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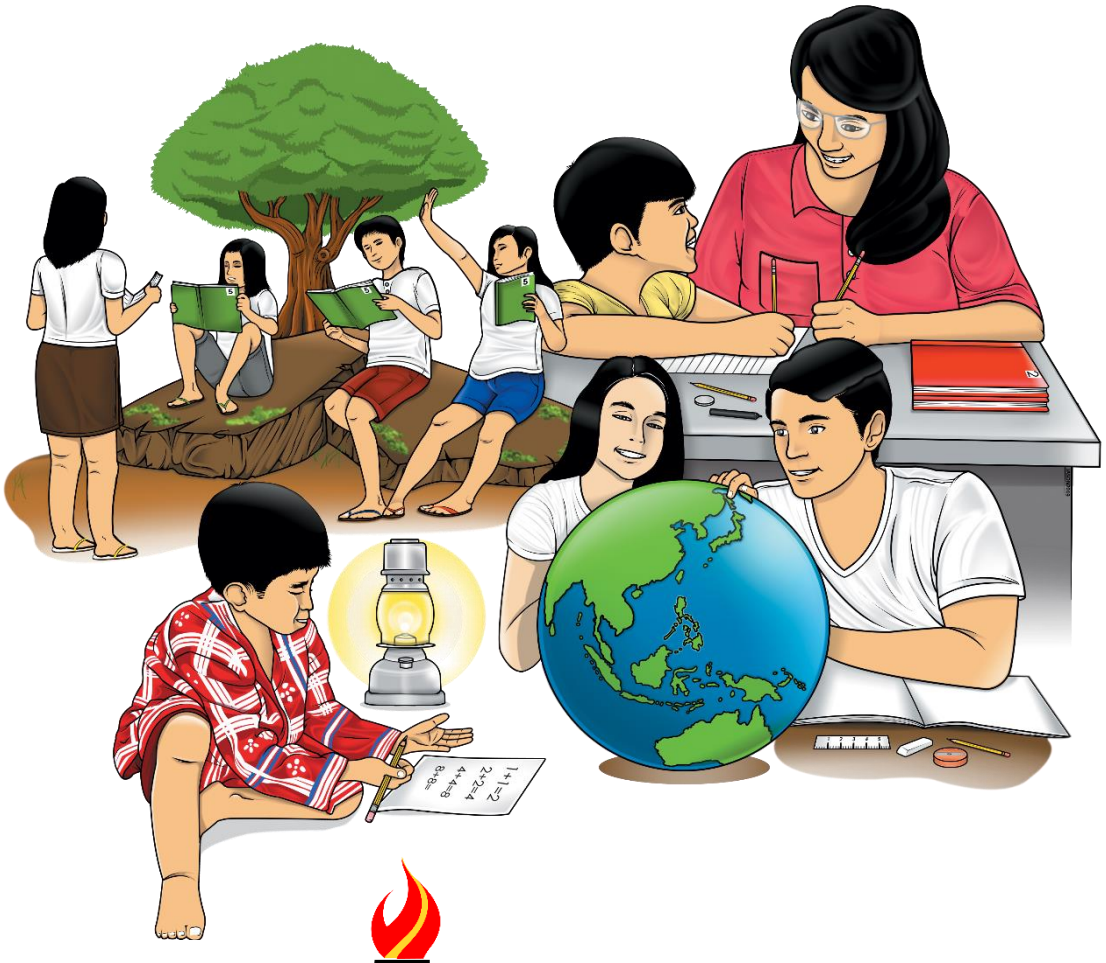
Science

Quarter 4 – Module 5:
Movements of the Earth



ALTERNATIVE DELIVERY MODE
ADM

Science – Grade 6
Alternative Delivery Mode
Quarter 4 – Module 5: Movements of the Earth
First Edition, 2020

Published by the Department of Education
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Undersecretary: Diosdado M. San Antonio

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Printed in the Philippines _____

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Movements of the Earth

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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

This module was designed and written with you in mind. It is here to help you differentiate between rotation and revolution and describe the effects of the Earth's motions (**S6ESIVe-f-5**). The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

This module focused on the following lessons:

- **Lesson 1** – The Earth's Rotation
- **Lesson 2** – The Earth's Revolution

After going through this module, you are expected to:

1. describe the Earth's movement on its axis and orbit;
2. explain how day and night happen as the Earth rotates on its axis;
3. using a globe, demonstrate how the Earth rotates on its axis;
4. demonstrate how the Earth revolves around the sun; and
5. appreciate the importance of the Earth's movements.

What I Know

Directions: Read the questions carefully and choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. Which of the following is the effect of the Earth's tilt and revolution?
   A. movement of wind
   B. occurrence of tides
   C. occurrence of seasons
   D. movement of water in seas

2. Which of the following statements is true?
   A. The Earth rotates on its axis once every 12 hours.
   B. The Earth rotates on its axis once every 24 hours.
   C. The Earth rotates on its axis once every 365 hours.
   D. The Earth rotates on its axis once every 365 days.

3. Which of these is the pathway of the Earth around the sun?
   A. Axis
   B. Orbit
   C. Ring
   D. Space

4. Which statement about the Earth is **false**?
   A. The Earth spins on its axis.
   B. The Earth revolves around the sun.
   C. The sun revolves around the Earth.
   D. The Earth travels on its orbit around the sun.

5. How many days would it take for the Earth to complete one revolution?
   A. 7 days
   B. 30 days
   C. 188 days
   D. 365 ¼ days

6. Which of these is the imaginary line where the Earth spins to complete one day?
   A. Axis
   B. Orbit
   C. Poles
   D. Latitude

7. Which of the following refers to the spinning movement of the Earth on its axis?
   A. Tilting
   B. Sliding
   C. Rotation
   D. Revolution

