# Daily Science

# 04/04/2017

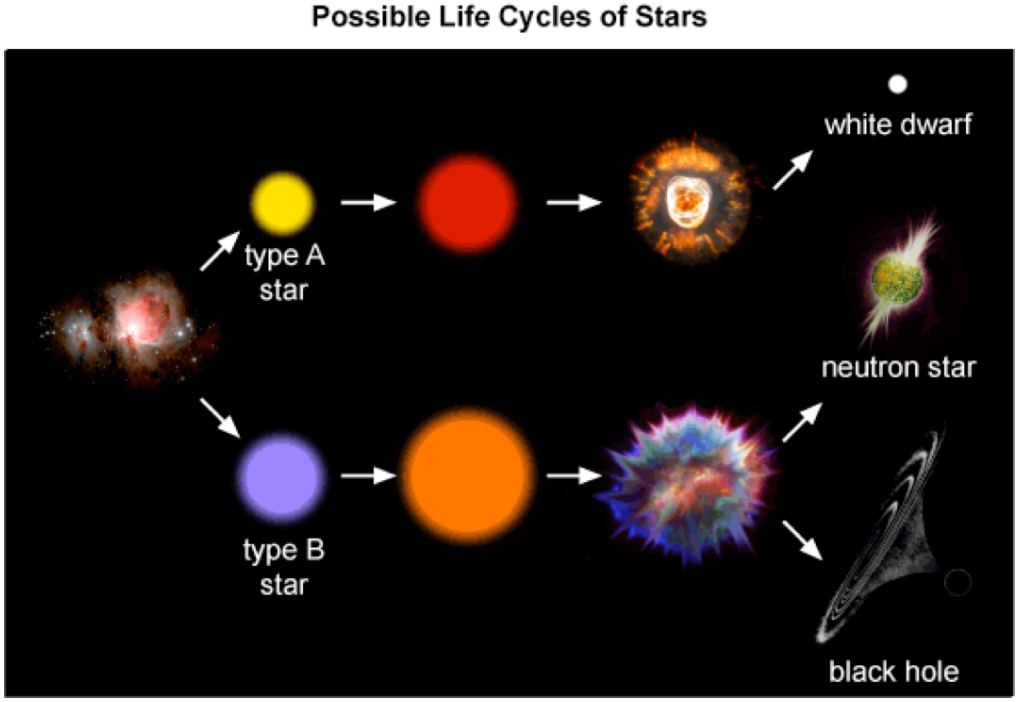
Which statement best describes the difference between type A stars and type B stars as shown in the diagram?

a. Type A stars burn for a shorter amount of time than type B stars.

b. Type A stars are less massive than type B stars.

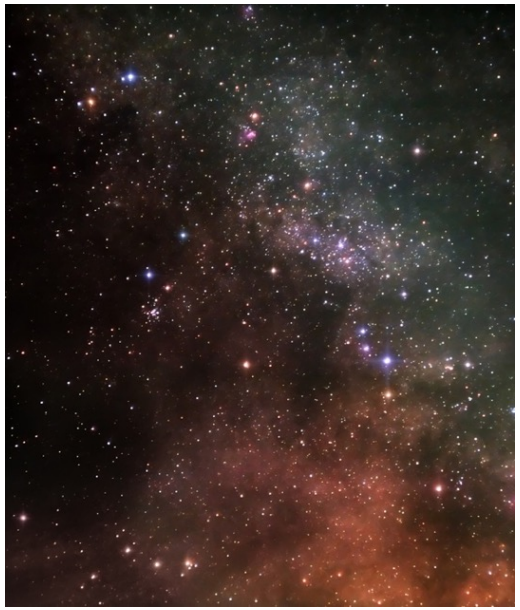
c. Type A stars are created from different gases than type B stars.

d. Type A stars are more massive than type B stars.



# Essential Questions:

1. What is the H-R Diagram?
2. How is the H-R Diagram used to classify stars?



# How are stars classified?

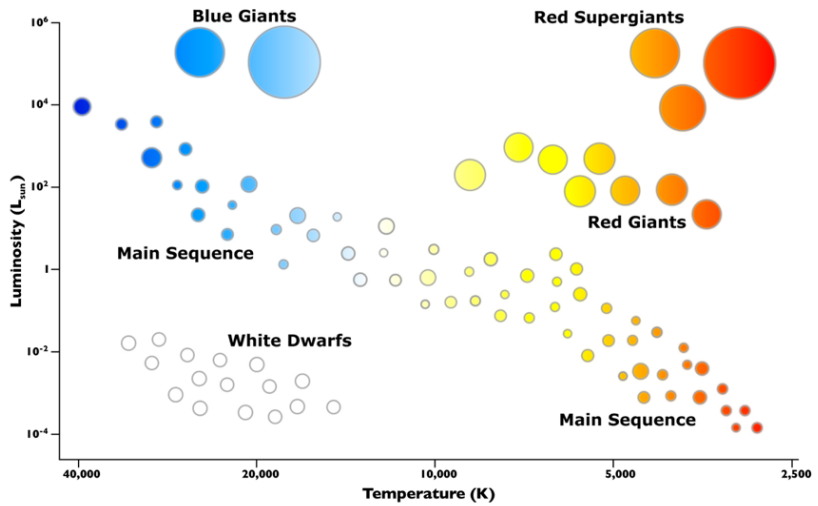
Color

Temperature

Size

Chemical Composition

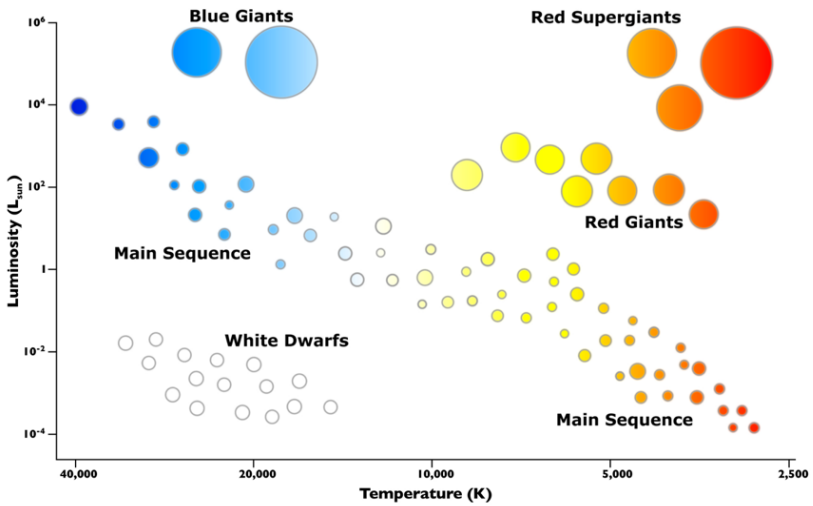
Brightness (luminosity)



