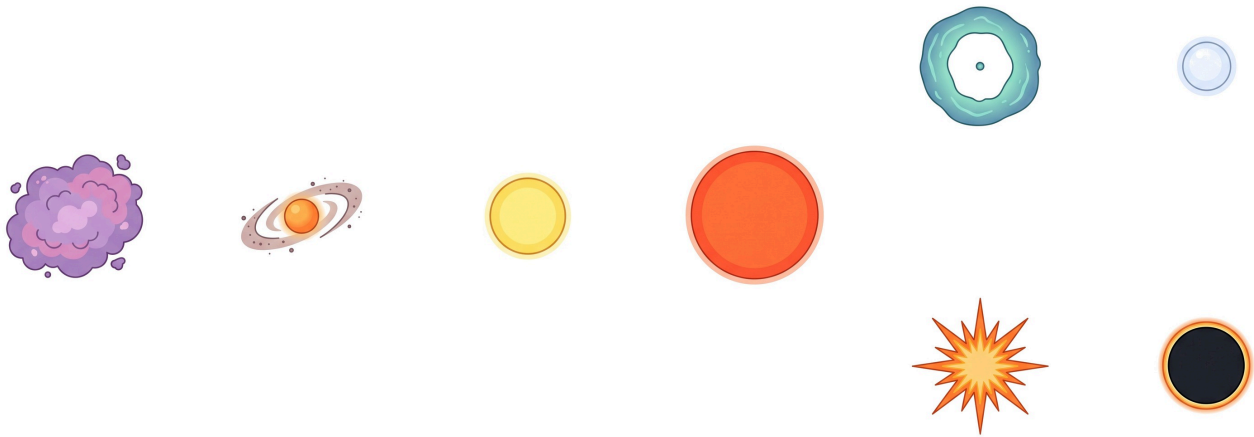


Life Cycle of a Star

How stars are born, shine and die



7

printable sheets

17

pages

All

answer keys included

Life Cycle of a Star Teaching Pack

How stars are born, shine and die

How to use this pack. The sheets are in a suggested teaching order: show the labeled diagram, have students label the blank one, then work through the practice sheets and finish with the quiz. Use them all over a week or pick the ones you need. The answer keys are together at the back.

