking place in the atmosphere?		
What layer in the atmosphere will you be likely affected? Why? How?		
<b>SUMMARY</b>		



Are there similar atmospheric phenomenon happening to all the layers of the atmosphere? How would the presence of weather disturbances on particular layers affect the a place? What may be the cause for the variations of atmospheric phenomena in various layers

### ACTIVITY 5. Heat is On



Now that you know that there are different atmospheric activities that happen in the different layers in the atmosphere, let us probe deeper in one of the factors that may have caused it. The next activity will lead you to investigate how heat transfer plays role in atmospheric activities.

Complete the Fact/Opinion sheet and verify your opinion later by performing the suggested experiments.

FACT	OPINION
Heat Transfer in the Atmosphere	
Atmospheric Circulation	

### 5.1. Laboratory Activity

A. Heat Transfer

B. Atmospheric Circulation

#### 5.1.A. Heat Transfer

For the activity on heat transfer, follow this link

<http://www.education.com/science-fair/article/greenhouse-effect-heat-transfer-atmosphere/>. This link provides an experiment that will help you determine what affects the atmosphere's ability to trap energy.



Answer the guide questions that follow. Write your observations and responses in your journal notebook.

How do the temperature readings compare in the two set ups? How did the presence of the plastic wrap affect the temperature reading in the box? How does the activity explain thermal distribution in the atmosphere? Does the result of the activity confirm your opinion? Explain.

#### 5.1.B Atmospheric Circulation

For the test on atmospheric circulation, click on the link <http://www.education.com/science-fair/article/heat/>. The site will let you examine the cause of the difference in the surface temperature on land and water.

In your journal, write the observation/s you will gather in the conduct of the activity. Do not forget to answer the guide questions below.



Which substance was heated first? How will the activity explain local air movement? How will the difference in heating capacity explain global atmospheric circulation? Does the result of the activity confirm your opinion?

### ACTIVITY 6. Wind: Where Does it Come and Go?



After studying the model and demonstrations of the atmospheric circulation, summarize your understanding of the effects of temperature difference to air movement and on a global scale describe how inter-tropical convergence zone occur. You may use a chain of events graphic organizer for your summary.

To help you complete your chain of events worksheet, watch the video links  
[http://ph.video.search.yahoo.com/video/play;\\_ylt=A0S00xhTh6tQ0zsAACPeRwx.;\\_ylu=X3oDMTBrc3VyamVwBHNIYwNzcgRzbGsDdmkKBHZ0aWQD?p=global+circulation&vid=FB9D71C51D3AC62A3AADFB9D71C51D3AC62A3AAD&l=1%3A55&url=http%3A%2F%2Fts3.mm.bing.net%2Fth%3Fid%3DV.4871013416632390%26pid%3D15.1&rurl=http%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DDHrapzHPCSA&tit=global+circulation+%281-54%29&c=1&sigr=11a08t11c&fr=yfp-t-711](http://ph.video.search.yahoo.com/video/play;_ylt=A0S00xhTh6tQ0zsAACPeRwx.;_ylu=X3oDMTBrc3VyamVwBHNIYwNzcgRzbGsDdmkKBHZ0aWQD?p=global+circulation&vid=FB9D71C51D3AC62A3AADFB9D71C51D3AC62A3AAD&l=1%3A55&url=http%3A%2F%2Fts3.mm.bing.net%2Fth%3Fid%3DV.4871013416632390%26pid%3D15.1&rurl=http%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DDHrapzHPCSA&tit=global+circulation+%281-54%29&c=1&sigr=11a08t11c&fr=yfp-t-711)

-This site contains discussions about the effect of solar energy to global circulation. Now that you already know how to distinguish one layer of atmosphere from the other, let's delve in more deeply into each layer and find out how your knowledge about the characteristics of each layer might contribute to the understanding of atmospheric phenomenon happening on them.



Do you now realize the connection between heating of the sun, the rate by which temperature rises on different parts of the globe and the resulting convection currents? How are they connected with the weather phenomenon of various places? **How would that affect the lifestyle of the people living in a certain location? How would the atmospheric phenomena determine the desirability of a place?**

### ACTIVITY 7. Hot! Hot! Hot!



You were able to realize in the previous activity that different parts of the globe heat up differently. To better answer the questions asked in the previous activities, Read the following research/feature article and answer the following questions.



<b>The Potential Impacts of Climate Variability and Change on Temperature-Related Morbidity and Mortality in the United States</b> <a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240665/pdf/ehp109s-000185.pdf">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240665/pdf/ehp109s-000185.pdf</a>	
What role did the temperature play in the study?	
Why is the studied phenomenon affecting differently the determined states yet not much the tropics?	
How is the phenomenon affecting the desirability of those locations?	
<b>The Impact of Climate Change on Natural Disasters</b> <a href="http://earthobservatory.nasa.gov/Features/RisingCost/rising_cost5.php">http://earthobservatory.nasa.gov/Features/RisingCost/rising_cost5.php</a>	
What general trend of temperature is cited in the article?	
What are its projected effects?	
How may the phenomenon affect certain places?	
<b>How does where we live Influence the way we live?</b>	

## ACTIVITY 8. Heat and the CO<sub>2</sub>



Now that you know how solar heating propels atmospheric phenomenon which has many advantages and disadvantages, you are going to do some probing on a global heating that is perceived to be detrimental. Your next task is to look at the connection between carbon dioxide and the global heating phenomenon known as the greenhouse effect by watching the video link <http://www.youtube.com/watch?v=kwt51gvaJQ>. Share your new understanding to other people in a more exciting way! Make a flyer that will inform them of the significant connection between carbon dioxide and greenhouse effect. You may still follow the format that you used earlier. Include in your flyer the comprehensive answers to the following guide questions.

**What effect did carbon dioxide have on temperature? How does this effect relate to what happens in the atmosphere? What impact will this effect have on the atmosphere's condition?**

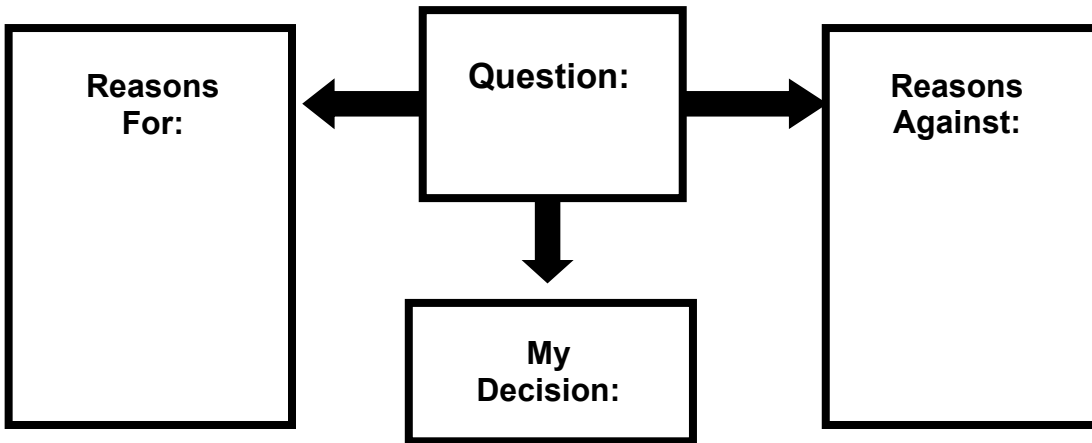
## ACTIVITY 9. A Walk to the City



You just have convinced yourself on the impact of carbon dioxide on temperature in the previous activity. But being convinced may not make sense not unless you are able to do something worthwhile with what you have learned. You are now ready to make use of your learning into good use on the next activity.

Make a list of the number of cars, jeeps, tricycle and even trucks you've seen on your way to school. On a Decision Making Chart, answer the question, "Does the volume of traffic affect the air quality in my local community?". Write your reasons for saying YES on the reasons for column, and the reasons for saying NO on the Reasons Against column. At the bottom of the chart, make a position by writing your decision on the same question. Now *that you've learned that atmosphere has the capacity to trap energy from the sun, examine this time the effects of this energy to different atmospheric conditions by performing the laboratory activity about atmospheric circulation.*

### Decision Making Chart



### End of FIRM UP:



In this section, the discussion was about the characteristics of the layers of the atmosphere and the effects of temperature difference in atmospheric circulation.

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 the characteristics of the atmosphere, let's go deeper by examining how these phenomena affect humans in return. In this section, the discussion was about locating places with the use of coordinate systems, determining the geographical setting by which the Philippines is bounded and recognizing the earth *resources that our country bears*.

*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



How has the atmosphere affected people? How do man's activities relate with the Earth's atmosphere? What activities do humans carry out with reference to the condition of the atmosphere? **How does where we live influence the way we can live more? How does location determine the growth of a particular place?** Find out the answers to these questions from the activities below.

### ACTIVITY 10. The Land



After learning the concepts on what affects atmospheric phenomena, the people's contribution on it and its possible impact on communities, you are now ready for the next activity. Click on the given links and analyze each situation. Answer the processing questions and later on, form a generalization.

<a href="http://www.youtube.com/results?search_query=yolanda+storm+surge">http://www.youtube.com/results?search_query=yolanda+storm+surge</a> -this is a video that shows a rare tidal surge in Tacloban brought about by the super typhoon Yolanda in 2013	<a href="http://www.sunstar.com.ph/cagayan-de-oro/local-news/2014/01/24/moreno-sendong-tragedies-thing-past-324801">http://www.sunstar.com.ph/cagayan-de-oro/local-news/2014/01/24/moreno-sendong-tragedies-thing-past-324801</a> -this is shows a news of flash flood in Cagayan.	<a href="http://www.sunstar.com.ph/davao/business/2014/01/24/organic-farming-benefits-lumads-324954">http://www.sunstar.com.ph/davao/business/2014/01/24/organic-farming-benefits-lumads-324954</a> -this article presents the progressive banana plantations in Mindanao
Why did the typhoon surge happen?  How did it affect Tacloban?  Why is it happening in the recent years?  Will this tidal surge still happen in the future? Explain.	What caused the flash flood?  Were there any predictions in the past that floods will happen?  How did it affect the communities of this place?  How is Cagayan viewed in terms of conduciveness for habitation and commerce?	What is the produce of the place?  What can be the weather demands of these crops?  How will this benefit the community?  How long will this situation last?

How do people view the place in terms of likelihood of habitation and commerce?		
<b>Conclusion:</b> <b>How does where we live influence the way we live?</b>		

## ACTIVITY 11. Debate

Using the data you've gathered from the series of activities conducted on the possible effect of atmospheric phenomena to certain locations, stress a position by debating on whether **LOCATION DETERMINES THE GROWTH OF A PARTICULAR PLACE**. Make sure to support your opinion with the needed information.

### End of DEEPEN:



In this section, the discussion was about the implications of weather phenomenon on various places.