# H-R Diagram Vocabulary

## Hertzsprung-Russell Diagram

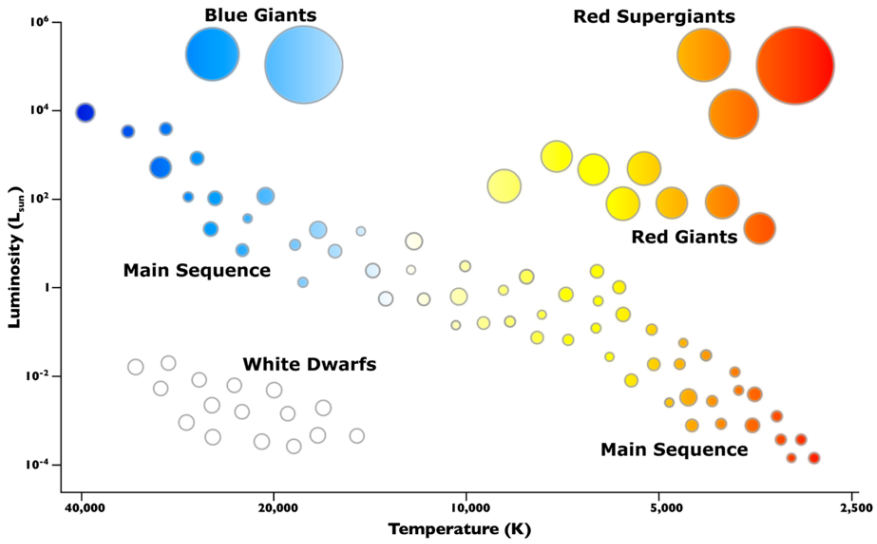
The H-R Diagram plots each star on a graph and measures the star's brightness (luminosity) against its temperature (color).



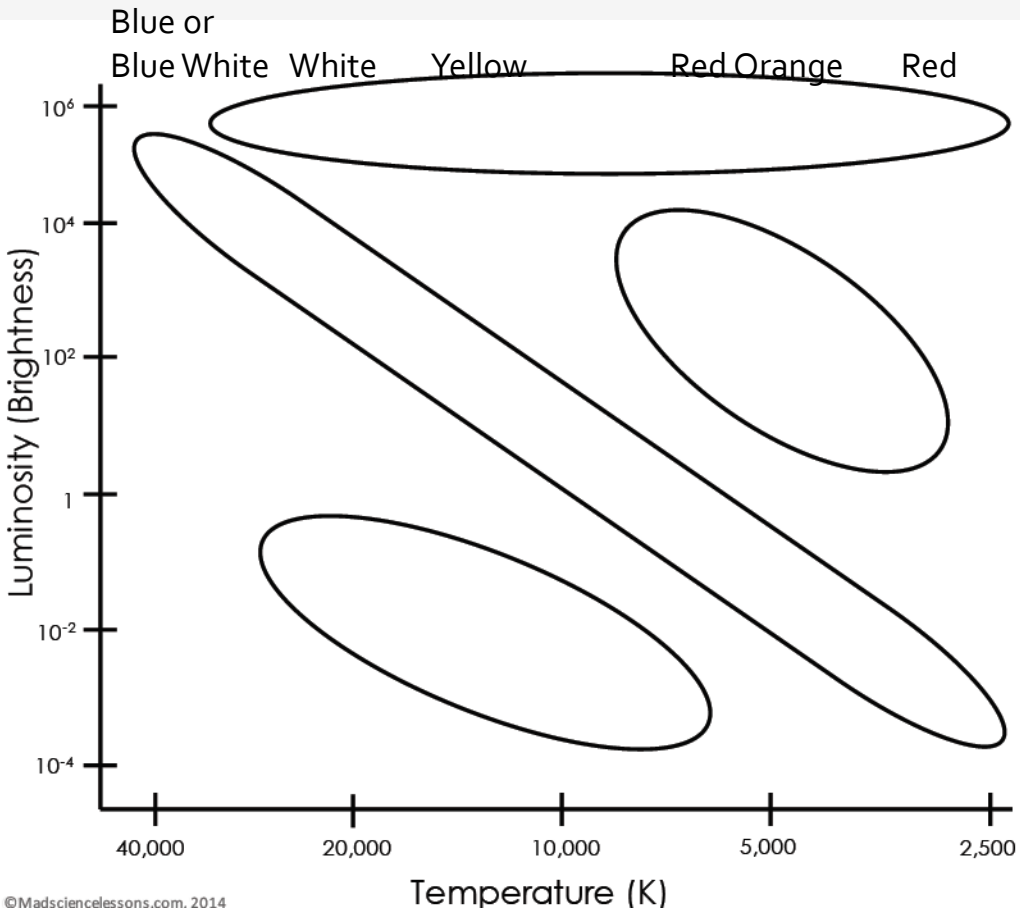
# H-R Diagram Vocabulary

## Temperature (K)

- Measured in Kelvin (K)
- Color of stars depends on their temperature
- The coolest stars – red
- Hottest stars – blue



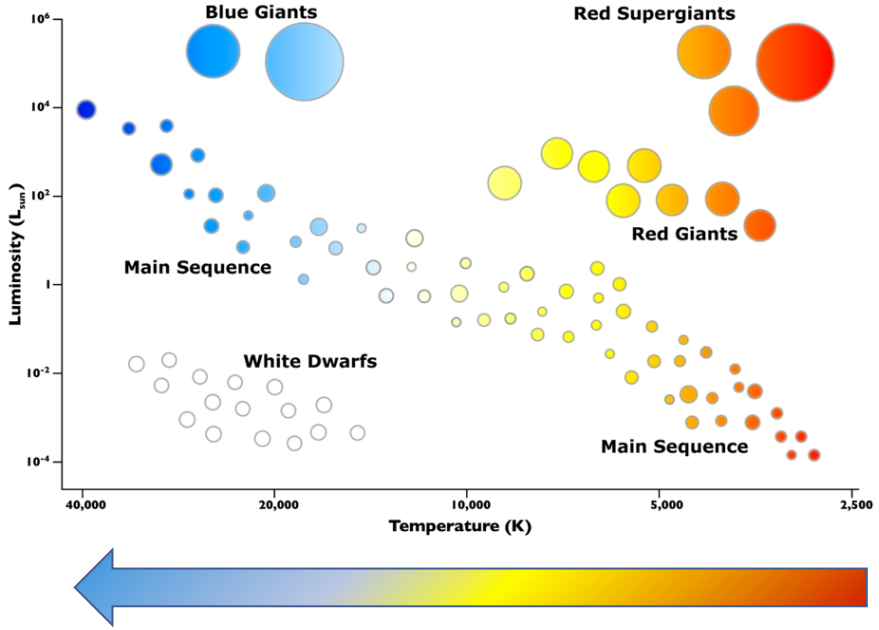
Fill in the star color on your graph



# H-R Diagram Vocabulary

**Temperature (K)**

- Temperature increases from right to left, which is different than every graph you've probably seen.

