

Planetary Systems Summative Assessment Teacher Rubrics

1. Why does using models make it easier to understand planetary systems? Describe one example of how using models has helped in your understanding of planetary relationships.

This item measures the student’s ability to recognize the need for models in the classroom when showing the position, movement, and size of planetary objects.

Criteria:

1. Student states that models are the only realistic way to show the visual relationships between Earth, Moon, Sun, and planets because planetary diameters are too large and/or astronomical distances are too vast.
2. Student describes at least one modeling situation that furthered their personal knowledge of planetary systems (example: rotation, revolution, phases, orbits, diameters, distances, etc.)

Code	Response
	<i>Correct Response</i>
20	Meets criteria above.
29	Any other completely correct response.
	<i>Partially Complete Response</i>
10	Explains size and/or distance issues but does not give personal modeling experience.
11	Gives personal modeling experience but does not explain rationale for using models.
19	Any other partially correct response.
	<i>Incorrect Response</i>
70	Provides incorrect rationale—example: “It is easier.”
76	Repeats the stem of the question.
79	Any other incorrect response
	<i>Non-Response</i>
90	Crosses out, erases, illegible, or impossible to interpret.
99	Blank.

2. Shade the side of the Earth model that is experiencing night. If Earth’s period of rotation became faster, how would it affect the number of hours of daylight? Explain.

This item measures the student’s ability to explain the regular and predictable motion of Earth’s rotation on its axis that causes day/night.

Criteria:

1. Student clearly shades one-half of the Earth facing away from the sun. Night occurs when the side of Earth away from the sun is not illuminated (Side A is shaded).
2. Student states that length of day and night is dependent on the rate of the Earth’s rotation on its axis. If rotational period is decreased, then so is day/night length.

Code	Response
	<i>Correct Response</i>
20	Meets criteria above.
29	Any other completely correct response.
	<i>Partially Complete Response</i>
10	Shades partial (not fully half) of side A but correctly explains rotational period and day length relationship.
11	Correctly shades side A but insufficient explanation for day length decrease—example: hours of daylight will become shorter.
12	Correctly shades side A but incorrect explanation of rotational period and day length—example: longer day length.
19	Any other partially correct response.
	<i>Incorrect Response</i>
70	Incorrect shading (of any sort) and incorrect explanation of rotational period and day length.
71	Incorrect shading (of any sort) and insufficient explanation for day length decrease—example: hours of daylight will become shorter.
76	Repeats stem of question.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crosses out, erases, illegible, or impossible to interpret.
99	Blank.

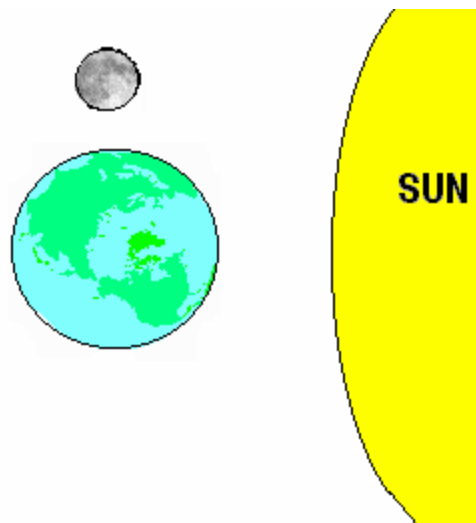
3. The diagram above shows the Moon's phase as seen from Earth. In the space provided below, draw and label the position of the Moon during this phase. Make sure the Moon is drawn to scale with the Earth's diameter.

This item measures the student's ability to construct and explain an accurate scale model representing Earth/Moon positional relationships which create phases.

Criteria:

1. Student draws Moon at a vertical right angle to the Earth and Sun.
2. Student draws Moon (1:4 approximately) in relative size to the Earth.

Code	Response
	<i>Correct Response</i>
20	Meets criteria above.
29	Any other completely correct response.
	<i>Partially Complete Response</i>
10	Draws Earth/Moon approximate sizes correctly but Moon is incorrectly placed.
11	Moon is correctly placed but size relationship is not in approximate scale.
19	Any other partially correct response.
	<i>Incorrect Response</i>
70	Incorrect Earth/Moon size relationship and incorrect placement of Moon.
76	Repeats stem of question.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crosses out, erases, illegible, or impossible to interpret.
99	Blank.



4. The moon goes through several phases in one month. One-half of the Moon is always illuminated. Explain what causes the phases of the moon?

This item measures the student's understanding of the relationship between the relative position of an orbital body and the source of illumination as seen from another point in space.

Criteria:

1. Student describes the moon's revolution around the Earth.
2. As a result of the moon's orbit around the Earth, we see a different amount of the lit portion of the moon.

Code	Response
	<i>Correct Response</i>
20	Meets criteria above.
29	Any other completely correct response.
	<i>Partially Complete Response</i>
10	Correctly describes Moon's revolution around Earth does not cite different angle viewpoint.
11	Correctly cites different angle viewpoint but does not identify Moon's orbit as reason.
12	Includes correct concepts but confuses moon's rotation and revolution.
19	Any other partially complete response.
	<i>Incorrect Response</i>
70	States that the moon changes shape.
71	States the Earth's shadow causes the phases.
72	States that the Moon's rotation causes the phases.
76	Repeats stem of question.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crosses out, erases, illegible, or impossible to interpret.
99	Blank.

