

BENCHMARK SC.E.1.4.1

Strand	E	Earth and Space
Standard	1	The student understands the interaction and organization in the Solar System and the universe and how this affects life on Earth.
Benchmark	SC.E.1.4.1	The student understands the relationships between events on Earth and the movements of the Earth, its moon, the other planets, and the sun. This benchmark also assesses SC.E.1.4.2 ⁷ and SC.E.1.4.3. ⁸
Item Type(s)		MC, SR
Benchmark Clarification		None specified.
Content Limits		None specified.
Stimulus Attributes		Items may use charts, diagrams, drawings, or graphs to illustrate properties of planets and moons.
Response Attributes		None specified.
Sample MC Item 1		<p>Early astronomers believed that Earth was the center of the universe and that all planetary bodies revolved around Earth. Copernicus and others provided evidence that Earth revolves in an elliptical orbit around the Sun. Which characteristic makes the Sun appear to revolve around Earth by moving from east to west across the sky?</p> <ul style="list-style-type: none"> *A. Earth's rotation B. Earth's tilt on its axis C. Earth's spherical shape D. Earth's orbit around the Sun

⁷ The complete text for SC.E.1.4.2 is "The student knows how the characteristics of other planets and satellites are similar to and different from those of the Earth."

⁸ The complete text for SC.E.1.4.3 is "The student knows the various reasons that Earth is the only planet in our Solar System that appears to be capable of supporting life as we know it."

Sample MC Item 2

The new moon phase is caused by the relative positions of Earth, the Moon, and the Sun. Why is the Moon not visible during the new moon phase?

- A. The sunlight is not being reflected off the Moon.
- B. The far side of the Moon is the only side visible.
- *C. The location of the Moon is between Earth and the Sun.
- D. The tilt of Earth causes the Moon to be blocked by the Sun.

Sample SR Item

Earth supports a great deal of life on and below its surface. Many factors work together to allow the great diversity of life on Earth. The Moon and Earth are approximately the same distance away from the Sun. Explain why the Moon is unable to support life in the same way as Earth.

Correct and Complete Response

The Moon does not have an atmosphere to help store energy from the Sun. The atmosphere would keep the temperature on the planet relatively consistent. The Moon is also missing nutrient cycles that allow chemicals to move through different forms. The water cycle, the carbon cycle, the nitrogen cycle, etc. are constantly reusing chemicals. The Moon has no way to naturally cycle energy on its surface.

BENCHMARK SC.E.2.4.1

Strand	E	Earth and Space
Standard	2	The student recognizes the vastness of the universe and the Earth's place in it.
Benchmark	SC.E.2.4.1	The student knows that the stages in the development of three categories of stars are based on mass: stars that have the approximate mass of our sun, stars that are two-to-three-stellar masses and develop into neutron stars, and stars that are five-to-six-stellar masses and develop into black holes.
Item Type(s)		MC
Benchmark Clarification		The student explains how stars change over time and have a pattern of development that depends on their mass.
Content Limits		Items will NOT require the student to know the names of specific stars other than the Sun. Items may address information about the solar masses of stars. Items may assess the student's knowledge of the star cycle.
Stimulus Attributes		None specified.
Response Attributes		None specified.
Sample MC Item		Scientists determine a star's size, temperature, age, and other characteristics from limited information. Since they cannot get close enough to study the star, which piece of information is most helpful in determining the star's life cycle? A. radius of the star B. position of the star *C. solar mass of the star D. distance from Earth to the star

BENCHMARK SC.E.2.4.2

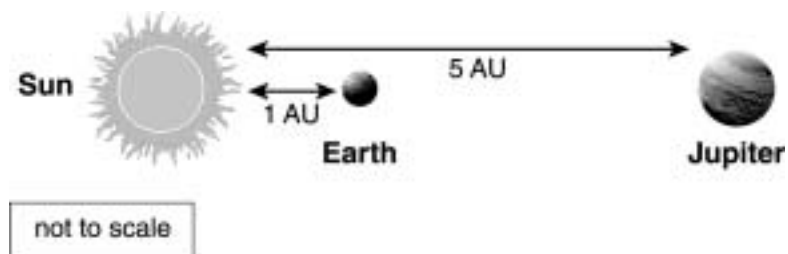
Strand	E	Earth and Space
Standard	2	The student recognizes the vastness of the universe and the Earth's place in it.
Benchmark	SC.E.2.4.2	The student identifies the arrangement of bodies found within and outside our galaxy.
Item Type(s)		MC
Benchmark Clarification		The student identifies the relative size and position of cosmic bodies in the universe.
Content Limits		Items will NOT require the student to calculate the size or the position of planets or stars.
Stimulus Attributes		Items may use diagrams or pictures to illustrate orbits.
Response Attributes		None specified.
Sample MC Item		<p>Several comets and asteroids have impacted Earth's surface in the past. Which of the following is preventing more of these objects from striking the surface of Earth?</p> <ul style="list-style-type: none">A. Heat from the Sun melts these bodies in space before they can reach Earth.B. Most objects are stopped by the asteroid belt before reaching inner planets.* C. Space between the planets is enormous, and Earth is one of the smaller planets.D. Jupiter's gravity pulls these bodies away from the inner planets, including Earth.

BENCHMARK SC.E.2.4.3

Strand	E	Earth and Space
Standard	2	The student recognizes the vastness of the universe and the Earth's place in it.
Benchmark	SC.E.2.4.3	The student knows astronomical distance and time.
Item Type(s)		MC, GR
Benchmark Clarification		None specified.
Content Limits		Items will NOT require the student to perform operations on numbers written in scientific notation. Items may assess the student's ability to compare distance and time using basic mathematical computation.
Stimulus Attributes		Items may provide the student with data on planets in chart, diagram, or table form.
Response Attributes		Items will describe units in which the answer is to be given.
Sample MC Item		<p>Earth's distance from the Sun is 149.5 million kilometers, which is the distance of one astronomical unit (AU). Distances to the other planets are expressed in terms of astronomical units. Pluto, for example, is 39.3 AU from the Sun. How is the planetary distance, in AU, determined when the actual distance in kilometers is known?</p> <p>A. Divide the planet's actual distance from the Sun by 39.3.</p> <p>B. Subtract the AU number from the actual number of kilometers.</p> <p>*C. Divide the planet's actual distance from the Sun by Earth's distance from the Sun.</p> <p>D. Subtract Earth's distance from the Sun from the planet's actual distance from the Sun.</p>

Sample GR Item

An astronomical unit (AU) is used to measure distances between the Sun and other planets or stars. Earth is 1 AU from the Sun. Light from the Sun reaches Earth in approximately 8.3 minutes. Jupiter is 5 AU from the Sun.



How long, in minutes, would it take light from the Sun to reach Jupiter?

Answer

41.5

	0	0	0	
+	0	0	0	+
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9