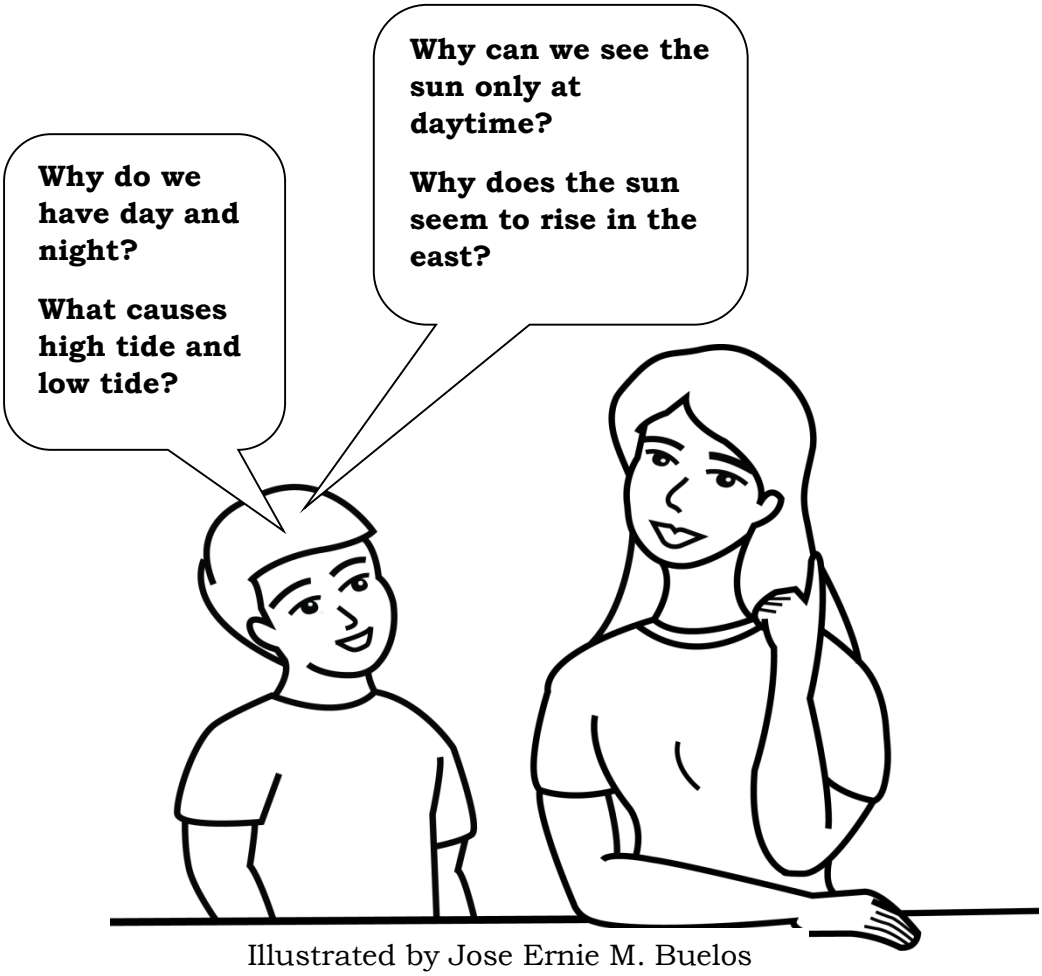
8. Which statement is **true** about the Earth's movement?
   A. Revolution causes day and night.
   B. The Earth rotates in a counterclockwise direction.
   C. Seasonal changes are effects of the Earth's rotation.
   D. Movement of water in the seas and oceans is an effect of the Earth's revolution.

9. Which statement is **false** about the Earth's orbit?
   A. Earth's orbit is slanted 23.5 degrees.
   B. An orbit is a circular path around the sun.
   C. An orbit is an imaginary route of the Earth around the sun.
   D. As the Earth spins on its axis, it also travels around its orbit.

10. Which of the following occur due to the rotation of the Earth on its axis?
   A. All parts of the Earth experience daytime
   B. All parts of the Earth experience nighttime.
   C. Part of the Earth facing the sun experience daytime while the part facing away experience nighttime.
   D. Part of the Earth facing the sun experience nighttime while the part facing away experience daytime.

Lesson 1 The Earth's Rotation

We are very curious about the things around us. We tend to ask how things exist and how they work. Look at the picture below.



Illustrated by Jose Ernie M. Buelos

Have you ever asked your parents similar questions? How did they answer?

The questions above are examples of what we commonly ask our parents as young kids. Seasonal changes and the occurrence of day and night are things we experience that may need to be explained to some. This module will be the key to answering these questions. This will focus on the Earth's movements—rotation and revolution.

What's In

Directions: Answer the following riddles. Select your answer in the box below. Write your answer on a separate sheet of paper.

1. I am the king of the solar system. I have my eight slaves that surround and never leave me. I share to them my heat and light. What am I?
2. I am a straight imaginary line. The Earth spins on me. What am I?
3. I am a circular path. I guide the Earth as it travels around the sun. What am I?
4. I am the third daughter of the sun. Among my siblings, I am the only one with life. I have plants and animals on me, and I am surrounded by many blue seas.
5. I look like your planet but I am small. What am I?

axis	Earth	globe	moon	orbit	sky	sun

What's New

Do you believe that the Earth is moving? How do you know that the Earth is moving? When the position of the stars, the sun and the moon that you observe from Earth changes, you will know that it is moving. Do activity 1 to see another evidence of the movement of the Earth.

Activity 1: The Spinning Earth

Objectives: At the end of this activity, I will be able to:

1. demonstrate how the Earth rotates on its axis using a globe, and
2. explain how day and night happen as the Earth rotates on its axis.

Materials: globe/ball, flashlight

Directions:

- Find a dark room.
- Ask the help of your parents or adult companion at home to turn on a flashlight and point it directly towards the globe or ball.
- Slowly turn the globe, ball or any round objects in a counterclockwise (West to East) movement.
- **Caution:** Do not play with the flashlight. Do not point the light directly to the eyes of your companion.
- The illustration below shows how you will do the activity.
- Answer the questions that follow.

