

## 5-ESS1-1 Earth's Place in the Universe

Students who demonstrate understanding can:

- 5-ESS1-1. Support an argument that the apparent brightness of the sun and stars is due to their relative distances from the Earth.** *[Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).]*

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

### Science and Engineering Practices

#### Engaging in Argument from Evidence

Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

- Support an argument with evidence, data, or a model.

### Disciplinary Core Ideas

#### ESS1.A: The Universe and its Stars

- The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth.

### Crosscutting Concepts

#### Scale, Proportion, and Quantity

- Natural objects exist from the very small to the immensely large.

## Observable features of the student performance by the end of the grade:

1	Supported claims														
a	Students identify a given claim to be supported about a given phenomenon. The claim includes the idea that the apparent brightness of the sun and stars is due to their relative distances from Earth.														
2	Identifying scientific evidence														
a	Students describe the evidence, data, and/or models that support the claim, including: <table border="1"> <tr> <td>i.</td><td>The sun and other stars are natural bodies in the sky that give off their own light.</td></tr> <tr> <td>ii.</td><td>The apparent brightness of a variety of stars, including the sun.</td></tr> <tr> <td>iii.</td><td>A luminous object close to a person appears much brighter and larger than a similar object that is very far away from a person (e.g., nearby streetlights appear bigger and brighter than distant streetlights).</td></tr> <tr> <td>iv.</td><td>The relative distance of the sun and stars from Earth (e.g., although the sun and other stars are all far from the Earth, the stars are very much farther away; the sun is much closer to Earth than other stars).</td></tr> </table>	i.	The sun and other stars are natural bodies in the sky that give off their own light.	ii.	The apparent brightness of a variety of stars, including the sun.	iii.	A luminous object close to a person appears much brighter and larger than a similar object that is very far away from a person (e.g., nearby streetlights appear bigger and brighter than distant streetlights).	iv.	The relative distance of the sun and stars from Earth (e.g., although the sun and other stars are all far from the Earth, the stars are very much farther away; the sun is much closer to Earth than other stars).						
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3	Evaluating and critiquing evidence														
a	Students evaluate the evidence to determine whether it is relevant to supporting the claim, and sufficient to describe the relationship between apparent size and apparent brightness of the sun and other stars and their relative distances from Earth.														
b	Students determine whether additional evidence is needed to support the claim.														
4	Reasoning and synthesis														
a	Students use reasoning to connect the relevant and appropriate evidence to the claim with argumentation. Students describe a chain of reasoning that includes: <table border="1"> <tr> <td>i.</td><td>Because stars are defined as natural bodies that give off their own light, the sun is a star.</td></tr> <tr> <td>ii.</td><td>The sun is many times larger than Earth but appears small because it is very far away.</td></tr> <tr> <td>iii.</td><td>Even though the sun is very far from Earth, it is much closer than other stars.</td></tr> <tr> <td>iv.</td><td>Because the sun is closer to Earth than any other star, it appears much larger and brighter than any other star in the sky.</td></tr> <tr> <td>v.</td><td>Because objects appear smaller and dimmer the farther they are from the viewer, other stars, although immensely large compared to the Earth, seem much smaller and dimmer because they are so far away.</td></tr> <tr> <td>vi.</td><td>Although stars are immensely large compared to Earth, they appear small and dim because they are so far away.</td></tr> <tr> <td>vii.</td><td>Similar stars vary in apparent brightness, indicating that they vary in distance from Earth.</td></tr> </table>	i.	Because stars are defined as natural bodies that give off their own light, the sun is a star.	ii.	The sun is many times larger than Earth but appears small because it is very far away.	iii.	Even though the sun is very far from Earth, it is much closer than other stars.	iv.	Because the sun is closer to Earth than any other star, it appears much larger and brighter than any other star in the sky.	v.	Because objects appear smaller and dimmer the farther they are from the viewer, other stars, although immensely large compared to the Earth, seem much smaller and dimmer because they are so far away.	vi.	Although stars are immensely large compared to Earth, they appear small and dim because they are so far away.	vii.	Similar stars vary in apparent brightness, indicating that they vary in distance from Earth.
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