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 seen the possible implications of the damage we create to atmosphere and the impact of its changes on us, let us look closer at how much of the changes taking place in the atmosphere can determine the viability of a place for settlement. As you progress to the activities, remind yourself to look back at the questions: **How does where we live influence the way we can live more? How does location determine the growth of a particular place?**

## ACTIVITY 12. News-on-the Go! (Scaffold #3)



As a member of EDGE, a non-profit organization, you were tasked to help in the campaign of promoting your own school. Create a flyer indicating the perks of enrolling in your school. Refer to the previous activities in making the flyer. You may develop your flyer based on the list of questions below:

- Why must your school be preferred in terms of its location?
- What resources can your school offer?
- How is your school ready to brace varying weather and atmospheric phenomena?

## ACTIVITY 13. Dialog Box Completion



Having established your position on the implication/s of man to his environment, complete a dialog box template filling in the box your position/argument on the situation given. Use voki.com

*After the catastrophic typhoon that hits Central Visayas, many citizens begin to be concerned with their way of living with where they are situated. In response to these issues about the environment, how would you feel if you are a/an;*

***Disaster and Risk Management Personnel***  
***Survivor***  
***Entrepreneur***  
***Barangay Official***

## ACTIVITY 14. Reflection Log



Write your reflection/s about the DIALOG-BOX activity in your blog. Use blogger.com. Express your thoughts on the questions below:



Which role did you feel most connected to? Will scientific knowledge help ensure safe and productive interaction between people and its environment? Did the activity help you better understand the interaction between the people and the community?

### ACTIVITY 15. Performance Task



#### TASK

Your province is to celebrate next month its 50<sup>th</sup> charter day. The big event is projected to draw a lot of people like law makers, businessmen, tourists and all types of citizens. As the adviser to the mayor of one of the towns in the province, you are requested to draft a promotional poster/video/PowerPoint Presentation assessing the viability of your town in terms of its resources and weather conditions, basis for living and investment suitability. This is to be presented to the governor for 5 minutes during the provincial meeting. The quality of your material and presentation will be assessed by the governor in terms of comprehensiveness, clarity and organization, persuasiveness and effective use of visual aids.

Below is the rubric that will be used to assess your work. Please be guided accordingly.

#### RUBRIC: Promotional Presentation

CRITERIA	EXEMPLARY (4)	SATISFACTORY (3)	DEVELOPING (2)	NEEDS IMPROVEMENT (1)
<b>CONTENT</b>	Presents comprehensive scientific reasoning with detailed elaboration of the pros and cons.	Presents a good number of scientific reasons reasoning with sufficient elaboration of pros and cons.	Presents insufficient and inconsistent scientific evidences in some parts with little elaboration of pros and cons	Weak scientific reasoning was presented.
<b>CLARITY/ ORGANIZATION</b>	A well thought out order of ideas is very apparent. More than enough details are used to build up	Order of ideas is apparent. Sufficient details are geared to the central idea.	Order of ideas is confusing in some parts less apparent. Some details are not specific to one central idea.	Order of ideas is not clear. No supporting details were given.

	concepts. Order of ideas is apparent and has an interesting progression.			
<b>PERSUA-SIVENESS</b>	Voice projection and confidence are evident in posture and eye contact with audience	Confidence is adequate. Voice projection is loud and understandable enough.	Lacks confidence. Some error and voice projection is to some extent inaudible.	Delivery is almost incomprehensible.
<b>USE OF VISUAL AIDS</b>	All important data are collected and are presented and organized in very readable and helpful tables/charts/graphs.	There are a number of data collected, presented and organized in tables/charts/graphs that are adequately attractive manner.	The use of visual aids did not help much the presentation. These were distracting in several parts.	No data is shown to help support the presentation.



*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. Right your answers on the AFTER column.*

## ACTIVITY 16. ANTICIPATION-REACTION GUIDE



Using the AR Guide, write agree or disagree for each statement given on 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 the module.



BEFORE Agree or Disagree		AFTER Agree or Disagree
	1. The layers of the atmosphere are arranged in the following order: mesosphere, troposphere, stratosphere, and thermosphere.	
	2. The temperature in each layer of the atmosphere increases as the layer progresses.	
	3. Clouds form in the troposphere.	
	4. Ozone layer is found in the mesosphere.	
	5. Convection accounts for the distribution of heat in the atmosphere.	
	6. Atmospheric temperature drops in mid-day due to an outgoing infrared radiation.	
	7. Sea breeze forms when the warm air over the water is pushed by the cold air over the land.	
	8. Breeze balances the distribution of heat in the atmosphere.	
	9. Land and water heat and cool at the same time.	
	10. Burning releases methane in the atmosphere.	

### End of TRANSFER:



Now that you've completed the performance task, take time to recall the entire experience and write a brief reflection by responding to the series of prompts provided in the table.

PROMPT	RESPONSE
What skills did you acquire in the completion of the performance task?	
What did you find the most challenging part of the task?	
What did you learn about your own learning throughout completing this task? Specifically, how will you apply that knowledge in the future?	



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

### POST-ASSESSMENT:



It's now time to evaluate your learning. Click on the letter of the answer that you think best answers the question. Your score will only appear after you answer all items. If you do well, you may move on to the next module. If your score is not at the expected level, you have to go back and take the module again.

- 1) Which body of water lies on the eastern side of the country where most typhoons form:
  - A. Sulu Sea
  - B. Celebes Sea
  - C. Pacific Ocean
  - D. South China Sea
- 2) Which of the following does not refer to the Philippines geographically?
  - A. belongs to the Pacific Ring of Fire
  - B. gateway to West Asia
  - C. typhoon prone country
  - D. Asia's rising tiger

1.
- 3) Edwin is having a world tour. He posted on his Twitter account the message "I finally visited this place: (Latitude 51.18; Longitude -1.83)". What could be the place and the famous landmark he visited? Click this site to help you arrive at the answer: <http://ctrlq.org/maps/address/>
  - A. Lady Liberty
  - B. Eiffel Tower
  - C. Great Pyramid of Giza Egypt
  - D. Stonehenge
- 4) Jean plans to have a cruise. In terms of proximity to the country, what cruise can be the most practical to have?
  - A. American Cruise
  - B. Australian Cruise

- C. Asian Cruise
  - D. European Cruise
- 5) What may be brought about by the archipelago nature of Philippine country?
- A. difficulty in reaching other places due to fragmentation of land
  - B. surrounding waters offers rich fishing ground
  - C. long shoreline offers diverse marine ecosystem
  - D. all of the above
- 6) Many metal products and by-products we use everyday are derived from metal containing rocks called
- A. magma.
  - B. lava.
  - C. oil.
  - D. ore.
- 7) Why is it that the only means by which the energy of the sun can reach the earth is through radiation?
- A. The source of the energy, the sun, is emitting radiant energy.
  - B. Only radiation does not need any medium for heat energy to transfer.
  - C. Earth is too far from the sun for convection and conduction to be possible.
  - D. The fastest mode of heat transfer is through radiation.
- 8) What is the main reason for the heating of the troposphere?
- A. radiation
  - B. convection
  - C. conduction
  - D. advection
- 9) How is heat gained in the troposphere transferred?
- A. radiation
  - B. convection
  - C. conduction
  - D. advection
- 10) What accounts for the rising and sinking of air?
- A. uneven heating on the earth's surface
  - B. rotation of the Earth on its axis
  - C. difference in the pressure at atmosphere's layers
  - D. presence of land and water forms on earth
- 11) Why do monsoons happen?

- A. Because jet streams strengthen in the summer
  - B. Because polar easterlies bring contrasting air to the tropics
  - C. Because oceans have large, seasonal temperature changes
  - D. Because continents heat and cool differently than oceans
- 12) Many of the great civilizations in the history have sprung along rivers and deltas. This is true with many places in the Philippines like Cagayan de Oro and Butuan. Here are some observations and statements about these places.
- Agriculture and aquaculture are mostly the livelihood of people living along rivers and deltas.
  - “Seasonal floods bring fortune to the community alongside rivers”
- Which can be the best inference we can derive from these observations?
- A. A river system with water all year round acts as cooling agents for crops alongside the rivers and water organisms to grow well.
  - B. Where there is water, plants and animals will surely be thriving healthily.
  - C. River systems and deltas are but waterways for easier transport of agricultural goods. Fish are just but what is expected of rivers.
  - D. River banks and deltas are fertile land with rich nutrients supplied by occasional flooding.
- 13) How does an increase in the use of fossil fuels contribute to a global rise in temperature?
- A. It increases atmosphere’s ability to absorb energy from the sun.
  - B. It increases levels of carbon dioxide.
  - C. It decreases nitrogen levels in the atmosphere.
  - D. It decreases atmosphere’s ability to radiate sun’s energy.
- 14) An increase in greenhouse gases has been linked to global rise in temperature. Which of these activities contribute to high concentration of greenhouse gases in the atmosphere?
- A. Storage of agricultural animal manure in tanks or pits.
  - B. Use of Styrofoam products.
  - C. Use of aerosol sprays.
  - D. Abundance of mining activities.
- 15) Why would you likely feel a cold brush of air on mountaintops?
- E. Less heat is radiated from the surface to regions at higher altitude.
  - F. Sky gets nearer at higher altitude thereby limiting entry of sun’s radiation.
  - G. Circulation of air brings cold air on.
  - H. Insufficient data to explain the experience.

16) Below are the illustrations of what happened in different parts of the Philippines in a particular season of the year. What weather is characterized by the illustrations below?



- A. Amihan, moderate temperatures, little or no rainfall, and a prevailing wind from the east.
  - B. Amihan, hot and humid weather, frequent heavy rainfall, and a prevailing wind from the west
  - C. Habagat, moderate temperatures, little or no rainfall, and a prevailing wind from the east.
  - D. Habagat, hot and humid weather, frequent heavy rainfall, and a prevailing wind from the west
- 17) The Philippines has been ranked as an investment grade country. A multinational agricultural firm will primarily consider in putting investment in a place in our country if
- A. there will be a lot of people in the place that will buy the product.
  - B. the resources of the place meets the demand of the product and with minimal possibility of loss of investment due to natural disasters.
  - C. the place will be providing very accessible routes to many of the possible markets
  - D. they just feel investing anytime and anywhere as long as there is money.
- 18) You have invited via Facebook your long-time friend Alexis, a resident of Michigan, to visit your place. She is very excited yet very apprehensive at the same time having heard the news that the Philippines ranks # 3 as the most risky country to live on earth in terms of natural disasters. With that

information, she's having in mind that **there is no place in our country that is considerably safe**. What can be the best strategy to convince her?

- A. Tell her that with the faith of the Filipino people, she will not be harmed.
- B. Assure her that your house is concrete and is very strong. Tell her that your family is really safety conscious.
- C. Send her links and data regarding hazard assessment, weather stability forecast and records of past calamities to hit your place.
- D. Let her decide by her own, you have invited her anyway.

19) When you plan to establish your own home in the future, which action is the most scientifically sound ?

- A. Establish your home where most people live. The number is an assurance of safety.
- B. Build your home wherever you like as there is no 100% safe home. Just make sure you don't use sub-standard materials in the house construction.
- C. Live the decision to home developers. Their construction clearances to construct are always scientifically guaranteed. So any house in a subdivision wherever it is located is safe.
- D. Make a comparative research of geographical and topographical risks as well as natural calamity history of your prospect location before deciding to build your home.

