

“Sky Watchers”

Grade 4 – Summative Assessment

Assessed Understandings

Students will understand:

1. As the Earth rotates, the Sun rises in the east, moves across the sky, and sets in the west. The position of the Sun in the sky appears to change over the course of the day.
2. The day to night cycle is caused by the Earth’s rotation. The Earth makes one complete rotation every 24 hours.
3. The appearance of the Moon changes shape in a predictable, repeated, monthly pattern of phases.
4. Technology allows us to view and study the Solar System.
5. The Moon and Sun appear to be the same size because of the distance from the observer.

Teacher Notes for the “Sky Watchers” Assessment

Introduction

These items are designed to provide an assessment of what students know and understand at the completion of the *Building Blocks of Science Sky Watchers* module. This document includes teacher directions, response sheets for the individual students, and analytic scoring rubrics for each question. A separate document contains the anchor papers for each question. **A close look at the rubrics prior to the administration of the assessment will be helpful to the teacher.**

Time and Preparation for the Assessment

This assessment should take about **45 minutes** to administer. You are free to read aloud any or all portions of the assessment to your students. Without giving away a more appropriate response, please help students understand the intent of the question or task. This is not a test of reading, writing, or artistic ability. Students may be encouraged to use any and all resources available, including material from classroom charts and individual journals. Please use the **terminology** from the investigations within the kit.

Directions for Administration

There is no additional preparation for this assessment.

Question 1: This question reflects the student’s understanding of the cause for day and night on Earth.

1. Why don’t we see the Sun at night?

Question 2: Cycles of the Earth found in nature and in the study of the sky are predictable and observable. This question will give teachers insight into the student’s ability to make a connection between day and night.

2. What is happening to the Earth to cause the day and night cycle? How long is the day to night cycle?

Question 3: The concept of the Earth rotating depends on the students understanding of day and night. From a picture of the Earth, the students are asked to explain daytime and nighttime.

3. Look at the picture above.
 - a. Where is it daytime? _____
Explain how you know. _____
 - b. Where is it nighttime? _____
Explain how you know. _____

Question 4: In scientific drawings, it is important to make accurate illustrations with labels.

- a. Look at the shadows of the flags in the pictures below.
Label the pictures: morning, noon, and evening.
Draw the position of the Sun in each picture.

- b. As the Earth rotates on its axis, the Sun appears to move across the sky from east to west. Describe the position (direction) of the Sun as it appears to move throughout the day.

Question 5: Students transfer of knowledge can be shown through their understanding of the Moon and its phases.

- 5. Is this the only phase of the moon that will ever be seen in Delaware? Explain your answer.

Question 6: The development of technology has allowed us to view and study space phenomena.

- 6. We send rockets into space. We use telescopes to observe objects in the space. How has this technology helped us learn more about the Solar System?

Question 7: The Sun is much larger than the Moon. Although the Moon is closer to Earth than the Sun, the two appear to be the same size when viewed from Earth. This is because objects appear smaller as the distance from the viewer increases.

- 7. The Sun is much bigger in size than the Moon but to us, the Sun and Moon appear to be the same size. Explain why.

Scoring Rubrics “Sky Watchers” Summative Assessment

1. Why don't we see the Sun at night?

This item measures the student's understanding of the cause for day and night.

Criterion for a complete response:

1. States that the Earth is facing away from the Sun at night (or similar response).

Code	Response
	<i>Complete Response</i>
10	Meets the criterion.
19	Any other scientifically correct response.
	<i>Incorrect Response</i>
70	Gives no indication of knowing the Earth is not facing toward the Sun.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

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| 2. What is happening to the Earth to cause the day and night cycle? How long is the day and night cycle? |
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This item measures the student's ability to explain how the cycle of day to night is caused by the Earth's rotation on its axis every 24 hours.

Criteria for a complete response:

1. States that day and night are caused by the rotation of the Earth on its axis. Example: We see day where the side of the Earth is facing the Sun and night on the side of the Earth facing away from the Sun as the Earth rotates on its axis.
2. States that it takes 24 hours for the Earth to completely rotate on its axis.

Code	Response
	<i>Complete Response</i>
20	Meets the criteria.
29	Any other scientifically correct response.
	<i>Partially Correct Response</i>
10	States that day and night are caused by the Earth facing towards or away from the Sun with no mention of the Earth turning on its axis taking 24 hours.
11	States that the Earth takes 24 hours to completely rotate but does not explain the relationship to day and night.
19	Any other partially correct response.
	<i>Incorrect Response</i>
70	Indicates that day and night are caused by the rising and setting of the Sun.
76	Repeats the stem of the question.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

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| 3. Look at the picture above.
a. Where is it daytime? Explain how you know.
b. Where is it nighttime? Explain how you know. |
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This item measures the student's ability to explain why we see day and night in particular locations on the Earth.