What is inside

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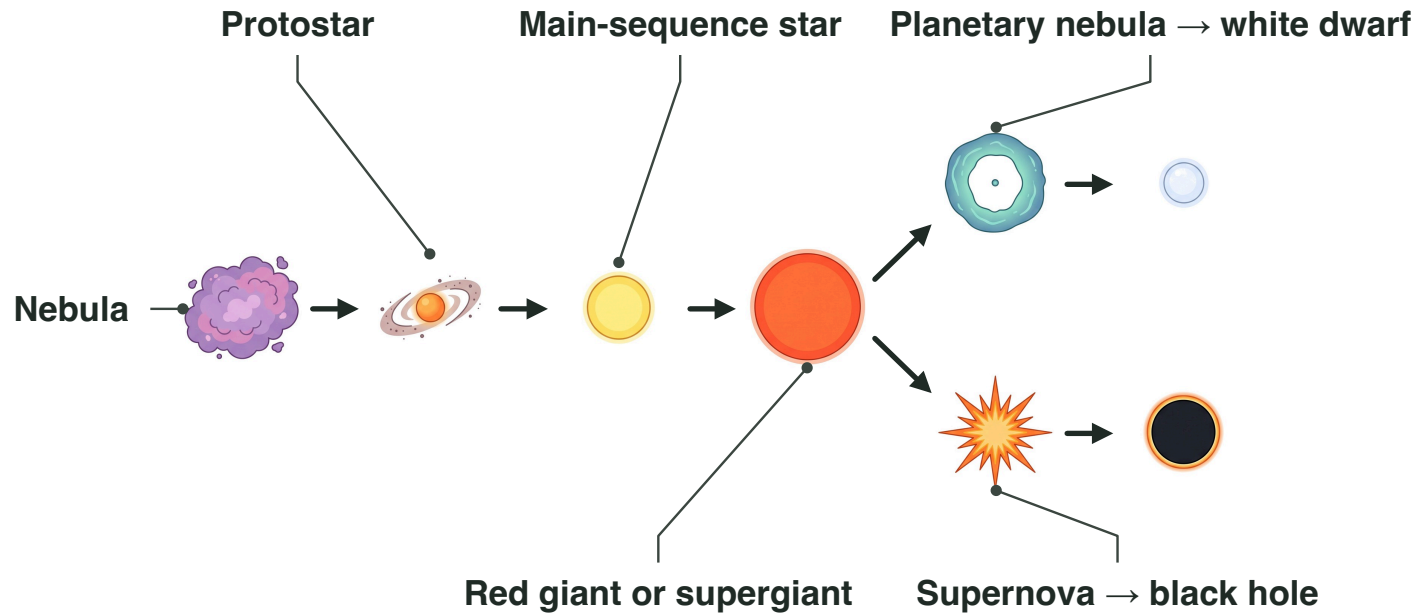
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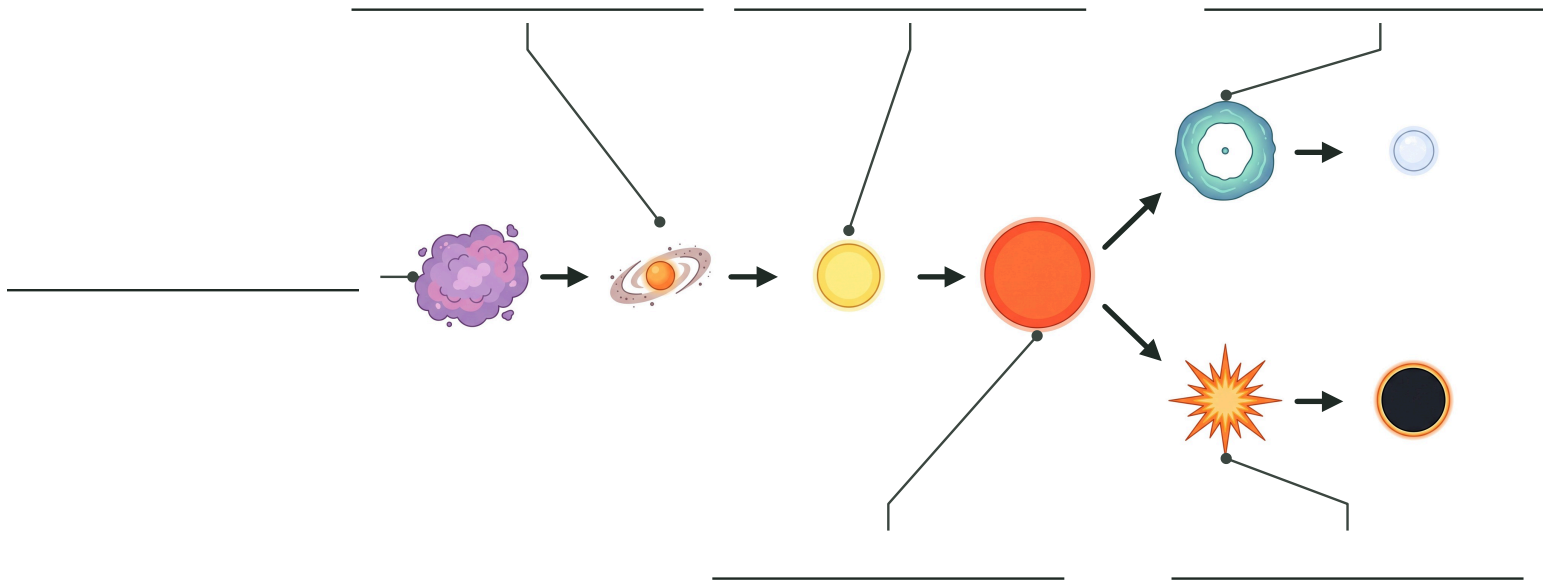
Life Cycle of a Star



Life Cycle of a Star

Name: _____

Write the name of each part on its line. Use the word bank.



Word bank

Main-sequence star

Nebula

Planetary nebula → white dwarf

Protostar

Red giant or supergiant

Supernova → black hole

Stages in the Life of a Star

Use the labeled life cycle of a star diagram to help you.