20) You happen to pay a visit to a relative in the province. You have observed that living practices are simple. But the practice of burning their garbage to keep them from filling-up caught your attention. What can be your best mode of action?

- A. Never mind at all. Just respect their way of life as you are just a visitor of the place.
- B. Post- a "No Burning of Garbage" sign in visible places of the barangay.
- C. Offer to conduct a symposium explaining the impacts/damages of burning garbage to the environment.
- D. Ask the barangay captain to establish a land-fill.

**GLOSSARY OF TERMS USED IN THIS LESSON:****Advection**

Advection involves the transfer of **heat energy** by means of horizontal mass motions through a medium.

**Aerosol**

a suspension of particles, other than water or ice, in the atmosphere and ranging in size from approximately five nanometres to larger than ten microns in radius; may be either natural or caused by human activity and most of the latter are usually considered to be pollutants.

**Air Pollutants**

Substances which concentrations are high enough to be hazardous to humans, other animals, vegetation, or materials.

**Atmospheric inversion**

a condition occurring when a cool layer of air gets trapped below a layer of warm air and is unable to rise. This 'ceiling' leads to a build up of polluted air close to the ground and prevents vertical mixing and dispersion of smoke and other air pollutants.

**Coordinate System**

A system of representing points in a space of given dimensions by coordinates, such as the Cartesian coordinate system or the system of celestial longitude and latitude.

**Conduction**

The process by which heat energy is transferred directly from a warmer to a cooler substance, by molecular movement, e.g. from a warm ground surface to cooler air above it.

**Convection**

Heat transfer in which mass is exchanged. A net movement of mass may occur, but more commonly parcels with different energy amounts change places, so that energy is exchanged without a net movement in mass.

**Deforestation**

The change of forested lands to non-forest uses. This is often cited as one of the major causes of the enhanced greenhouse effect for two reasons: 1) trees that are burned or decompose release carbon dioxide; and, 2) trees that are cut no longer remove carbon dioxide from the atmosphere.

**Exosphere**

Region of the atmosphere beyond 400 km. that fades into interplanetary space.

**Fossil Fuel**



A general term for a fuel that is formed in the Earth from plant or animal remains, including coal, oil, natural gas, and tar sands.

**Global warming**

an increase in the earth's average atmospheric temperature that causes corresponding changes in climate and that may result from the greenhouse effect.

**Greenhouse effect**

a term used to describe the role of atmospheric trace gases - water vapor, carbon dioxide, methane, nitrous oxide, ozone, in keeping the earth's surface warmer than it would be otherwise;

**Greenhouse gas**

gas that absorbs infrared (thermal) radiation due to its chemical structure. Greenhouse gases absorb Earth's thermal energy as it radiates from the ground, through the atmosphere, out towards space. Examples of greenhouse gases include carbon dioxide, methane, and water vapor.

**Longitude**

The distance in degrees east or west of the prime meridian at 0° measured by the angle between the plane of the prime meridian and that of the meridian through the point in question, or by the corresponding time difference

**Latitude**

The angular distance north or south of the earth's equator, measured in degrees along a meridian, as on a map or globe.

**Map**

A representation, usually on a plane surface, of a region of the earth or heavens.

**Globe**

A sphere on which a map of the world or the heavens is drawn or represented

**Typhoon**

A violent tropical storm or cyclone, esp in the China seas and West Pacific

**Natural Resources**

The natural wealth of a country, consisting of land, forests, mineral deposits, water, etc.

**Mesosphere**

Region of the atmosphere, between approximately 50 to 100 km, in which temperature decreases with altitude

**Ozone layer**

a region in the stratosphere where there is ozone.



**Ozone depletion**

the process whereby the natural equilibrium between chemical reactions forming and destroying stratospheric ozone is disturbed by the release of manufactured chemicals.

**Photochemical smog**

air pollution caused by chemical reactions among various substances and pollutants in the atmosphere in the presence of sunlight; ozone is a major constituent.

**Radiation**

The transfer of energy (including heat and light) by electromagnetic waves of different wavelengths. Radiation is able to pass through gases, liquids, and solids or through a vacuum. Solar radiation is electromagnetic radiation emitted by the sun mainly as visible light, ultraviolet and infrared rays.

**Thermosphere**

Region of the atmosphere in which temperature increases with altitude. Located at approximately 100 to 400 km.

**Troposphere**

Lowest region of the atmosphere, defined by a steady decrease in temperature with altitude. Extends to approximately 15 km above Earth's surface.

**Stratosphere**

Portion of the atmosphere between the tropopause, at approximately 8 to 15 km, and 50 km in altitude, depending upon latitude, season, and weather.

**REFERENCES AND WEBSITE LINKS USED IN THIS LESSON:**

<http://www.youtube.com/watch?v=FEE-PcNeLfo> – Its more fun in the Philippines video showing the country's rich natural resources.

<http://geography.about.com/cs/latitudelongitude/a/latlong.htm> - this offers a text on coordinate systems and the pertinent concepts such as latitude and longitude.

<http://www.kidsgeo.com/geography-games/latitude-longitude-map-game.php> - an interactive game for kids with the objective of finding a location in a community given two coordinate values

<http://www.purposegames.com/game/longitude-and-latitude-quiz> - an interactive game of identifying a location in a map with a given longitude and latitude values

[http://www.google.com.ph/imgres?imgurl=http://wikitravel.org/upload/shared/thumbnail/e4/Intramuros\\_map\\_captioned.png/400px-](http://www.google.com.ph/imgres?imgurl=http://wikitravel.org/upload/shared/thumbnail/e4/Intramuros_map_captioned.png/400px-) intramuros map

<http://geography.about.com/cs/latitudelongitude/a/latlong.htm> - longitude and latitude reading material

[http://www.xn----9hciecaaawbbp1b1cd.com/image/users/155630/ftp/my\\_files](http://www.xn----9hciecaaawbbp1b1cd.com/image/users/155630/ftp/my_files) - map of philippine airlines international flights

[http://www.gglc.ph/gglc\\_whyphil.php#strategic-location](http://www.gglc.ph/gglc_whyphil.php#strategic-location) – information of airline destination's travel time

<http://focusweb.org/node/1271#sthash.y1BIBEbK.dpuf> - a view of why Americans are after the Philippines strategic location

[http://www.goesr.gov/users/comet/tropical/textbook\\_2nd\\_edition/media/graphics/2004\\_NPacif\\_tracks.jpg](http://www.goesr.gov/users/comet/tropical/textbook_2nd_edition/media/graphics/2004_NPacif_tracks.jpg) - illustration showing typhoon tracks in the west pacific in the year 2004

[http://en.wikipedia.org/wiki/Typhoons\\_in\\_the\\_Philippines](http://en.wikipedia.org/wiki/Typhoons_in_the_Philippines) - information of the Philippines most destructive typhoons in the past years.

[http://www.mindoro.com/i/maps/Ring-of-fire\\_280405.gif](http://www.mindoro.com/i/maps/Ring-of-fire_280405.gif) - illustration presenting the coverage of Pacific Ring of Fire

<http://global.britannica.com/EBchecked/topic/118426/Ring-of-Fire>  
<http://www.sott.net/article/225907-Major-Ring-of-Fire-Events-Yet-To-Come> - reading materials offering information about the ring of fire and the hazards associated with it

[http://images.gmanews.tv/v3/webpics/v3/2013/04/2013\\_04\\_01\\_11\\_00\\_39.jpg](http://images.gmanews.tv/v3/webpics/v3/2013/04/2013_04_01_11_00_39.jpg) - illustration depicting a fish market

<http://cpscecotours.blogspot.com/2006/08/marine-biodiversity.html> - text describing the Philippines as having the richest marine ecosystem in the world

<http://library.wrdsb.ca/files/2010/03/ProsConsExample1.jpg> pros and cons graphic organizer

<http://www.gdc.govt.nz/assets/Files/EnvHealth/Education/Everything-comes-from-earth.pdf> - text on tracing the origin of different resources

<http://www.youtube.com/watch?v=idc7mZ6naI0> – video presentation on natural resources, their use and conservation

<http://www.gdc.govt.nz/assets/Files/EnvHealth/Education/Everything-comes-from-earth.pdf> - text presenting classification of resources

<http://www.youtube.com/watch?v=ncExXQitWLI> – video on resource conservation

<http://www.epa.gov/recyclecity/mainmap.htm> - decision making game on community resource management and conservation

[http://hdn.org.ph/wp-content/uploads/DP\\_12\\_Tongson.pdf](http://hdn.org.ph/wp-content/uploads/DP_12_Tongson.pdf) - case study on watershed management and conservation in Sta. Rosa Philippines

[http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/?cid=nrcs143\\_026849](http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/?cid=nrcs143_026849), - case studies of different United States conservation practices.

[http://education.nationalgeographic.com/education/encyclopedia/atmosphere/?ar\\_a=1&ar\\_r=3#page=2](http://education.nationalgeographic.com/education/encyclopedia/atmosphere/?ar_a=1&ar_r=3#page=2) –(reader) contains discussion on the composition of the atmosphere as well as the various phenomena taking place in its different layers

<http://greenliving.nationalgeographic.com/car-pollution-affect-environment-ozone-layer-20133.html> -(reader) article on how car pollute the environment and the ozone layer.

[http://weather.about.com/gi/o.htm?zi=1/XJ&zTi=1&sdn=weather&cdn=education&tm=67&f=10&su=p284.13.342.ip\\_&tt=3&bt=0&bts=1&zu=http%3A//earthguide.ucsd.edu/earthguide/diagrams/energybalance/index.html-animation](http://weather.about.com/gi/o.htm?zi=1/XJ&zTi=1&sdn=weather&cdn=education&tm=67&f=10&su=p284.13.342.ip_&tt=3&bt=0&bts=1&zu=http%3A//earthguide.ucsd.edu/earthguide/diagrams/energybalance/index.html-animation) about global energy balance

[http://weather.about.com/gi/o.htm?zi=1/XJ&zTi=1&sdn=weather&cdn=education&tm=34&f=10&su=p284.13.342.ip\\_&tt=3&bt=0&bts=1&zu=http%3A//earthguide.ucsd.edu/earthguide/diagrams/greenhouse/index.html-simulation](http://weather.about.com/gi/o.htm?zi=1/XJ&zTi=1&sdn=weather&cdn=education&tm=34&f=10&su=p284.13.342.ip_&tt=3&bt=0&bts=1&zu=http%3A//earthguide.ucsd.edu/earthguide/diagrams/greenhouse/index.html-simulation) of global warming and greenhouse effect

[http://weather.about.com/gi/o.htm?zi=1/XJ&zTi=1&sdn=weather&cdn=education&tm=226&f=10&su=p284.13.342.ip\\_&tt=3&bt=0&bts=1&zu=http%3A//www.classzone.com/books/earth\\_science/terc/content/visualizations/es1903/es1903page01.cfm%3Fchapter\\_no%3Dvisualization](http://weather.about.com/gi/o.htm?zi=1/XJ&zTi=1&sdn=weather&cdn=education&tm=226&f=10&su=p284.13.342.ip_&tt=3&bt=0&bts=1&zu=http%3A//www.classzone.com/books/earth_science/terc/content/visualizations/es1903/es1903page01.cfm%3Fchapter_no%3Dvisualization) – land and sea breeze animation

