

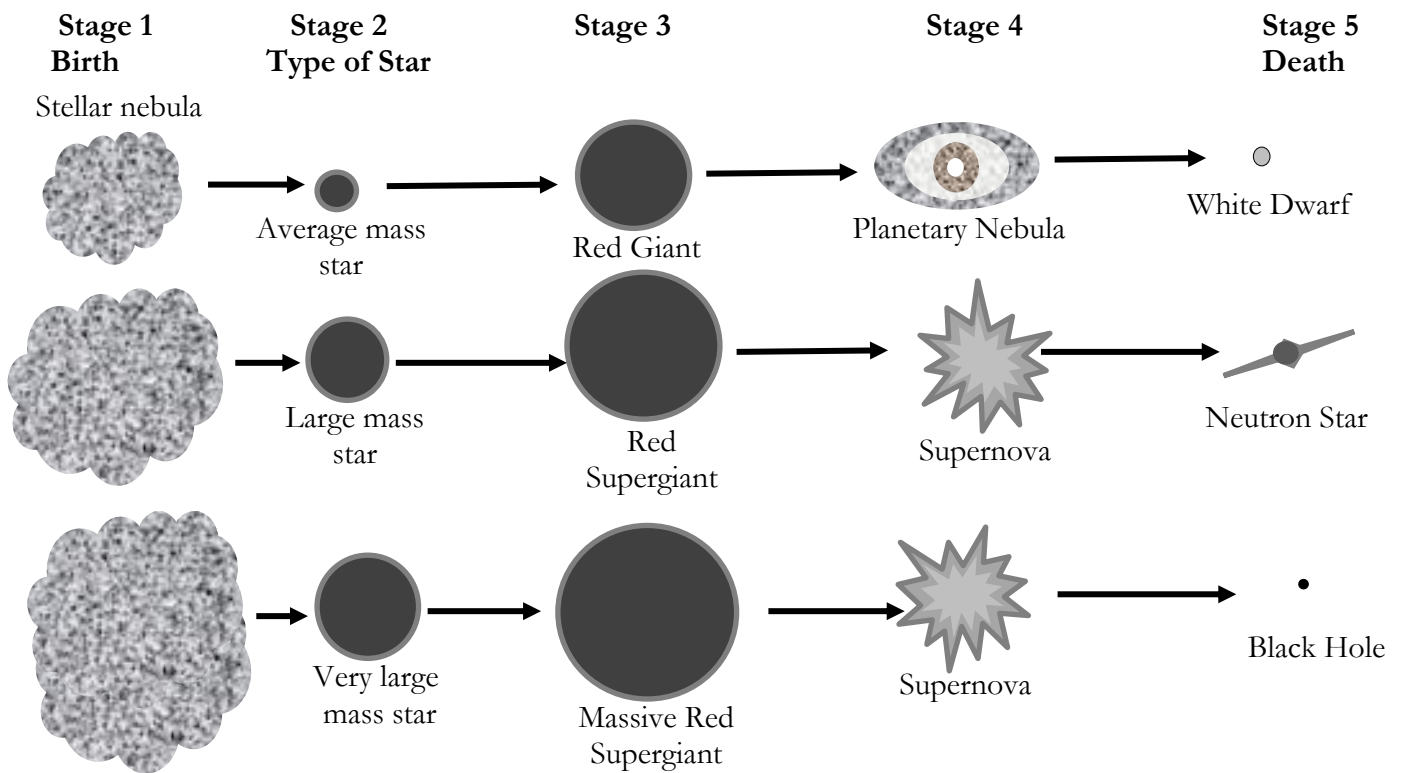
Life Cycles of Stars

Why?

Most people love to gaze at stars in the night sky. In early childhood when we learn songs like “Twinkle, Twinkle Little Star,” we begin to wonder what they are. Just as people pass through recognizable stages of life from birth to death, so do stars! We experience stars as unchangeable bright specks of light. Despite our personal experience, stars actually change over time – but on a time scale so huge that our lives are just a tiny moment compared to a star’s life. In this activity we will explore the ways stars change over their lives.


