

Name: _____

#11

44. Classification of the Sun and Other Stars

A ¹The numerous stars shining in the night sky are just a fraction of the stars in the universe.

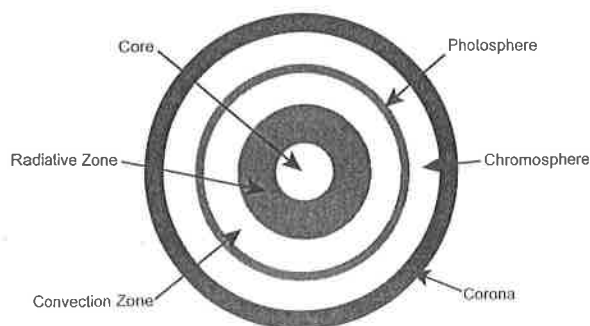
²There are billions of them, including our sun.

B ³The sun is Earth's closest **star** and is located at the center of the solar system. ⁴All of the planets revolve around it because of its huge gravitational force. ⁵Although the sun appears larger than anything else in the solar system, it is considered only a medium-sized star.

C ⁶The sun is made of hot gases called plasma. ⁷Many people believe the sun is a hot ball of burning gases, but it's not. ⁸The plasma that makes up the sun is actually so hot that it glows much like a wire in a light bulb. ⁹About three-quarters of the sun is made of hydrogen and one-quarter is helium. ¹⁰It produces energy through **nuclear fusion** reactions (a process by which the nuclei of two or more atoms join to form a single, larger nucleus) that turn hydrogen atoms into helium atoms. ¹¹This energy radiates through space and provides Earth with the heat and light necessary to maintain life. ¹²The sun's light is so powerful that it can damage your eyesight even from Earth.

D ¹³Solar energy is created deep within the **core** of the sun, where the temperature is 27,000,000 degrees Fahrenheit (15,000,000 degrees Celsius). ¹⁴Heat from the core travels through the **radiation** and **convection zones** to the surface of the sun. ¹⁵It takes a million years for the energy generated in the sun's core to reach its surface.

Solar Anatomy



E ¹⁶The next layer of the sun that gives off the light energy that is seen from Earth is called the **photosphere**. ¹⁷It is the innermost layer of the sun's atmosphere and glows at more than 9,900 degrees Fahrenheit (5,500 degrees Celsius). ¹⁸That's hot enough to melt almost any substance. ¹⁹**Sunspots**, which are small, dark patches that are cooler than the surrounding areas, are located in this layer of the sun.

F ²⁰The atmospheric layer above the photosphere is the **chromosphere**. ²¹The **corona** is the outermost layer of the sun's atmosphere. ²²**Solar prominences**, huge blazes of gas, appear in this area along with **solar flares**, which are fierce, brilliant explosions of gas.

G ²³Stars are categorized by their **brightness**, **color**, and **temperature**. ²⁴These characteristics may change through a star's life cycle. ²⁵Scientists use a scale called **magnitude** to measure their brightness. ²⁶The brightest stars give off the most energy. ²⁷The star's size, temperature, and distance from Earth are important factors for how bright a star looks, known as its **apparent magnitude**. ²⁸The sun appears to be the brightest star from Earth, but using the magnitude scale, scientists are able to make a more accurate measurement of its brightness. ²⁹The brightest stars are classified as 0 (or even minus magnitudes) and the dimmest stars can have a magnitude as high as 9.

H ³⁰The color of a star depends on its surface temperature. ³¹Stars are classified according to their colors or **spectral type**. ³²Red stars are the coolest, orange and yellow stars are somewhat hotter, and the hottest stars are blue or blue-white.

I ³³Early astronomers studied patterns of bright stars called constellations. ³⁴Many of the constellations are named after characters or objects from ancient Greek myths. ³⁵As Earth spins, the constellations appear to move, too.

Read all directions!!