<http://www.epa.gov/climatechange/kids/scientists/proof.html> - shows data on the current CO2 in the atmosphere

<http://epa.gov/climatechange/kids/basics/today/greenhouse-effect.html-with> video on global warming(learn the basics-today's climate change-greenhouse effect)

<http://www.weatherwizkids.com/weather-wind.htm>

<http://dsc.discovery.com/convergence/everestbeyond/altitude/altitude.html>

<http://telstar.ote.cmu.edu/enviro/m3/s2/04solarad.shtml>- article on global warming and ozone depletion

<http://www.extension.iastate.edu/agdm/articles/others/TakApr08.html>- shows how agricultural processes contribute to increasing GHG

## 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.

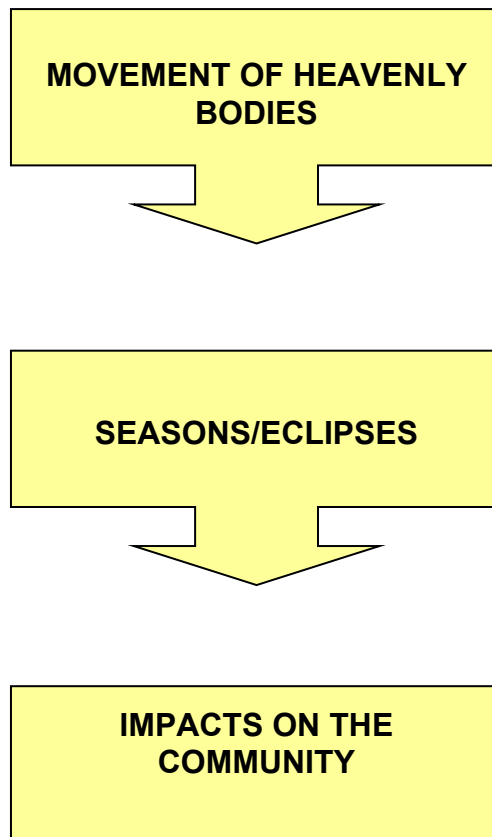
### ☒ LESSON AND COVERAGE:

In this lesson, you will learn the following:

<b>Lesson 3</b>	<p>using models, relate:</p> <ul style="list-style-type: none"> <li>the tilt of the Earth to the length of daytime.</li> <li>the length of daytime to the amount of energy received.</li> <li>the position of the Earth in its orbit to the height of the Sun in the sky.</li> <li>the height of the Sun in the sky to the amount of energy received.</li> <li>the latitude of an area to the amount of energy the area receives.</li> </ul> <p>2.</p> <p>* determine the implications of the available solar energy in a given season.</p> <p>show what causes change of the seasons in the Philippines using models.</p>
-----------------	--

	<p>* propose activities appropriate for the season.</p> <p>explain how solar and lunar eclipses occur.</p> <p>collect, record, and report data on the beliefs and practices of the community in relation to eclipses.</p> <p>* clarify misconceptions on seasons and eclipses.</p> <p>3.</p>
--	--

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:

10. Answer the pre-test and take note of the unfamiliar concepts.
11. Read thoroughly the given reading materials and make summaries.
12. Study any given model and make a comprehensive analysis.

13. Comprehend well the guide questions and follow-up questions and let them be your guide for understanding.
14. Answer every question exhaustively.
15. Browse sites and read articles, play interactive games, watch videos and etc. for concept development and for assessment.
16. Take the post-test to measure how much you have learned.
17. Ask, post questions for clarifications in any case you have concerns regarding the lesson.
18. Cover all the activities on their respective times of completion.
19. Have fun learning!

### **PRE-ASSESSMENT:**

---



*Let's find out how much you already know about this module. Click on the letter that you think best answers the question. Please answer all items. After taking this short test, you will see your score. 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.

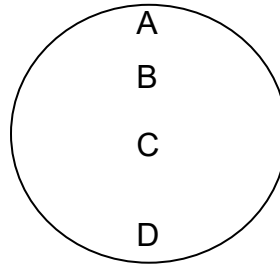


- C. The outdoor clothing is following designer's trends, but is primarily dictated by the temperature brought about by resulting temperature, which, in turn, is brought about by the intensity of solar radiation and the length of the day.
- D. The choice of outdoor clothing has been carried through generations 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 of 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 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 drag and drop the things appropriate for Juan's vacation inside the luggage. Click **SAVE** and **SUBMIT** once you are done.





*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 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. Click SAVE once you're done.

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. Click SAVE once you're done.

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 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 clicking 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. Drag and drop the happy face to the circle where you agree on the given statement/illustration otherwise drop the sad face. Click the ANSWER button to verify score and read feedbacks.



AGREE



DISAGREE

The earth rotates.


The earth exactly has a vertical axis of rotation.

The earth's axis of rotation is changing as it revolves around the sun.


The sun revolves around the earth.




### ANSWER KEY




The earth rotates on its axis. One rotation is equivalent to 24 hours.




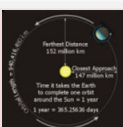


The earth has a tilted axis of rotation. The tilt is measured at  $23\frac{1}{2}$  degrees from the vertical.




The earth's axis of rotation is always fixed but as earth revolves around the sun, its orientation changes.





The earth revolves around the sun. One revolution is equivalent  $365\frac{1}{4}$  or one year.





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 as a learner	

#### ACTIVITY 4. 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.

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

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

Click <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.

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

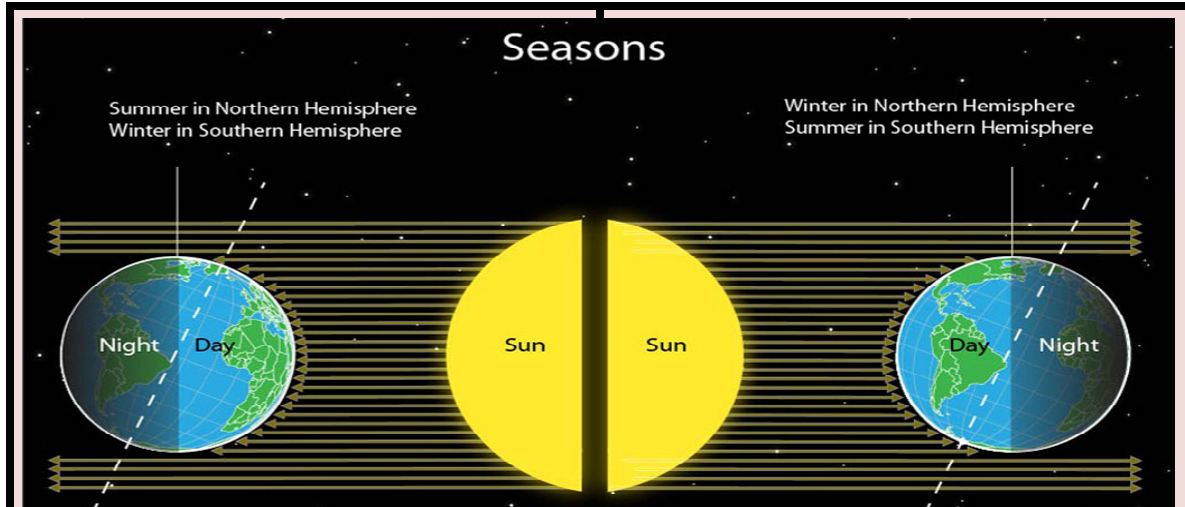


Do the seasons have the same characteristics? How does the changing seasons affect the way people dress and choose their activities? How about on how animals behave? What is the most distinct characteristic of every season? **Why does the same place have different seasons in a given year? What could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

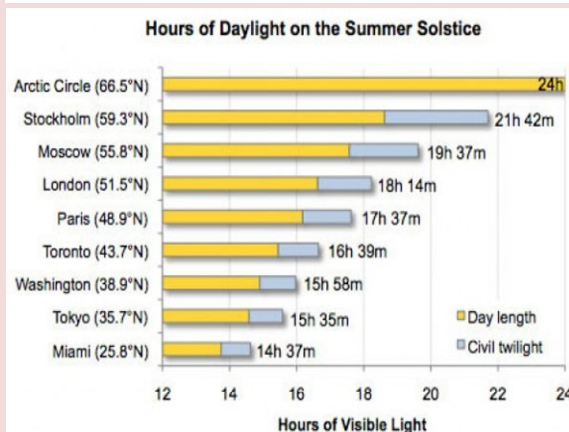
#### ACTIVITY 5. Picture Perfect Seasons



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 clicking the correct answer.

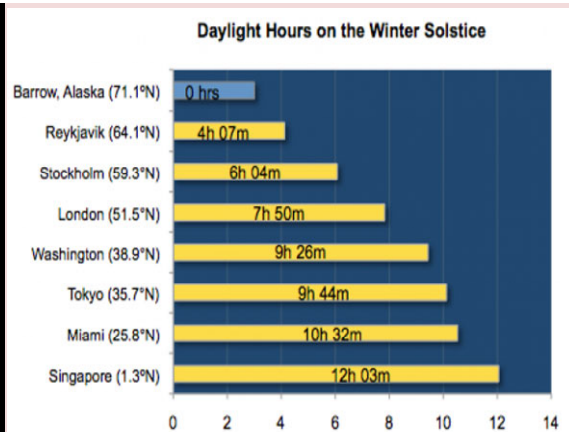


<http://education.nationalgeographic.com/media/photos/000/312/31279.jpg>



[http://www.washingtonpost.com/rf/image\\_606w/WashingtonPost/Content/Blogs/capital-weather-gang/201206/images/Hours%20of%20visible%20light.jpg?uuiid=iOm7\\_LrXEeGr1K7MqbRGbQ](http://www.washingtonpost.com/rf/image_606w/WashingtonPost/Content/Blogs/capital-weather-gang/201206/images/Hours%20of%20visible%20light.jpg?uuiid=iOm7_LrXEeGr1K7MqbRGbQ)

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).



[http://www.washingtonpost.com/rf/image\\_606w/WashingtonPost/Content/Blogs/capital-weather-gang/201212/images/daylight%20compar%20visual.png?uuiid=2FUBqErMEeKmpgg6yF6ANg](http://www.washingtonpost.com/rf/image_606w/WashingtonPost/Content/Blogs/capital-weather-gang/201212/images/daylight%20compar%20visual.png?uuiid=2FUBqErMEeKmpgg6yF6ANg)

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 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. Click on the given links to read and organize your thoughts by constructing a T-chart graphic organizer. Save and submit your work.

