

STARS

Essential Question:

What is the universe, and what goes on in stars?

A series of several parallel white lines of varying lengths, slanted diagonally from the bottom-left towards the top-right, set against a blue gradient background.



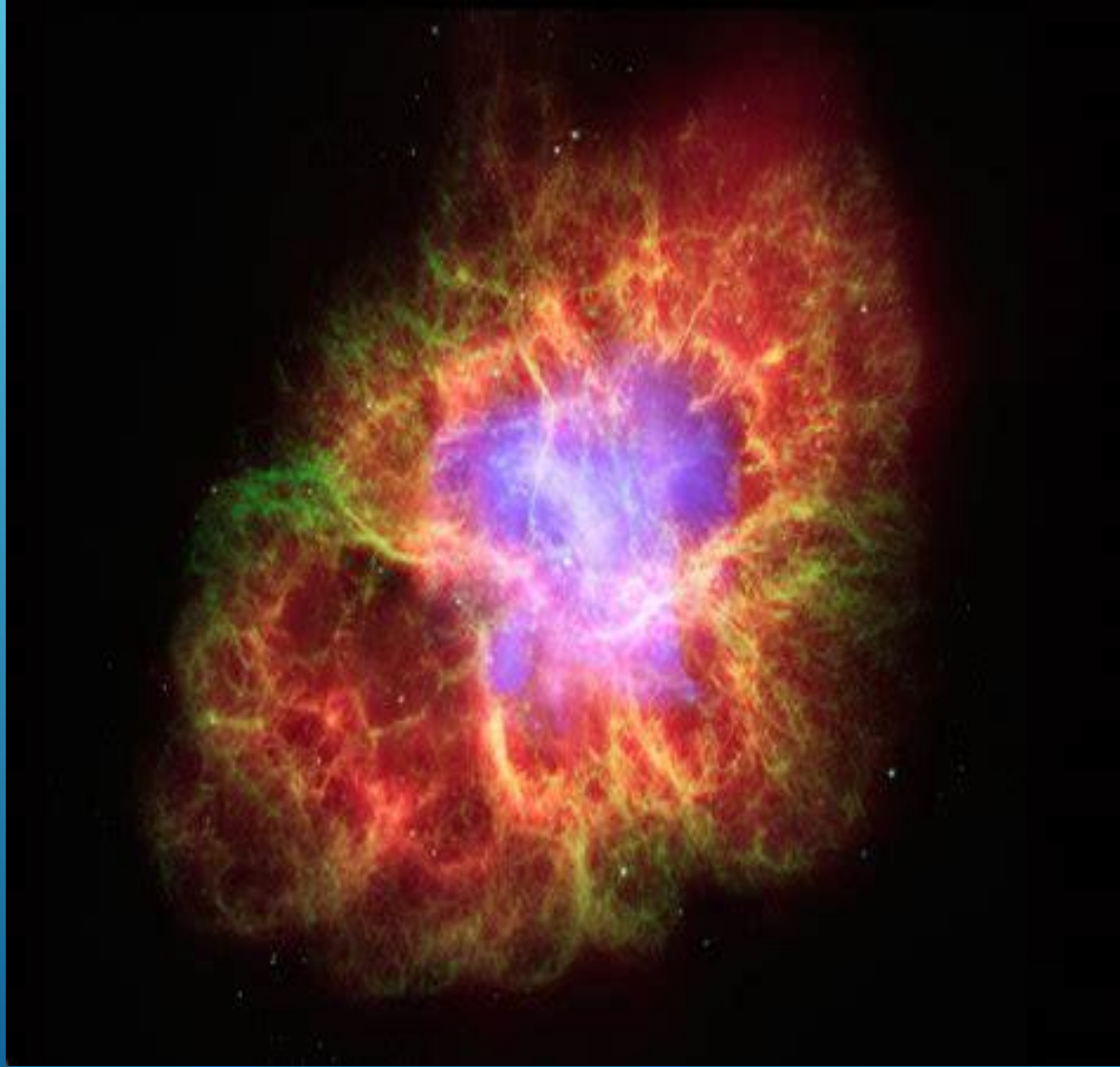
WHAT ARE STARS?

A star is an object that produces its own energy, including heat and light.

Stars go through stages, or cycles.