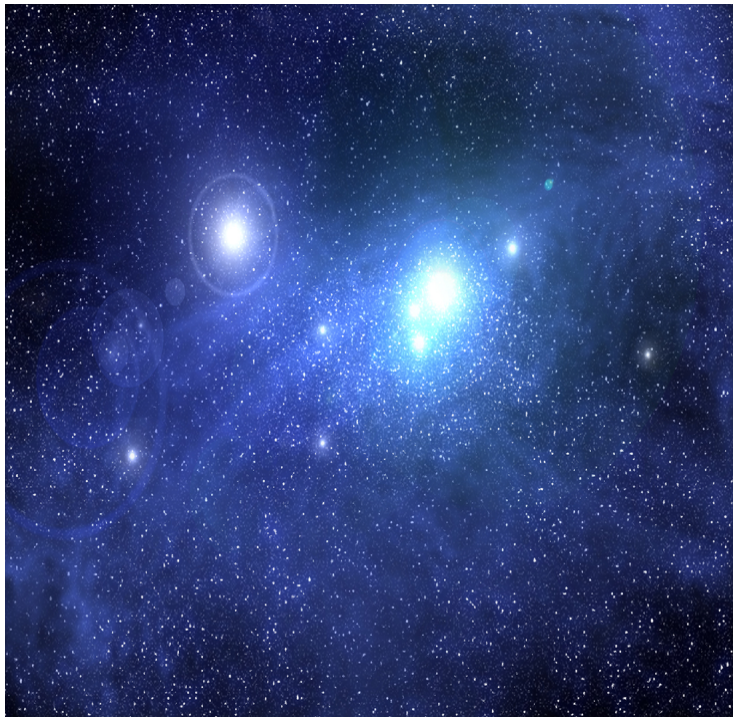



Hottest "Coolest"

# H-R Diagram Vocabulary

**Luminosity**

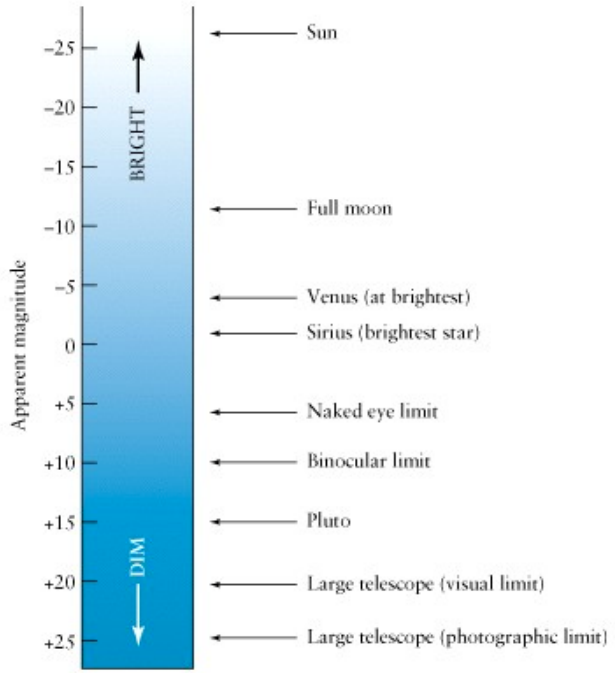
- The amount of energy (light) a **star** emits
- Brightness



# H-R Diagram Vocabulary

## Apparent Magnitude

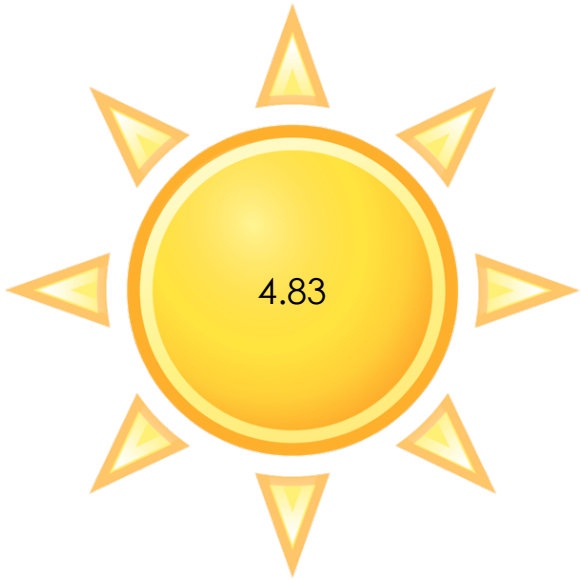
Tells us how bright an object appears from Earth.



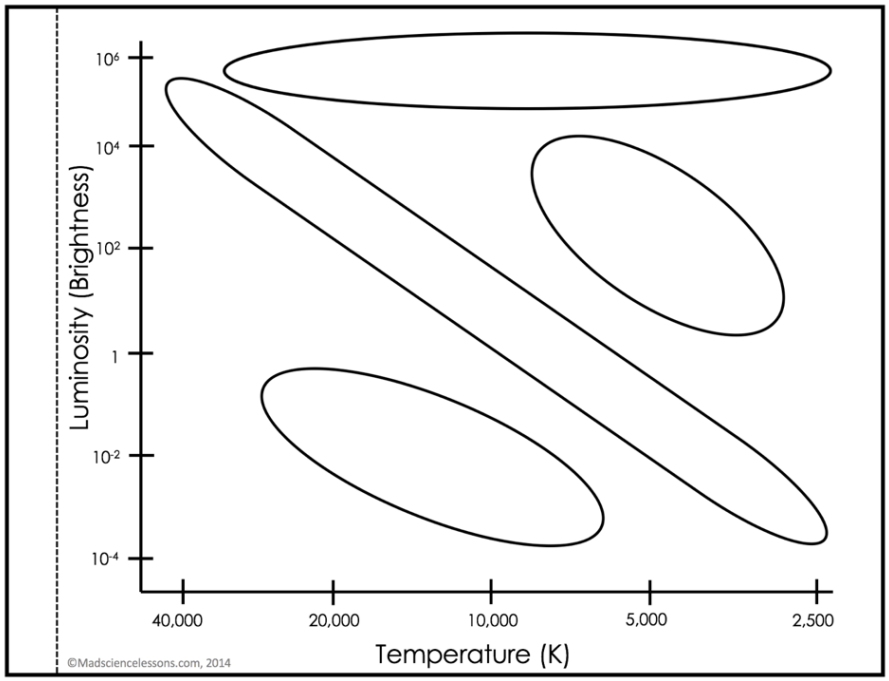
# H-R Diagram Vocabulary

**Absolute Magnitude**

The measure of a star's brightness as if it were at a standard distance of exactly 10 parsecs (32.6 light years) from the observer.