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

Click [http://www.learninggamesforkids.com/graphic\\_organizers/writing/t-chart.html](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 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?**



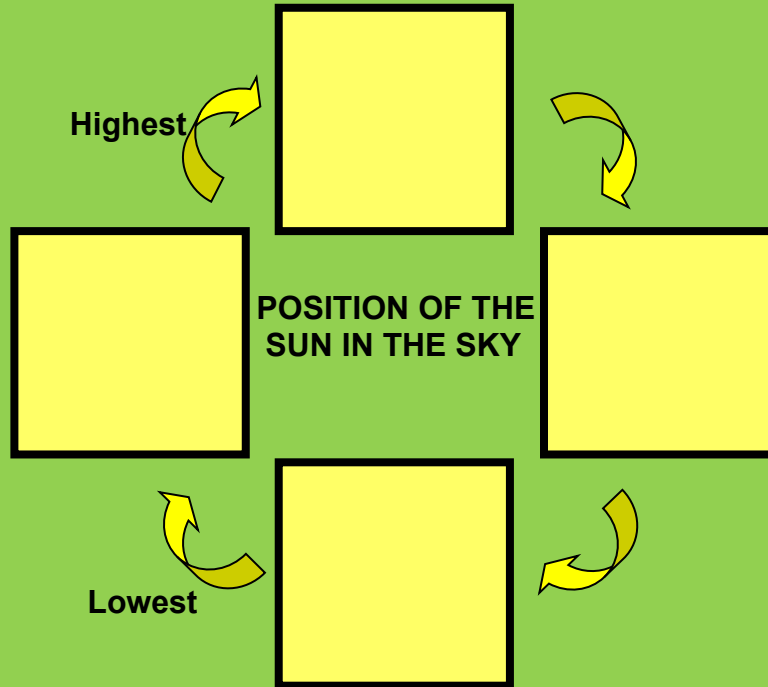
Work on the interactive site. Set the earth's inclination to that of Earth. Observe the following in relation with the others: *The Animation of Earth around the Sun, Seasons, Average Daily Temperature at Observation Site and Sunlight Angle*. Answer the activity that follows. Drag and drop the pictures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

Click

[http://highered.mheducation.com/olcweb/cgi/pluginpop.cgi?it=swf::800::600::/sites/dl/free/0072482621/78778/Seasons\\_Nav.swf::Seasons%20Interactive](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).

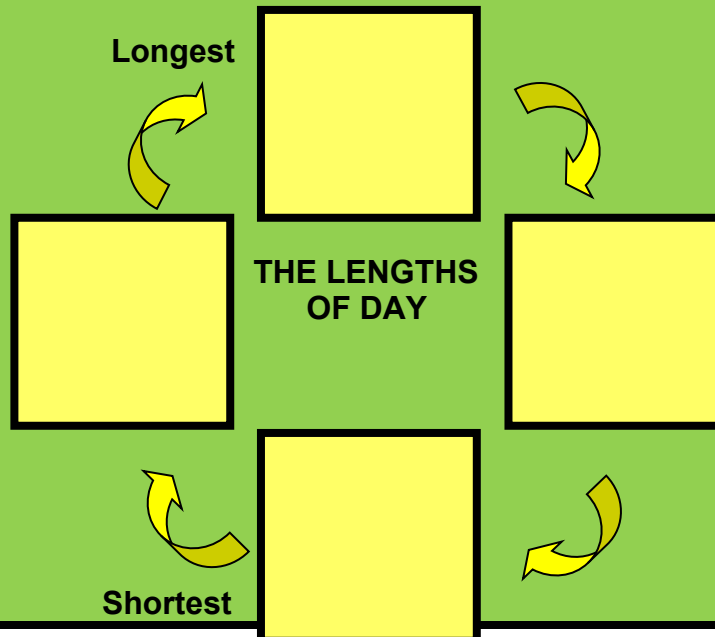


**A) Arrange the pictures from the highest to the lowest position of the mid-day sun in the sky as the seasons change in the observed interactive activity. Please do not break the seasons' cycle.**



Therefore, the position of the mid-day sun is highest on \_\_\_\_\_ and lowest on \_\_\_\_\_.

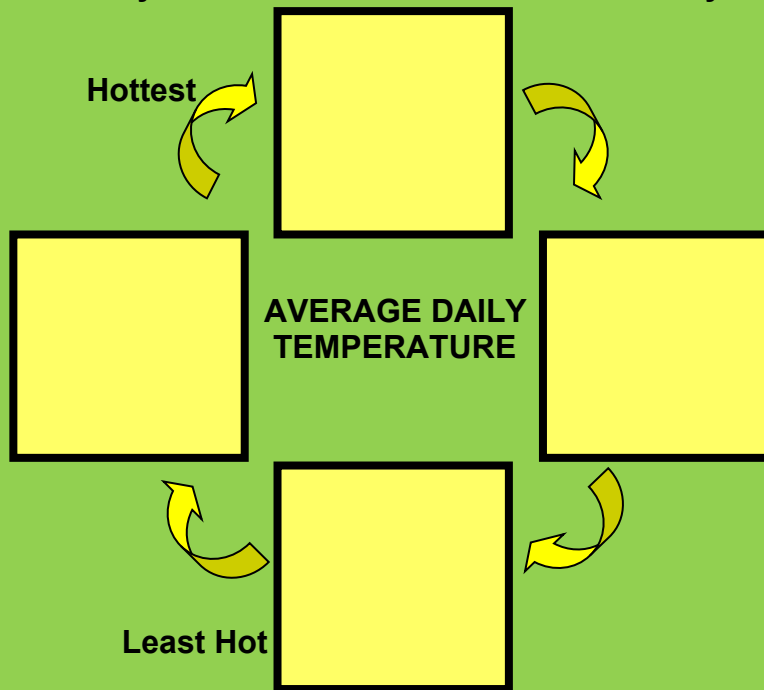
**B) Arrange the pictures from the longest to the shortest length of day the sun is observed in the horizon as the seasons change in the observed interactive activity. Please do not break the seasons' cycle.**



Therefore, the days are longest on \_\_\_\_\_ and shortest on \_\_\_\_\_.

4.

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,

---



---



---



---

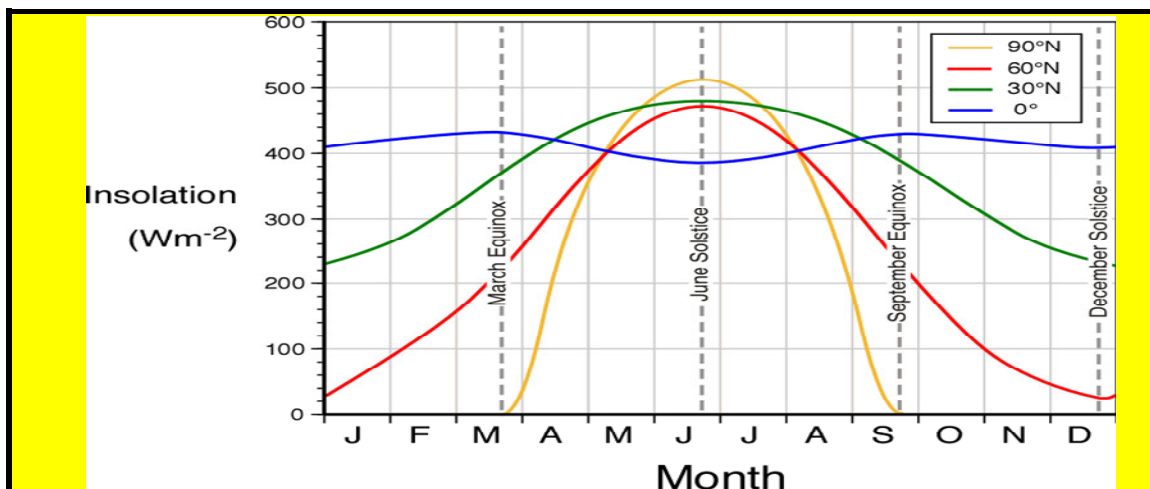


## ACTIVITY 8. A Roller Coaster of Warm and Cold



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.

Click <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?**

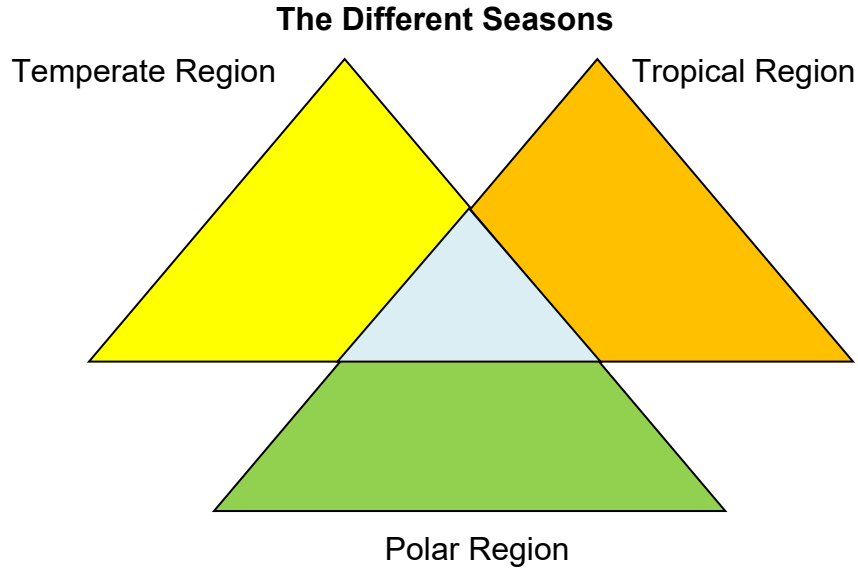
### ACTIVITY 9. Does Warm Matter?



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.

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

Click <http://polardiscovery.whoj.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)



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 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.

Click <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*)

Click <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.

**R**ead the contents of the article or watch the video presentation.

**A**sk yourself the following question: What were the main idea and details of these sources?

*These materials are about or tell me about*

---



---



---



---



---

**P**ut 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 11. The Enlightened



Click on <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 12. Checks and Balances



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

Click

<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.

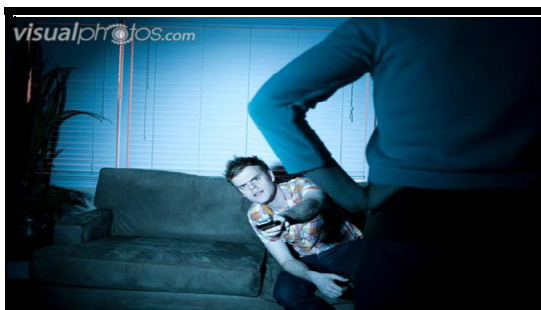
Comfort Zone	Stretch

## ACTIVITY 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/2x4818709/young\\_man\\_watching\\_t](http://www.visualphotos.com/photo/2x4818709/young_man_watching_t)





[https://farm3.staticflickr.com/2924/14014500597\\_f633b87391.jpg](https://farm3.staticflickr.com/2924/14014500597_f633b87391.jpg)

v_woman_blocking_view_is0990011.jpg	
<b>Situation:</b> Someone blocks your vision while you're watching a television on a dark room.	<b>Situation:</b> You are looking for a small thing in front of you with the light at your back.
Who cast a shadow to whom?	Who cast a shadow on what?
What will you see in front of you?	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.

