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Science

Quarter 4 – Module 6:
The Reason for the Seasons

ALTERNATIVE DELIVERY MODE
ADM

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Science

Quarter 4 – Module 6:
The Reason for the Seasons

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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Hello! How are you? Have you ever wondered why Philippines have only two seasons? Most countries of the world have only two seasons, this is because most countries lie within the tropical zone.

This module will help you understand why seasons change, why some countries only have two and other countries have four. There is a beauty to be found in the changing of the earth's seasons. There is a reason why everything~~'s~~ changes. Be a scientist yourself, let's work hand in hand as we find out the tilt of the earth and how it affects the changes in seasons.

Most Essential Learning Competency:

Using models, relate the tilt of the earth and the seasons **(S7ES-IVh-9)**.
After going through this module, you are expected to:

1. discuss and explain the relationship of Earth's axis tilt and position which determines the season;
2. identify the different seasons and their characteristics; and
3. explain why there are different seasons in the different regions of the world.

What I Know

Directions: Read and understand the questions carefully. Write your answer on a separate sheet of paper.

1. What are the four seasons of Earth?
   A. Rainy, Summer, Dry and Wet
   B. Autumn, Spring, Fall, Winter
   C. Spring, Summer, Fall, Winter
   D. Summer, Fall, Autumn, Winter

2. What causes the season?
   A. The earth's revolution
   B. The earth's tilt
   C. The earth's axis
   D. The earth's rotation

3. When will we have the shortest shadow?
   A. Spring
   B. Summer
   C. Autumn
   D. Winter

4. What is the hottest season in the year?
   A. Autumn
   B. Spring
   C. Summer
   D. Winter

5. When will we have the longest shadow?
   A. Spring
   B. Summer
   C. Autumn
   D. Winter

6. What is the coldest season?
   A. Autumn
   B. Spring
   C. Summer
   D. Winter

7. Which season has the shortest days and has longer nights?
   A. Autumn
   B. Spring
   C. Summer
   D. Winter

8. What season do animals hibernate and migrate to different areas?
    A. Autumn
    B. Spring
    C. Summer
    D. Winter

9. What is the event described as the shortest day of the year?
    A. Vernal Equinox
    B. Winter Solstice
    C. Summer Solstice
    D. Autumnal Equinox

10. Why are the seasons different in the Northern and Southern hemispheres?
    A. The earth's distance to the sun is constant
    B. The earth is continuously rotating around the sun.
    C. The sun is moving around the earth so one half the earth is heated and the other half is frozen.
    D. During summer or winter one part of the planet is closer or father to the sun.

11. When it is summer in southern hemisphere, which of the following BEST describes the tilting of the earth in the northern hemisphere?
    A. The earth is tilted towards the sun.
    B. The earth is tilted away from the sun.
    C. The distance between southern and northern hemisphere is constant.
    D. The distance between both hemispheres are not constant and always changing.

12. Why do seasons change?
    A. Seasons change because the sun is directed to the southern hemisphere only.
    B. Seasons change because the sun is tilted to both Northern and Southern Hemisphere.
    C. Seasons change because the earth is stationary directing its rays to Northern and Southern Hemisphere.
    D. Seasons change because direct rays of the sun shift from one hemisphere to the other as the earth goes around the sun.

13. Which part of the earth experiences summer in December and winter in June?
    A. Northern hemisphere since sun is tilted towards it on June and December.
    B. Northern hemisphere because it receives direct rays from the sun in December and lesser in June.
    C. Southern hemisphere because it receives direct rays from the sun in December and lesser energy in June.
    D. Both southern and northern hemisphere because they receive equal rays directed from the sun in December and June.

14. Do the tilt of the earth and revolution around the sun affects the seasons?
    A. No, because it only affects the Earth's length of day
    B. No, because it's the Earth's distance from the sun that affects the seasons
    C. Yes, because these allows different parts of the Earth to receive the same amount of energy
    D. Yes, because these allows different parts of the Earth to receive different amounts of energy

15. Lina lives in the Japan and her friend Aly lives in Australia, during February Lina is experiencing winter while Aly is experiencing summer, what is the reason for this?
    A. Aly lives in a high latitude place compared to Lina.
    B. Lina lives in a high latitude place compared to Aly.
    C. Lina and Aly's country have same distance from the equator.
    D. Lina and Aly are living in countries that are in opposite hemispheres.

Lesson 1 Seasons

What's In

Directions: Read and understand the questions carefully. Write your answer on a separate sheet of paper.