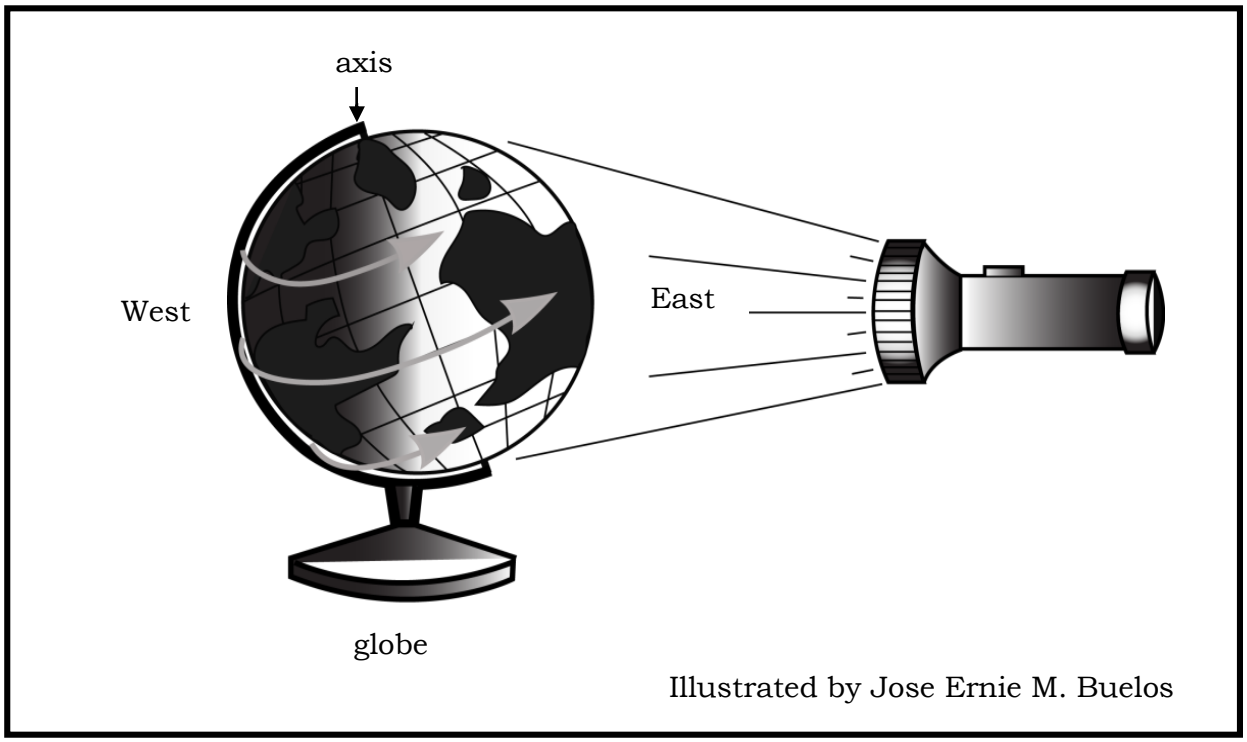


Figure 1. Activity Setup

Guide Questions:

1. What do the following objects represent in the illustration?

   A. Flashlight - _____
   B. Globe - _____

2. Which part of the globe or ball would receive light?

_____

_____

3. Would all parts of the globe or ball receive light at the same time from the flashlight? Why?

_____

_____

4. What would happen to the part of the Earth which receives light?

_____

_____

5. What would happen to the part of the Earth not receiving light?

_____

_____

What is It

In your first activity, the globe or the ball represents the Earth. A **globe** is a representation of our planet. The green areas represent land, while the blue areas represent water. The flashlight represents the sun. The sun gives off light energy to the planets in the solar system. When the globe moves in **counterclockwise** (East to West) motion, there are parts of the globe which directly face the light and there are also parts which are facing away from the light.

When the Earth spins on its axis, the part directly facing the sun experiences **daytime** while the part of the Earth which facing away from the sun experiences **nighttime**. An **axis** is an imaginary line where the Earth spins. It is tilted **23.5 degrees** and it extends from the North Pole to the South Pole. The spinning of the Earth on its axis is called **rotation**. It takes **24 hours** or one day to complete one rotation and this causes day and night. The counterclockwise spinning of the Earth on its axis makes the sun seems to rise in the East and seems to set on the West.

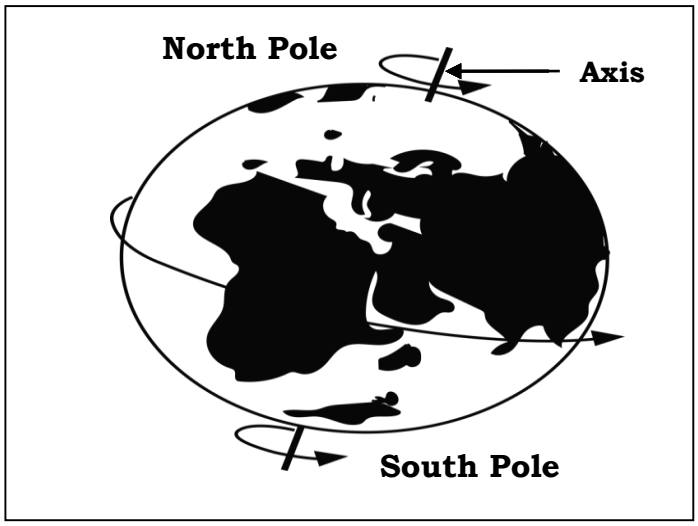


Figure 2. Earth's Rotation on its Axis
Illustrated by Jose Ernie M. Buelos

As the Earth rotates on its axis, objects that are not fixed on the ground such as air get deflected. The deflection of the air is called **Coriolis Effect**. This effect happens because different parts of the Earth move at different speed as it rotates on its axis. ~~Because~~ the Earth is an oblate spheroid, so the part near the equator is much wider compared to the poles. This means that movement of air in the equator is faster compared to the part near the North Pole or South Pole. The farther you go from the equator the slower is the movement of the air. Therefore, air is deflect~~ed~~ towards the right in the Northern Hemisphere and towards the left in the Southern Hemisphere instead of moving in straight patterns.

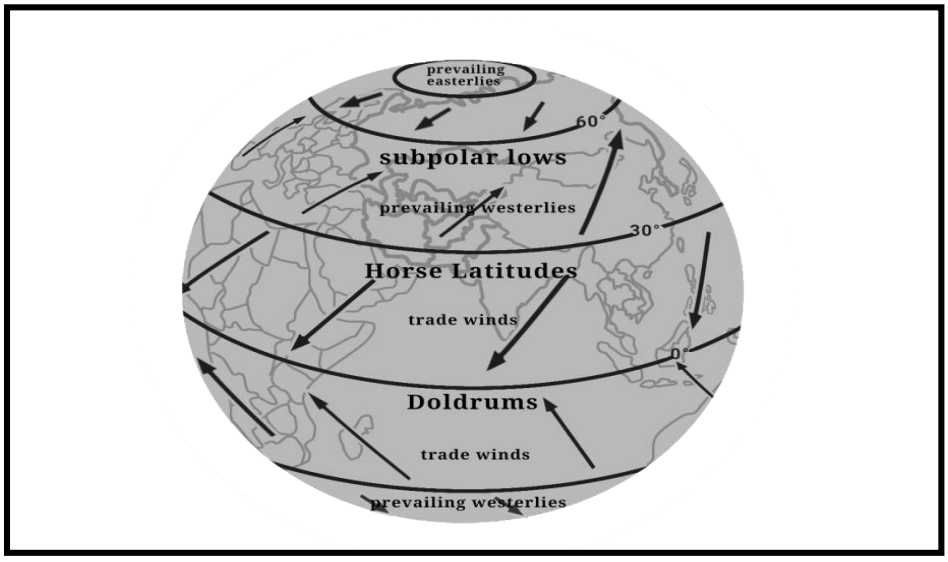


Figure 3. Coriolis Effect
Illustrated by Jomar P. Tajanlangit

The Coriolis Effect contributes to the circular motion of the wind. The deflected air affects the surface ocean currents, which occur on the open seas and oceans influencing the direction of the waves.

Coriolis Effect also influences the spinning directions of typhoons. Typhoons in the Northern Hemispheres spin in counter clockwise direction while typhoons in the Southern Hemispheres spins in clockwise direction.

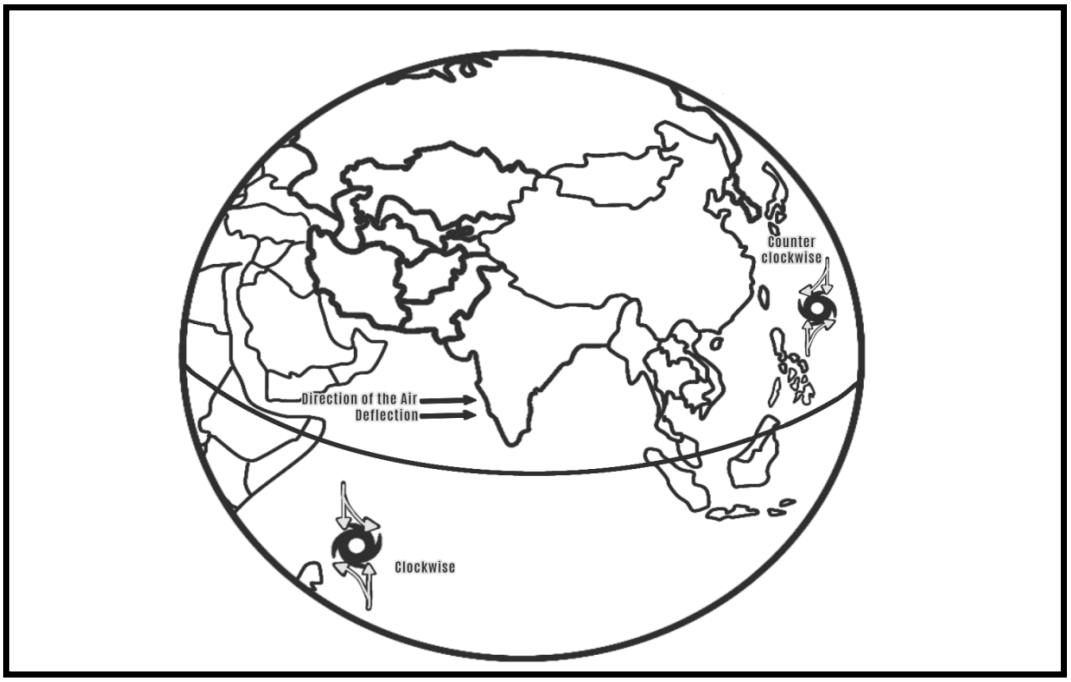
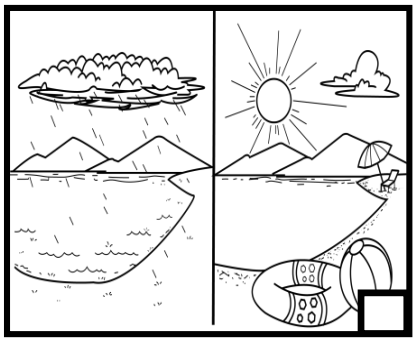


Figure 4. Direction of the Tropical Cyclones Due to Coriolis Effect
Illustrated by Jomar P. Tajanlangit

What's More

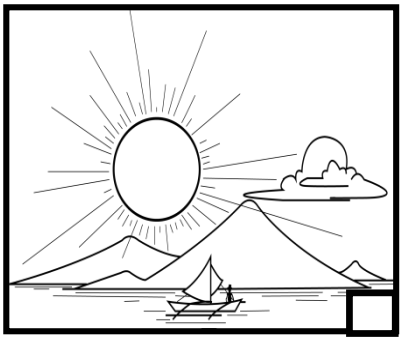
Directions: Write (✓) if the picture shows the effect of Earth's movement on its axis and (**x**) if it's not. Write your answer on a separate sheet of paper.

1



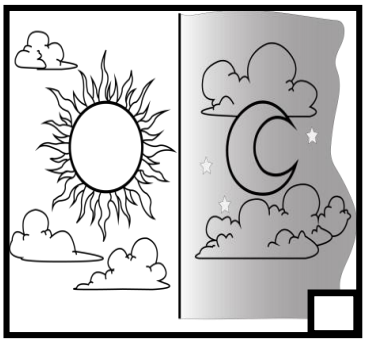
Change of Seasons

2



The sun seems to rise in the East

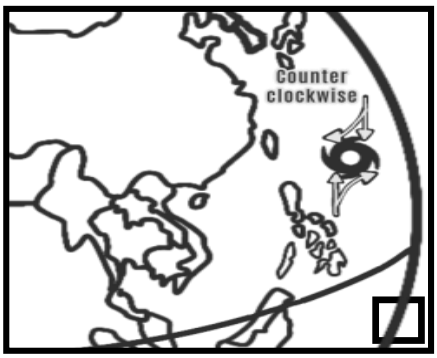
3



Day and Night

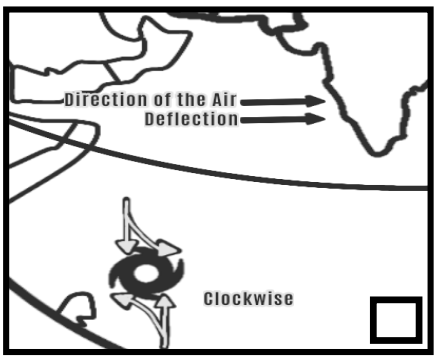
Illustrated by Jose Ernie M. Buelos

4



Direction of the spinning of tropical cyclones

5



Air Deflection

Illustrated by Jomar P. Tajanlangit

Guide question:

What are the different effects of Earth's rotation based on given the activity?

_____

_____

What I Have Learned

Directions: Complete the sentences by writing the correct word from the box. Write your answers on a separate sheet of paper.

24 hours	axis	Coriolis Effect	daytime
nighttime		rotation	

I have learned that:

1. The movement of the Earth on its axis is called _____. It causes day and night.
2. The part of the Earth which is facing the sun experiences _____.
3. The side of the Earth facing away from the sun experiences _____.
4. One complete rotation is equivalent to _____ or one day.
5. The deflection of the air as a result of Earth's rotation is called _____.

What I Can Do

Directions: Draw/illustrate the Earth's movement on its axis. Then, write three (3) effects of Earth's rotation below. Write your answer on a separate sheet of paper.

West

East

1. _____
2. _____
3. _____

Assessment

Directions: Choose the letter of the best answer. Write your answer on a separate sheet of paper.

1. Which of the following causes of day and night?
   A. rotation of the sun on its axis
   B. rotation of the Earth on its axis
   C. revolution of the moon around the sun
   D. revolution of the moon around the Earth

2. Which of the following statements about Earth's rotation is **true**?
   A. The Earth's rotation causes climate change.
   B. The Earth's rotation is equivalent to one day.
   C. The Earth's rotation is equivalent to one year.
   D. The Earth's rotation causes seasonal change.

3. Which of the following refers to imaginary line where the Earth spins?
   A. Axis
   B. Ellipse
   C. Orbit
   D. Pole

4. Which is **not** an effect of the Earth's rotation on its axis?
   A. Day and night
   B. Coriolis Effect
   C. Seasonal Changes
   D. Sun seems to rise on the East and set on the West

5. Which of the following is an effect of the Earth's rotation?
   A. Earthquake
   B. Coriolis Effect
   C. Movement clouds
   D. Change of seasons

6. Which is the effect of the counterclockwise movement of the Earth?
   A. The sun seems to rise in the East.
   B. The sun seems to rise in the West.
   C. The sun seems to rise in the North.
   D. The sun seems to rise in the South.

7. How long does it take for the planet Earth to complete one rotation?
   A. 21 hours
   B. 22 hours
   C. 23 hours
   D. 24 hours

8. Which condition is experienced in places facing the sun during Earth's rotation?
   A. Daytime
   B. Nighttime
   C. Darkness
   D. Cold temperature

9. Which is **true** about Earth's tilt on its axis?
   A. The Earth is tilted 0 degrees.
   B. The Earth is tilted 90 degrees.
   C. The Earth is tilted 22.5 degrees.
   D. The Earth is tilted 23.5 degrees.

10. Which of the following explains Coriolis effect?

   A. As the Earth rotates on its axis, air does not move
   B. As the Earth rotates on its axis, air remains stationary
   C. As the Earth rotates on its axis, air moves back and forth
   D. As the Earth rotates on its axis, air is deflected and changes its direction.

Additional Activities

Directions: Which of following activities can be **BEST** done during daytime or nighttime? Write **DT** if it is best done during daytime and **NT** if it is best done during nighttime.

_____1. Sleeping

_____2. Helping with the household chores

_____3. Sharing bedtime stories to younger siblings

_____4. Watching the stars on the sky

_____5. Eating breakfast

_____6. Playing

_____7. Going to School

_____8. Eating dinner

_____9. Going to mall

_____10. Watching the moon

Lesson 2 The Earth's Revolution

You have learned in your previous lesson about the Earth's rotation on its axis. In this lesson, you will learn another movement of the Earth through its imaginary path around the sun.

What's In

Directions: Arrange the scrambled letters to form the correct words being described. Write your answer on a separate sheet of paper.

No.	Word	Description
1	TATIROON	The spinning movement of the earth on its axis.
2	SIXA	Imaginary straight line where the Earth spins
3	ONRETIVOLU	The journey of the Earth around the sun
4	AREY	The complete travel time of the Earth's revolution
5	BORIT	Imaginary path that guides the Earth around the sun

What's New

You have learned in your first activity that Earth is moving on its axis. However, our planet also moves on its imaginary path around the sun. As you do your next activity, find out what this movement is and its effect.

Activity 2: The Travelling Earth

Objectives: At the end of this activity, I will be able to:

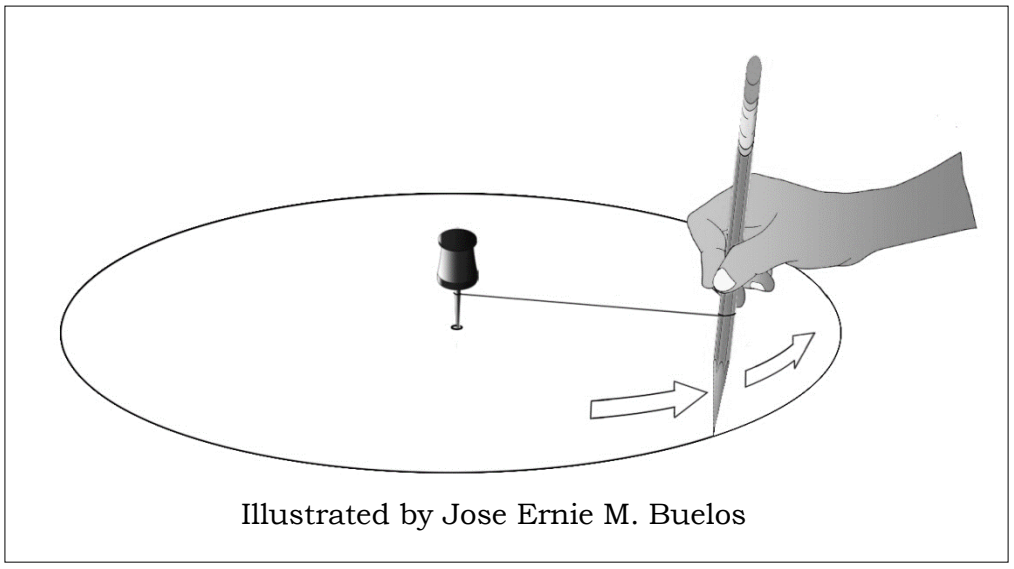
demonstrate how the Earth revolves around the sun

Materials:

- 1 clean sheet of paper
- six (6) inches string
- 1 pushpin
- 1 pencil

Directions:

1. Place the 1 clean sheet of paper on a table.
2. Set the pushpin at the center of the paper.
3. Loop the end of the string around the pushpin and the other end to the body of a pencil.
4. Move the pencil around to form a circular mark on the paper.
5. The illustration below shows how you will do the activity.
6. Answer the questions that follow



Illustrated by Jose Ernie M. Buelos

Figure 5. Activity Setup

Guide Questions:

1. What do the following materials represent in the activity?

   A. Pencil -_____

   B. Pushpin- _____

2. What does the circular path in your drawing represent~~s~~?_____

3. What do you call to the circular movement of the pencil around the pushpin? _____

4. Do you think Earth is also travelling around the sun just like in your activity? What are the evidences that the Earth is indeed travelling around the sun?

   _____

   _____

What is It

In your second activity, you have used the pencil to represent the Earth and the pushpin to represent the Sun. The circular mark around the pushpin represents the Earth's orbit. An **orbit** is an imaginary path of the Earth around the sun. As the Earth moves around the sun, revolution happens.

Revolution is the movement of the Earth on its orbit around the sun while it is tilted 23.5 degrees in its axis. One Earth's revolution is equivalent to **365 1/4 days** or **one year**.

Have you observed that the positions of the stars change from time to time? If the Earth is not moving, then each star will appear to be in the same place relative to other stars. When the Earth is on the other side while it revolves around the sun, star patterns from the other side cannot be seen on Earth. Indeed the Earth is revolving around the sun because the star patterns called **constellations** that can be seen at nighttime seems to change their positions.

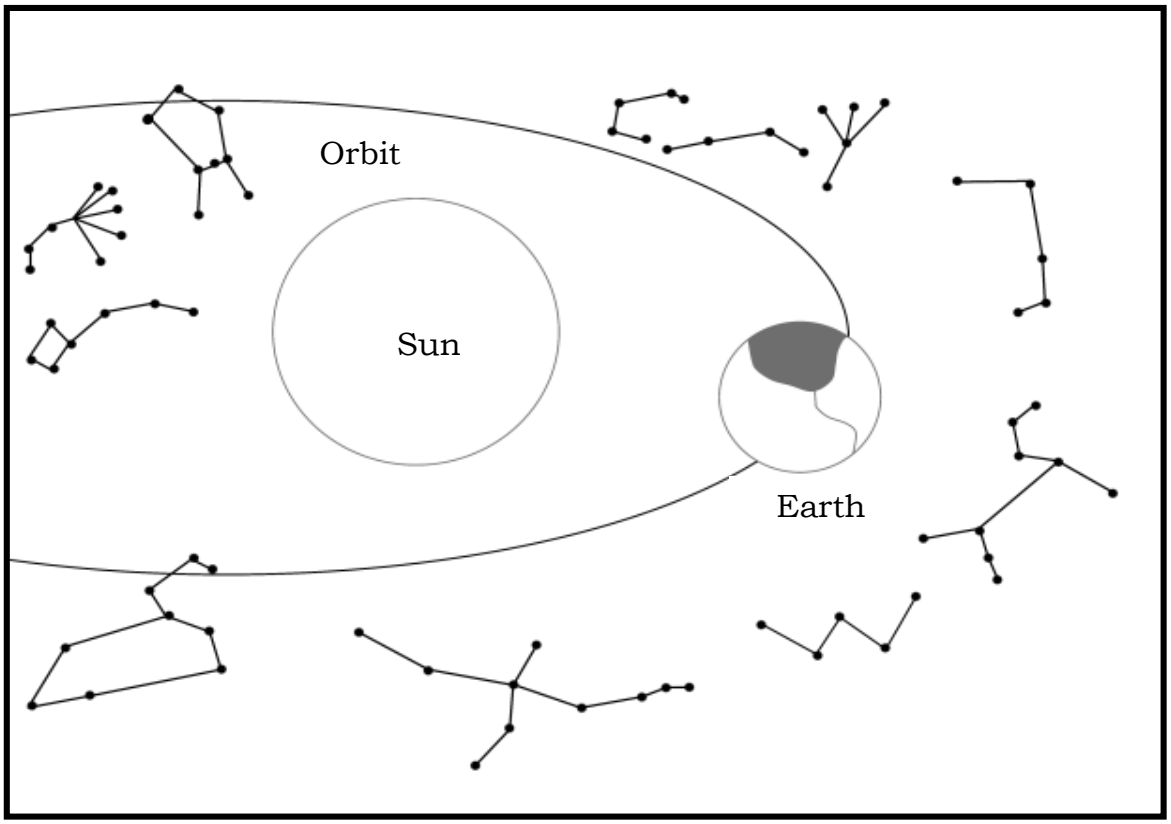


Figure 6. Constellations as Seen from the Earth
Illustrated by Jomar P. Tajanlangit

Another evidence that the Earth is revolving around the sun is the change of seasons. Study the illustration below.