Part A. Write the word or words that fit each description.

Word bank

Fusion Gravity Hydrogen Main-sequence star Mass Nebula
Planetary nebula → white dwarf Protostar Red giant or supergiant Supernova → black hole

1. A stable, shining star like our Sun. Stars spend most of their lives in this stage. _____
2. The force that pulls gas and dust together to form a star. _____
3. A massive star explodes. Its core can collapse into an object that no light can escape. _____
4. A giant cloud of gas and dust in space where stars are born. _____
5. The gas that a star like the Sun uses as its fuel. _____
6. A star that has swollen to a huge size because its fuel is running low. _____
7. The amount of matter in a star. It decides how the star's life will end. _____
8. A hot, young object that is still pulling in gas and dust. It is not yet a true star. _____
9. A star like the Sun sheds its outer layers as a glowing shell of gas. A small, dense core is left. _____
10. The process deep inside a star that releases the energy that makes it shine. _____

Part B. Answer the questions.

1. What are the first two stages in the life of every star?

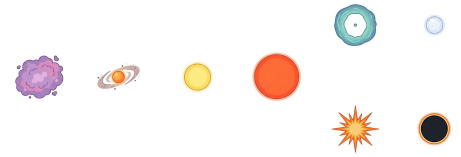
2. What is the difference between a red giant and a supergiant?

3. What will be left when the Sun reaches the end of its life?

The Lives of Stars

Read the text. Then answer the questions on the next page.

- 1 A star is a huge ball of hot, glowing gas. Stars do not last forever. Each one is born, shines for millions or billions of years, and then dies. Every star begins in a **nebula**, a giant cloud of gas and dust in space.
- 2 **Gravity** pulls part of the cloud together into a clump. As the clump shrinks, it gets hotter and hotter. This hot, young object is a **protostar**. When its center is hot enough, **fusion** begins. In fusion, hydrogen is turned into helium and energy is released. That energy makes the star shine.
- 3 Now the star is a **main-sequence star**. It is stable, because the outward push of its energy balances the inward pull of gravity. A star spends most of its life in this stage. Our Sun is a main-sequence star. It is about halfway through this stage.
- 4 In time, the hydrogen in the star's core runs low. What happens next depends on the star's **mass**. A star like the Sun swells into a **red giant**. Later it gently pushes its outer layers off into space. This glowing shell of gas is called a **planetary nebula**, although it has nothing to do with planets. The small, hot core left behind is a **white dwarf**. It slowly cools and fades.
- 5 A star with much more mass has a shorter and more violent life. It uses up its fuel faster and swells into a **supergiant**. Then its core collapses and the star explodes as a **supernova**. The core that is left is a tiny, very dense **neutron star**. If the star was massive enough, the core becomes a **black hole** instead. Its gravity is so strong that not even light can escape.



Stages in the life of a star. At the right are the two ways a star's life can end.

The Lives of Stars: Questions

Go back to the text to find each answer. The paragraphs are numbered to help you.

1. What is this text mostly about?

- ☐ How planets orbit the Sun
- ☐ How stars are born, change and die
- ☐ Why the night sky is dark
- ☐ How black holes were discovered

2. What is a nebula?

- ☐ A young star
- ☐ An exploding star
- ☐ A giant cloud of gas and dust
- ☐ The core of a dead star

3. Number the steps 1, 2 and 3 to show how a star forms (paragraph 2).

- ☐ The clump shrinks and gets hotter.
- ☐ Fusion begins, and the star shines.
- ☐ Gravity pulls part of the cloud into a clump.

4. Why is a main-sequence star stable?

5. What decides how a star's life will end?

- ☐ Its color
- ☐ Its mass
- ☐ Its distance from Earth
- ☐ The nebula it came from

6. What is left behind when a star like the Sun dies?

- ☐ A black hole
- ☐ A neutron star
- ☐ A protostar
- ☐ A white dwarf

7. What is a planetary nebula?

8. Give two ways the life of a massive star is different from the life of a star like the Sun.

The Life of a Star Like the Sun

These steps tell the life story of a star like our Sun. They are mixed up. Put them in order.