Test I: Fill in the missing letters to form the word(s) being describe in each number.

1. It is located at approximately 66.5 degrees north of the equator. It is the beginning area where the sun will not rise during winter solstice and will not set during summer solstice.

A	r	_	t	_	_		C	_	_	c	l	e

2. This line of 0 degrees latitude is the starting point when referring to other points towards North or South pole of the globe.

E	_	_	a	t	_	r

3. It is located at approximately 23.5 degrees south of the equator. This line marks the point farthest to the south at which the sun is hanging directly upward at noon.

T	r	_	p	_	c		o	_		C	_	p	r	_	c	_	_	n

4. It is located at approximately 23.5 degrees north of the equator. This line marks the point farthest to the north at which the sun is hanging directly upward at noon.

_	r	o	p	_	_		_	f		C	_	_	c	e	_

5. It is located at approximately 66.5 degrees south of the equator. No permanent residents are found within the boundaries of this latitude.

A	n	_	_	_	c	t	_	c		C	_	_	_	l	e

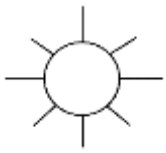
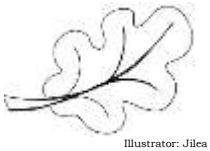
Test II: Write **TRUE** if the statement is correct and **FALSE** if the statement is wrong.

1. Latitudes run in an east to west direction.
2. Lines of latitude are parallel to one another and never meet.
3. The equator is at 90 degrees latitude.
4. Prime meridian is the major line of latitude.
5. Lines of latitude get shorter toward the poles, with the equator having the longest line.

What's New

Hello there! You are already familiar with the major lines of latitude. Let's now discover together the seasons of the earth. Are you ready? Let's start!

Different places on Earth experiences different temperatures and varying length of daytime throughout the year. These are brought about by the changing seasons. Countries located further north or south of the equator get to experience four different seasons however it is not the same for the countries located near or at the equator. Listed below are the four seasons of the Earth.

Seasons	
 Illustrator: Jilea A. Yson	**Spring** starts when the day and night are the same length on March 20. The weather gets warmer and sunnier. Trees and plants start to grow. Many animals have their babies in spring.
 Illustrator: Jilea A. Yson	**Summer** begins on the longest day of the year. In the north this is on 21 June. Summer is usually the warmest and the sunniest time of the year. Fruit grows on trees and plants. Young animals grow bigger and stronger.
 Illustrator: Jilea A. Yson	**Autumn** starts when the day and night are the same length again on September 21. During autumn, the leaves change color and fall from the trees. Some animals collect food before winter comes.
 Illustrator: Jilea A. Yson	**Winter** begins on the shortest day of the year. In the north this is on 21 December. The weather is colder and, in some places, there is lots of snow. Plants and trees stop growing. Some animals, like bats and bears, find places to hide and sleep. This is called hibernation.

Activity 1

Describing the Four Seasons

Directions: Complete the following sentences with the correct word. Choose the word from the box. Write your answer on a separate sheet of paper.

SPRING	ripen hot rainy ice cream umbrella crops snowmen days sunglasses gloves leaves bloom falling snowflakes butterflies warmer sweep bees snow beach cold birds nights migrate	**SUMMER**
1. All the trees and plants are in _____. 2. The _____ start singing sweet songs. 3. The weather gets _____. 4. The trees bring new _____ on their branches. 5. Swarms of _____ rush at the flowers. 6. Colorful _____ fly up in the air.		1. The weather is _____. 2. The _____ are very long. 3. People wear shorts and _____. 4. Children love to go to the _____ to have a bath into the sea. 5. Everyone loves to eat _____. 6. The fruits _____ and are ready to be eaten.
AUTUMN		**WINTER**
1. Leaves are _____ off trees. 2. The birds _____ southward. 3. The _____ are harvested. 4. The weather is cool and _____ days are getting shorter. 5. People has a lot of leaves to _____. 6. People wear raincoats and carry an _____.		1. A white layer of _____ covers the ground. 2. People wear thick coats, _____ and boots. 3. The weather is very _____. 4. Children love making _____. 5. The _____ get longer. 6. _____ dance in the air.

What is It

Seasons on Earth

As earth orbits the sun, it maintains its 23.5 degrees tilt on its axis. Among the obvious effects of this tilting is the way the sun's rays are focused on places on earth which brings about the changes in seasons on Earth. Countries located 23.5 degrees to 66.5 degrees north and south latitudes experience four seasons (spring, summer, autumn and winter). The areas where the four seasons are experienced is known as the temperate zone.

