



# Handout 1 (pink)

# Stars and Stellar Evolution

## Characteristics of Stars

# 1

## ● What is a star?

- A ball of gases that gives off a tremendous amount of electromagnetic energy.



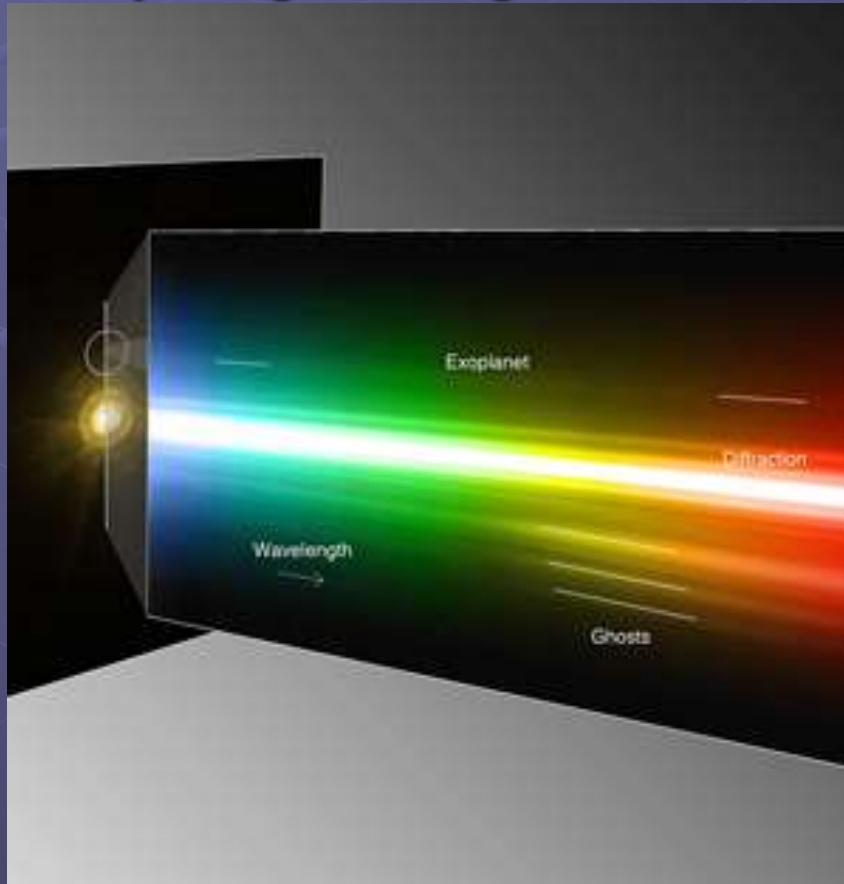
# 2

- How does the color of stars seen from Earth differ from their actual color?
  - From Earth, stars appear as tiny specs of white light, but they actually vary in color.



# 3

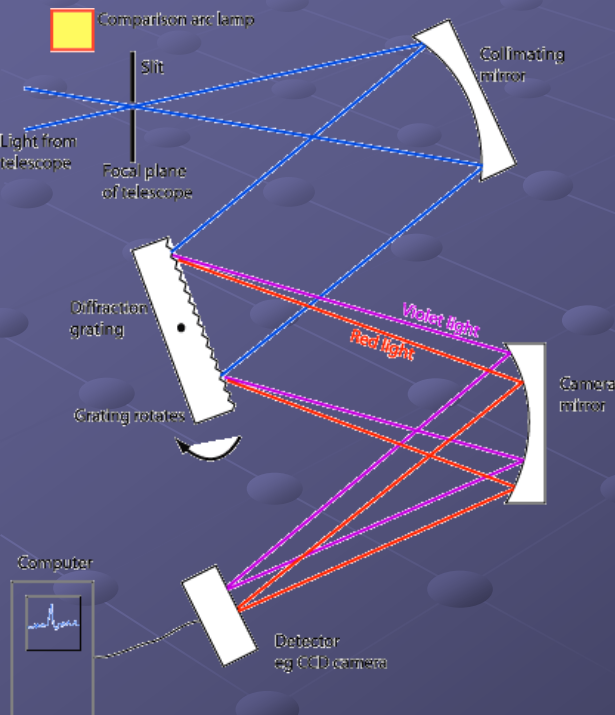
- How do astronomers learn about stars?
  - By analyzing the light that stars emit.



# 4

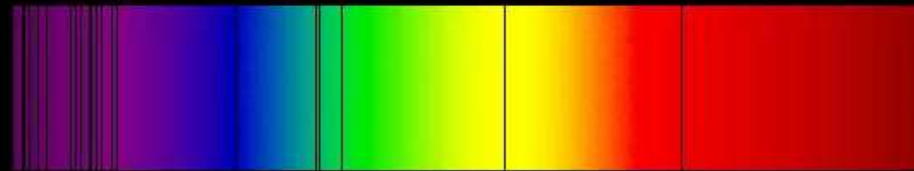
## ● What are spectrographs?

- Devices that separate light into different colors.