All stars form out of a **Nebula**

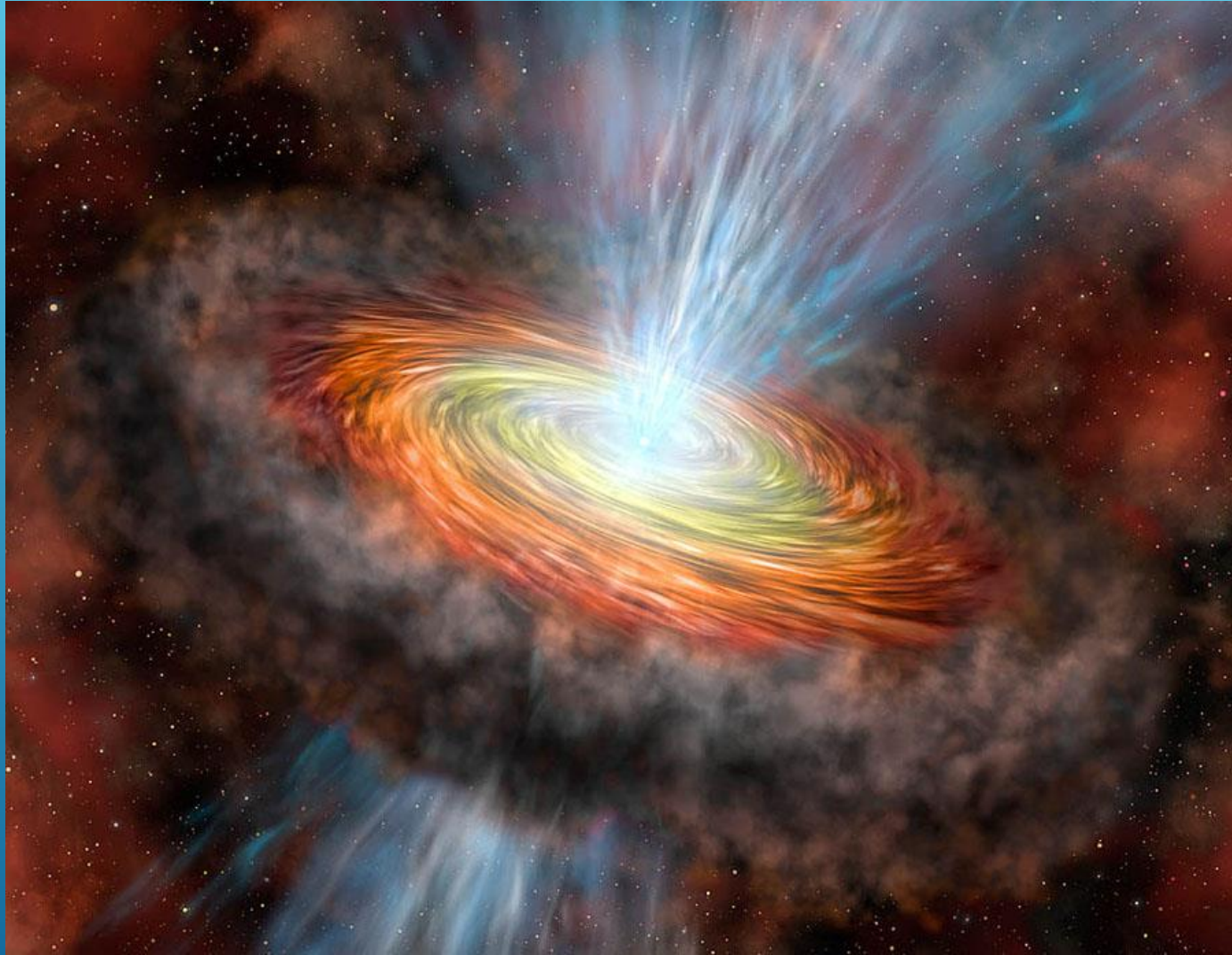
A nebula is a huge cloud of gases and dust.
Gravity pulls the mass of the nebula closer together.