Criteria for a complete response:

1. States that it is daytime in the United States and nighttime in Japan.
2. Explanation includes the Sun is shining on the side of the Earth facing the United States, and it is not shining on the side of the Earth where Japan is located.

Code	Response
	<i>Complete Response</i>
20	Meets the criteria.
29	Any other scientifically correct response.
	<i>Partially Correct Response</i>
10	States that the United States is in the daytime and Japan is in the nighttime but gives an incorrect explanation.
11	States that daylight occurs on the side of the Earth facing the Sun and nighttime on the side of the Earth facing away from the Sun but incorrectly states that Japan is in daylight and the United States is in night.
19	Any other partially correct response.
	<i>Incorrect Response</i>
70	Gives incorrect or no explanation for day and night and which location is experiencing day and night.
76	Repeats the stem of the question.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

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| 4a. Look at the shadows of the flags in the pictures below. Label the pictures: morning, noon, and evening. Draw the position of the Sun in each picture. |
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This item measures the student's ability to explain that as the Sun gets higher in the sky closer to the middle of the day, the shadow will become shorter. The Sun rises low in the horizon from the east, rises to its highest point in the south around midday and slowly begins to set in the west toward the end of the day (in Delaware).

Criteria for a complete response:

1. Labels the first picture "noon," the middle picture as "morning," and the last picture as "evening."
2. Draws the Sun in the first picture as directly or nearly directly over the flag. Draws the Sun in the second picture as being in the western sky. Draws the Sun in the third picture as being in the eastern sky.

Code	Response
	<i>Complete Response</i>
20	Meets the criteria.
29	Any other scientifically correct response.
	<i>Partially Correct Response</i>
10	Student correctly labels the pictures and incorrectly positions the Sun (in one or more pictures).
11	Student correctly positions the Sun and incorrectly labels the pictures (in one or more pictures).
19	Any other partially correct response.
	<i>Incorrect Response</i>
70	Gives incorrect positions with no labels.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

4b. Describe the position (direction) of the Sun as it appears to move throughout the day.
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This item measures student's ability to describe the path of the Sun throughout the day as rising in the east, moving nearly overhead at noon, and setting in the west.

Criterion for a complete response:

1. States that the Sun rises in the east, moves overhead, and sets in the west.

Code	Response
	<i>Complete Response</i>
10	Meets the criterion.
19	Any other scientifically correct response.
	<i>Incorrect Response</i>
70	Gives incorrect or no explanation.
76	Repeats the stem of the question.
79	Any other incorrect response.
	<i>Non response</i>
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

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| 5. Is this the only phase of the Moon that will ever be seen in Delaware? Explain your answer. |
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This item measures the student's ability to recognize that the Moon goes through phases over a period of a month.

Criteria for a complete response:

1. Recognizes that the Crescent moon is not the only phase of the Moon.
2. Explains that the Moon goes through a series of changes and is seen anywhere from a full moon to a crescent to nothing at all. (Note: Student does not need to use the term "phases" nor describe each phase but does need to give indication of other phases. Use of the term "phases" is not a sufficient explanation.)

Code	Response
	<i>Complete Response</i>
20	Meets the criteria.
29	Any other scientifically correct response.
	<i>Partially Correct Response</i>
10	Student states that this is not the only phase of the Moon but does not give an explanation.
11	Student indicates that the Moon goes through phases but does not explain what is meant by phases.
19	Any other partially correct response.
	<i>Incorrect Response</i>
70	Gives incorrect or no explanation.
76	Repeats the stem of the question.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

6. We send rockets into space. We use telescopes to observe objects in space. How has this technology helped us learn more about the Solar System?
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This item measures the student's ability to explain how technology has allowed us to study the Solar System.

Criterion for a complete response:

1. Implies that technology allows us to view, photograph, and draw conclusions about the objects in our Solar System.

Code	Response
	<i>Complete Response</i>
20	Meets the criterion.
29	Any other scientifically correct response.
	<i>Partially Correct Response</i>
10	States an activity (e.g., Hubble telescope, shuttle missions, etc.) but with no explanation.
11	Cites examples of other technology not related to space.
19	Any other partially correct response.
	<i>Incorrect Response</i>
70	Gives incorrect or no explanation for this question.
76	Repeats the stem of the question.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.

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| 7. The Sun is much bigger in size than the Moon but to us, the Sun and Moon appear to be the same size. Explain why. |
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This item measures student's understanding of the size/distance relationship of objects.

Criterion for a complete response:

1. States that the Sun is much farther away from us than the Moon so it appears to be smaller.

Code	Response
	<i>Complete Response</i>
10	Meets the criterion.
19	Any other scientifically correct response.
	<i>Incorrect Response</i>
70	Gives incorrect or no explanation.
76	Repeats the stem of the question.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crossed out, erased, illegible, or impossible to interpret.
99	Blank.