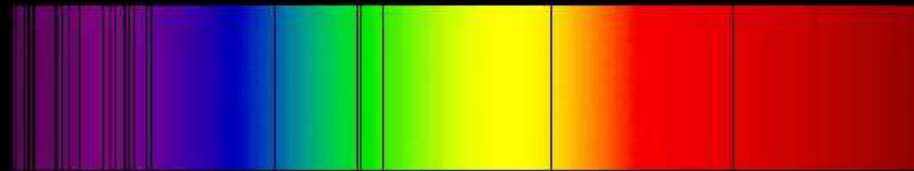


A Schematic Diagram of a Slit Spectrograph

### Absorption Lines from our Sun



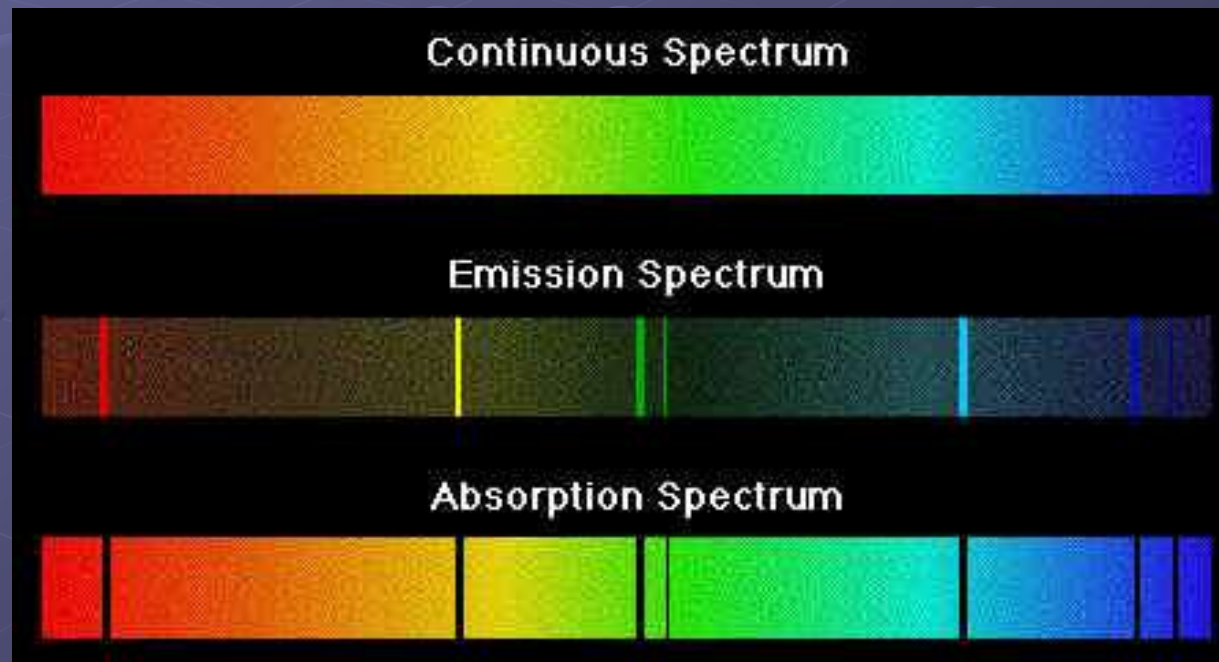
### Absorption Lines from a supercluster of galaxies, BAS11 $v = 0.07c$ , $d = 1$ billion light years



# 5

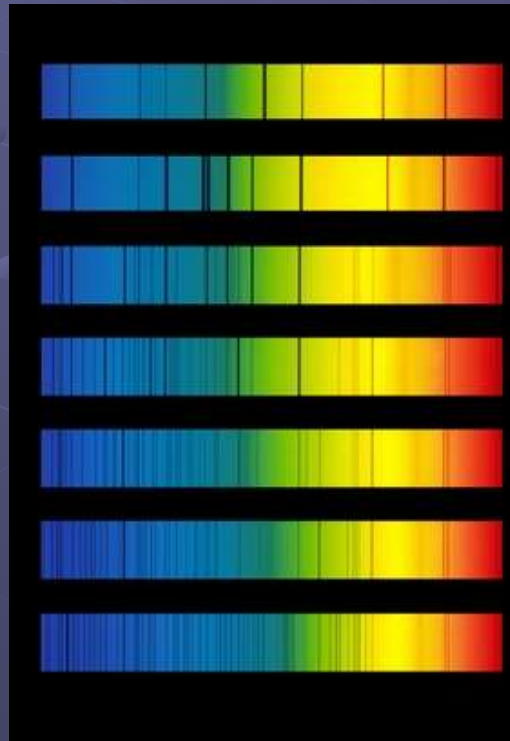
● What are the three types of spectra?

- Emission
- Absorption
- Continuous



# 6

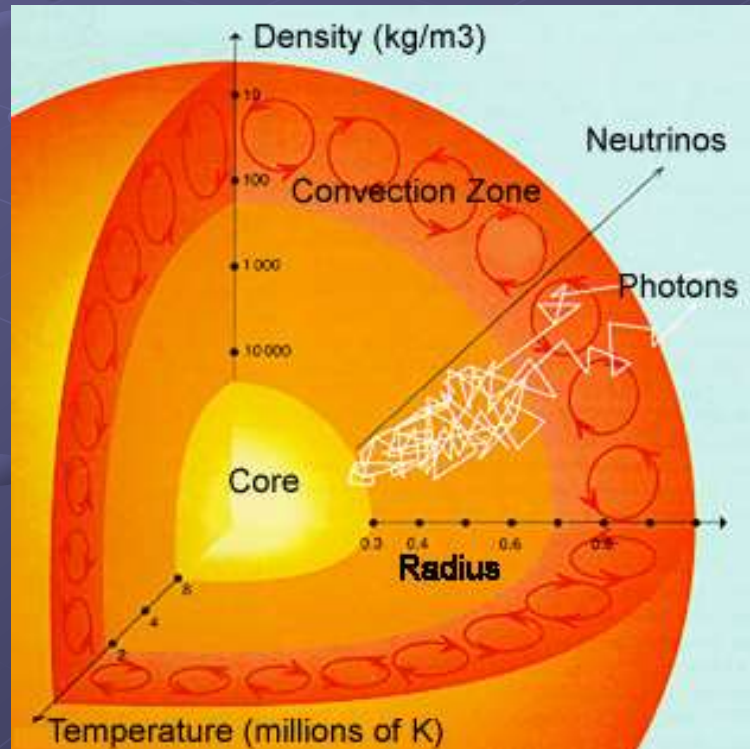
- What does a star's dark-line spectrum reveal?
  - The star's composition and temperature.