 <p><a href="http://farm9.staticflickr.com/8338/8183493340_0815e8380e_z.jpg">http://farm9.staticflickr.com/8338/8183493340_0815e8380e_z.jpg</a></p>	 <p><a href="http://images.nationalgeographic.com/wpf/media-live/photos/000/305/cache/total-lunar-eclipse-winter-solstice-2010_30579_990x742.jpg">http://images.nationalgeographic.com/wpf/media-live/photos/000/305/cache/total-lunar-eclipse-winter-solstice-2010_30579_990x742.jpg</a></p>
What is happening to the sun in the sky?	What is happening to the moon in the sky?
What cast shadow on earth in this situation?	

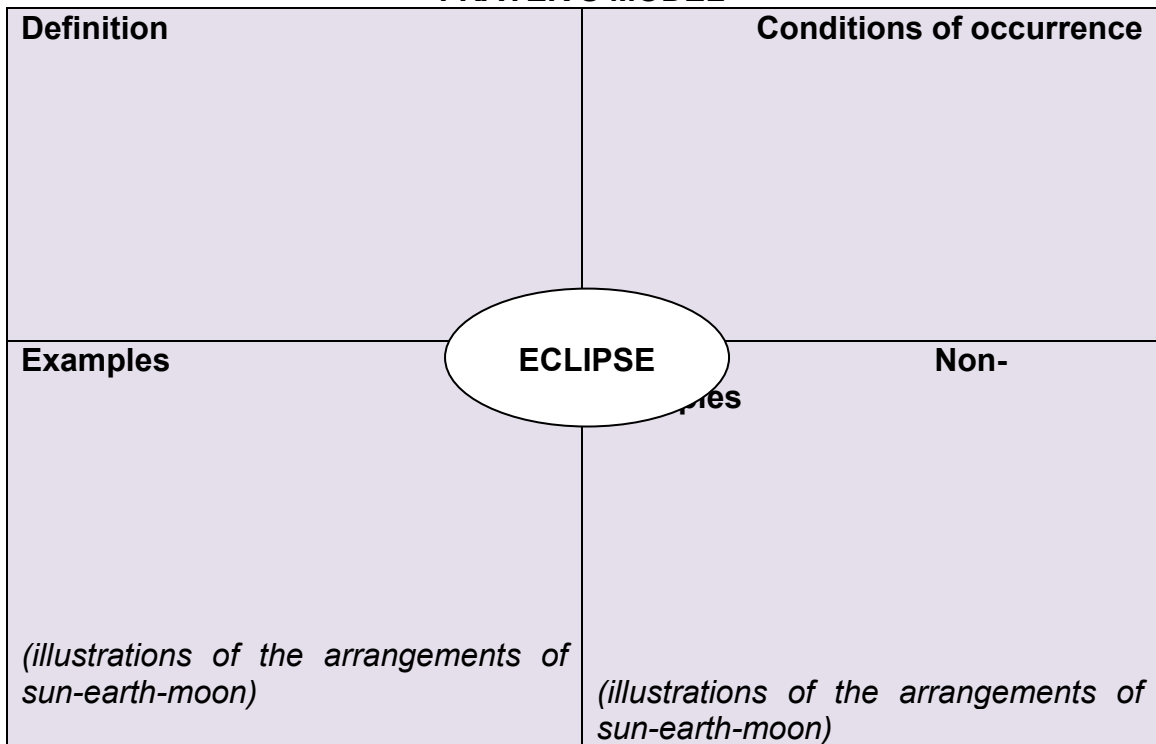
<p>What are the heavenly bodies involved in this situation and what could be their arrangement in the sky?</p>	<p>What cast shadow on moon in this situation?</p> <p>What are the heavenly bodies involved in this situation and what could be their arrangement in the sky?</p>
--	---



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?**

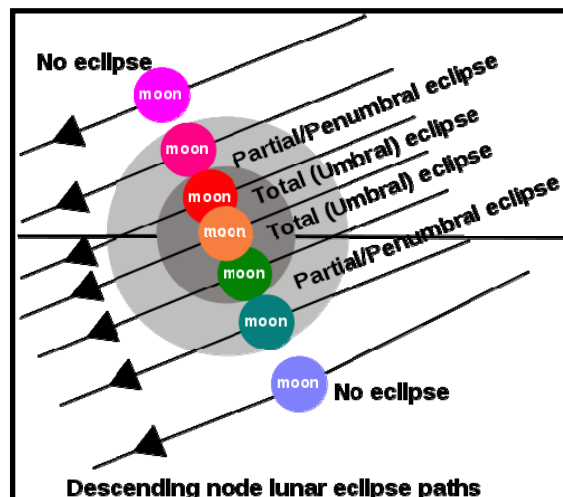
- C. **Representation:** Click <https://www.youtube.com/watch?v=zTVhNGGFEos> (a video on the occurrence of solar and lunar eclipse) and watch the video. Summarize the concept using the Frayer's Model graphic organizer.

### FRAYER'S MODEL



What is the difference between solar and lunar eclipse? 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:** Click [http://www.newworldencyclopedia.org/entry/Lunar\\_eclipse](http://www.newworldencyclopedia.org/entry/Lunar_eclipse) and read the contents of the article. Study the given picture and answer the question that follows.





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 . . . . .

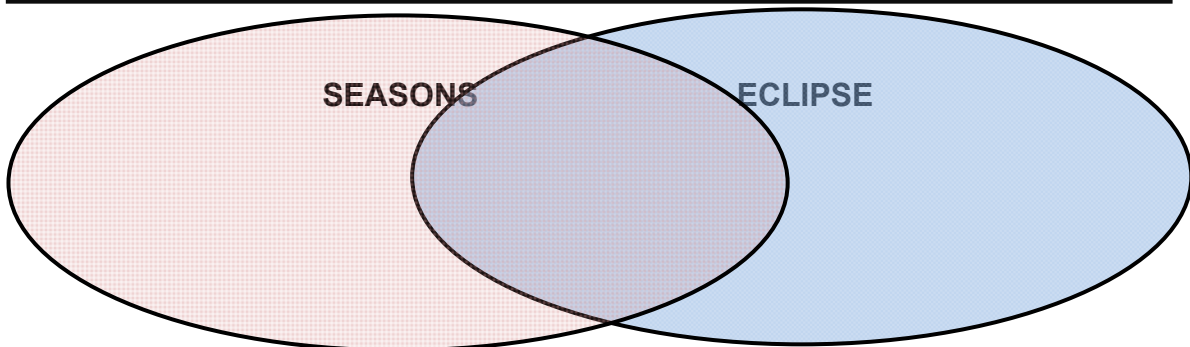


Is the orbital plane of the moon the same as the orbital plane of the earth? How does this determine the occurrence of an eclipse? **How are eclipse formed?**

### ACTIVITY 14. 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.

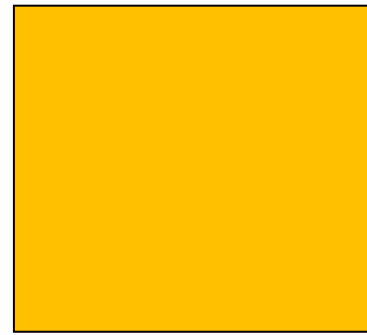
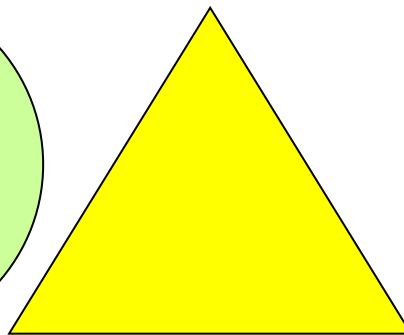
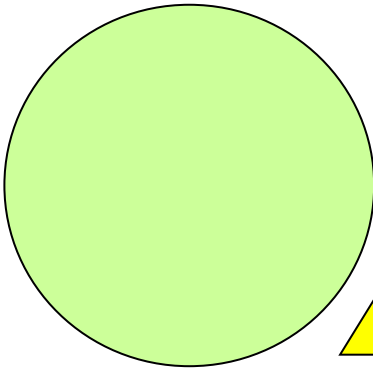


How are the two alike? How are they different? **Does your answer lead to the answer of why both of them occur?**



*Now that you have covered all the learning competencies, have a check on yourself on how far 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.*

### CIRCLE, TRIANGLE, SQUARE



### 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.

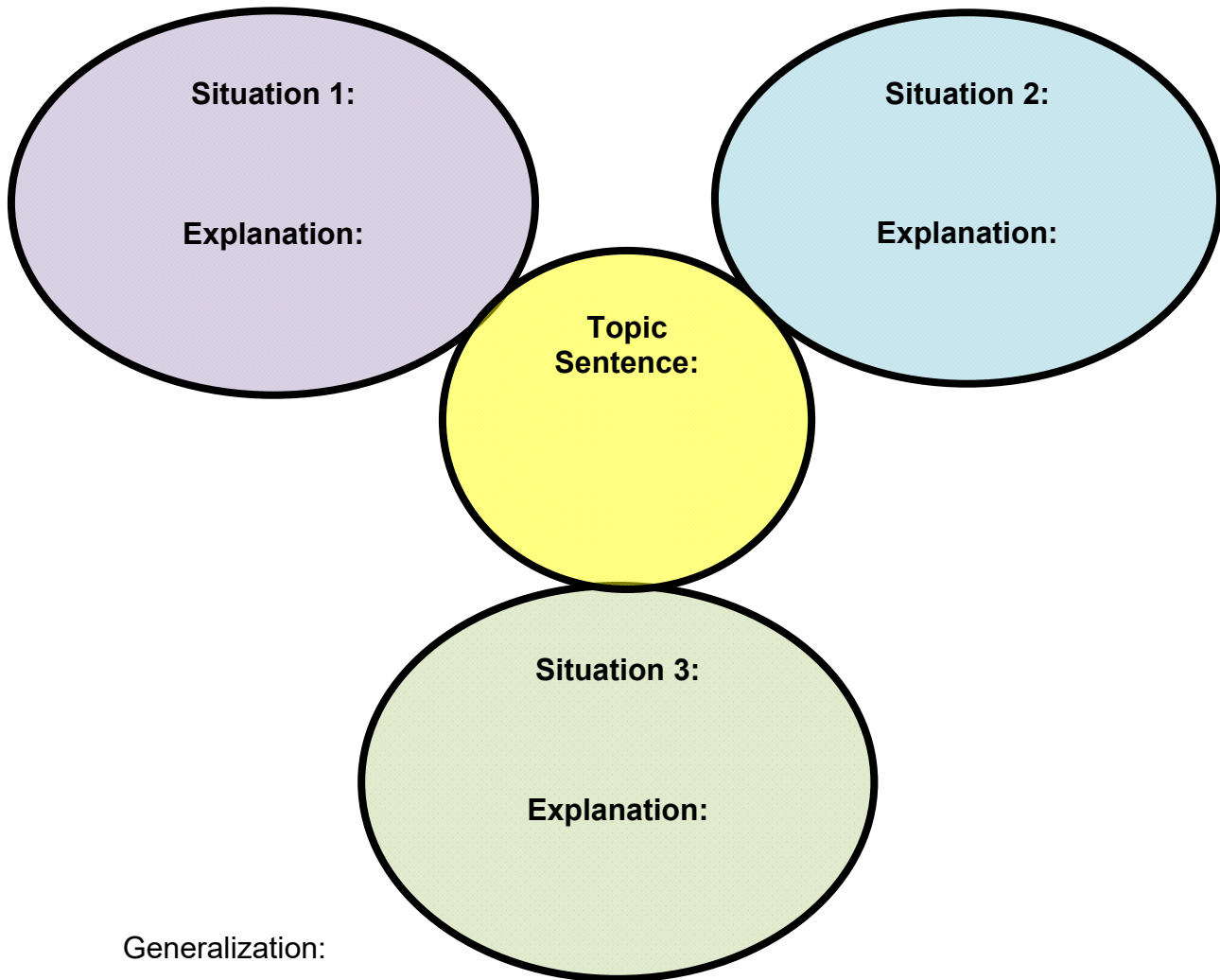
***Why do seasons and eclipses occur?***

### ACTIVITY 15. Reasons!



Study the contents of the following given links:  
[https://www.youtube.com/results?search\\_query=midnight+sun](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 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. Click on the given sites and read, watch or analyze their contents. Summarize the idea by completing the graphic organizer.