# Quick Action – H-R Diagram INB Template



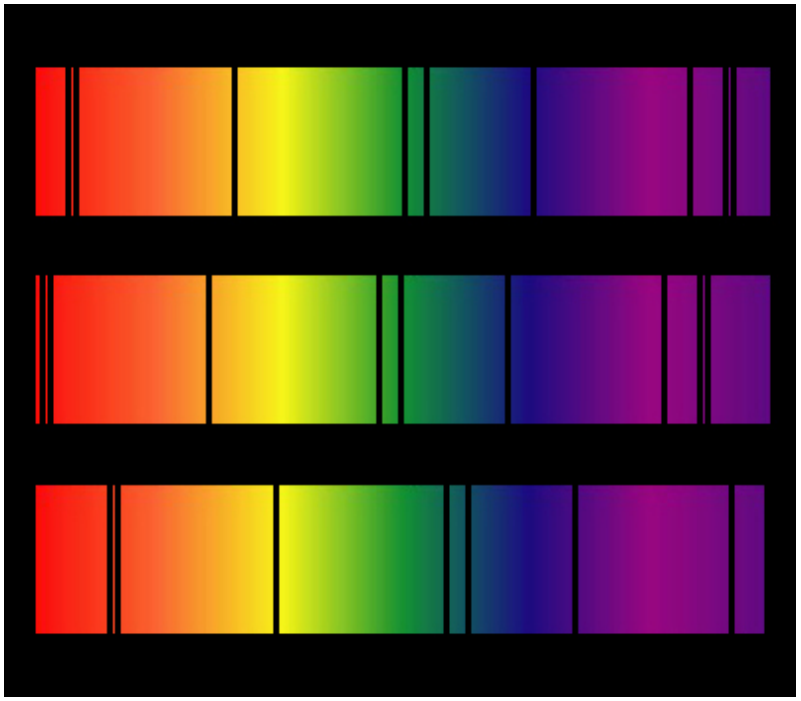

| Star Classification | | | | |
|---|---|---|---|---|
| Main Sequence | Red Giants | Supergiants | Red Dwarfs | White Dwarfs |
| | | | | |

# H-R Diagram Vocabulary

## Chemical Composition and Spectral Class

Astronomers use spectographs to determine the elements found in stars.

A spectograph is a device that breaks light into colors and produces an image

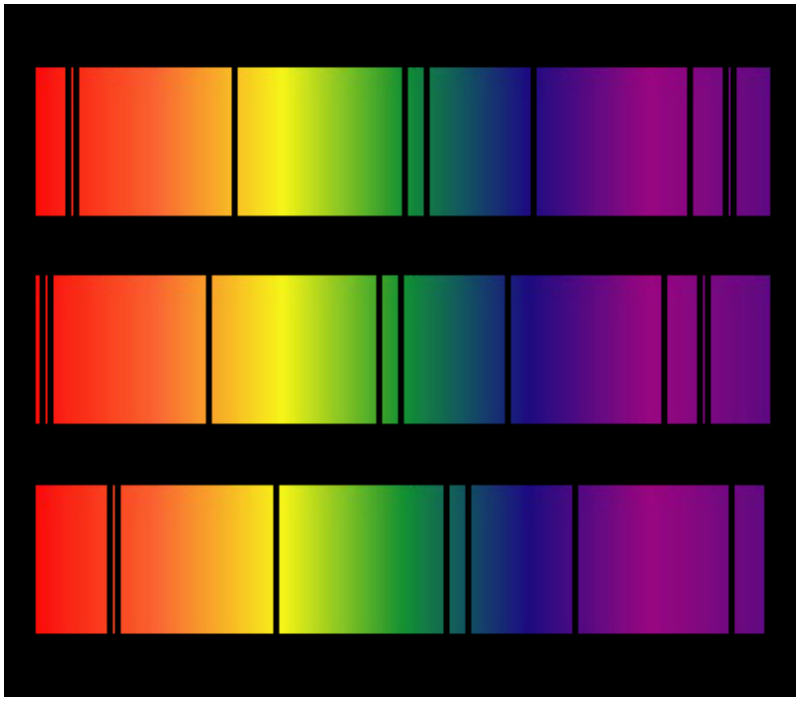


# H-R Diagram Vocabulary

## Chemical Composition and Spectral Class

Each chemical element absorbs light at particular wavelengths .

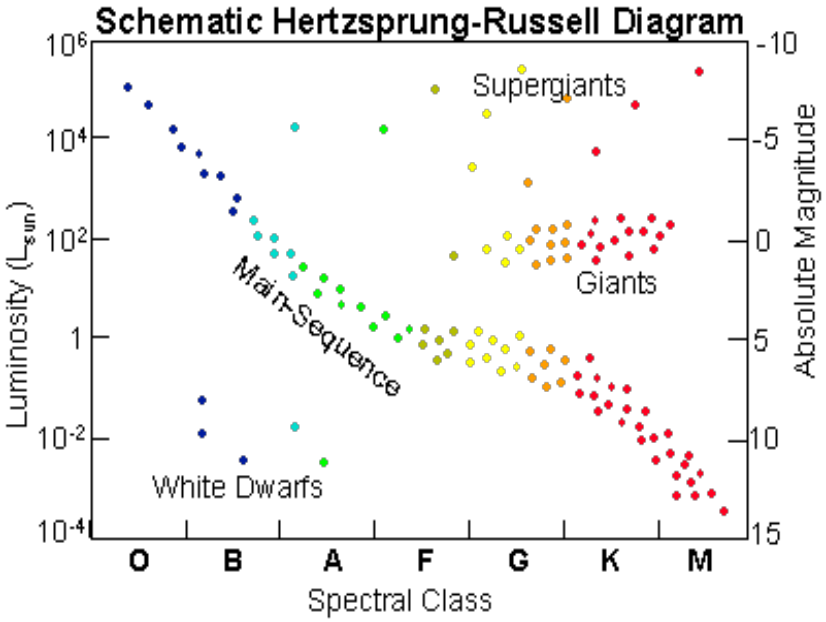
Just as each person has a unique set of fingerprints each element has unique spectral lines.



# H-R Diagram Vocabulary

## Chemical Composition and Spectral Class

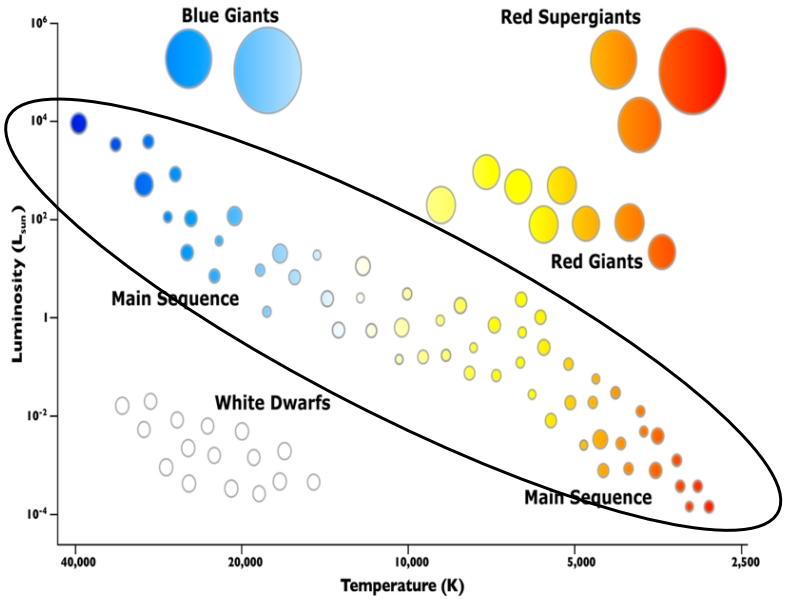
- Stars are classified by their spectra (the elements that they absorb) and their temperature.
- There are seven main spectral types (O, B, A, F, G, K, and M) listed in order of decreasing temperature.