NEBULA

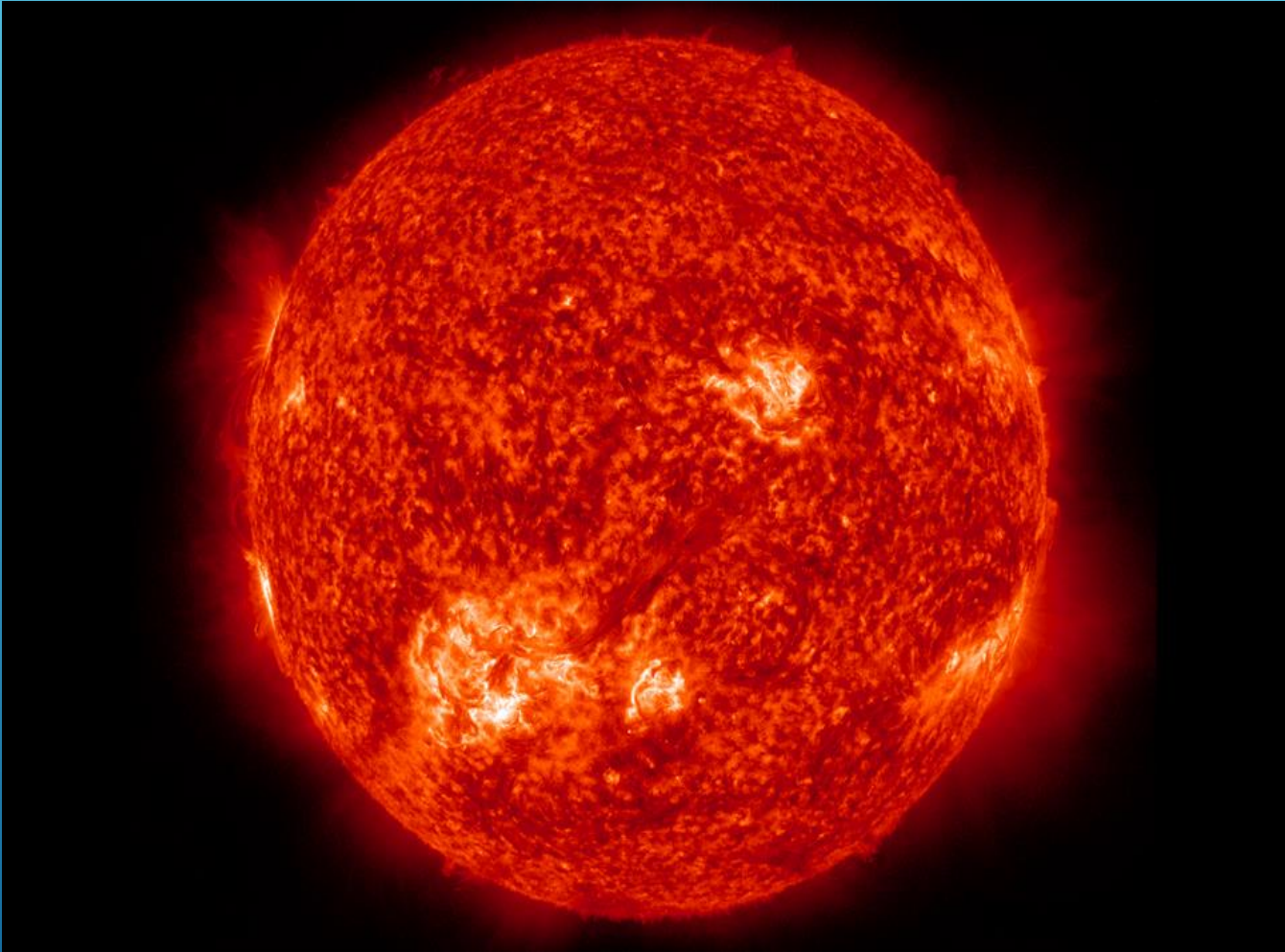
Huge cloud of gases and dust





PROTOSTAR

- As the hydrogen atoms move closer, they collide with each other. The collisions produce heat and the temperature in the clouds begins to rise.
- Eventually the temperature reaches millions of degrees Celsius, and hydrogen atoms begin combining to form helium atoms. This process gives off tremendous amounts of heat and light. **The star becomes a protostar, or beginning star**



RED GIANT

- Hydrogen is the fuel that produces energy in the Sun.
- For a few billion years, hydrogen continues to combine to form helium, and the star increases in temperature.
- Eventually the heat forces the hydrogen on the edge of the star to expand into space.
- As the expanding hydrogen moves farther away from the center of the star, it cools and turns red.
- At this stage the star is called a RED GIANT.
- A red giant is many times larger than the original star.
- In the star's core, the temperature has risen to about 100,000,000 degree Celsius.