# 7

## ● What is true of the layers of a star?

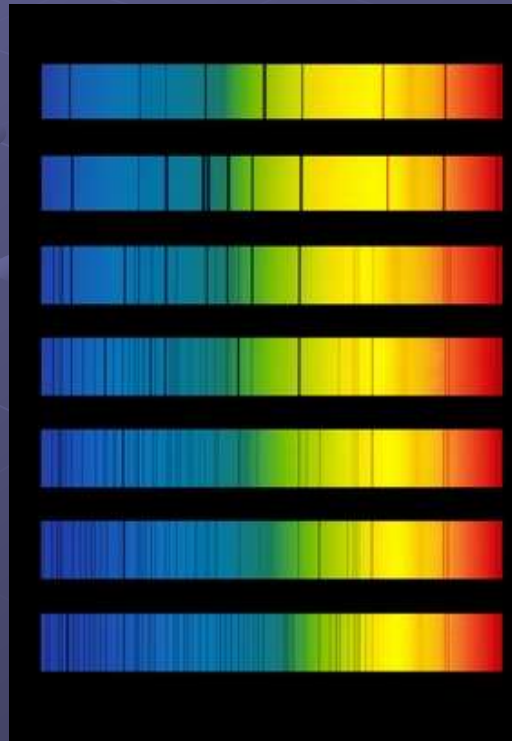
- The inner layers are very hot
- The outer layers are somewhat cooler





# 8 (use for page 6 in the Astronomy Workbook)

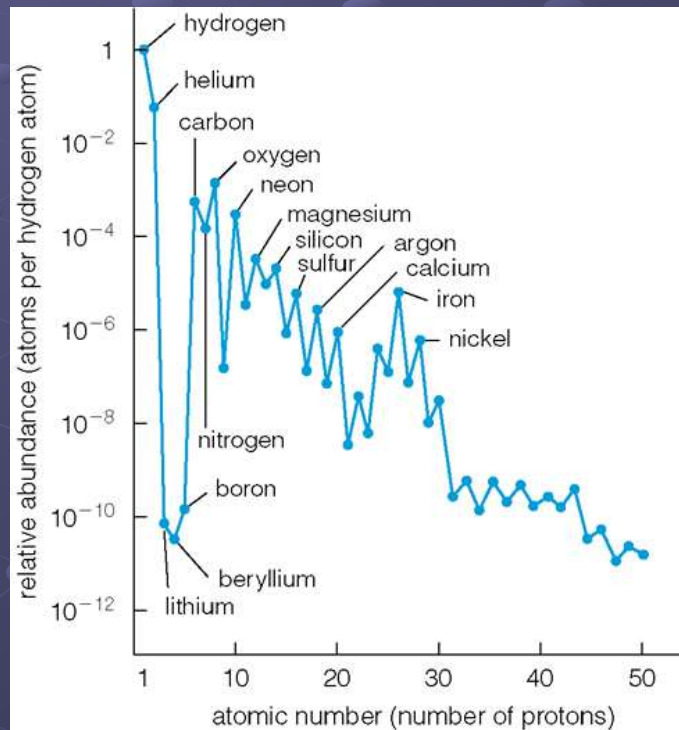
- What do the colors and lines in the spectrum of a star indicate?
  - The elements that make up the star.



# 9 (use for page 4 in the Astronomy Workbook)

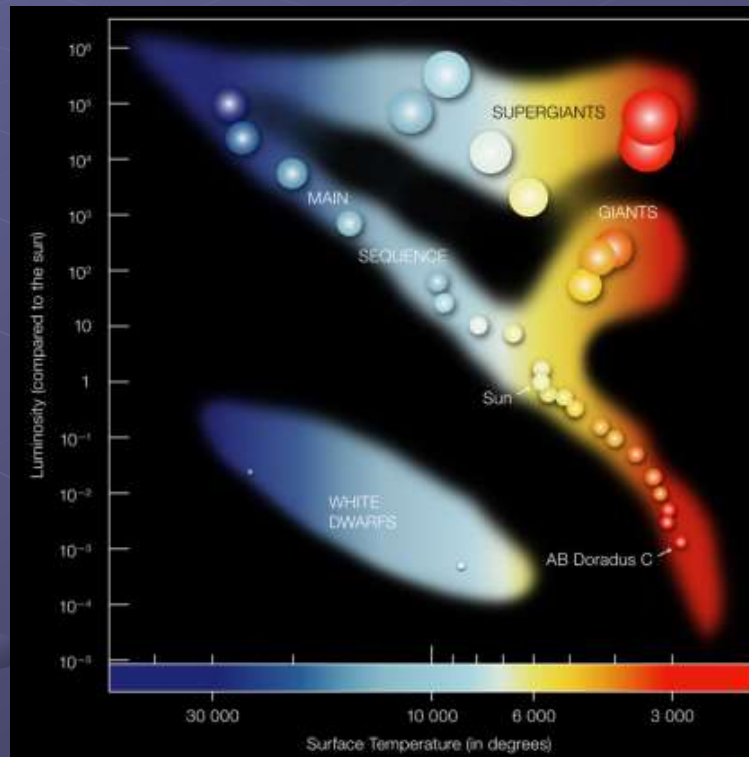
● What is the most common element in stars? What is the second most common element?