# H-R Diagram Vocabulary

## Main Sequence

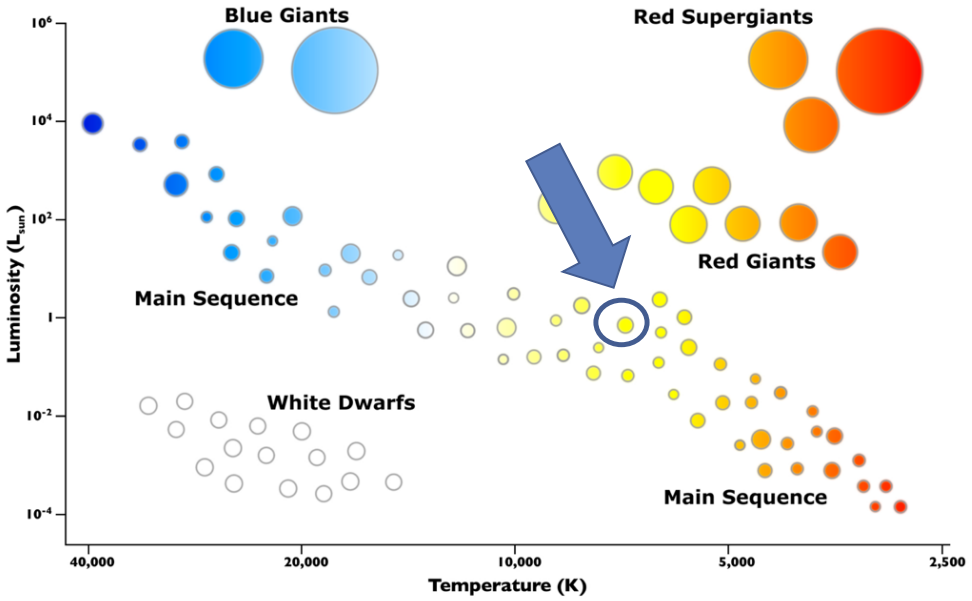
- About 90 percent of the stars in the universe, including the sun
- Ranges from high to low luminosity and high to low temperature
- Color – ranges from red to blue
- Spectral Class M-O



# H-R Diagram Vocabulary

**Sun**

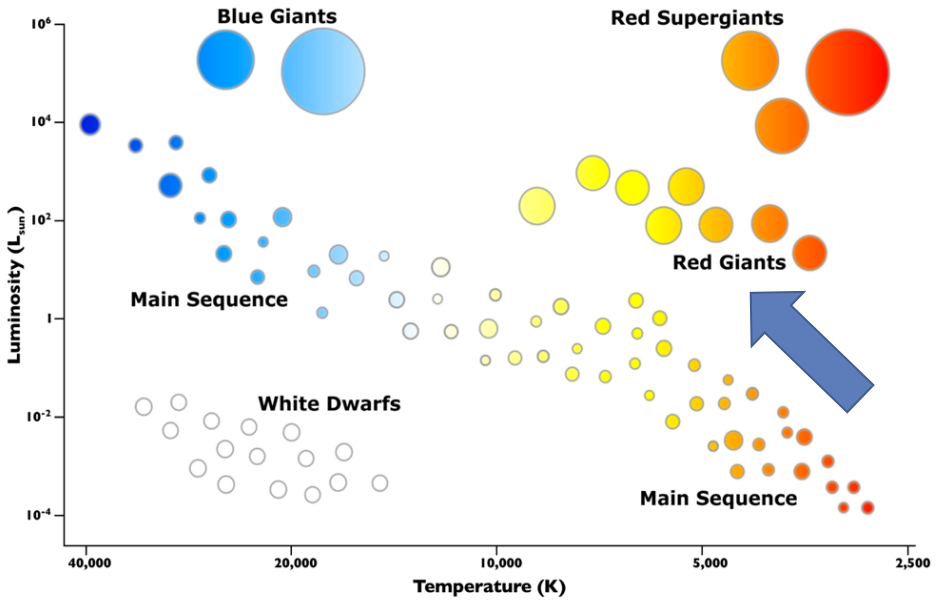
- Medium size star
- Medium brightness and temperature
- Color – yellow
- Spectral Class G



# H-R Diagram Vocabulary

## Red Giants

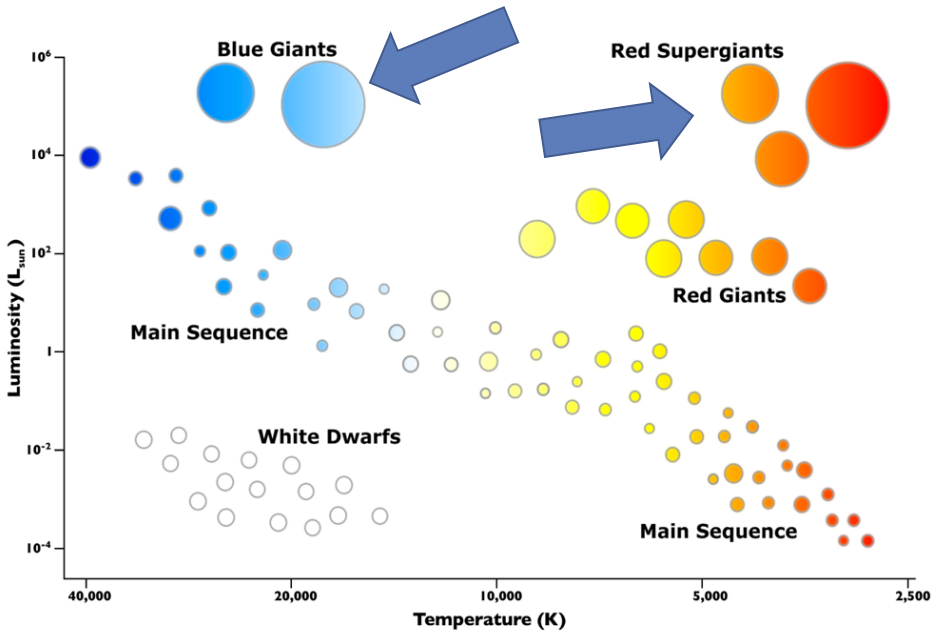
- A red giant is a dying star.
- Our own **sun** will turn into a red giant star, expanding to engulf the inner planets.
- Color - reddish-orange hue
- High luminosity/ low temperature
- Spectral Class K-M