<b>#1 Article:</b> Indian Youths Defy Superstition, Eat During Eclipse <a href="http://science.gaeatimes.com/2010/01/15/indian-youth-defy-superstition-eat-during-eclipse-3667/">http://science.gaeatimes.com/2010/01/15/indian-youth-defy-superstition-eat-during-eclipse-3667/</a> (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?	
<b>#2 Video:</b> Does solar thermal work in very cold temperatures? <a href="https://www.youtube.com/watch?v=CH8Z9nBrCBg">https://www.youtube.com/watch?v=CH8Z9nBrCBg</a> (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?	
<b>#3 Graphs:</b> Ultra violet radiation typical reading <a href="http://www.hpa.org.uk/Topics/Radiation/UnderstandingRadiation/UnderstandingRadiationTopics/UltravioletRadiation/uv_TypicalReadings/">http://www.hpa.org.uk/Topics/Radiation/UnderstandingRadiation/UnderstandingRadiationTopics/UltravioletRadiation/uv_TypicalReadings/</a> (a table of the intensity of UV rays during the day)  <a href="http://www.sunsmart.org.uk/UV-the-sun-and-skin-cancer/how-do-we-know/sunsmart-campaign-evidence-base#Reference">http://www.sunsmart.org.uk/UV-the-sun-and-skin-cancer/how-do-we-know/sunsmart-campaign-evidence-base#Reference</a> 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?	
<b>Why do seasons and eclipses occur?</b>	



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 17. Your Seasons Are Numbered (Misconception Check)**

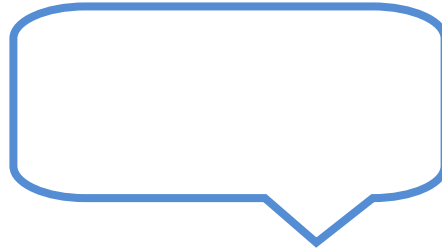


You were presented with activities in the past that helped you in determining lengths of days, height of the overhead sun, insolation of a place and etc. Present the possible points-of-view of the people in different parts of the globe. Express your perceived thoughts using voki.com. You may look into 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.)

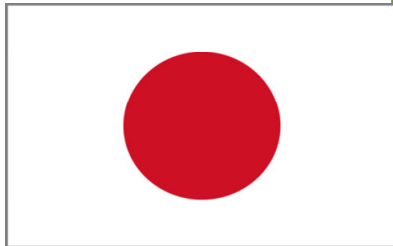
**“The tilt of the earth brought the same season in all locations of the earth”**



**“Southern and French Antarctic Territory”**



**“Philippines”**



**“Japan”**



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 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.

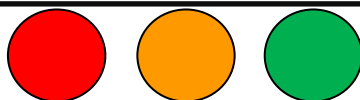


How confident are you in defending your arguments on the reason for seasons? What are the strong points of your argument? How do you plan to refute the statement regarding the distance between the earth and the sun?

## ACTIVITY 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. Drag and drop 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
<ul style="list-style-type: none"> <li>using models, relate the tilt of the Earth to the length of daytime</li> </ul>	
<ul style="list-style-type: none"> <li>using models, relate the length of daytime to the amount of energy received</li> </ul>	
<ul style="list-style-type: none"> <li>using models, relate the position of the Earth in its orbit to the height of the Sun in the sky</li> </ul>	
<ul style="list-style-type: none"> <li>using models, relate the height of the Sun in the sky to the amount of energy received</li> </ul>	



<ul style="list-style-type: none"> <li>• using models, relate the latitude of an area to the amount of energy the area receives</li> </ul>	
<ul style="list-style-type: none"> <li>• show what causes change in the seasons in the Philippines using models</li> </ul>	
<ul style="list-style-type: none"> <li>• explain how solar and lunar eclipses occur</li> </ul>	
<ul style="list-style-type: none"> <li>• collect, record, and report data on the beliefs and practices of the community in relation to eclipses</li> </ul>	
<ul style="list-style-type: none"> <li>• * determine the implications of the available solar energy in a given season.</li> </ul>	
<ul style="list-style-type: none"> <li>• propose activities appropriate for the season</li> </ul>	
<ul style="list-style-type: none"> <li>• clarify misconceptions on eclipses</li> </ul>	



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

## ACTIVITY 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. Click SAVE once you're done.

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 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 can you possibly help them? How confident are you now to explain **why do seasons and eclipses occur?**

## ACTIVITY 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. Click on [www.powtoon.com](http://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.

- Why do seasons occur?
- Why do eclipses happen?
- 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 23. Performance Task



#### TASK

The UNESCO launched a program with the theme “*Liberating Communities from Misguided Beliefs and Practices for Progress in the 21<sup>st</sup> 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.
ORGANIZATION	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	Utilizes clear enough font size, background color, image resolutions and	The use of visual/aural aids was distracting in several parts.	The use of visual/aural makes the presentation confusing in most parts.

	resolutions and video quality. Sound is of great quality as well.	video quality. Sound is also audible enough.		
JUSTIFICATION	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
IMPACT	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 . . . . .***



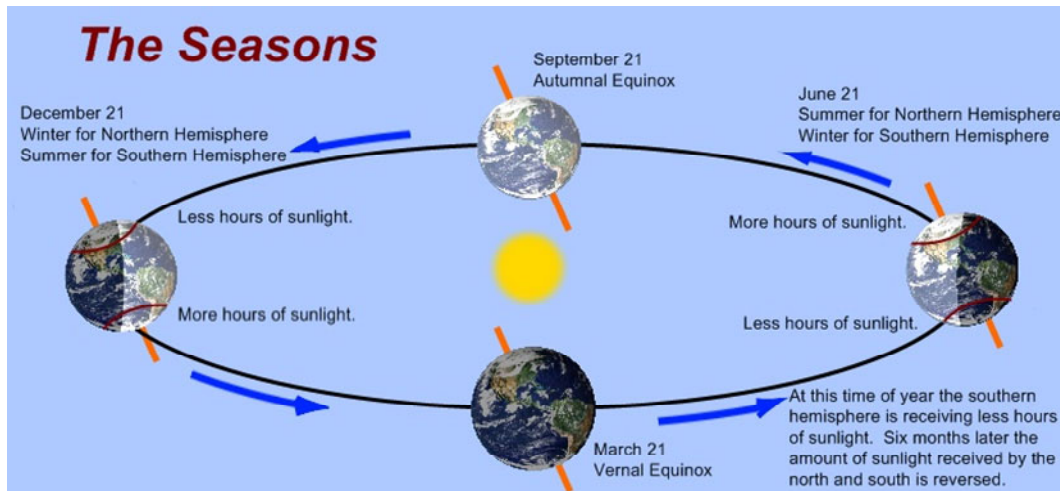
*Try to answer the Post-Assessment now and see for yourself how much your understanding about the Earth's atmosphere has improved.*



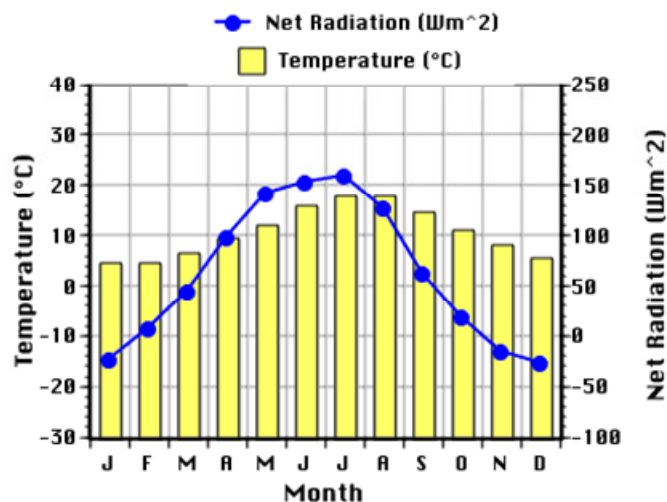
## POST-ASSESSMENT:



It's now time to evaluate your learning. Click on the letter of the answer that you think best answers the question. Your score will only appear after you answer all items. If you do well, you may move on to the next module. If your score is not at the expected level, you have to go back and take the module again.

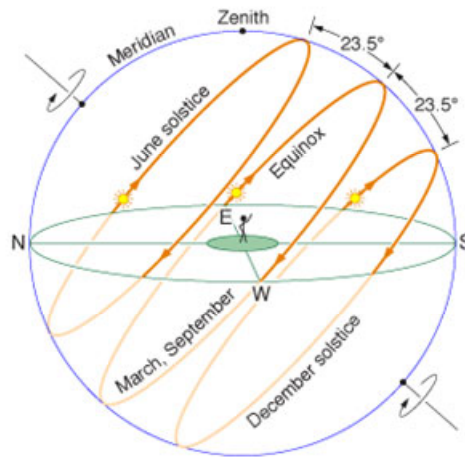


- 1) Refer to the diagram above. In which season is the northern hemisphere experiencing longer days?
- A. summer
  - B. autumn
  - C. winter
  - D. spring



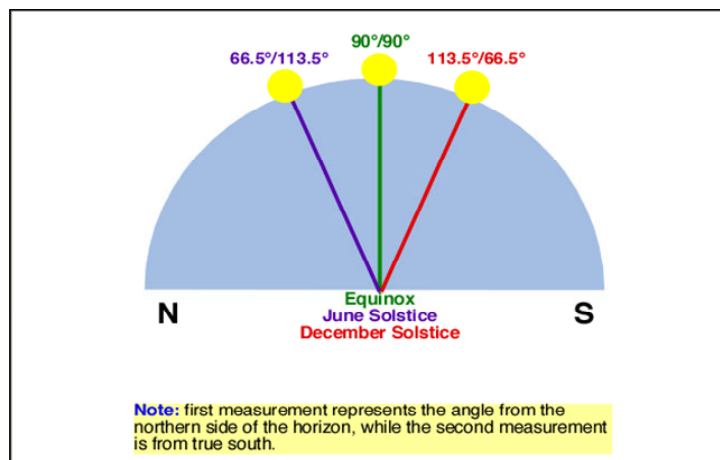
2) What is the best interpretation of the above shown graph?