Around June 21 or 22 of each year, the Earth's axis is tilted toward the sun. At this time of the year, the Tropic of Cancer (located at 23.5 degrees north) receives vertical rays from the sun. While the rest of the Earth receives slanting or oblique rays. This is the summer solstice and this marks the beginning of the summer season

in the northern hemisphere. At this time, the Northern Hemisphere experiences longer days than night leading to higher surface temperatures. Also, during this season, areas beyond the Arctic Circle (located at 66.5 degrees north) receive 24 hours of daylight and the areas beyond the Antarctic Circle (located at 66.5 degrees south) are in complete darkness for 24 hours. This is because the southernmost limit of the sun's rays is at 66.5 degrees south. This means that, if it is summer in the Northern Hemisphere, then it is winter in the Southern Hemisphere.

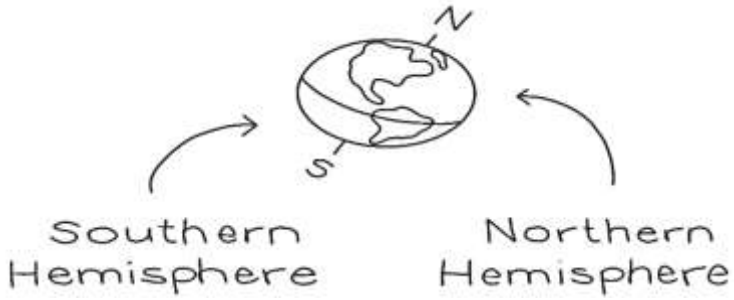
By the month of September, the vertical rays of the sun have moved from the Tropic of Cancer to the equator (0 degrees latitude) and the rest of the Earth receives slanting rays. This month marks the beginning of autumn in the Northern Hemisphere and spring in the Southern Hemisphere. On September 22 or 23, the length of day and night is equal everywhere on Earth. This is called autumnal equinox.

By December, the Earth reaches half of its path around the sun. the Northern Hemisphere is now tilted away from the sun. The vertical rays of the sun now strike the Tropic of Capricorn (located at 23.5 degrees south). The northernmost limit of the sun's rays at 66.5 degrees North, so the areas beyond the Arctic Circle experience 24 hours of darkness. December 21 or 22 is the winter solstice and it marks the beginning of winter in the Northern Hemisphere. During this time, countries in the Northern Hemisphere experiences longer nights than days. It is then summer in the southern hemisphere and all the conditions are reversed.

As the Earth continues to revolve, it reaches ¾ of its path around the sun in the month of March. As in the month of September, the vertical rays of the sun are again directly over the equator. March 20 or 21 marks the spring equinox and this is the beginning of spring in the Northern Hemisphere and autumn in the Southern Hemisphere. The length of day and night is equal at this time everywhere on Earth.

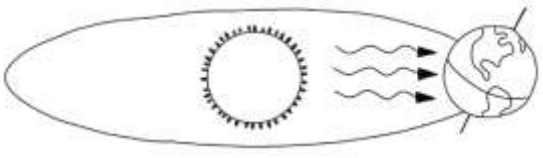
Within a year, we experience two solstices and two equinoxes. This attributes to the tilt of the Earth's axis that 'changes' the suns position relative to the Earth's equator, the Earth's motion around the sun and the spherical shape of earth.

Earth has seasons because its axis is tilted. Earth rotates on its axis as it orbits the Sun, but the axis always points in the same direction.



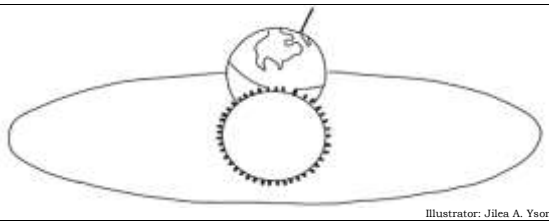
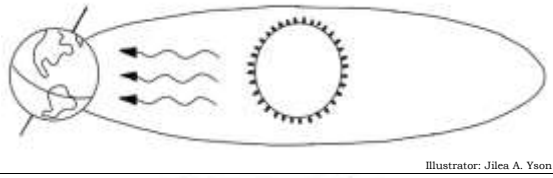
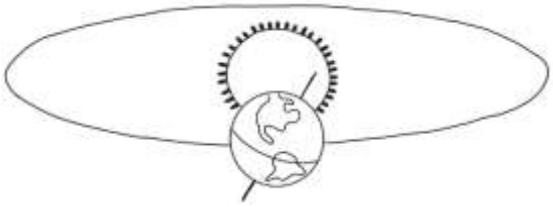
Illustrator: Jilea A. Yson

Figure 2. Northern and Southern Hemisphere



Illustrator: Jilea A. Yson

December 21/22: Winter at the north of the equator and summer at the south of the equator. The sun shines directly on the Southern Hemisphere and Indirectly on the Northern Hemisphere.

