

CHARACTERISTICS OF STARS

Like the Sun, all **stars** are huge spheres of glowing gas. They are made up mostly of hydrogen and some helium, and they produce their energy by nuclear fusion. **Nuclear fusion** is the process where two atoms of hydrogen fuse together to form an atom of helium. This process releases a tremendous amount of energy and makes stars shine brightly. Astronomers classify stars according to their physical characteristics. These include:



1. Color

2. Temperature

2. Size

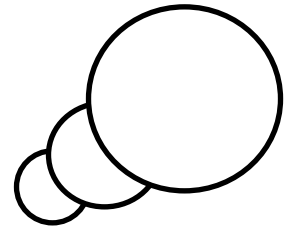
3. Brightness

A. Color and Temperature

If you look up in the night sky, you can see slight differences in the colors of stars. Like hot objects on Earth, a star's color reveals its surface temperature. If you watch a toaster heat up, the wires inside glow red hot. The wires inside a light bulb are even hotter and glow white. Stars are the same. The coolest stars, with a surface temperature of about 3,000°C appear reddish. The hottest stars, with surface temperatures over 20,000°C appear bluish-white.

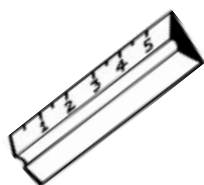
B. Size

The stars in the sky all appear to be points of light of the same size. Many stars are actually the same size of the Sun, which is a medium-sized star. However, some stars are much larger and are called **giant** and **supergiant** stars. Most stars are much smaller than the Sun. Black and white **dwarf stars** are about the size of Earth. **Neutron stars** are even smaller, only about 20 km in diameter.



C. Brightness

The brightness of a star depends on both its size and its temperature. How bright a star looks from Earth depends on both its distance and how bright the star actually is. The brightness of a star can be described in 2 different ways: apparent brightness and absolute brightness. A star's **apparent brightness** is its brightness as seen from Earth. Astronomers can measure apparent brightness easily, using devices similar to those used by photographers. However, apparent brightness does not take into account how far away a star is from Earth. A star's **absolute brightness** is the brightness the star would have if all stars were the same standard distance from Earth. This allows astronomers to compare the brightness of all stars.



Distances on Earth are often measured using kilometres and miles. However, distances between stars are so large that kilometres are not very practical units. Astronomers use a unit called the **light-year** to measure the distance between stars. A light year is the distance that light travels in one year, which is roughly 9.5 million million kilometres.

REVIEW QUESTIONS - CHARACTERISTICS OF STARS

1. What is a star?

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2. What is the chemical composition of most stars?

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3. How do stars generate their light and heat energy? Describe the process.

4. What are 4 characteristics that astronomers use to classify stars?

a.	b.	c.	d.
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5. What reveals a star's surface temperature?

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6. Circle the letter of what is revealed by the red color of the supergiant star, Betelgeuse.

- | | |
|--------------------------------|-----------------------------|
| a. It is an extremely hot star | c. It is far away |
| b. It is in a constellation | d. It is a fairly cool star |

7. Stars that are much larger than the Sun are called _____ and _____.

8. What two factors determine how bright a star looks from Earth?

a.	b.
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9. Complete the table about the measurement of a star's brightness.

Measurement	Definition
Apparent brightness	a.
Absolute brightness	b.

10. What 2 things must an astronomer measure to calculate a star's absolute brightness?

a.	b.
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11. A light-year is equal to about _____ kilometres.