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# TEACHER GUIDE

## THE SUN AND OTHER STARS GRADES 3-5

### COMMON MISCONCEPTIONS

- **The sun is not a star.**  
The sun is a star, similar to the many other stars we see in the night sky. Although we see the sun during the day, and it looks different (bigger and brighter) than the stars we see at night, it is an average, medium-sized star.
- **The sun is bigger and brighter than all other stars.**  
Our sun is a medium-sized, average star. Other stars in the universe can be much bigger or smaller. Some are brighter and some are dimmer. Our sun appears much larger and brighter than the other stars we see at night because it is *much, much closer to Earth than any other stars*.

### SUN AND OTHER STARS

It may be difficult to comprehend at first that the sun, which warms our planet during the day, is the same or even smaller and dimmer than many of the tiny distant dots of light we see in the night sky. Our sun is an average, medium-sized star. It appears to us to be a different type of object because it is much, much closer to the Earth than any of the other stars we can see. Our sun is the only star in our solar system. Eight planets orbit around it. All of these planets and our sun are closer in distance to the Earth than any other stars we see at night.

### STAR BRIGHTNESS

Stars in the sky appear to vary in size, brightness, and color. This can be due to a variety of factors—how big they are, how close they are, how bright they burn, and their composition. Stars are balls of exploding gas held together by gravity that produce light and heat. They do vary in size and other characteristics, but at this level, focus is on recognizing our sun as a star and the fact that its close distance is what makes it seem so different from any other stars we can see (which are almost inconceivably far away). As student understanding of chemistry and scale deepens, additional factors are taken into account.

## SCALE: TIME AND DISTANCE

At this level students are just starting to try to comprehend immense scales (both small and large). Students should be made aware that the models used in this episode, such as the candles to show relative distance and the chocolate bunnies to demonstrate habitable zone, are not to scale. The distances involved are so immense it would be impossible to show a scale model.

Scale in our universe is so large we start to think of distance in terms of time. Light is capable of traveling faster than anything else we know of. It takes light only one second to travel 186,000 miles. At that speed, light can travel nearly 6 trillion miles in a year. Still hard to understand, it does help put things in perspective to know that it takes light from our sun less than 8.5 minutes to reach the Earth, while it takes light from the next closest star - Alpha Centauri - about 4 years to get to Earth! It's no wonder other stars appear to be so much smaller and dimmer than the Sun.

## HABITABLE ZONE

Earth is able to support life due to the existence of liquid water at its surface, and the presence of an atmosphere surrounding its surface. If the Earth were closer or further away from the sun, it is likely that this balance of conditions would not exist (as can be seen by studying the conditions of other planets in our solar system). Because we understand the importance of a planet's distance from the star it orbits, we can use those parameters to narrow our search for life in the universe by focusing on other star/planet systems similar to the Earth and sun.

## OTHER STARS

In this episode, the team uses a telescope to look at stars in the night sky (please note, you should never look at the sun with your naked eye and especially not through a telescope—it can damage your vision). Stars the team observe include:

- **Sirius**—brightest star in the night sky, twice as big as the sun and 500,000 times further away.
- **Rigel**—a star brighter than Sirius, appears blue, looks dimmer because it is 90 times further away than Sirius
- **Antares**—red, much bigger than sun (large enough that it would consume our sun, Mercury, Venus, Earth and Mars)