# H-R Diagram Vocabulary

## Supergiants

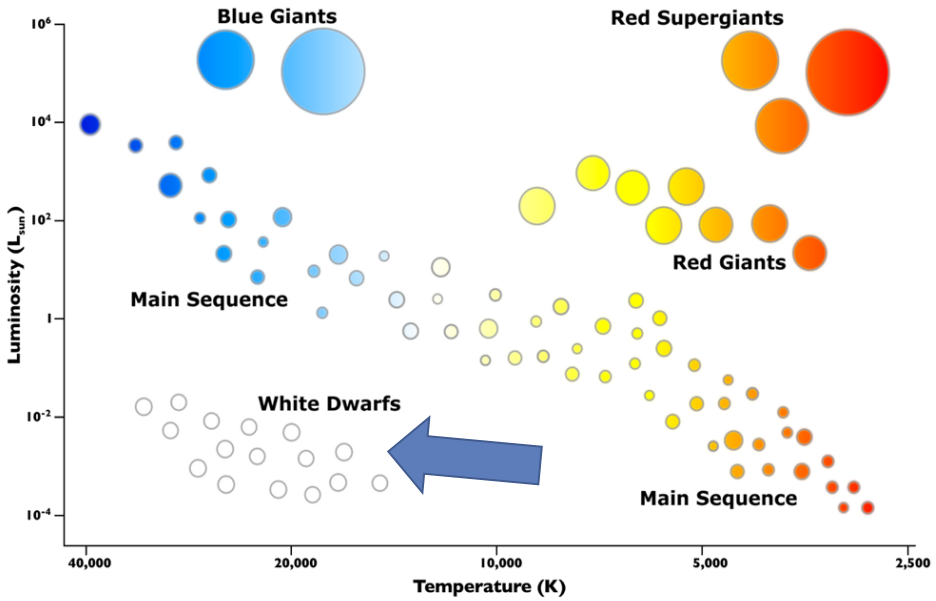
- They are the largest stars in the universe in terms of volume, although they are not the most massive.
- Color – reddish orange/blue
- High luminosity/low-high temperatures
- Spectral Class K-M, B-A



# H-R Diagram Vocabulary

## White Dwarfs

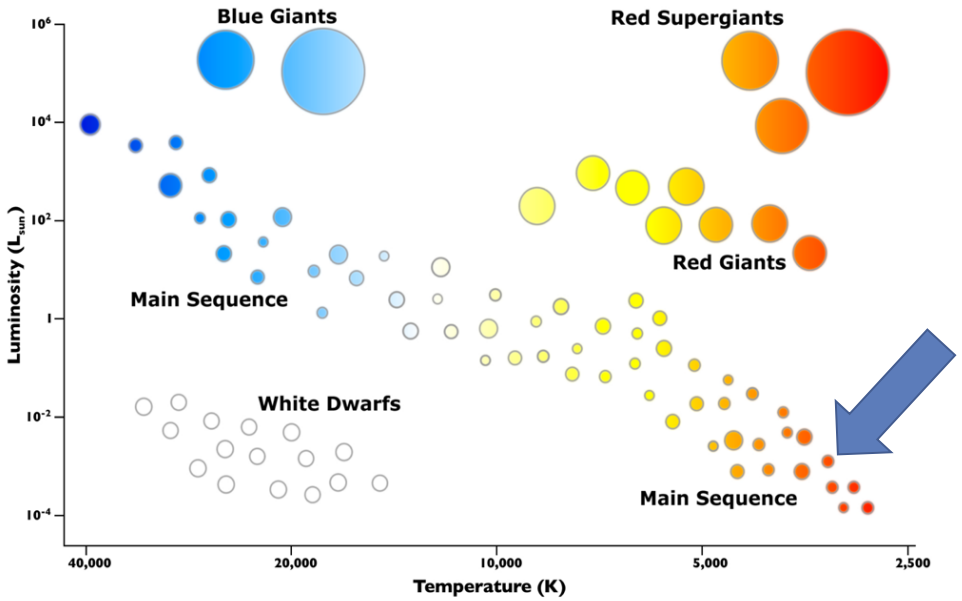
- A small very dense star that is typically the size of a planet
- Formed when a low-mass star has exhausted all its fuel
- Color – white
- Low luminosity/high temperature
- Spectral Class B, O, A



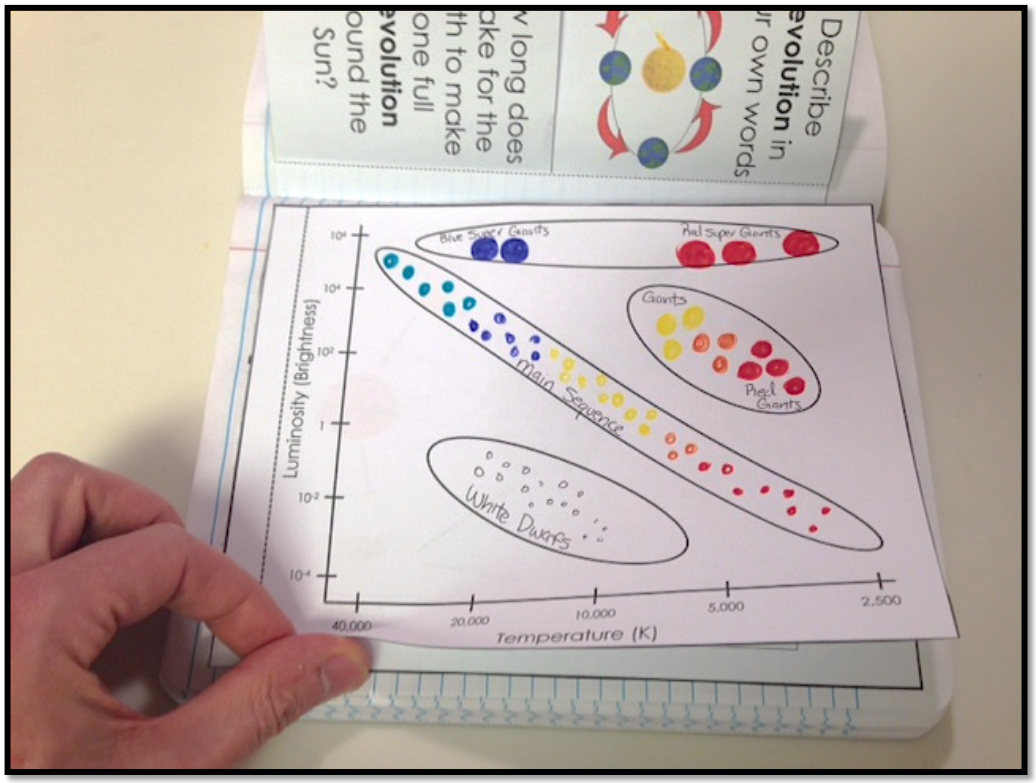
# H-R Diagram Vocabulary

## Red Dwarfs

- A small and relatively cool star on the main sequence
- Color – red
- Low luminosity/low temperature
- Spectral Class – M



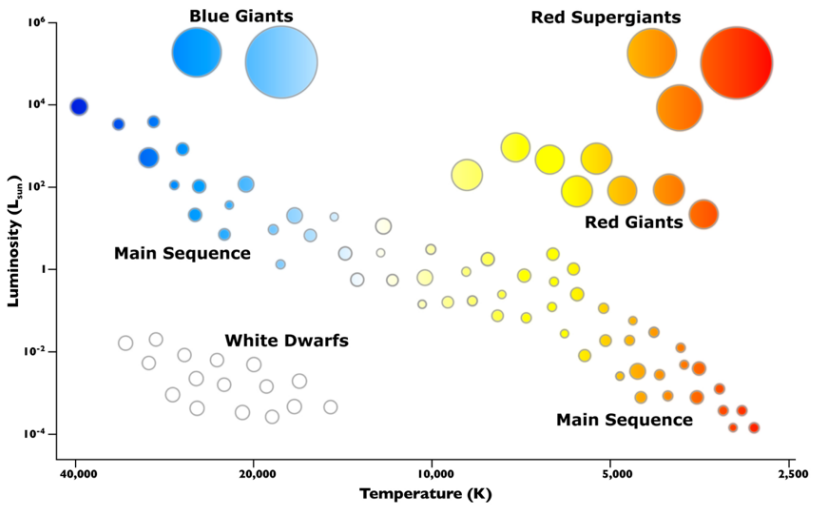
# Quick Check – Galaxies INB Template



# Check for Understanding

**Can you…**

1. Can you interpret the H-R Diagram?
2. Can you use the H-R Diagram to explain how stars are classified?



# Try these questions….

Astronomers classify stars by size and temperature.

