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DepED
DEPARTMENT OF EDUCATION

Lesson Exemplar for Science

Quarter 3
Lesson
7

Lesson Exemplar for Science
Quarter 3: Lesson 7 of 8 (Week 7)
SY 2025-2026

Development Team

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SCIENCE (EARTH AND SPACE) /QUARTER 3 / GRADE 8

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	*The learners learn that:* 1. The interaction between the Sun, Earth, and Moon causes tides.
B. Performance Standards	By the end of the Quarter, learners identify that predictable interactions of the Sun-Earth-Moon system result in tidal effects.
C. Learning Competencies and Objectives	***Learning Competency*** 1. *The learners* relate the relative movements of the Earth, Moon, and Sun with the occurrence of tides ***Lesson Objectives*** 1. Demonstrate the movements of the Sun, the Earth, and the Moon; 2. Infer the phases of the Moon from the interaction of the Sun, Earth, and Moon; 3. Distinguish the salient difference between high and low tides; and 4. Realize how the moon and sun's gravitational forces on the Earth create tides.
D. Content	Moons and Tides
E. Integration	Non-belief in superstitions Empiricism - Empiricism is the practice of relying on observation and experiment rather than theory or pure logic. When it comes to understanding the relationship between moon phases and tides, it plays a crucial role in separating fact from fiction.

II. LEARNING RESOURCES
Helmenstine, A. (2022, May 11). *Phases of the moon - Lunar phases*. Science Notes and Projects. https://sciencenotes.org/phases-of-the-moon-lunar-phases/ Phil Hart. (2012, March 27). *Moon Phase animation.* https://www.youtube.com/watch?v=LHD4Pk0D8_g phystv. (2015, February 16). *Sun, earth, moon animation.* https://www.youtube.com/watch?v=_QcgDiF1a14

III. TEACHING AND LEARNING PROCEDURE		NOTES TO TEACHERS
A. Activating Prior Knowledge	**DAY 1** **1. Short Review** **Activity 1.** • Show an animated movement of the Sun, Earth, and Moon using this link: https://www.youtube.com/watch?v=_QcgDiF1a14 • Let students observe and come up with 5 observations and 5 inferences. • Divide the class into at least five (5) groups. • Each student shares their observations and inferences with their elbow partner. Then, they join another pair of students within their group, share their ideas, and listen to their new pairs' observations and inferences. • After they share them with the rest of the pairs, hand them each a blank paper. Within their group, they need to decide which observation and inference they will share in class. When they finish writing them, have them post them on the on the board. • Reconvene as a class and read over the observations and inferences made. Pick out key observations and inferences related to the Earth's and Moon's motion and movement around the Sun. **2. Feedback (Optional)** This optional sub-component involves giving qualitative feedback to performance or products done through homework or classroom activity from the previous day/week or lesson.	See Learning Activity Sheet: *Activity # 1: Three Bodies in Motion* Using the animated clip, ensure that students can identify each celestial body. Refrain from giving clues of what answers they are supposed to have such as the concepts of rotation, revolution, etc. Do not yet reveal if their observations are correct or not. This will be revisited in the unlocking of terms and/or by the end of the discussion.
B. Establishing Lesson Purpose	**1. Lesson Purpose** • Present the following learning objectives and emphasize the highlighted terms: • Demonstrate the **movements** of the Sun, the Earth, and the Moon; • Infer the **phases of the Moon** from the interaction of the Sun, Earth, and Moon; • Distinguish the salient difference between **high and low tides**; and • Realize how the **moon and sun's gravitational forces** on the Earth create tides.	You may call representatives to read each objective. Asking them the questions for processing can help you check their misconceptions and the context of their knowledge source.

- After presenting the objectives, ask the students what they think is the lesson focus today. Ask them to share their prior understanding of these terms and how they knew about them.

2. Unlocking Content Area Vocabulary

- Recall the animated movement of the Sun, Earth, and Moon using this link: https://youtu.be/_QcgDiF1a14?si=WKKnHPS12B2SLI_9
- Identify observations and inferences from their answers to identify terms related to the shapes of the Sun, Earth, and Moon, and their placement and movement.
- Ask the class to unjumble the letters in the table below and describe how these are observed in the video.

A. SIAX	**B. ETORAT**
C. LVOEERV	**D. TIOBR**

Brief Discussion Points:

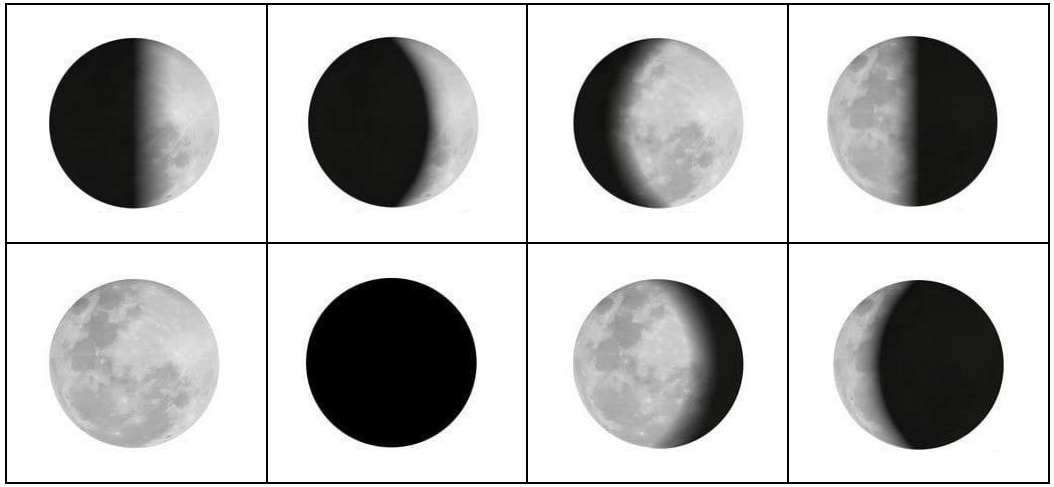
- **Axis** – the imaginary line by which the Earth rotates.
- **Rotate** – the spinning of the Earth about its axis
- **Revolve** – the movement of a body about another body such as the Earth to the Moon and the Moon to the Earth
- **Orbit** – an imaginary path of the revolving body such as the orbit of the Earth around the Sun and the orbit of the Moon around the Earth.

After processing their answers, transition them to the unlocking of the terms they will commonly encounter in the lesson.

Introduce and pre-teach vocabulary terms related to the motion of the planets and moon. Continue displaying the animated diagram and use it to identify terms related to the shapes of the Sun, Earth, and moon, and their placement, motion, and movement.

C. Developing and Deepening Understanding	**SUB-TOPIC 1: MOON REVOLUTION AND MOON PHASES** **1. Explicitation** **Activity 2.** • Ask the students to answer the question, "What is gravity?" in their worksheet. • Call five (5) students to sit together in the center of the room and share their ideas on the question, "What is gravity?" • The rest of the class listens attentively to compare what they have written and what is being shared in class. • Ask the students to share what are the common and different answers after the sharing. • To close the activity, ask the students how the concept of gravity is observed between the Earth and the Moon. *Discussion Points:* • Gravity or gravitational force is a non-contact force. This means objects do not have to be in contact feel the force they exert on each other. • On the surface of the Earth, it causes the objects to fall towards the ground. • The Moon keeps on revolving on its around Earth due to the Earth's gravity. The Moon must circle Earth in a curved route because of the constant inward pull of Earth's gravity. • Because of this interaction, the moon serves as the natural satellite of the Earth. o It has a rocky surface covered with craters, valleys, mountains, and flat areas. o It does not have water or air and is 1/4 the size of Earth. o It does not have its light; it only reflects the light from the sun. It takes about twenty days to revolve around the Earth. This revolution results in various views of the Moon from the Earth. **DAY 2** **2. Worked Example** **Activity 3.** • Divide the class into five (5) groups. • Ask each group to prepare a basketball, tennis ball, and a flashlight. • Ask them to dim the entire room by covering the windows. Assign a place in the room where the groups will stay.	See Learning Activity Sheet: *Activity #2: The Gravity* This activity connects the previous discussions in elementary earth science and physics topics with the new lesson. While students are doing the activity, you may start webbing the ideas on the board as you hear them. Ask the answers of the students in the synthesis questions in the worksheet and start processing it. The last point describing the moon is the take-off point to the activity in Day 2. See Learning Activity Sheet: *Activity #3: Celestial Dance* For the materials, you can contextualize and/or use

	• Let each group designate a student each to hold the flashlight (Sun), basketball (Earth), and tennis ball (Moon). • Assign the flashlight in the center, the basketball at arm's length from the flashlight, and the tennis ball just beside the basketball. • Ask the students to observe the basketball as it slowly spins on its axis and revolves around the flashlight; while the tennis ball revolves around, at a slower pace, the basketball. • Make sure that the flashlight points to where is the basketball. • Let the students do this for at least three revolutions or until all the questions in the worksheet are answered. • Emphasize that the students must focus on the tennis ball during the demonstration. *Guide Questions:* 1. As the basketball spins, which part of it faces the flashlight? How about facing away? 2. What can you infer from the different faces of the basketball lit by the flashlight while the tennis ball revolves around it? *Discussion Points:* • The gravity or gravitational force is responsible for the Earth, Sun, and Moon to keep their functions in the solar system. • One side of the Earth consistently faces the Sun as it rotates while the other side faces away. This represents the daytime and nighttime on the Earth, respectively. • As the Earth revolves with the Moon around the sun, different sides of it will be lit by the Sun. The manner in which the Sun's light hits the Earth at various angles explains why the different phases of the Moon. **DAY 3** **3. Lesson Activity** For this activity, briefly recall Activity No. 2 and what they have observed with the tennis ball as it revolves around and with the Earth. **Activity 4.** 1. Show the moon phases below. 2. Ask the students to arrange the images by examining the light depicted in each phase and use it to determine the pattern of the moon's appearance changes during each phase.	crumpled papers with different sizes to replace the basketball and tennis ball. Make sure that as you process this, let the students that the sun emits light throughout its surface. See Learning Activity Sheet: *Activity #4: Lunar Cycle*



1. Let the students redraw each phase of the Moon in the circles of the graphic organizer below if the light comes from the left as shown in the LAS.
2. For the outer part of the graphic organizer – the rectangles, connect the title of each phase of the moon and write a short description of each.
3. Let the students write an explanation at the bottom of their lunar cycle graphic organizer to the following question: *Why does the moon appear to change phase?*

Discussion points:

- Direct the discussion on the correct lunar cycle shown below.
- Highlight that the phase of the moon is evident due to the consequence of the motion of the Moon as it reflects the light of the Sun from its surface.

To bring this information to life and get them to start thinking about the phases of the moon, you may show them this short video about the moon.
https://www.youtube.com/watch?v=LHD4Pk0D8_g

The images and the name with the description of the moon phases can be posted on the board instead of giving each group of students a copy. In this way, it can be reused and convenient in your part

Phases of the Moon
Image Source:
sciencenotes.org

SUB-TOPIC 2: TIDES

1. Worked Example

Brainstorm. As a class, brainstorm the term 'TIDES'. You may ask them the following questions:

a. What do you know about the tides?
b. How often do they occur?
c. What causes the tides to come and go?
d. What is the influence of the sun and the moon?

Tidal Vocabulary: Show the words and definitions in class. Match up these terms with their corresponding definitions. Each term has two possible answers.

Column A	Column B
1. Tides	A. The highest point to which water rises on the seashore at each tide.
2. High Tide	B. This generally occurs due to the gravitational pull of the moon and the sun on the water mass of the sea.
3. Low Tide	C. The rise and fall of the surface of the ocean occurs approximately every twelve and a half hours.
4. Neap Tide	D. The highest and lowest tides of the month.
5. Spring Tide	E. It occurs when the moon and the sun are at right angles with the Earth and are weak because the gravitational force of the sun and the moon cancel each other out.
	F. It occurs when the Earth is not directly beneath the Moon, nor on the opposite side of the globe from the Moon
	G. The weakest tide (i.e. with relatively low "High Tides" and relatively high "Low Tides").
	H. The lowest point to which water descends on the seashore at each tide.

