4

Science 4

Microlearning Module

QUARTER 4 – Module 8

Changes in the Direction and Length of the Shadow

Microlearning Module

REGION XII - DIVISION OF SULTAN KUDARAT

Science 4
Microlearning Module (MLM)
Quarter 4 – Module 8: Changes in the Direction and Length of the Shadow
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MICROLEARNING MODULE

Name: _____Grade & Sec: _____ Score: _____
Subject: Science 4 Quarter: 4 MLM No. 8
Teacher: _____
Learning Competency: **The learners describe the changes in the direction and length of shadows from a shadow stick and use the information to infer why the Sun changes position during the day.**

Changes in the Direction and Length of Shadows

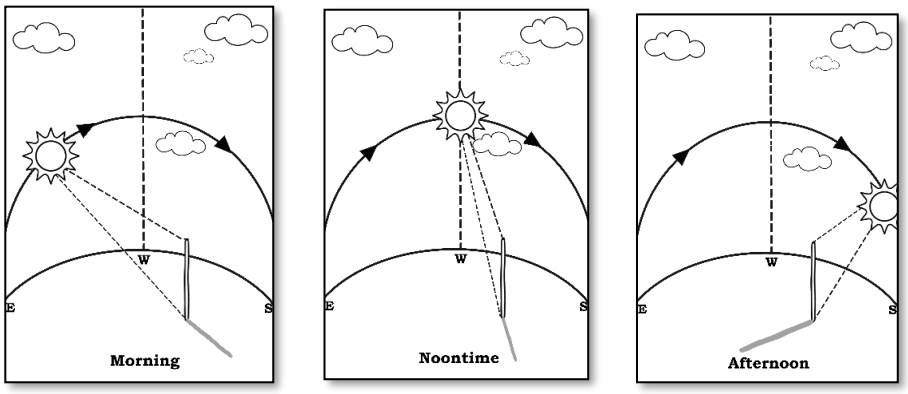
A. Look Back!

Direction: Put a mark (/) if the statement is correct and mark (X) if it is wrong. Write your answer on a separate sheet of paper.

1. The sun's core is the coolest part of the sun.
2. The sun's diameter is larger than 1 million kilometers.
3. The sun is a solid spherical object, not a gaseous body.
4. The sun is primarily composed of helium and hydrogen.
5. The sun radiates more infrared energy than visible light.

B. What's New?

Have you ever noticed how the shadow of trees or buildings changed during the day? Let us try this activity. This will reveal your initial conceptions and articulate your thoughts about shadow.



Activity B.1: Shadow Stick Predictions

Directions:

1. Look at the diagram or image of a shadow stick at different times of the day (e.g., morning, noontime, afternoon).
2. Predict how the direction and length of the shadow will change throughout the day.
3. Explain why this happens.

C. What Is It?

A **shadow** is the dark area or shape that appears on a surface when an object blocks light from reaching that surface. Shadows are formed when an object obstructs the path of light, casting a projection of that object onto another surface.

The direction and length of shadows are always shifting, and this can tell us a lot about the position of the Sun in the sky.

In the morning, you'll notice the shadow of the stick points to the east. As the day goes on, the shadow will slowly move, pointing more and more towards the west. By the afternoon, the shadow will be pointing west. By evening, the shadow will be pointing north.

Not only does the direction change, but the length of the shadow also changes. In the morning and evening, the shadow is long. Around midday, the shadow is the shortest.