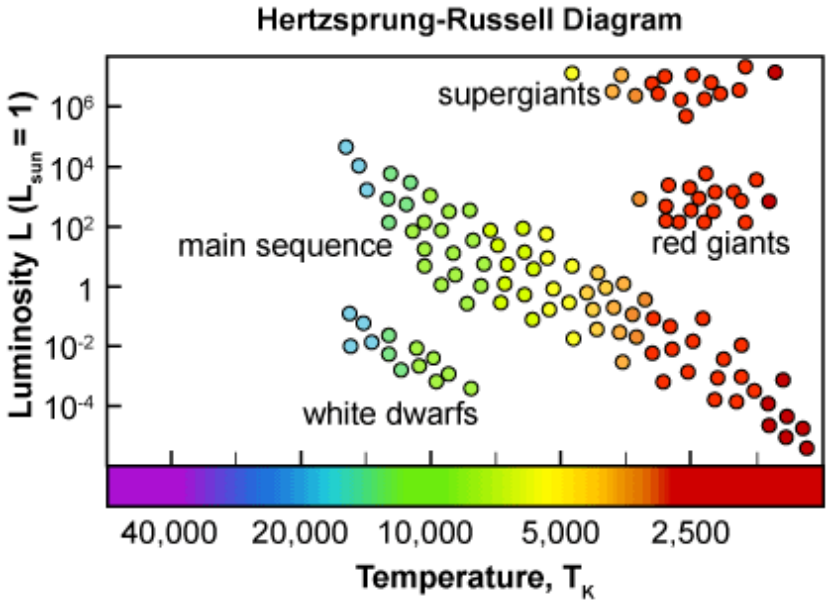
Which kind of star would be both hotter than the Sun and less bright?

a. supergiant

b. red dwarf

c. red giant

d. white dwarf



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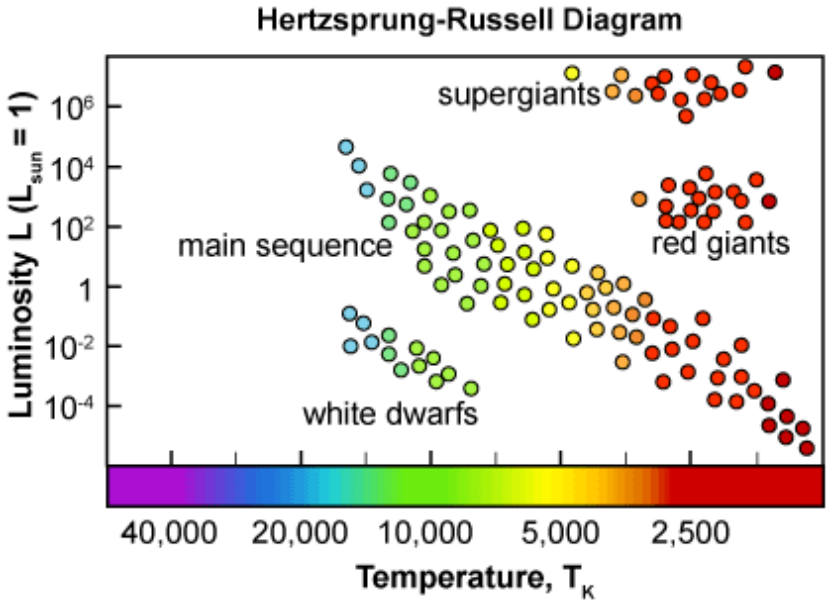


Several factors affect the brightness of stars as seen from Earth.

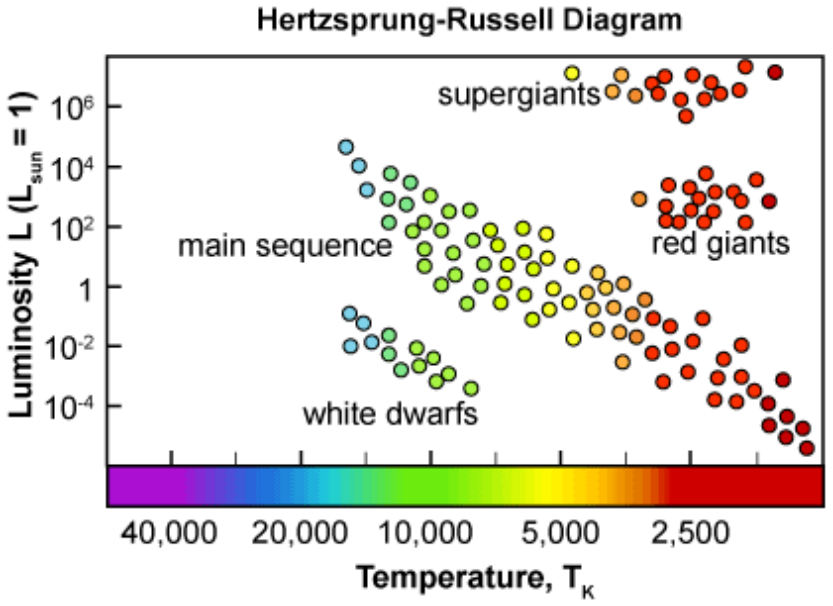
Where would most of the hundred brightest stars appear on the H-R diagram?

a. to the left of center

b. in the upper half of the diagram

c. along the main sequence

d. in the lower right part of the diagram



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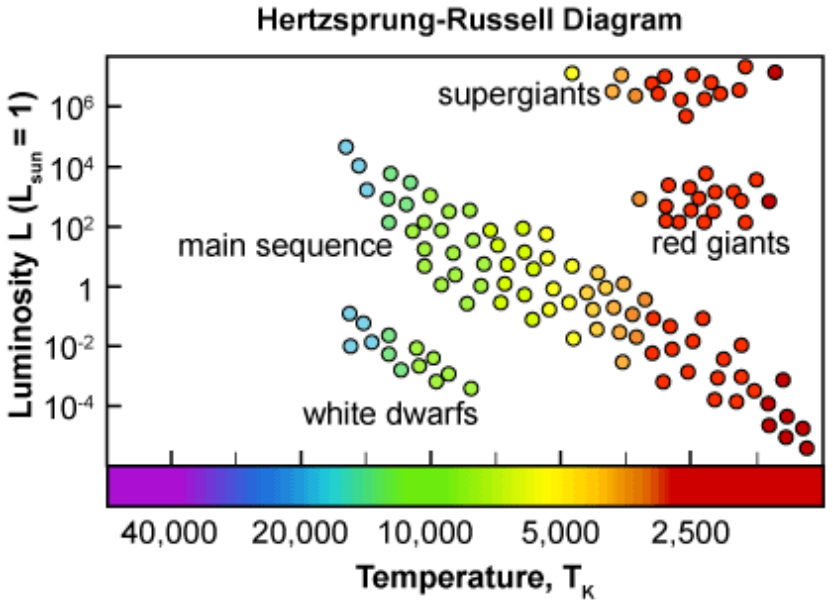


An astronomer discovers a new star that would be placed at the far left end of main sequence stars in an H-R diagram.