To transition to next sub-topic, mention to the class that it is not only the phases that we see manifest the effect of the movement of the Earth, Moon, and Sun. There is also the concept of "tides."

This will serve as an introduction of the concept on Tides. It is much recommended to use pictures of High and Low tide of your community so students can better understand.

ANSWER KEY:

1. B and C
2. A and I
3. H and F
4. E and G
5. D and J

	I. It occurs simultaneously on the side of the Earth when it is directly below the moon, and again on the opposite side of the Earth. J. It occurs when the moon and the sun are lined up with the Earth, so that their gravitational forces combine, causing the strongest pull on the Earth and the waters that cover it Further discussion of Tides can be done after introducing the terms above. To begin the conversation about the causes of tidal movement, ask these *guide questions*: • What makes waves on the ocean? (Wind) • What are tides? (The tide is the cyclic rising and falling of Earth's ocean surface.) • What makes tides go up and down? (The moon and sun) • Does the moon have gravity? (Yes) • Does the sun have gravity? (Yes) • What effect does the moon's gravity have on the ocean? (It causes a tidal bulge on the side of the Earth closest to the moon) These questions pertain to tidal movement. Moreover, you may demonstrate this one to show how moon causes the tidal movement. Ask students to follow you. *Place a rubber band on a table in a circular shape. It represents the oceans. Now place one finger in the middle of the rubber band. The finger represents the Earth and ocean's center of gravity. Call the finger "E". Now place a finger from your other hand along the inside edge of the rubber band. This finger represents the force the moon exerts on the Earth's oceans. Call this finger "M". Following a straight line, slowly pull M away from E. At this point, the rubber band stretches.* This is a simplistic model of the effect of differential gravitational forces on the oceans. The moon exerts a much stronger pull on the water molecules closest to it. The molecules on the other side of the Earth receive a much weaker pull. In very simple terms, the difference in the moon's pull on the two sides of the Earth creates a stretched effect on the oceans. These pulling forces are called ***Differential Gravitational Forces***.	Answer for the guide questions are those inside the parenthesis.

	DAY 4 **2. Lesson Activity** ***The Highs and the Lows***. This is a class demonstration of the Differential Gravitational Force caused by the Moon. • Divide the class into at most three (3) groups. • Have all students in the group except one form a tight circle, sitting or standing, with their elbows interlocked and facing inward. • The lone student represents the moon and walks slowly around the outside of the circle. As the moon passes by, the students in the circle who are nearest the moon lean toward it. The students on the opposite side of the circle also bulge out, representing differential gravitational forces. • After the moon passes by, the students return to an upright position. • If necessary and possible, the teacher can stand in the middle of each circle and point to where students should lean outward. • Have the moon stop at several points in the circle and let the class see where high and low tides are in relation to the moon's orbit. Note that high tides are the areas where the students are leaning out away from the center of the circle. Low tides are at the sides of the circle, halfway between the high tides. • Students take turns being the moon until everyone is leaning outward at the correct times. In addition to the moon, have another student play the sun. Students will now act out the combined gravitational pull of the moon and the sun. • For this scenario only demonstrate the areas where the sun is in alignment with the moon (**Spring Tide**) and where the sun, Earth, and moon form a 90^{o} angle (**Neap Tide**). • When the Sun, Earth, and moon are in alignment, the tides are more extreme. • When the Sun, Earth, and Moon form a 90^{o} angle, the gravitational pull of the Sun and Moon mostly cancel each other out. The difference between high and low neap tides is relatively small. *Guide Questions:* 1. If the Moon is pulling on one side, how is the other side affected?	The class will be modeling the impact of the Sun and the Moons on tides with the students' movement The circle is a very simplistic model of the Earth if it were covered with water at a consistent depth. Here, the student representing the water would bulge at the points nearest and farthest from the moon. At these points high tides are occurring. Make sure that you can identify which among your students represent the High tide and the Low tide. For the part 2 of the activity, include the Sun' gravitational force. Remember that there are two forces acting on the Earth with the Moon being the closer and having more influence on tides than that of the Sun.

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Possible student response: It also bulges on that side

2. Why does the Sun not move when we're modeling this? Or why is the Sun in a fixed point?

Possible student response: The Sun does not revolve around the Earth

3. What's pulling you back during the activity?

Possible student response: Gravity of the Sun and the Moon

4. What is causing the bulge?

Possible student response: Gravity pulling on the water

5. What do you notice when the Sun and the Moon are both pulling on the same side?

Possible student response: They create extremes in tides called spring tides.

Additional Discussion Points:

Tides are periodic rises and falls of large bodies of water. These are caused by the gravitational pull between the Earth, the Sun, and the Moon
Spring tides happen twice a month. This happens when there is a full moon and a new moon and the sun and moon are in line.
Because the sun is much farther away than the moon.
Spring tides are higher than normal, and storms can raise the height of tides due to the increased rainfall and winds. This increased water level can cause flooding near coastal areas.
Recreational users such as surfers, Livelihoods of fishermen, and Scientists studying the effects of tides

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<td>By understanding the scientific principles behind tides and moon phases, students can better evaluate superstitions and rely on evidence-based reasoning. This approach helps in developing a more accurate understanding of the natural world.</td>
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<td>D. Making Generalizations</td>
<td>
1. Learners' Takeaways
Exit Pass
Give Me A "?" and A "."
On a ½-crosswise pad paper, each student must give a "?" by writing a question based on the lesson and must give a "." by writing what they have learned.
<table>
<tr><th colspan="2">GIVE ME A "?" and A "."</th></tr>
<tr><td>?</td><td>.</td></tr>
<tr><td>Write here the question you have about our topic.</td><td>Write here what you have learned from our topic.</td></tr>
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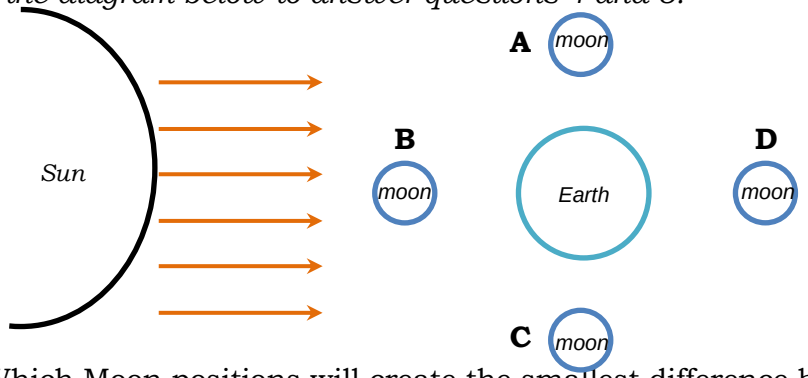
	2. Reflection on Learning ***Debunking Myths and Superstitions.*** Throughout history, various superstitions have been linked to the phases of the moon and the occurrence of tides. However, scientific understanding has debunked many of these myths. Read the statements below and provide a brief scientific explanation that refutes or supports the superstition associated with moon phases and tides. 1. The full moon causes strange behavior in people and animals. 2. A new moon can bring bad luck. 3. High tides during a full moon can lead to more accidents at sea. 4. The waning gibbous moon brings a time of decrease and decay. 5. Harvests are better if planted during a waxing moon. Possible Answers: 1. The belief that the full moon causes erratic behavior is a superstition. Scientifically, there is no credible evidence linking the full moon to changes in human or animal behavior. Studies have shown that the moon's gravitational pull affects large bodies of water, like oceans, but it does not have a significant impact on the human body or behavior, as the effect is too minuscule to cause any noticeable changes. 2. A new moon occurs when the moon is positioned between the Earth and the Sun, making it invisible from Earth. This is a natural and regular part of the lunar cycle that happens approximately every 29.5 days. There is no scientific basis for associating the new moon with bad luck. The new moon is simply a phase in the lunar cycle and has no impact on human fortunes. 3. While it is true that high tides are higher during a full moon (spring tides), there is no evidence to suggest that these higher tides lead to more accidents at sea. Mariners are well aware of tidal patterns and can plan accordingly. Modern navigation tools and weather forecasting further ensure the safety of sea travel, irrespective of the moon's phase. 4. The waning gibbous moon is the phase following the full moon, where the visible portion of the moon decreases. This phase is a regular part of the lunar cycle and has no intrinsic effect on growth or decay in nature. The concepts of	This activity will help students critically evaluate and understand why certain superstitions about the moon and tides are not scientifically valid.