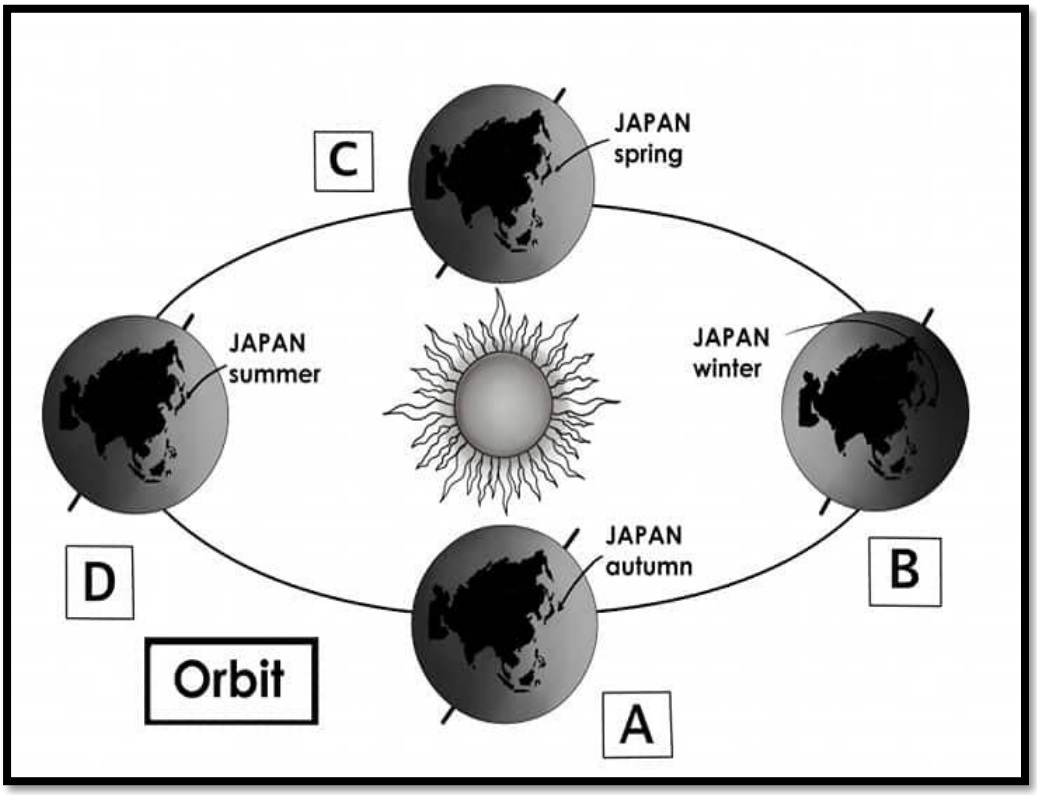


Figure 7. Change of Seasons in a Year
Illustrated by Jose Ernie M. Buelos

In position B, the amount of light received by Japan is lesser. It experiences winter season. In position D, the amount of light received by Japan is greater. It experiences summer season. However, in position A and C, the amount of light received by Japan is neither less or great. It experiences either autumn or spring.

Seasons are a temporary period of change in climate. Seasons change because of the unequal distribution of heat coming from the sun because of the Earth's tilted position as it revolves around the sun. If the Earth is tilted towards the sun, the country experiences summer. If it is tilted away, it is winter, and if it is neither tilted towards nor away, it is autumn or spring. Each season lasts for three months.

However, countries located near the equator, like the Philippines, have only two seasons—the wet and the dry seasons. This is because the equator receives equal amount of light throughout the year.

What's More

Directions: Write **true** if the statement is correct and **false** if it is incorrect. Write your answers on a separate sheet of paper.

_____1. The movement of the Earth around the sun is called rotation.

_____2. The Earth revolves around the sun through its orbit.

_____3. Revolution causes the change of seasons.

_____4. Seasons change because Earth is tilted while it revolves around the sun.

_____5. The Earth spins around its orbit in a clockwise movement.

What I Have Learned

Directions: Complete the sentences by supplying the correct word/s found in the box

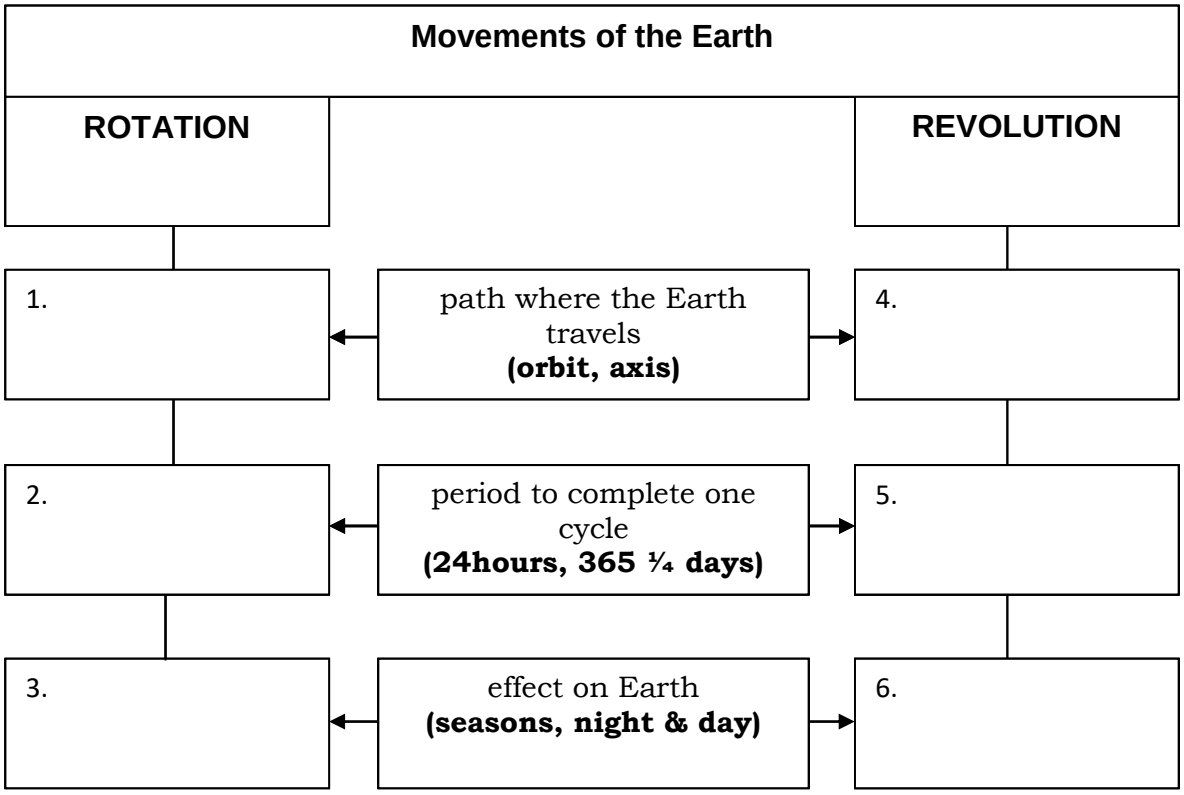
365 ¼ days		axis	orbit
revolution	rotation	season	sun

I have learned that:

1. The movement of the Earth on its orbit around the sun is called _____.
2. An imaginary circular path around the sun where Earth travels is called _____.
3. As the tilted Earth revolves around the _____, unequal distribution of light happens. This causes the change of season.
4. A temporary climatic change in a certain location is called _____.
5. The Earth revolves around its orbit once every _____ or one year.