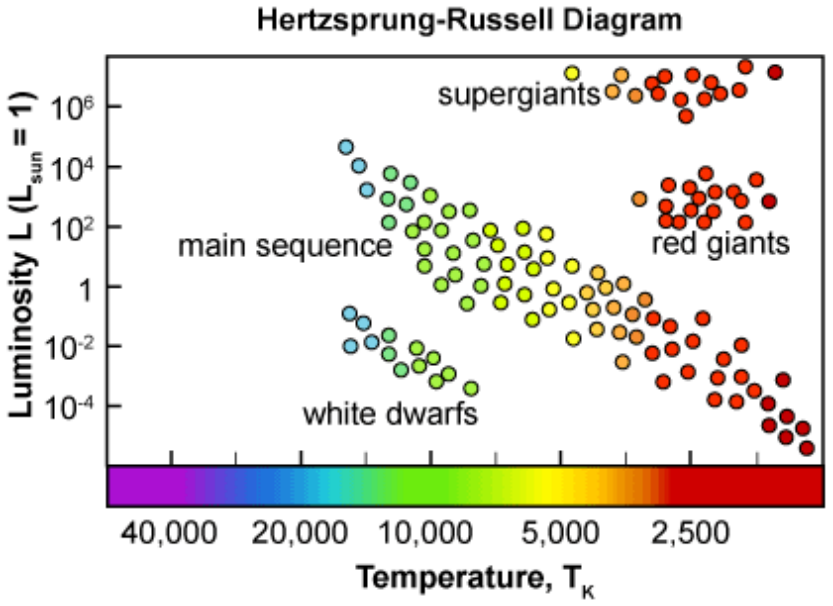
Which description would best match this star ?

a. large and blue-white

b. very large and yellow

c. small and white hot

d.extremely large and red hot



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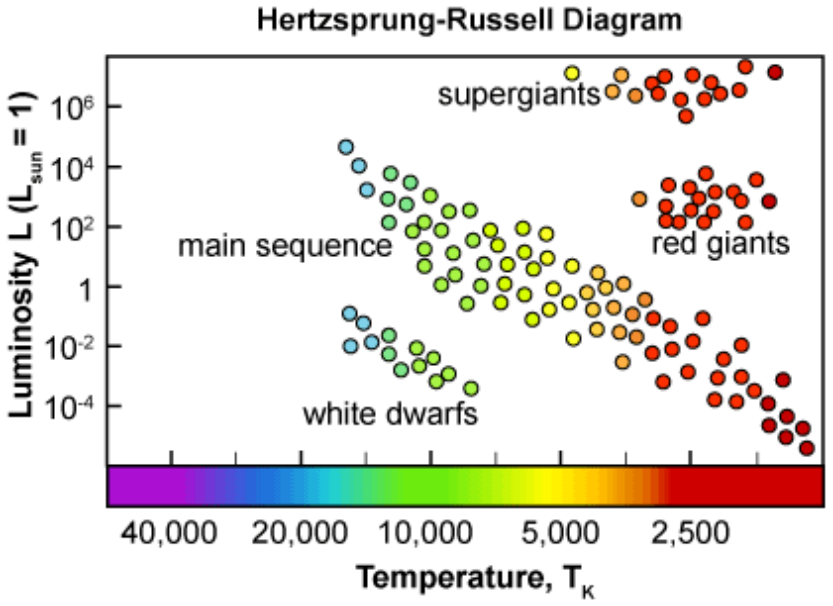


The Hertzsprung-Russell diagram shows the characteristics of stars as they go through different stages of their lives.

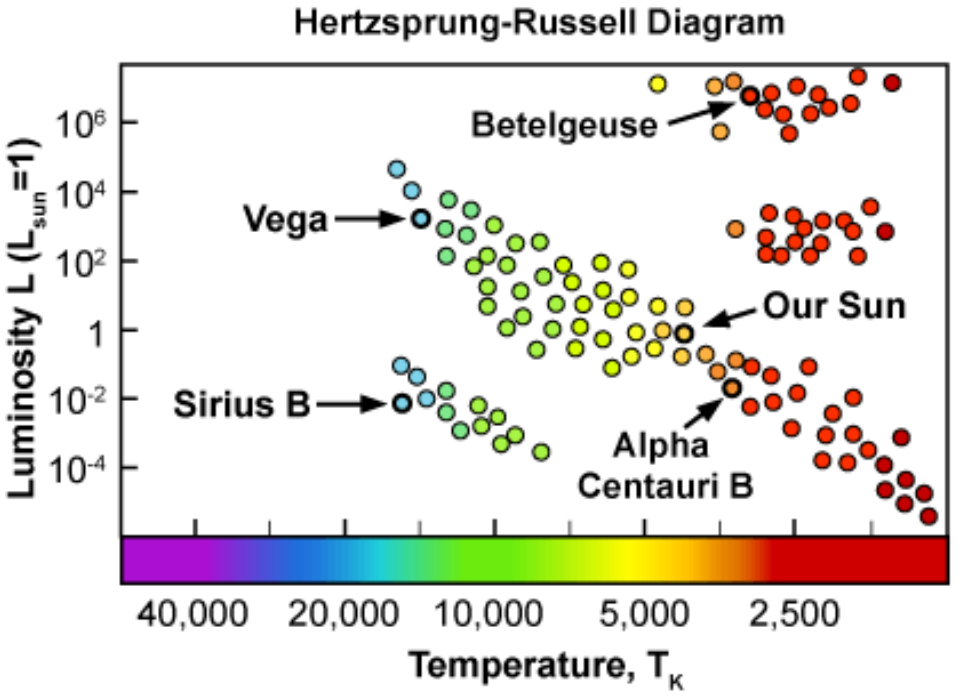
Given the information in the diagram, which statement is true?

a. Alpha Centauri B is hotter than the Sun, and Sirius B gives off more light than the Sun.

b. Betelgeuse is hotter than the Sun, and Alpha Centauri B gives off more light than the Sun.

c. Sirius B is hotter than the Sun, and Betelgeuse gives off more light than the Sun.

d. Vega is hotter than the Sun, and Sirius B gives off more light than the Sun.



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