5. If Earth, Moon, and Sun were in the following orientation, which lettered location(s) on the Earth would experience high tide? In the space provided below explain why.

This item measures the student’s understanding of the Moon and Sun’s gravitational influence on the Earth’s tides. *Teacher Note:* The Moon’s gravitational influence is twice that of the Sun. Therefore, the Sun’s gravitational influence on tides may be omitted in student explanation.

Criteria:

1. Student identifies w and y as areas of high tide on Earth.
2. Student describes the Moon’s gravitational pull on Earth’s waters (the Moon’s gravitational pull on Earth itself, the Sun’s gravitational pull on Earth’s water, and there is an effect on the opposite side caused by the rotation of the Earth).

Code	Response
	<i>Correct Response</i>
20	Meets criteria above.
29	Any other completely correct response.
	<i>Partially Complete Response</i>
10	Identifies either w or y but not both. Correctly describes the gravitational pull.
11	Identifies both w and y but no explanation.
12	Identifies both w and y but states that the Moon’s gravity causes w and the Sun’s gravity causes y.
13	Identifies both w and y but states incorrect reasoning.
19	Any other partially complete response.
	<i>Incorrect Response</i>
70	States x and/or z.
71	Identifies either w or y or both with an incorrect explanation.
76	Repeats stem of question.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crosses out, erases, illegible, or impossible to interpret.
99	Blank.

6. Describe two conditions on Earth and how they make it suitable for life as we know it?

This item measures the student’s ability to explain the conditions that make Earth suitable for life.

Criteria:

1. Student states that Earth has any two of the following parameters—a suitable temperature range, atmosphere, liquid water, gravity, etc.
2. Student accurately describes how the conditions support life on Earth.

Code	Response
	<i>Correct Response</i>
20	Meets criteria above.
29	Any other completely correct response with at least two criteria.
	<i>Partially Complete Response</i>
10	States only 1 of the criteria with reasonable explanation.
11	States 2 of the criteria with no explanation.
12	States 2 criteria but explains only 1.
19	Any other partially complete response.
	<i>Incorrect Response</i>
70	States food as a condition.
71	States plants as a condition.
76	Repeats stem of question.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crosses out, erases, illegible, or impossible to interpret.
99	Blank.

7. Mars has two moons, Phobos and Deimos. Use the diagram below and state which moon (if any) has more of a gravitational affect on Mars. Explain?

This item measures the student’s understanding of gravity as a force that acts between masses over long distances.

Criteria for a correct response:

1. States that Phobos would have greater gravitational influence because it is more massive than Deimos.
2. States that Phobos would have greater gravitational influence because it is closer.

Code	Response
	<i>Correct Response</i>
20	Meets criteria above.
29	Any other completely correct response.
	<i>Partially Complete Response</i>
10	States 1 but not 2.
11	States 2 but not 1.
19	Any other partially complete response.
	<i>Incorrect Response</i>
70	States Deimos has greater influence.
76	Repeats stem of question.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crosses out, erases, illegible, or impossible to interpret.
99	Blank.

8. Use 2 examples to explain how technology has advanced our understanding of the solar system.

This item measures the student’s ability to recognize how technological advances have increased our understanding of the solar system.

Criteria for a correct response:

1. Identifies and explains 2 examples of technology that has led to changes in our understanding of the solar system.

Code	Response
	<i>Correct Response</i>
20	Meets criteria above.
29	Any other completely correct response.
	<i>Partially Complete Response</i>
10	Gives 1 example and a logical explanation.
11	Gives 2 examples but only explains one.
19	Any other partially complete response.
	<i>Incorrect Response</i>
70	Only lists 2 examples with no explanation.
71	Gives 2 reasonable examples but incorrect explanation.
76	Repeats stem of question.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crosses out, erases, illegible, or impossible to interpret.
99	Blank.

9. In the space below, draw a diagram that represents the orientation of the Sun and Earth during the summer in the Northern Hemisphere. Label the North and South Poles. Explain why it is warmer in the summer than the winter in the Northern Hemisphere.

This item measures the student's ability to identify the cause of the summer season.

Criteria:

1. Draws diagram with Northern Hemisphere tilted toward the sun.
2. The tilt of Earth on its axis causes the angle of the sunlight striking the surface to vary the amount of solar energy per unit area received at the Earth's surface.
3. Explains that the number of hours of daylight are longer during the day, increasing the amount of time that energy is absorbed.

Code	Response
	<i>Correct Response</i>
20	Meets criteria above.
29	Any other completely correct response.
	<i>Partially Complete Response</i>
10	Has criteria 1 and 2.
11	Has criteria 2 and 3 but incorrect diagram.
19	Any other partially complete response.
	<i>Incorrect Response</i>
70	Attempts to relate distance between Earth and Sun as reason.
79	Any other incorrect response.
	<i>Non-Response</i>
90	Crosses out, erases, illegible, or impossible to interpret.
99	Blank.