Part A. Number the steps from 1 to 7.

- ☐ The hydrogen in the core runs low, and the star swells into a red giant.
- ☐ The clump shrinks and heats up. It is now a protostar.
- ☐ The red giant pushes its outer layers off into space as a planetary nebula.
- ☐ Gravity pulls gas and dust in a nebula together into a clump.
- ☐ The star shines steadily for billions of years as a main-sequence star.
- ☐ Only the small, hot core is left. It is a white dwarf, and it slowly cools and fades.
- ☐ The center gets hot enough for fusion to begin. The star starts to shine.

Part B. Answer the questions.

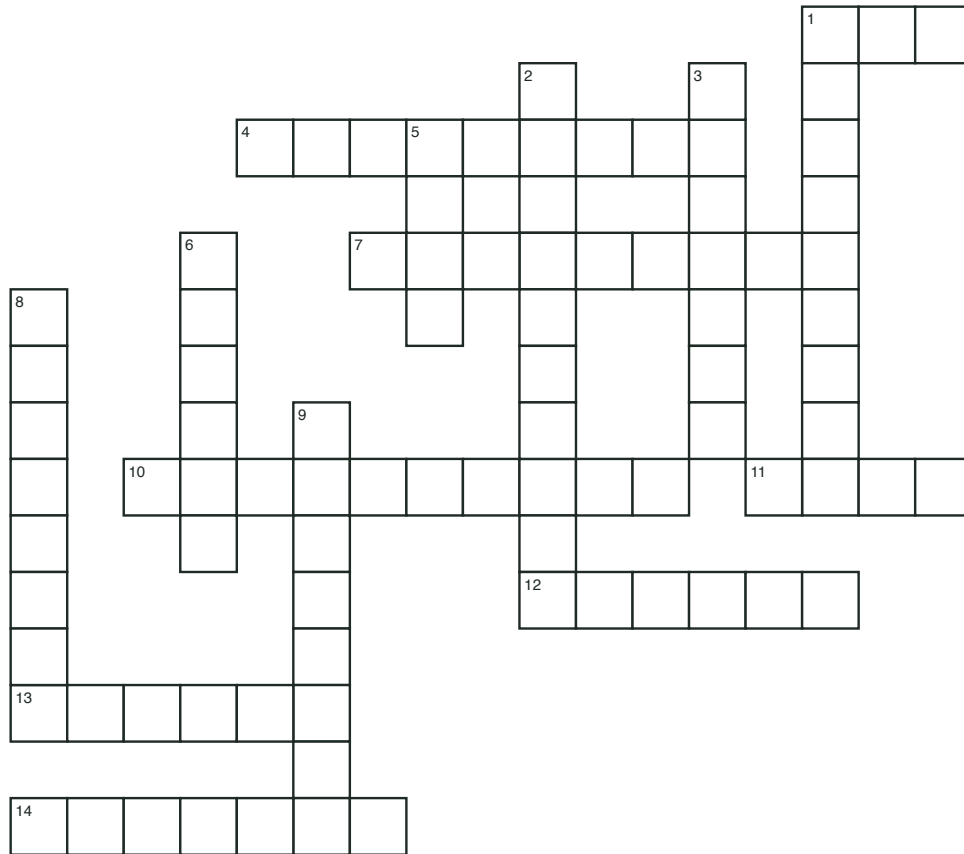
1. Which of these stages is the Sun in today?

2. Will the Sun ever explode as a supernova? Explain your answer.

3. A star with much more mass than the Sun has a different ending. Describe what happens to it after the main-sequence stage.

Life Cycle of a Star Crossword

Read each clue. Write the answer in the puzzle, one letter in each box. Use the word bank if you get stuck.



ACROSS

1. The star closest to Earth.
4. An object with gravity so strong that not even light can escape (2 words).
7. A hot, young object that is not yet a true star.
10. What a massive star swells into before it explodes.
11. The amount of matter in a star.
12. The process that releases the energy that makes a star shine.
13. A giant cloud of gas and dust where stars are born.
14. The force that pulls gas and dust together.

DOWN

1. The explosion of a massive star.
2. The small, hot core left behind by a star like the Sun (2 words).
3. A ____ star is the tiny, very dense core that can be left after a massive star explodes.
5. The center of a star.
6. The gas that is made in the core of a star like the Sun.
8. The gas a star like the Sun uses as its fuel.
9. What a star like the Sun swells into when its fuel runs low (2 words).

Word bank

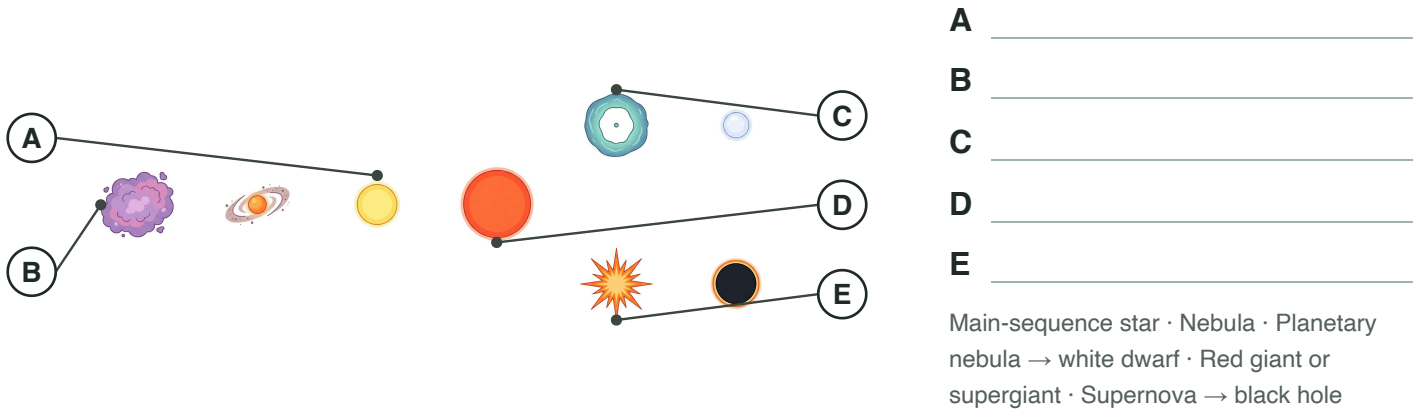
black hole core fusion gravity helium hydrogen mass nebula neutron
protostar red giant Sun supergiant supernova white dwarf

Life Cycle of a Star Quiz

Score _____ / 13

In the picture, a star's life runs from left to right. At the right it splits into two paths.

Part A. This is the life cycle of a star. Write the name of each stage.



Part B. Choose the best answer.

- What force pulls gas and dust together to form a star?
 - ☐ Fusion
 - ☐ Gravity
 - ☐ Friction
 - ☐ Magnetism
- What process makes a star shine?
 - ☐ Evaporation
 - ☐ Reflection
 - ☐ Fusion
 - ☐ Melting
- Which stage is the Sun in now?
 - ☐ Protostar
 - ☐ Main-sequence star
 - ☐ Red giant
 - ☐ White dwarf
- What decides how a star's life will end?
 - ☐ Its color
 - ☐ Its distance from Earth
 - ☐ Its name
 - ☐ Its mass
- Which kind of star explodes as a supernova?
 - ☐ A protostar
 - ☐ A star like the Sun
 - ☐ A star with much more mass than the Sun
 - ☐ Every star
- What is a planetary nebula?
 - ☐ A cloud where planets form
 - ☐ A glowing shell of gas shed by a star like the Sun
 - ☐ A very large planet
 - ☐ The explosion of a massive star

Part C. Write your answer.