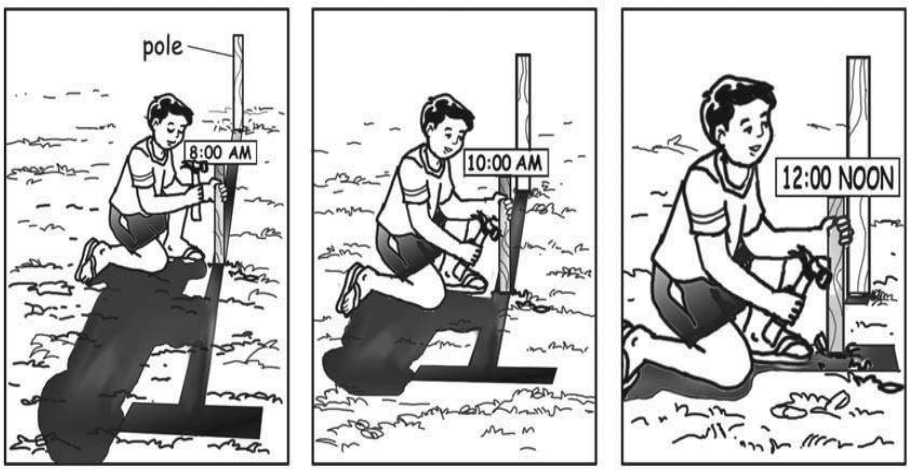
What does this all mean? It has to do with the position of the Sun. In the morning, the Sun is in the eastern part of the sky. As the Earth rotates, the Sun appears to move across the sky towards the west. By afternoon, the Sun is in the western part of the sky.

The changing direction of the shadow tells us the Sun is moving across the sky. The changing length of the shadow tells us the Sun is getting higher or lower in the sky during the day.

When the Sun is low in the sky, in the morning or evening, the shadow is long. When the Sun is high overhead at midday, the shadow is shortest.

By watching a simple shadow stick, we can learn a lot about how the Sun appears to move across the sky during the day. This is all due to the Earth's rotation, and how the Sun's position changes from our perspective on the ground.

D. Let's try!



Activity D.1: Shadow Stick Observation

Materials needed:

1. straight stick or wooden dowel (about 1-2 feet long)
2. chalk or marker
3. notebook and pencil
4. ruler

Directions:

1. Go outside on a sunny day and find a flat, open area to place your shadow sticks.
2. Firmly insert the stick into the ground, making sure it is standing straight up.
3. Observe the direction the shadow of the stick is pointing on the ground. Use the chalk or marker to trace the outline of the shadow.
4. Measure the length of the shadow in your notebook.
5. Wait 1 hour and observe the shadow again. Has the direction changed? Trace the new shadow outline and measure the length.
6. Repeat step 5 every hour throughout the day, continuing to observe, trace, and measure the shadow.
7. After your final observation, review the data you collected and record it using the table below.

Time	The actual length of the pool (cm)	Length of the shadow of the pool (cm)	Difference in length (cm)
8:00 am			
10:00 am			
12:00nn			
2:00 pm			

Guide Questions:

Write your answer on a separate sheet of paper.

1. How did the direction of the shadow change for the day? In which direction was it pointing at the start and end of the day?
2. Why do you think the shadow direction changed like this? What might this tell you about the sun's position in the sky?

3. How did the length of the shadow change from morning to afternoon? When was the shadow longest? When was it shortest?
4. Why do you think the shadow length changed during the day? What does this suggest about the sun's position?
5. Based on your observations, can you infer why the sun appears to change position in the sky throughout the day? What causes this apparent movement?

E. Let's Evaluate

Directions: Read each question carefully. Choose the best answer for each question and write it on a separate sheet of paper.

1. The shadow of a stick is the elongated dark area cast by the stick when it obstructs light rays from reaching the surface behind it. Around what time of day is the shadow of the stick shortest?
   A. midnight B. noon C. sunrise D. sunset

2. A shadow is an area of darkness created when an opaque object blocks light rays from a light source. How does the length of the shadow change from morning to afternoon?
   A. It gets longer C. It gets shorter
   B. It disappears D. It stays the same length

3. As the day goes on, the direction of the shadow cast by a vertical stick. Which likely to happen to the direction of the shadow cast by a vertical stick as the day goes on?
   A. it moves randomly
   B. it moves from east to west
   C. it moves from north to south
   D. it stays pointing in the same direction

4. The apparent movement of the sun across the sky during the day is caused by the rotation of the Earth on its axis. What causes the sun to appear to move across the sky during the day?
   A. The sun is moving.
   B. The Earth is rotating.
   C. The clouds are moving.
   D. The atmosphere is bending the light.