What I Can Do

Directions: Differentiate Earth's **rotation** from **revolution** by completing the boxes in the diagram below. Select your answer which best describes to each movement from the parenthesis. Put your answers in their proper columns.



Guide Questions:

1. What are the differences between Earth's rotation from revolution?

_____

_____

_____

_____

Assessment

Directions: Choose the letter of the best answer. Write your answer on a separate sheet of paper.

1. Which causes the change of seasons?
   A. Revolution of the sun around the Earth
   B. Revolution of the sun around the moon
   C. Revolution of the Earth around the sun
   D. Revolution of the moon around the Earth

2. Which statement is **true** about the movement of the Earth?
   A. Earth moves around the sun on its axis.
   B. Earth moves around the sun through its ring.
   C. Earth moves around the sun through its orbit.
   D. Earth moves around the sun through its ring.

3. Approximately, how long does it take for the Earth to complete one revolution around the sun?
   A. 88 days
   B. 225 days
   C. 288 days
   D. 365 1/4 days

4. Which are the two seasons experienced in places near the equator?
   A. Wet and dry
   B. Fall and spring
   C. Dry and spring
   D. Summer and winter

5. Which of the following statements about the revolution of the Earth is correct?
   A. As the Earth spins on its axis, it causes climate change.
   B. As the Earth revolves around the sun, it causes day and night.
   C. As the Earth revolves around the sun, it also rotates on its axis.
   D. As the sun revolves around the Earth, it causes seasonal change.

6. Which of these statements is **true?**
   A. Axis is the path of Earth around the sun.
   B. Poles contribute to the unequal distribution of heat from the sun.
   C. The Earth's tilted orbit causes unequal distribution of heat from the sun.
   D. The Earth's tilted axis causes unequal distribution of heat from the sun.

7. How do you call the short climatic changes caused by the Earth's revolution around the sun?
   A. Coriolis
   B. Monsoon
   C. Season
   D. Weather

8. Which of the following is the evidence that the Earth is revolving around the sun?
   A. The climate condition remains the same.
   B. Tides in the ocean and seas changes.
   C. The position of clouds in the sky changes.
   D. The position of constellations changes as seen from Earth.

9. Why do different areas of the Earth receive a different amount of sunlight throughout a year?
   A. because the Earth is tilted
   B. because the Earth is sphere
   C. because the Earth is floating
   D. because the Earth is spinning

10. Which of these is the effect of Earth's revolution around the sun?
   A. direction of the wind changes
   B. direction of the typhoons changes
   C. direction of the ocean current changes
   D. positions of the constellations changes

Additional Activities

Directions: Make the following statements correct by selecting the correct word/words from the parenthesis. Write your answer on the separate sheet of paper.

1. Earth travels in its (orbit, axis) around the sun.
2. (Rotation, Revolution) causes the change of seasons.
3. It takes (24 hours, 365 ¼ days) to complete a period of revolution.
4. The change in position of constellations as seen from Earth is caused by Earth's (revolution, rotation).
5. Countries near the equator experience (two, four) seasons.

Answer Key

Lesson I: Earth's Rotation

What I Can Do *(Drawing/ illustrate on separate sheet of paper and write the three effects of the Earth's rotation below)* **Assessment** 1. B 2. B 3. A 4. C 5. B 6. A 7. D 8. A 9. D 10. D **Additional Activities** 1. NT 2. DT 3. NT 4. NT 5. DT 6. DT 7. DT 8. NT 9. DT 10. NT	4. The part of the Earth receives light experience daytime. 5. The part of the Earth which do not receive light experience nighttime. **What's More** 1. X 2. ✓ 3. ✓ 4. ✓ 5. ✓ Guide question. The different effects of the Earth's rotation are: • The sun seems to rise in the east • Day and night • Direction of tropical cyclones • Air deflection **What I have Learned** 1. Rotation 2. Daytime 3. Nighttime 4. 24 hours 5. Coriolis Effect	**What I Know** 1. C 2.B 3.B 4.C 5.D 6.A 7.C 8.B 9.A 10.C **What's In** 1. Sun 2. Axis 3. Orbit 4. Earth 5. Globe **What's New** 1. a. Flashlight - Sun b. Globe - Earth 2. The part of the globe or ball would receive light is the side facing towards the flashlight 3. No, because the globe is round. Therefore there are parts facing away from the light.

Lesson II: Earth's Revolution

Assessment	What I have Learned	What's In
1. C	1. Revolution	1. ROTATION
2. C	2. Orbit	2. AXIS
3. D	3. Sun	3. REVOLUTION
4. A	4. Season	4. YEAR
5. C	5. 365 ¼ days	5. ORBIT
6. D	**What I can Do**	
7. C	ROTATION	
8. D	1. Axis 2. 24 hours	**What's New**
9. A	3. night and day	1.
10. D	REVOLUTION 4. Orbit 5. 365 ¼ days 6. Seasons	A. Earth B. Sun 2. Orbit 3. Revolution
Additional Activities	Guide Questions:	4. Yes, the evidences are the change of the star patterns in the sky and the change of seasons.
1. Orbit	Rotation is the spinning movement of the Earth on its axis. It causes night and day. One complete rotation is equivalent to 24 hours or one day, however, revolution is the movement of the Earth around the sun in its imaginary path called orbit. One complete revolution is equivalent to 365 ¼ days or 1 year.	**What's More**
2. Revolution		1. False
3. 365 ¼ days		2. True
4. Revolution		3. True
5. two		4. True
		5. False

References

NOTE: All texts and illustrations in this SLM were originally developed and created.

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