 Illustrator: Jilea A. Yson	**March 20/21**: Spring at the north of the equator and autumn at the south of the equator. The sun shines equally on the Southern and Northern Hemispheres.
 Illustrator: Jilea A. Yson	**June 21/22**: Summer at the north of the equator and winter at the south of the equator. The sun shines directly on the Northern Hemisphere and Indirectly on the Southern Hemisphere.
 Illustrator: Jilea A. Yson	**September 22/23**: Autumn at the north of the equator and Spring at the south of the equator. The sun shines equally on the Southern and Northern Hemispheres.

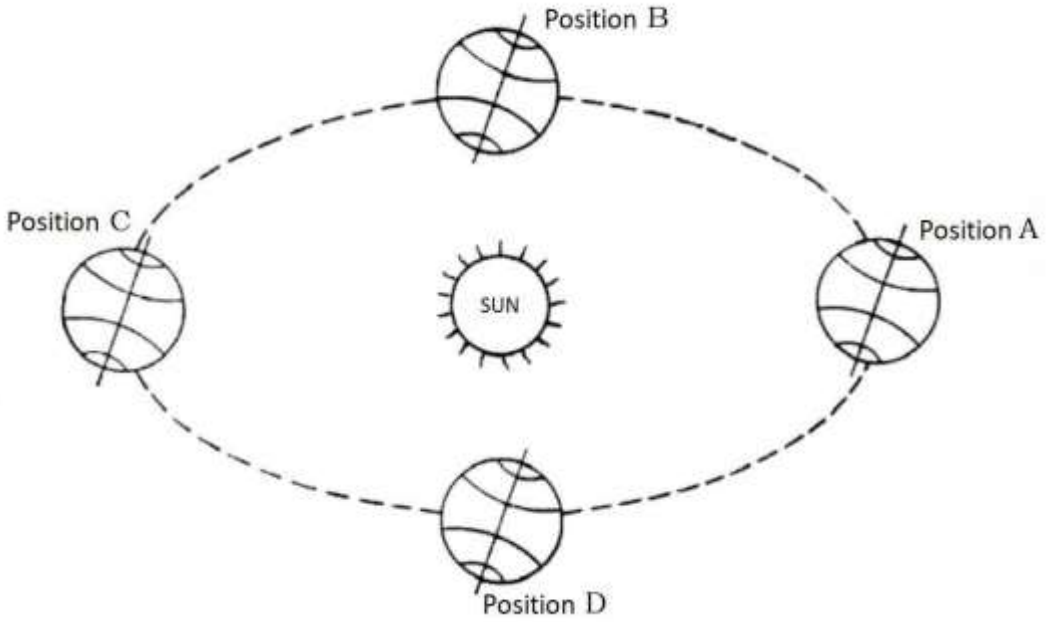
Seasons in the Philippines

The Philippines is in the tropical climate zone. Tropical climate regions receive solar radiation at high angles all throughout the year. Consequently, ~~people of~~ the Philippines do not experience the four seasons described in the previous section. Instead, the "seasons" in the Philippines are described as the wet and dry seasons. When it seldom rains, the season is described as dry season, when there is much rainfall, it is described as the wet season.

What's More

Solstice and Equinox

Directions: Analyze the illustration below then and answer the following questions. Write your answer on a separate sheet of paper.



Illustrator: Jilea A. Yson

Figure 1. Earth's Axial tilt

For the Northern Hemisphere, which position (A, B, C, or D) of the earth represents:

1. Summer Solstice
2. Autumnal Equinox
3. Winter Solstice
4. Spring Equinox
5. The longest day of the year in Southern Hemisphere occurs at what position?
6. The length of daylight in the northern hemisphere at position A is _____ than at position B (longer, shorter, equal).
7. As the earth moves from position C to position D, does the duration of daylight in the Northern Hemisphere get longer, shorter or remain the same?