- Hydrogen (H)
- Helium (He)



# 10

- What is indicated by a star's color?
  - The surface temperature of the star.

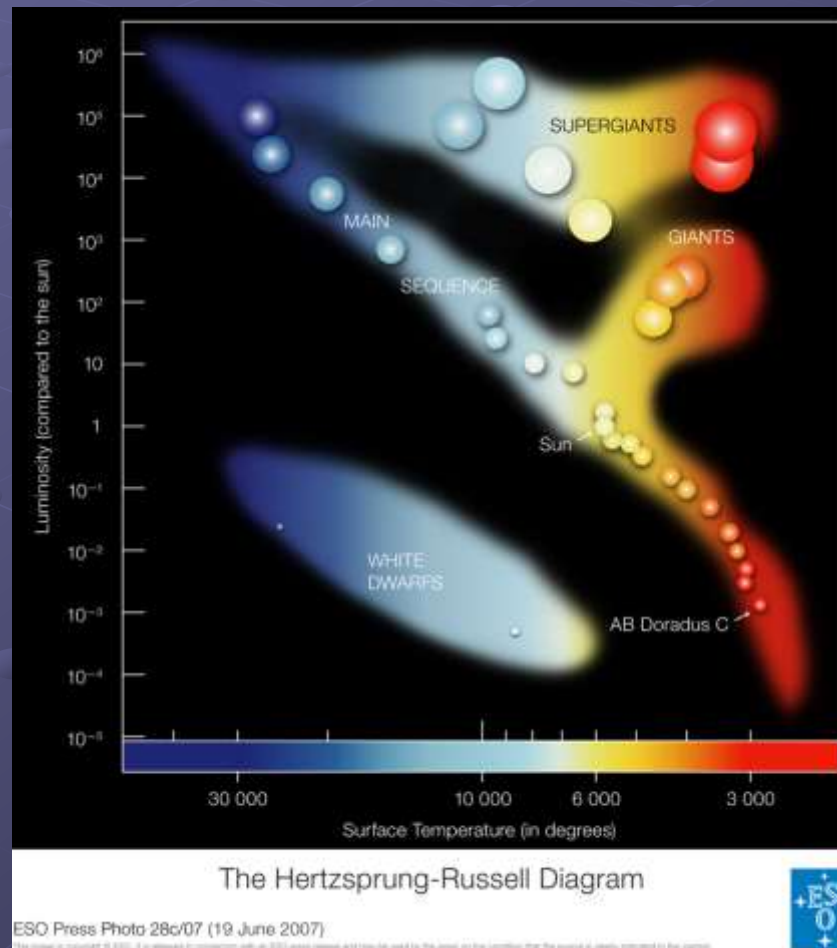


The Hertzsprung-Russell Diagram

# 11

● What color are the coolest stars?