	increase or decrease tied to moon phases are cultural beliefs rather than scientific facts. The natural processes of growth and decay are driven by environmental factors such as temperature, humidity, and biological activity, not lunar phases. 5. The belief that planting during a waxing moon leads to better harvests is a tradition in some agricultural practices, but scientific research does not support this. Plant growth is influenced by factors such as soil quality, water availability, climate conditions, and agricultural practices. The moon's phases have no direct impact on the growth cycles of plants.	

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		**NOTES TO TEACHERS**
A. Evaluating Learning	**1. Formative Assessment** 1. What are the "phases of the moon"? a. The repeating pattern of night and day b. The monthly pattern of lunar and solar eclipses c. The sequence of seasons the moon causes on Earth d. The different shapes of the moon as seen from Earth 2. Which statement describes the motion of the moon through space? a. The moon revolves around Earth as Earth revolves around the sun. b. The moon revolves around Earth but does not rotate on its axis. c. The moon revolves around the sun as the sun revolves around Earth. d. The moon does not revolve around Earth but does rotate on its axis 3. What would happen to the ocean if there wasn't a moon orbiting Earth? a. A moonless Earth would create weaker tides. b. A moonless Earth would cause the sun to dry up the Ocean leaving no water on planet Earth. c. A moonless Earth would mean that the water of the ocean would be equally distributed around the earth, and we would almost have no high or low tides at all.	**ANSWER KEY:** 1. D 2. A 3. A 4. A 5. B 6. D

d. Nothing will change. There will still be high tides and low tides

Refer to the diagram below to answer questions 4 and 5.



4. Which Moon positions will create the smallest difference between high tide and low tide?
   a. A or C b. B or C c. B or D d. C or D
5. The side of Earth that is directly opposite from the side that faces the moon is expected to have
   a. high tides. c. the fastest moving tides.
   b. low tides. d. the slowest moving tides.
6. Why does the Moon have a greater tidal effect than the Sun?
   a. The Moon has more mass than the Sun
   b. The Moon rotates faster than the Sun
   c. The Moon is a solid and the Sun is a gas
   d. The Moon is closer to the Earth than the Sun

2. Homework (Optional)

The teacher may give homework for extended deliberate practice.

A. Teacher's Remarks	*Note observations on any of the following areas:*	**Effective Practices**	**Problems Encountered**	This lesson design component prompts the teacher to record relevant observations and/or critical teaching events that he/she
	strategies explored			

<table>
<tr><td rowspan="3"></td><td>materials used</td><td></td><td></td><td rowspan="4">can reflect on to assess the achievement of objectives. The documenting of experiences is guided by possible areas for observation including teaching strategies employed, instructional materials used, learners' engagement in the tasks, and other notable instructional areas.

Notes here can also be on tasks that will be continued the next day or additional activities needed.

This lesson design component guides the teacher in reflecting on and for practice. Entries on this component will serve as inputs for the LAC sessions, which can center on sharing the best practices discussing problems encountered and actions to be taken; and identifying anticipated challenges and intended solutions. Guide questions or prompts may be provided here.</td></tr>
<tr><td>learner engagement/ interaction</td><td></td><td></td></tr>
<tr><td>Others</td><td></td><td></td></tr>
<tr><td>B. Teacher's Reflection</td><td colspan="3">Reflection guide or prompt can be on:

▪ <u>principles behind the teaching</u>
What principles and beliefs informed my lesson?
Why did I teach the lesson the way I did?

▪ <u>students</u>
What roles did my students play in my lesson?
What did my students learn? How did they learn?

▪ <u>ways forward</u>
What could I have done differently?
What can I explore in the next lesson?</td></tr>
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