What I Have Learned

Directions: Read the paragraph carefully and identify the correct words that fit in the given sentences in the box below. Write your answer on a separate sheet of paper.

axis	equator	equinox		hemispheres
shortest	solstice	summer	sun	winter
		365.25		

The Earth takes (1) _____ days to orbit the sun. The Earth is also spinning on an (2) _____, tilted at 23 degrees. This means that different parts of the Earth receive more direct rays from the (3) _____ at different times of the year. The (4) _____ divides the Earth into Northern and Southern (5) _____. When the Northern hemisphere is tilted towards the sun it is (6) _____ in that hemisphere.

On two days a year both hemispheres receive equal hours of day and night. These are called (7) _____. A (8) _____ is when the sun is at its greatest distance from the equator. The (9) _____ solstice is sometimes called the (10) _____ day.

What I Can Do

Directions: Create a poem about "seasons" with four stanzas consisting four lines each. The poem should include the reason why the length of daytime is not consistent for the whole year and why there are seasons. Write your poem on a separate sheet of paper. Please be guided with the rubric below.

Rubric				
Category	**4**	**3**	**2**	**1**
Word Choices and Main Ideas	The poem uses many precise, and descriptive words to develop a main idea or message.	The poem uses several descriptive words to develop a main idea or message.	The poem uses general or ordinary terms to develop a main idea or message.	The poem uses general or ordinary terms to describe the object, the words do not develop a main idea or message.
Organization	The sequencing of words and phrases is logical and the reader is able to follow the ordering of ideas easily.	The sequencing of words and phrases is somewhat logical, and the reader is able to follow the ordering of ideas with minimal effort.	The sequencing of words and phrases is very confusing and the reader may need to use hi or her own knowledge to determine the ordering of ideas.	The sequencing of words and phrases is random. The reader can find no evidence of thoughtful ordering of ideas.

Assessment

Directions: Read and understand the questions carefully. Write your answer on a separate sheet of paper.

1. During which season do the leaves change color and fall off the trees?
   A. Autumn
   B. Spring
   C. Summer
   D. Winter

2. How often does the earth orbit the sun?
   A. Every 7 days
   B. Every 24 days
   C. Every 30 days
   D. Every 365 days

3. Which pole is pointed towards the sun when the northern hemisphere is experiencing winter?
   A. East Pole
   B. West Pole
   C. North Pole
   D. South Pole

4. What is the result of earth's tilt?
   A. Seasons
   B. Climate
   C. Weather
   D. Day and Night

5. What is the shape of the earth's orbit around the sun?
   A. Circular
   B. Square to rectangle
   C. Elliptical (slightly oval)
   D. Variable and changes with the seasons (no particular shape)

6. The earth is a tilted planet. What is the degree of tilt?
   A. 23.5 degrees
   B. Exactly 25 degrees
   C. Approximately 25 degrees
   D. 90 degrees with respect to the sun

7. What does rotation mean?
   A. An object spinning on is axis
   B. The sun moving around the earth
   C. An object moving around another object
   D. The sun is heating up the earth while it spins

8. What are the names of the days when day and night are of equal duration?
   A. Summer Solstice and Winter Solstice
   B. Summer Equinox and Winter Equinox
   C. Vernal Solstice and Autumnal Solstice
   D. Vernal Equinox and Autumnal Equinox

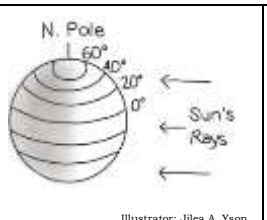
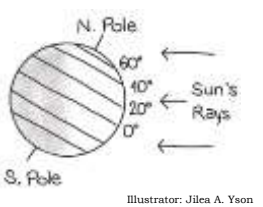
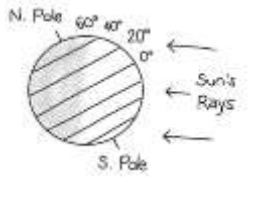
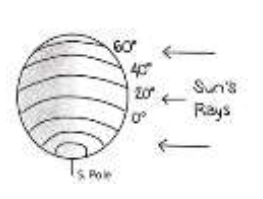
9. What does revolution mean?
   A. The earth wobbles on its axis
   B. The Earth is moving around its axis
   C. The shadows get shorter as seasons go on.
   D. It means an object moving around another object.