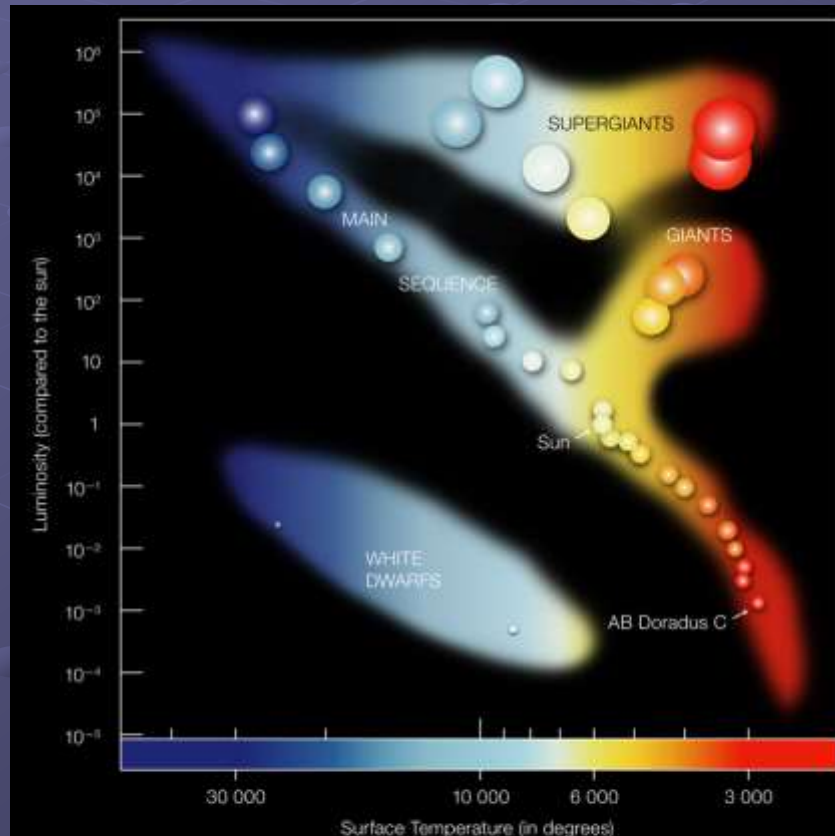
- Red



# 12

## ● What Color are the hottest stars?

- blue

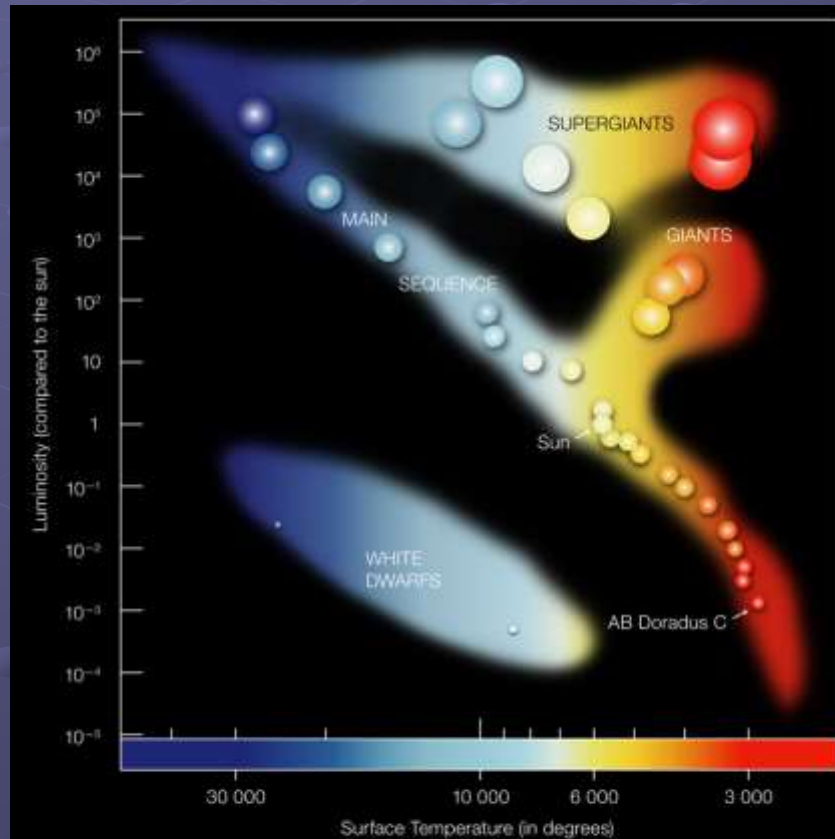


The Hertzsprung-Russell Diagram

# 13

● What temperature is our star (the Sun)?