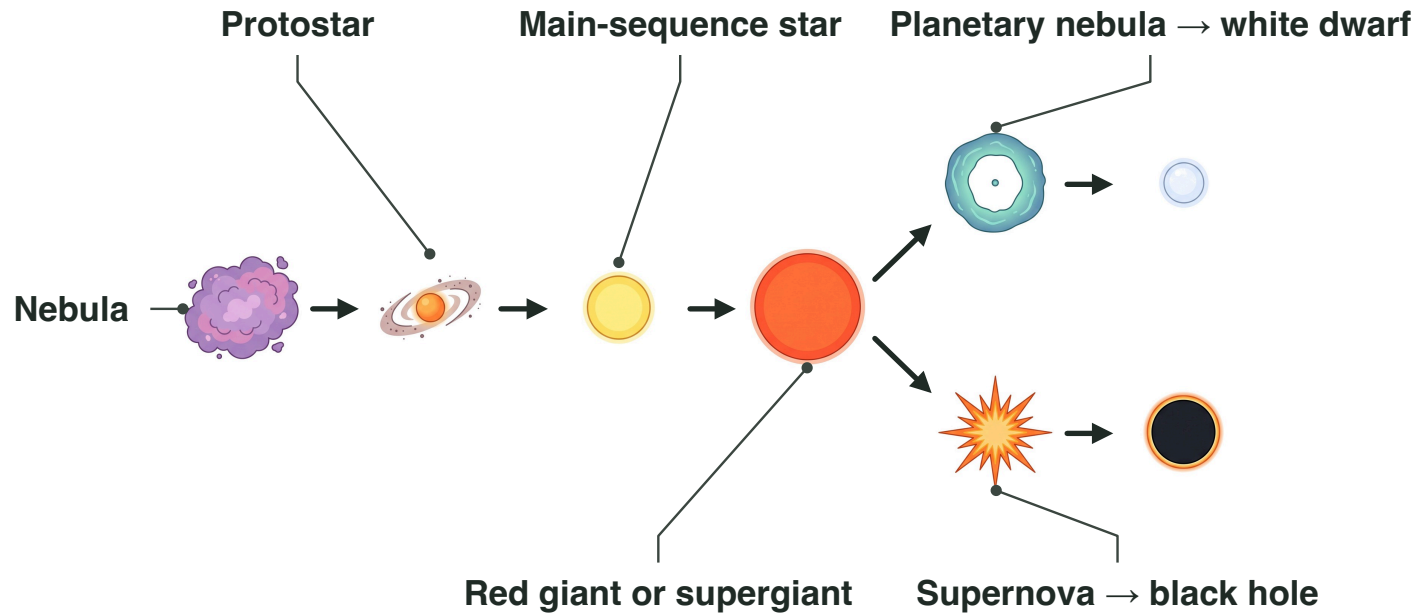
7. What is a protostar?

8. What will happen to the Sun after it becomes a red giant?

Answer Keys

In the same order as the sheets.

Life Cycle of a Star: Answer Key



Stages in the Life of a Star: Answer Key

Answers are in green. Written answers will vary; these are examples.

Part A. Write the word or words that fit each description.

Word bank

Fusion Gravity Hydrogen Main-sequence star Mass Nebula
Planetary nebula → white dwarf Protostar Red giant or supergiant Supernova → black hole

- | | |
|---|---------------------------------------|
| 1. A stable, shining star like our Sun. Stars spend most of their lives in this stage. | Main-sequence star |
| 2. The force that pulls gas and dust together to form a star. | Gravity |
| 3. A massive star explodes. Its core can collapse into an object that no light can escape. | Supernova → black hole |
| 4. A giant cloud of gas and dust in space where stars are born. | Nebula |
| 5. The gas that a star like the Sun uses as its fuel. | Hydrogen |
| 6. A star that has swollen to a huge size because its fuel is running low. | Red giant or supergiant |
| 7. The amount of matter in a star. It decides how the star's life will end. | Mass |
| 8. A hot, young object that is still pulling in gas and dust. It is not yet a true star. | Protostar |
| 9. A star like the Sun sheds its outer layers as a glowing shell of gas. A small, dense core is left. | Planetary nebula → white dwarf |
| 10. The process deep inside a star that releases the energy that makes it shine. | Fusion |

Part B. Answer the questions.

1. What are the first two stages in the life of every star?
A nebula and then a protostar.
2. What is the difference between a red giant and a supergiant?
A star like the Sun swells into a red giant. A massive star swells into a supergiant, which is much bigger.
3. What will be left when the Sun reaches the end of its life?
A white dwarf.

The Lives of Stars: Answer Key

Answers are in green. Written answers will vary; these are examples.