As you work through the following questions, be sure to follow your team role(s).

Model 1 - Three Stars from Birth to Death



Note: The relative scale of objects is not accurate in this diagram.

*Use the information in Model 1 to answer questions 1 – 6.
Reach agreement with your team before writing down your consensus answer.*

1. How many different **types of stars** are included in Model 1?
2. Describe what the symbol  represents in Model 1.
3. What is the name of the first stage of life for all three types of stars?

Read This!

Stella is the Latin word for star. **Nebula** is the Latin word for cloud.

4. Explain why you think astronomers used the term “Stellar nebula.” Cite specific information from Model 1 and the information in the Read This! box as part of your answer.

5. Look carefully at Model 1. Compare the different stages of life for all three types of stars. Which stages are very similar?

- a. only Stage 1 b. Stages 1, 2, and 3
c. all of the stages d. none of the stages



6. Analyze Model 1 to determine the life story of each of the three stars shown in Model 1. Complete the paragraphs below to describe the life cycles of stars. Base your answers on the labels in Model 1.

An **average mass star** like our sun begins its life in a _____
_____. After it has spent a time as a star, it expands to form a
_____. Next, it expands to form a _____
_____. In its last stage of life, it contracts to form a very small
_____ star.

A **large mass star** begins its life in a _____
_____. After it has spent a time as a star, it expands to form a _____
_____. Next, it explodes into a _____
_____. In its last stage of life, it contracts to form a very small _____ star.

A **very large mass star** begins its life in a _____
_____. After it has spent a time as a star, it expands to form a _____
_____. Next, it explodes into a
_____. In its last stage of life, it contracts to form an
invisible _____.