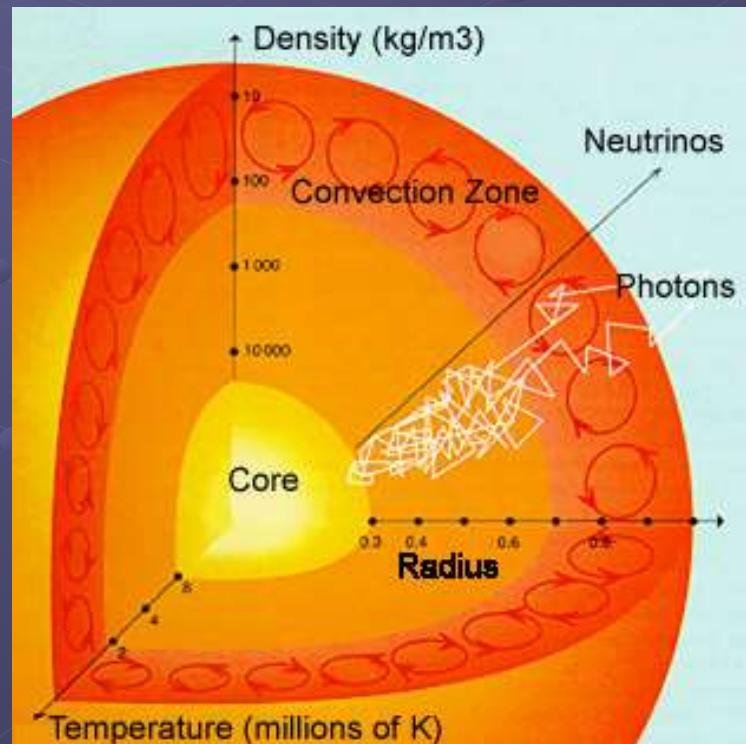
- 5,500 C°



The Hertzsprung-Russell Diagram

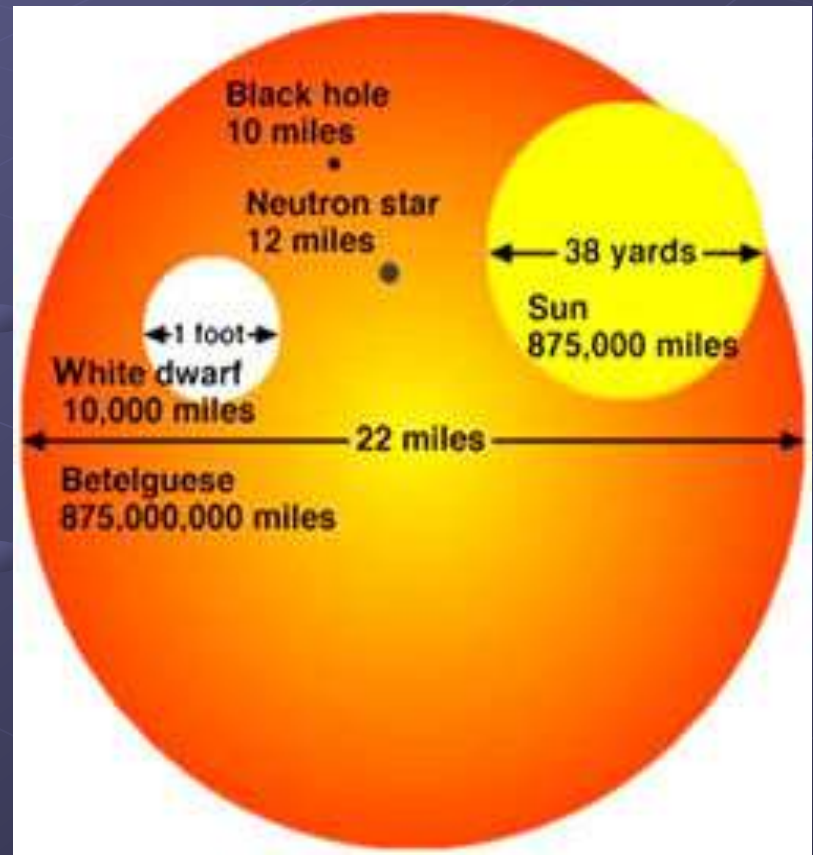
# 14

- What is the diameter of the sun?
  - 1,390,000 km compared to Earth at 12,756 km



# 15

- Stars that are very dense may have:
  - More mass than the sun and still be much smaller than the sun.





# 16

- What two kinds of motion are associated with stars?
  - Actual motion and apparent motion.

# 17

- What causes the apparent motion of the stars, which we can see with the unaided eye?
  - The movement of the Earth.



# 18

- What causes the circular trails of light seen in long-exposure photographs of the stars?
  - The rotation of Earth on its axis.



# 19

- In the Northern Hemisphere, the movement of stars called circumpolar stars makes them appear:
  - To circle Polaris, the North Star.

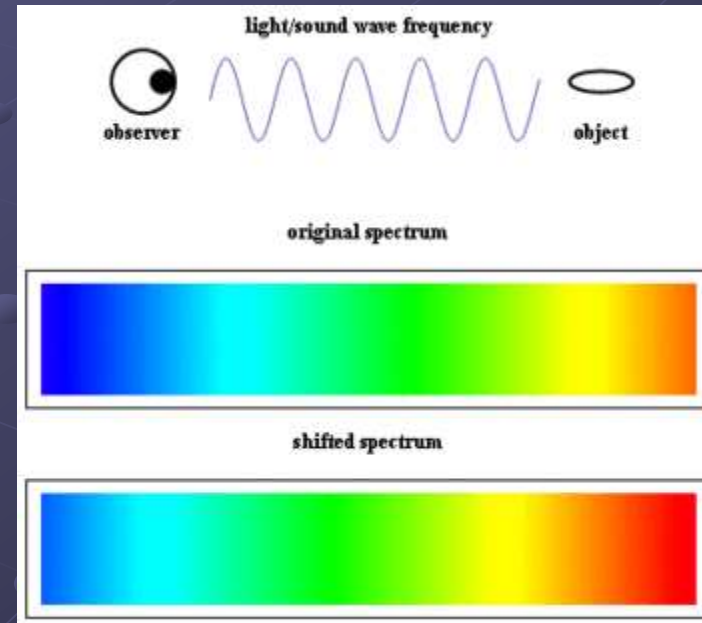
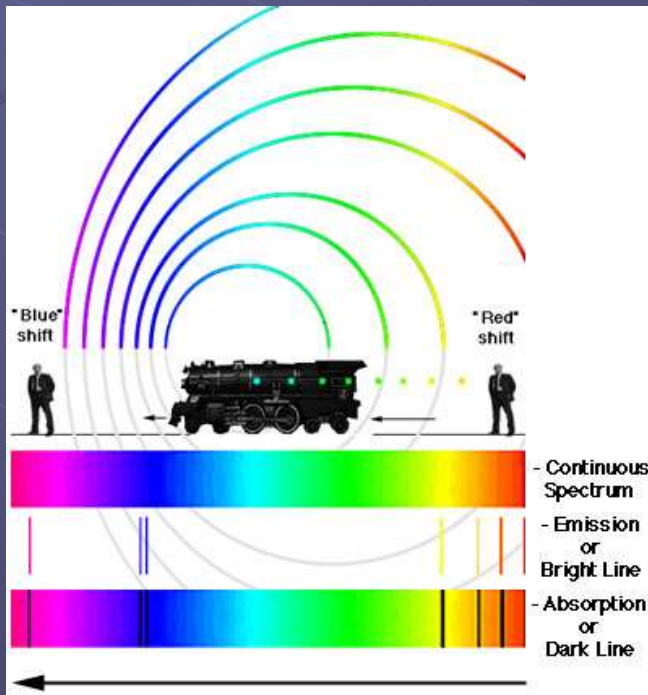


- What are three types of actual motion that stars may have?
  - They rotate on an axis
  - They may revolve around another star
  - They either move away from or toward our solar system.