- 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.



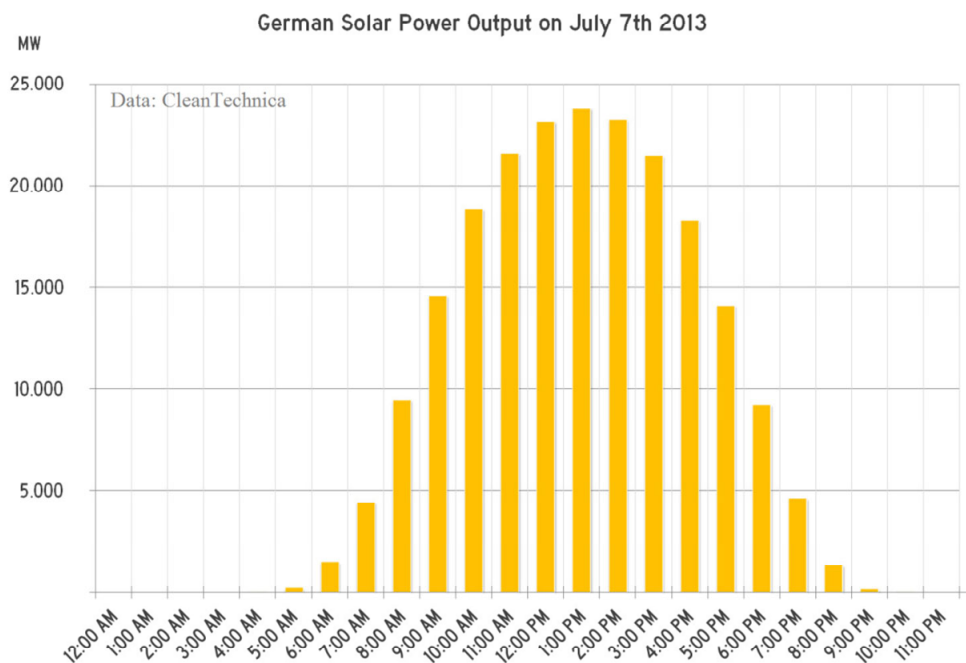
3) Which statement is TRUE about the position of the earth on its orbit in relation to the height of the sun in the sky?

- 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.

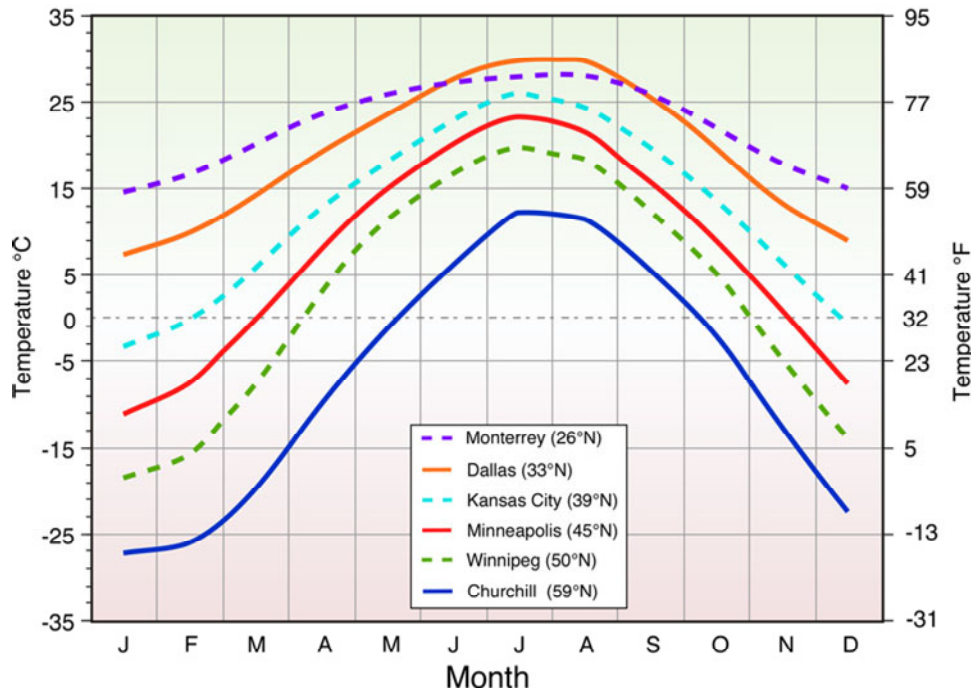


### Positioning of the Sun in the Equator throughout the Year

- 4) Refer to the above diagram. Why are there no four seasons in the places near the equator like the Philippines?
- The sun does not change its path across the sky in the entire year.
  - 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.
  - 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 earth's spherical shape.
  - 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 demon or animal is believed to consume the moon or sun.
  - The event makes foods and drinks dirty.
  - The sun or moon is revealing its inner darkness during this event.
  - It is the time of coming together of the sun and moon resolving old feuds and anger



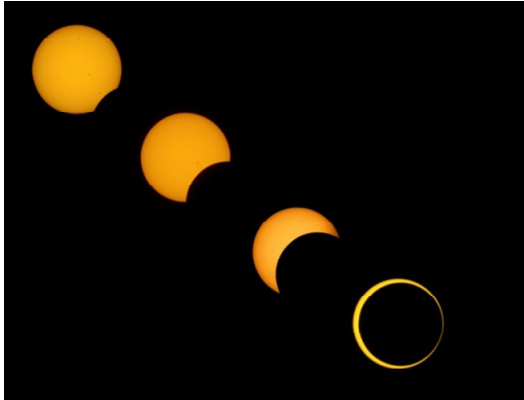
- 6) Which statement is the best interpretation of the above graph?
- The area received the greatest solar energy on July 7, 2013.
  - Energy from the sun is greatest when the sun is highest in the sky.
  - The sun moves higher in the sky towards mid-day and sets afterwards.
  - The sun starts rising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



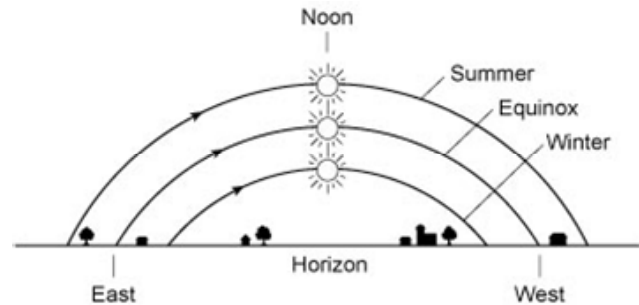
- 7) Which of the following activities is appropriate for a certain place on a particular month or season?
- Basking in a picnic under the sun is a good activity on May in Dallas as the place is neither too hot nor too cold.
  - It will be snowing in Monterey on January, so ice skating is a good leisure activity.
  - It is great to shop for winter clothes in any of those places in the month of June in the height of winter season.
  - 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?
- They both share the same process. The moon is casted upon by the shadow of the earth.
  - 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.
  - 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 of the moon are due to the earth casting its shadow on the moon.

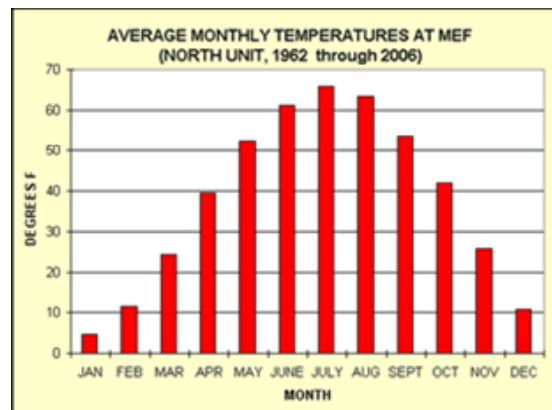
**Illustration A**



**Illustration B**



**Illustration C**



Guide questions:

- What had caused the moon to 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?

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



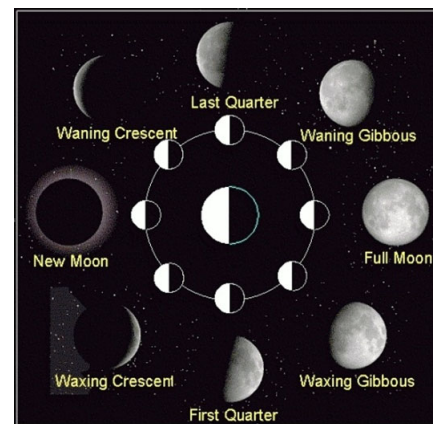
**Illustration A**



**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.<sup>[2]</sup>  
[http://en.wikipedia.org/wiki/Winter\\_solstice](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?

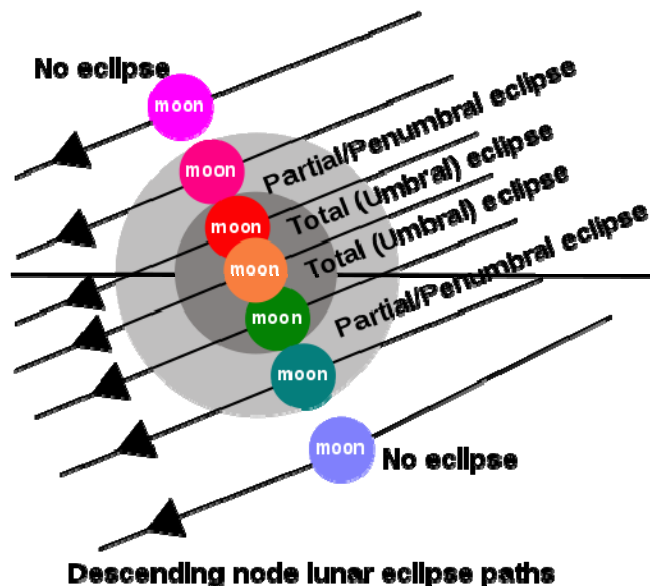
Why winter solstice celebration is happens once a year only?

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?
- The distance between the sun and the earth remains unchanged all throughout the year which is approximately  $1.5 \times 10^8$  km, thus it is not the cause of seasons.
  - 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  $23.5^\circ$
  - The seasons are caused by the regular increase and decrease of the sun's surface radiation and not by its distance from the sun.
  - 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?
- Swimming in the sea as the water is comfortably warm.
  - Kite flying as thunderstorms are not likely to happen.
  - Outdoor painting as there is less probability of having a rain.
  - 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.





- 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 likely 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 perspective 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=Q7JwUoJyBsbGkAWLz4HlBw&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](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=Q7JwUoJyBsbGkAWLz4HlBw&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](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