4. For each statement, circle T for true and F for false. If the statement is false, replace the **bold word(s)** to make the statement true. Then write the number of the sentence(s) that best supports your answer.

a. T F The sun is considered to be a **large** star in the solar system. _____

b. T F The sun is a hot ball of **burning** gases. _____

c. T F It takes a **million years** for the energy generated in the sun's core to reach its surface. _____

d. T F Scientists use a scale called magnitude to measure a star's **heat**. _____

2. What do astronomers call the patterns that we see in the sky?

- a. galaxies
- b. solar systems
- c. constellations
- d. moons

Write the number of the sentence that best supports your answer. _____

The brightness of a star is its:

- a. spectral type.
- b. magnitude.
- c. corona.
- d. flare.

Write the number of the sentence that best supports your answer. _____

What is the relationship between a star's temperature and its brightness?

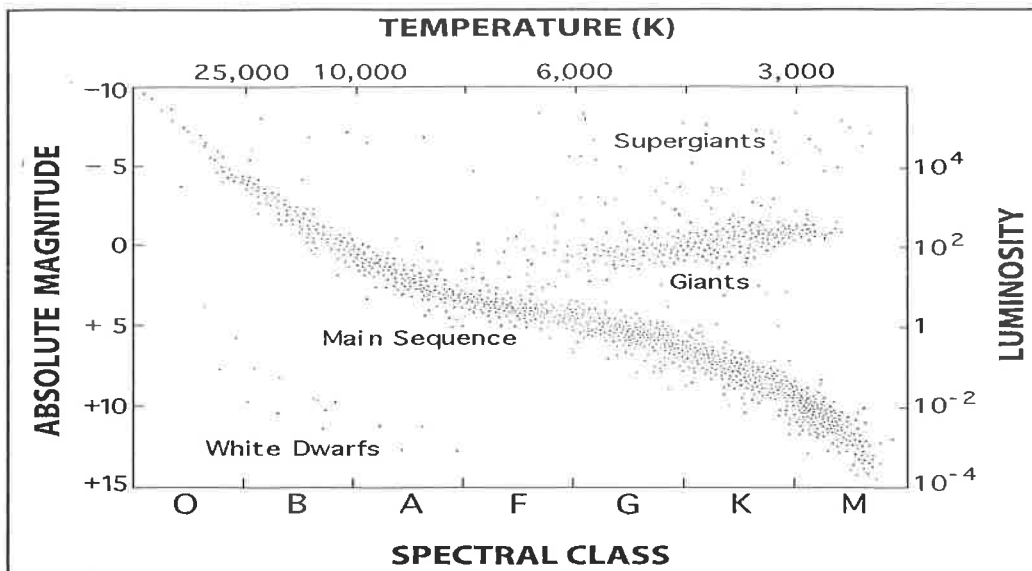
Write the numbers of the sentences that best support your answer. _____, _____

5. What are three ways stars are categorized?

Write the number of the sentence that best supports your answer. _____

6. Describe nuclear fusion reactions as they occur in the sun.

Write the numbers of the sentences that best support your answer. _____, _____



In the early 1900s, two astronomers, Ejnar Hertzsprung and Henry Russell, tried to find a pattern in the life of stars. They tried to see if there was a relationship between a star's brightness and its temperature. This chart is called the Hertzsprung-Russell (H-R) diagram. An H-R diagram compares the temperatures and absolute magnitudes of stars.

The diagram shows the largest stars at the top and the smallest stars at the bottom. The bluest (hotter) stars are on the left, and the reddest (cooler) stars are on the right. The stars that are near the top of the chart are the brightest and those near the bottom are the dimmest.

7. If you were looking at the night sky, what type of star would you most likely see?

8. According to the diagram, what is the range of absolute magnitude for a supergiant?

Written Response Questions

For the following two questions, apply all of the information you've learned when answering.

9. What are the layers of the sun and what are they made of?

10. Why does the sun have spots?