WHITE DWARF

- **The final stages of a star's cycle depends on its mass.**
- When all the helium is gone, a star begins to cool and shrink. It then becomes a white dwarf.
- A white dwarf is a small and very dense star that shines with a cooler white light.
- The dwarf stage is the end of a medium-sized star's cycle.
- The heaviest stars end their cycles differently.

THINK ABOUT IT

What data could you use to find out the stage of a star's cycle?

Contrast a protostar and a white dwarf.

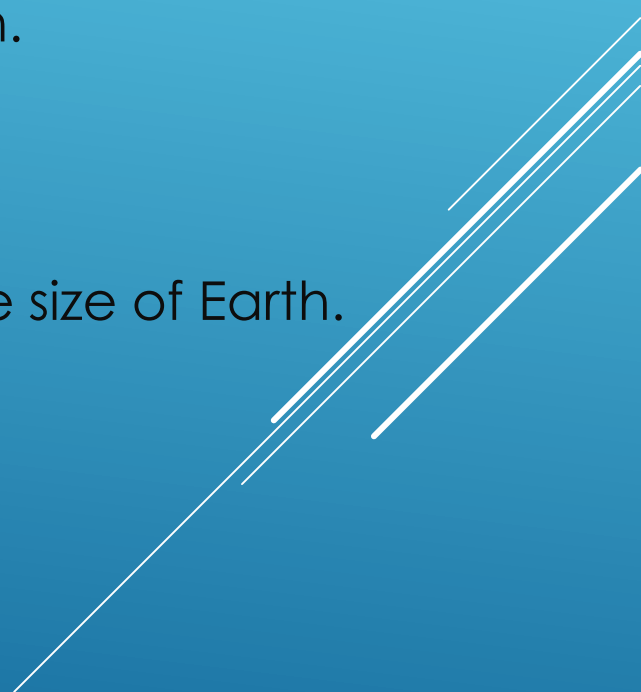
A series of several parallel white lines of varying lengths and positions, all slanted diagonally from the bottom-left towards the top-right, located in the lower right quadrant of the slide.

HOW ARE STARS CHARACTERIZED?

Stars are characterized by their:

- Size
 - Color
 - Temperature
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HOW ARE STARS CHARACTERIZED? SIZE

- Giant stars have diameters that are 10 to 100 times that of the sun.
 - Red supergiants are the largest stars.
 - They may have a diameters that are 1,000 times that of the Sun.
 - White Dwarfs are some of the smallest stars and can be about the size of Earth.
 - Neutron stars are the smallest
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- A decorative graphic consisting of several parallel white lines of varying lengths and orientations, located in the bottom right corner of the slide.

HOW ARE STARS CHARACTERIZED? COLOR

A star's color tells you about its surface temperature

- Red and orange colors indicate cooler stars.
- Yellow stars are hotter
- blue stars are the hottest

- The Sun is a medium sized yellow star whose surface temperature is about 6,000 degrees Celsius.

HOW ARE STARS CHARACTERIZED?

- In the night sky, some stars appear brighter than others.
- A star could appear faint because it is less luminous or is very far away from the Earth.
- Sirius is one of the brightest stars in the sky. However, other stars give out much more light than Sirius, but appear fainter in the night sky because they are farther away.
- How bright a star looks in Earth's night sky is its APPARENT MAGNITUDE.
- Apparent magnitude depends on how much light a star gives off and how far away it is from Earth. A star's actual brightness is called its ABSOLUTE MAGNITUDE



COLOR AND SURFACE TEMPERATURE OF STARS

THINK ABOUT IT

In your table groups discuss the following questions:

1. What does the color of a star tell us about that star?
 2. How can stars be different?
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- A decorative graphic consisting of several parallel white lines of varying lengths and thicknesses, arranged in a diagonal pattern from the bottom right towards the top right of the slide.

USING STARS TO FIND PLANETS

- Planets around distant stars are too dim ,small, and far away to be seen even through a telescope.

How are these planets discovered?

- When scientists observe a star whose motion is not smooth, they infer that a planet's gravity is affecting its motion.
- By measuring the motion of the star, astronomers can calculate the mass and distance from the star of the possible planet.
- Using such methods, astronomers have discovered what may be more than 160 planets beyond our solar system!

EXIT TICKET

ON YOUR POST IT NOTE PROVIDED PLEASE
ANSWER THE FOLLOWING QUESTION:

HOW CAN ASTRONOMERS DISCOVER
PLANETS AROUND DISTANT STARS THAT
THEY CANNOT SEE?