1. What is this text mostly about?

- ☐ How planets orbit the Sun
- ☒ **How stars are born, change and die**
- ☐ Why the night sky is dark
- ☐ How black holes were discovered

2. What is a nebula?

- ☐ A young star
- ☐ An exploding star
- ☒ **A giant cloud of gas and dust**
- ☐ The core of a dead star

3. Number the steps 1, 2 and 3 to show how a star forms (paragraph 2).

- 2** The clump shrinks and gets hotter.
- 3** Fusion begins, and the star shines.
- 1** Gravity pulls part of the cloud into a clump.

4. Why is a main-sequence star stable?

The outward push of its energy balances the inward pull of gravity.

5. What decides how a star's life will end?

- ☐ Its color
- ☒ **Its mass**
- ☐ Its distance from Earth
- ☐ The nebula it came from

6. What is left behind when a star like the Sun dies?

- ☐ A black hole
- ☐ A neutron star
- ☐ A protostar
- ☒ **A white dwarf**

7. What is a planetary nebula?

A glowing shell of gas that a star like the Sun pushes off into space.

8. Give two ways the life of a massive star is different from the life of a star like the Sun.

Any two: it is shorter, it uses up its fuel faster, it swells into a supergiant, it ends in a supernova, it leaves a neutron star or a black hole.

The Life of a Star Like the Sun: Answer Key

Answers are in green. Written answers will vary; these are examples.

Part A. Number the steps from 1 to 7.

- 5** The hydrogen in the core runs low, and the star swells into a red giant.
- 2** The clump shrinks and heats up. It is now a protostar.
- 6** The red giant pushes its outer layers off into space as a planetary nebula.
- 1** Gravity pulls gas and dust in a nebula together into a clump.
- 4** The star shines steadily for billions of years as a main-sequence star.
- 7** Only the small, hot core is left. It is a white dwarf, and it slowly cools and fades.
- 3** The center gets hot enough for fusion to begin. The star starts to shine.

Part B. Answer the questions.

1. Which of these stages is the Sun in today?

It is a main-sequence star.

2. Will the Sun ever explode as a supernova? Explain your answer.

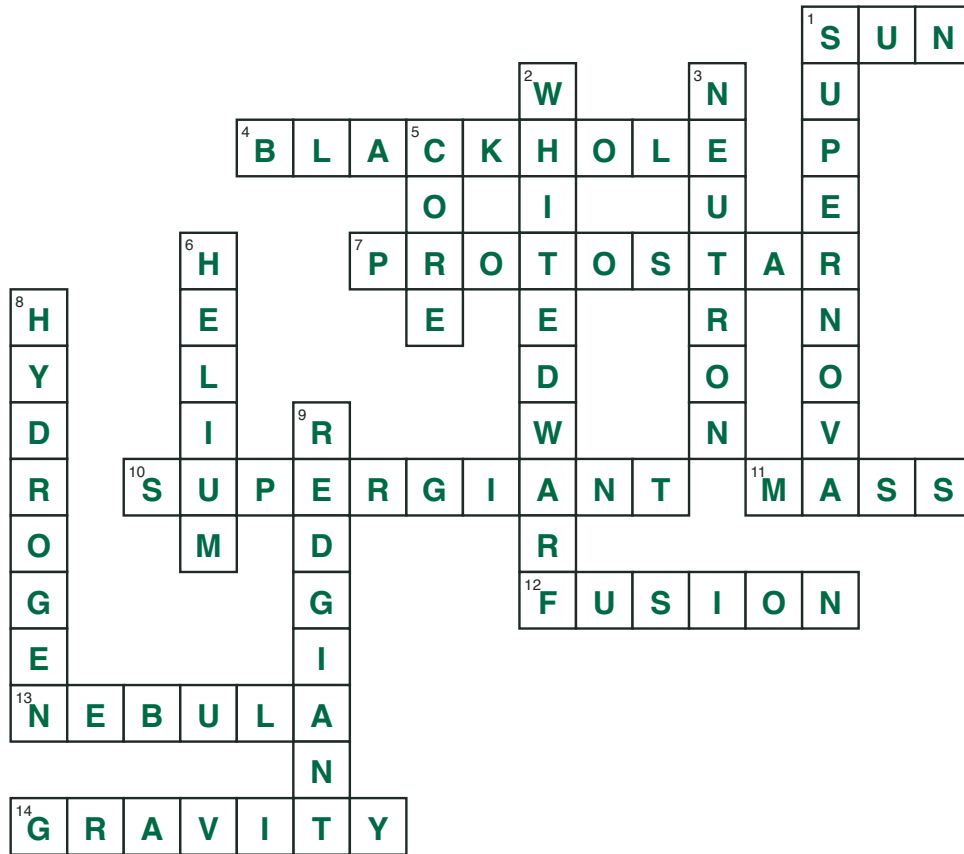
No. Only a star with much more mass than the Sun explodes as a supernova.

3. A star with much more mass than the Sun has a different ending. Describe what happens to it after the main-sequence stage.

It swells into a supergiant and explodes as a supernova. Its core is left as a neutron star or a black hole.

Life Cycle of a Star Crossword: Answer Key

Answers are in green.



ACROSS

1. The star closest to Earth.
4. An object with gravity so strong that not even light can escape (2 words).
7. A hot, young object that is not yet a true star.
10. What a massive star swells into before it explodes.
11. The amount of matter in a star.
12. The process that releases the energy that makes a star shine.
13. A giant cloud of gas and dust where stars are born.
14. The force that pulls gas and dust together.

DOWN

1. The explosion of a massive star.
2. The small, hot core left behind by a star like the Sun (2 words).
3. A ____ star is the tiny, very dense core that can be left after a massive star explodes.
5. The center of a star.
6. The gas that is made in the core of a star like the Sun.
8. The gas a star like the Sun uses as its fuel.
9. What a star like the Sun swells into when its fuel runs low (2 words).

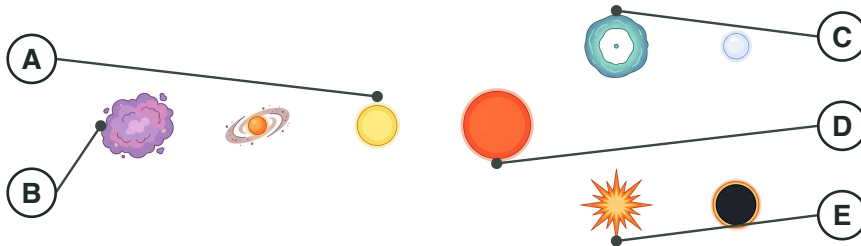
Word bank

black hole core fusion gravity helium hydrogen mass nebula neutron
protostar red giant Sun supergiant supernova white dwarf

Life Cycle of a Star Quiz: Answer Key

Answers are in green. Written answers will vary; these are examples.

Part A. This is the life cycle of a star. Write the name of each stage.



A Main-sequence star

B Nebula

C Planetary nebula → white dwarf

D Red giant or supergiant

E Supernova → black hole

Main-sequence star · Nebula · Planetary nebula → white dwarf · Red giant or supergiant · Supernova → black hole

Part B. Choose the best answer.

1. What force pulls gas and dust together to form a star?

- ☐ Fusion
- ☒ Gravity
- ☐ Friction
- ☐ Magnetism

2. What process makes a star shine?

- ☐ Evaporation
- ☐ Reflection
- ☒ Fusion
- ☐ Melting

3. Which stage is the Sun in now?

- ☐ Protostar
- ☒ Main-sequence star
- ☐ Red giant
- ☐ White dwarf

4. What decides how a star's life will end?

- ☐ Its color
- ☐ Its distance from Earth
- ☐ Its name
- ☒ Its mass

5. Which kind of star explodes as a supernova?

- ☐ A protostar
- ☐ A star like the Sun
- ☒ A star with much more mass than the Sun
- ☐ Every star

6. What is a planetary nebula?

- ☐ A cloud where planets form
- ☒ A glowing shell of gas shed by a star like the Sun
- ☐ A very large planet
- ☐ The explosion of a massive star

Part C. Write your answer.

7. What is a protostar?

A hot, young object that is pulling in gas and dust. Fusion has not started yet.

8. What will happen to the Sun after it becomes a red giant?

It will shed its outer layers as a planetary nebula. A white dwarf will be left.