# 21 (use for page 4 in the Astronomy Workbook)

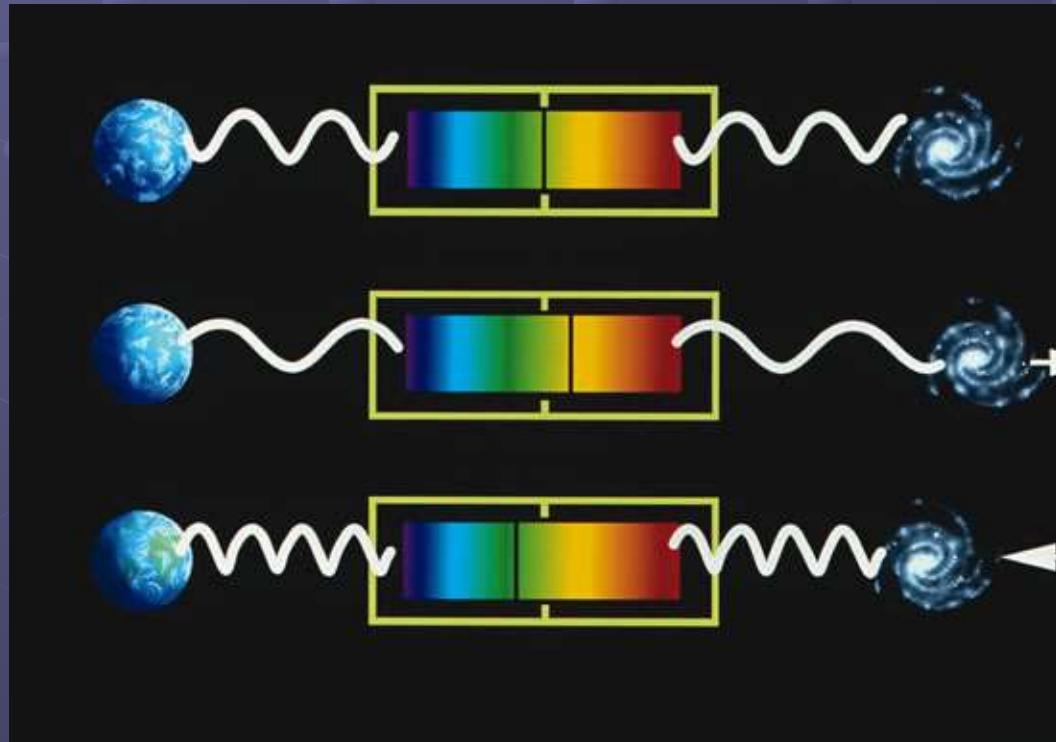
## ● What is the Doppler effect?

- The apparent shift in wavelength of light emitted by a light source moving toward or away from an observer.



# 22 (use for page 4 in the Astronomy Workbook)

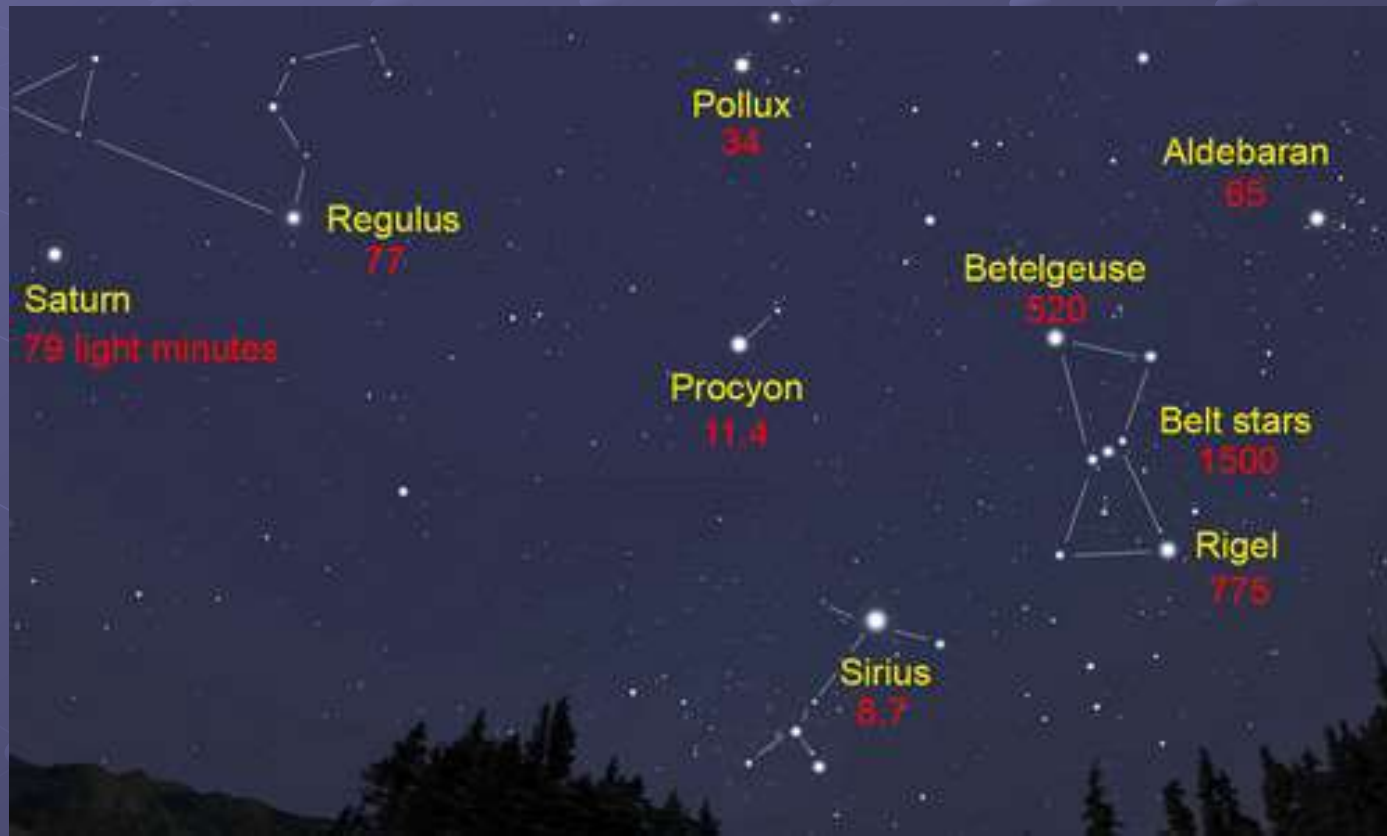
- What does the fact that most distant galaxies have red-shifted spectra indicate?
  - That those galaxies are moving away from Earth.





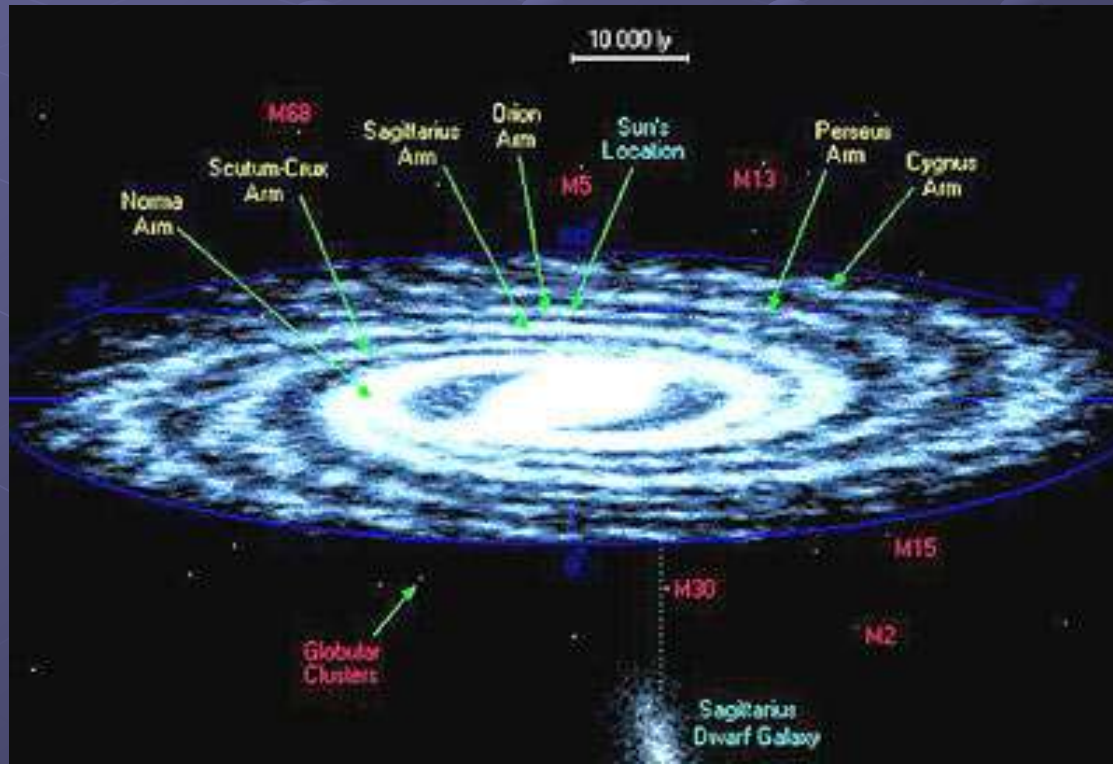
## ● What is a light-year?

- The distance that light travels in one year.



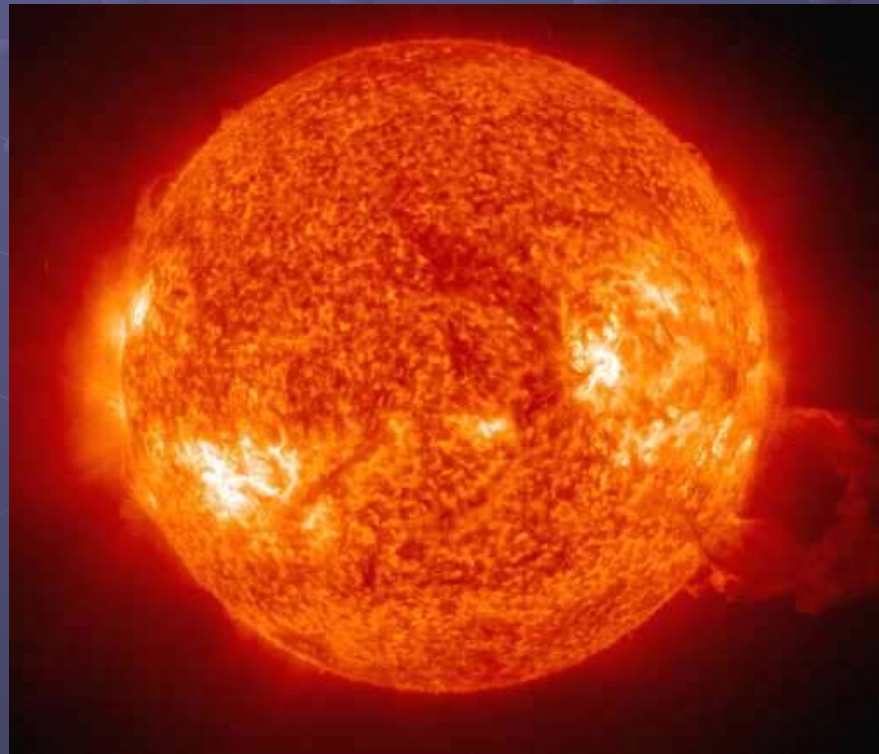


- How many kilometers does light travel in one year?
  - 9.46 trillion km



# 25

- When we witness an event on the sun, when did it actually take place?
  - About 8 minutes before we see it.



# The End