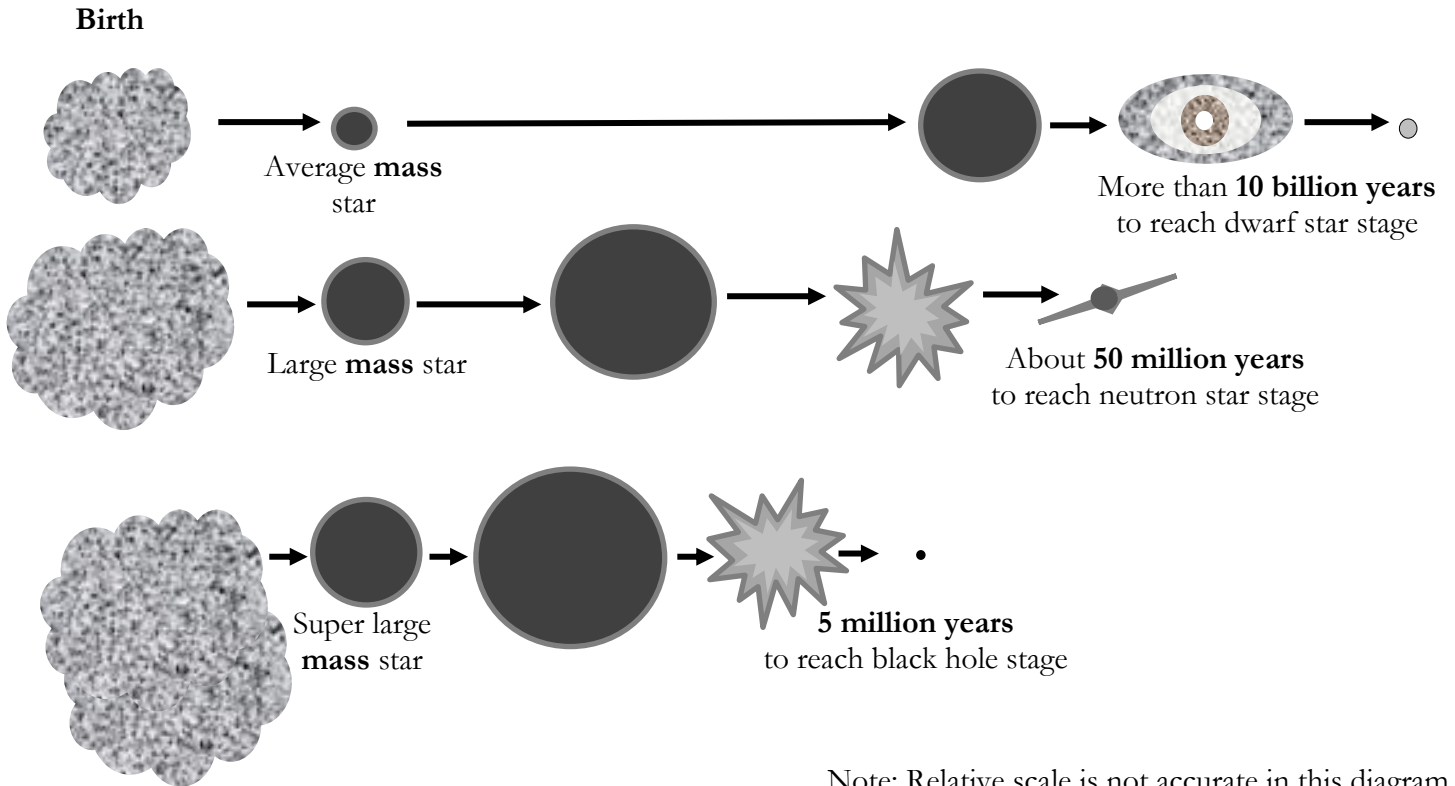


Check with your teacher before you continue.

Read This!

Astronomers sometimes use the term **Stellar Evolution** for the processes you have described above.

Model 2 - How Long do Three Types of Stars Exist?



*Use the information in Model 2 to answer questions 7 – 12.
Reach agreement with your team before writing down your consensus answer.*

7. In Model 2, identify the characteristic of stars that is represented by the different sizes of these objects.

Age Color Mass Type Volume



Check with your teacher before you continue.

8. As you move from the top to the bottom of Model 2, the mass of the stars...

increases decreases remains the same

9. **Highlight** all of the numbers and their units shown in Model 2.

10. **Circle** all the units that are used with numbers in Model 2.

Hundreds of Years

Thousands of Years

Millions of Years

Billions of Years

Trillions of Years

11. Identify the pattern that exists as you move from the top to the bottom ↓ of Model 2. As you move from top to bottom of Model 3, the number of years a star exists...

increases

decreases

remains the same

Read This!

Astronomers use the term **lifespan** to describe how long a star exists, from birth to death.



12. How does the lifespan of a star relate to the mass of the star?

a. Complete the sentence below.

As the mass of a star increases, the lifespan of the star _____

b. Cite three specific pieces of evidence from Model 2 to support your claim.

13. The sun in our solar system is considered to be an **average mass star**.

a. Based on Model 1, predict the last stage of life for our sun.

white dwarf

neutron star

black hole

b. Based on Model 2, predict the lifespan of our sun.

5 million years

50 million years

more than 10 billion years

What I Still Wonder...

14. Write one question you have about the life cycles of stars.

Extension Questions

15. Astronomers use some of the same terms as we use to discuss humans.
- Compare how these terms are used in the two different fields of study.
 - Use your prior knowledge and information from Model 1 to complete the table below.

Term	What it means to astronomers	What it means to most people
Birth		
Death		
Lifespan		