5. What is the main reason the sun appears to change position in the sky throughout the day?
   A. The Earth is rotating on its axis.
   B. The sun is moving across the sky.
   C. The clouds are moving in front of the sun.
   D. The atmosphere is bending the sun's light.

6. The direction of a shadow changes as the position of the light source relative to the object casting the shadow changes over time. Why does the shadow direction changes during the day?
   A. The stick is moving.
   B. The Earth is rotating.
   C. The sun is staying in one spot.
   D. The wind is blowing the shadow.

7. The length of a shadow depends on the angle of the light source relative to the object casting the shadow and the height of that object. Why is the shadow shortest at midday?
   A. The sun is not moving.
   B. The sun is lower in the sky.
   C. The sun is higher in the sky.
   D. The stick is shorter at midday.

8. How can watching a shadow stick help us understand the Sun's movement?
   A. It shows us when the sun rises and sets.
   B. It can't, shadows don't tell us about the sun.
   C. It shows us when the sun is directly overhead.
   D. It shows us how the sun appears to move across the sky.

9. Why is the shadow longer in the morning and evening compared to midday?
   A. The sun is higher in the sky at midday.
   B. The stick is taller in the morning and evening.
   C. The sun is brighter in the morning and evening.
   D. The ground is darker in the morning and evening.

10. How can observing changes in a shadow stick's help us understand the sun's movement?
   A. It can't, shadows don't tell us about the sun.
   B. It shows us when the sun rises and sets each day.
   C. It shows us how fast the sun is moving across the sky.
   D. It shows us the sun's position in the sky during the day.

F. References

Abutay et al. 2015. *Science Learner's Material*. Pasig City: LEXICON PRESS, INC.

Abutay et al. 2015. *Science Teacher's Guide*. Pasig City: LEXICON PRESS, INC.

Vedantu (2024) Shadows: Learn definition, properties and facts, VEDANTU.

https://www.sciencelearn.org.nz/resources/2771-light-and-shadows

https://www.google.com/search?q=SHADOW+OF+TREES&sca_esv=f99155e75c23de43&sca_upv=1&udm=2&tbs=sur:cl,ic:gray&source=lnt&sa=X&ved=2ahUKEwiP1Li40s2FAxUcxDgGHRspC5oQpwV6BAgCEA4&biw=1920&bih=953&dpr=1&safe=active&ssui=on#vhid=6P8qbTW2Tqu4jM&vssid=mosaic

ANSWER KEY

SCIENCE Grade 4
Quarter: 4 Module: 8

A. Look Back!

1. False 2. True 3. False 4. True 5. True

B. What's New?

Morning (8 AM):
The sun is low on the eastern horizon.
The shadow cast by the stick is long and elongated, stretching towards the west.
The shadow's length is longer than the height of the stick itself.
Noon 12 PM):
The sun is at its highest point in the sky.
The shadow cast by the stick is shortest and directly underneath the stick.
The shadow's length is minimal, possibly just a small circle or oval underneath the stick's base.
Afternoon 4 PM):
The sun starts to descend towards the western horizon.
The shadow cast by the stick is long and elongated again, but this time stretching towards the east.
The shadow's length is comparable to the morning shadow but in the opposite direction.

C. Let's try!

Answers may vary

E. Evaluation

1. B 2. A 3. B 4. B 5. A 6. B 7. C 8. D 9. A 10. D

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This Microlearning Module has been developed by DepEd - Division of Sultan Kudarat for educational purposes only. It is designed to supplement classroom instruction and should not be used as the sole source of information. Teachers are encouraged to exercise their professional discretion and tailor the content to suit their students' individual needs.

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