10. It is the reason that causes the length of daylight to change.
   A. It depends on the shape of the planet.
   B. It is based on how far the sun rays reach.
   C. It is based on the tilt of the sun beside the planet.
   D. It depends on the tilt of the earth as it moves around the sun.

11. Which of the following BEST describe the tilt of the earth during the spring and fall equinoxes?
   A. The earth is tilted toward the sun.
   B. The earth is tilted away from the sun.
   C. The earth is not tilted during spring and fall.
   D. The earth is titled neither toward or away from the sun.

12. Which of the following BEST describes the tilt of the earth when it is summer in the southern hemisphere?
   A. The Earth is not tilted.
   B. The Earth is tilted toward the sun.
   C. The Earth is tilted away from the sun.
   D. The Earth is tilted neither away not toward the sun.

13. Which diagram shows the illumination of the earth in North Pole during the first day of summer?

			
A.	B.	C.	D.

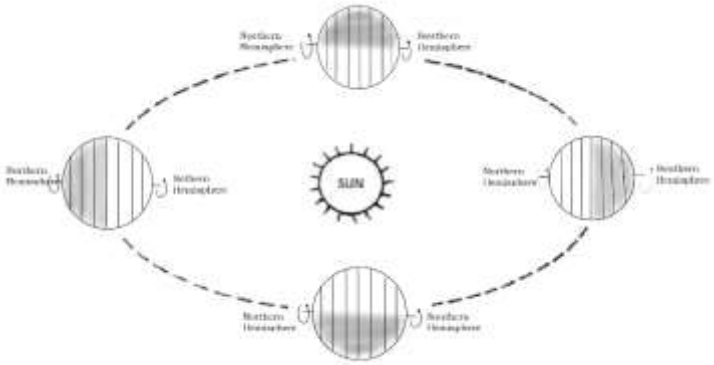
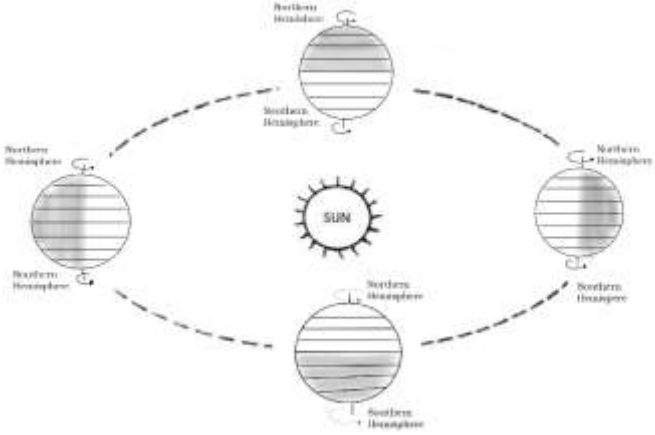
14. While Anna is enjoying her summer vacation, she noticed that during summer the sunrise is earlier in the morning compared to other months of the year. Can Anna enjoy longer day time during summer compared to ~~any~~ other month~~s~~ of the year?
   A. Yes, because during summer the sun rises and never sets.
   B. Yes, because during summer the sun rises early and it sets late.
   C. No, because during summer we can experience shortest day time.
   D. No, because during summer the sun rises early but also sets early.

15. Why do seasons change?
    A. Seasons change because the sun is directed to the southern hemisphere only.
    B. Season change because the Earth axis is tilted and always pointed in the same direction
    C. Seasons change because the earth is stationary directing its rays to northern hemisphere always.
    D. Seasons change because of the distance of the earth to the sun

Additional Activities

Earth's seasons change due to our planet's angle of tilt, 23.5 degrees relative to our orbit around the sun. This varies the energy received on the different regions on Earth leading to seasons. What will happen if the tilt earth changes to 90 degrees or 0? Will the energy received of the different regions of the Earth remain the same to have seasons?

Directions: Analyze the illustrations and explain your answer. Write your answer on a separate sheet of paper.

Earth's Tilt	Illustration	Explanation
90 degrees	 Illustrator: Jilea A. Yson	
0 degree	 Illustrator: Jilea A. Yson	

Answer Key

What I Know
1. C
2. B
3. B
4. C
5. D
6. D
7. D
8. D
9. B
10. D
11. B
12. D
13. C
14. D
15. C

Assessment
1. A
2. D
3. D
4. A
5. C
6. A
7. A
8. D
9. D
10. D
11. D
12. C
13. A
14. B
15. B

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