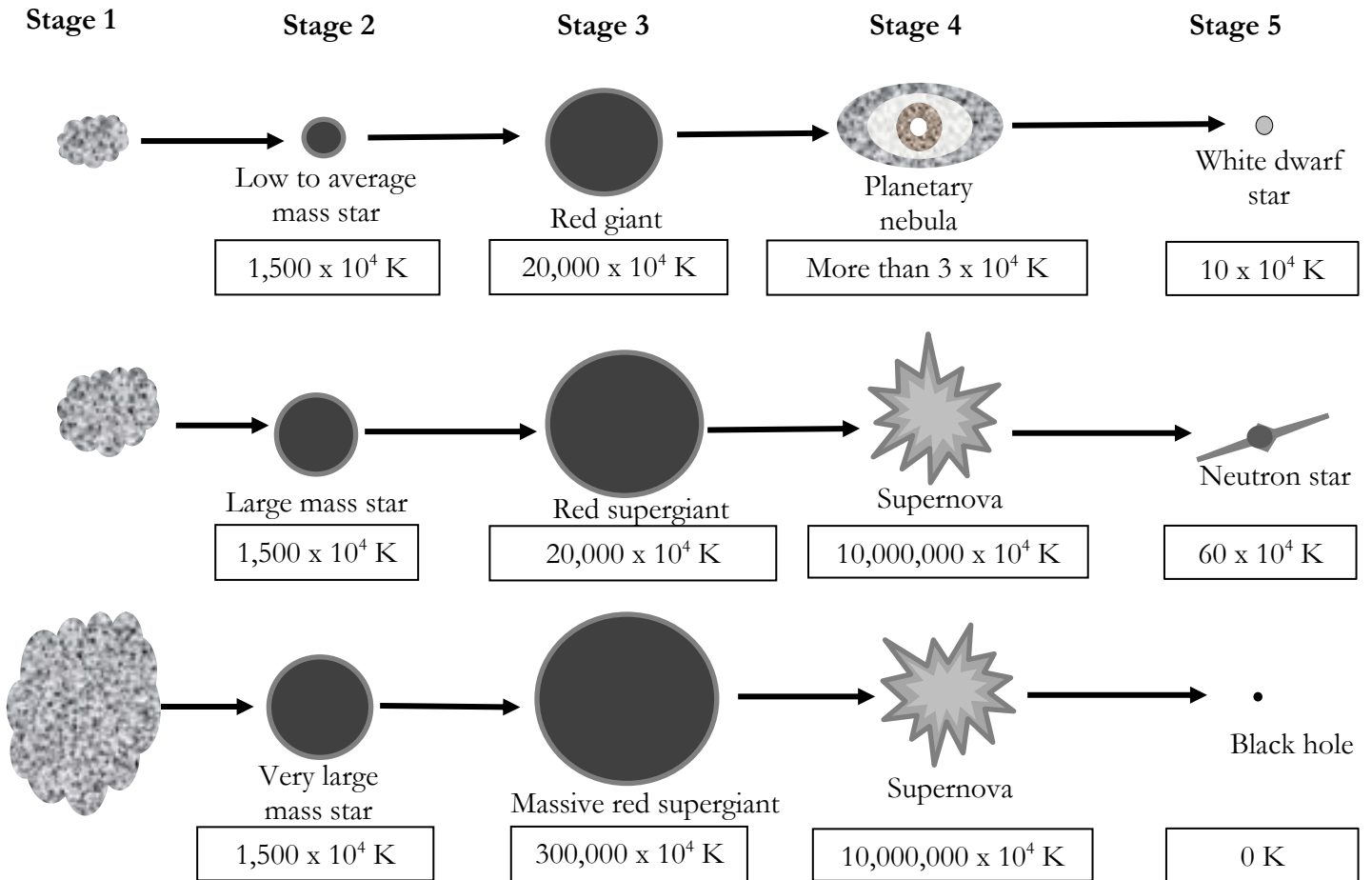
- Do you think these terms should be used by astronomers to discuss stars? Explain why or why not.

16. Take out a blank piece of paper. Choose a reader from your team. The reader will read aloud **one of the paragraphs from question 6**. The reader will pause after each sentence to allow the other team members to draw each section of the star's life cycle diagram. When the paragraph is finished, team members check each other's diagrams for accuracy, using Model 1 as the answer key.

Another team member chooses a different paragraph from question #6 and repeats the process.

Continue until everyone has had practice drawing all three types of life cycle diagrams.

Model 3 - Temperature Changes in Stars, from Birth to Death



Note: Relative scale is not accurate in this diagram

KEY

20 x 10⁴ K = Core temperature (in Kelvins)

17. Use data from Model 3 to answer questions a and b below.

Carefully observe the core temperatures of stages 2, 3, and 4 in the life cycles of all three types of stars. Based on your observations, **how does the core temperature of a star change as it ages?**

a. Write your claim as one complete sentence:

b. Present evidence from Model 3 to support your claim: