

LIFE CYCLE OF STARS

In this session you will be learning about the stages of a star throughout its lifetime.

Are all stars the same? Write down any differences you can think of here:

Where do stars come from?

Stars are born in clouds of gas and dust, which then clump together by way of gravitational attraction. If the resulting clumps attract enough mass, they will begin to heat up and glow, eventually creating a new star.

What will happen to the Sun next?

The Sun is currently in its 'main sequence phase'. At the core of main sequence stars, hydrogen is converted to helium in a process called nuclear fusion. This nuclear reaction provides enough energy for main sequence stars to shine brightly for many years. The Sun is about halfway through its life as a main sequence star. It will be a main sequence for another 5 billion years (5,000,000,000).

ACTIVITY 1: BALLOON GAME

You are all going to become stars! Your teacher will give everyone a balloon. Some of you will be given red balloons, some yellow balloons, some white and one of you will receive a blue balloon. Follow the instructions from your teacher then try and answer the following questions:

1. *What colour are stars that are hottest?*

2. *What colour are stars that are coldest?*

3. *Which stars will live the longest?*

RESOURCES

- ☆ Red balloons x8
- ☆ Yellow balloons x5
- ☆ White balloons x2
- ☆ Blue balloon x1
- ☆ Pin to pop the balloon

WARNING

Be careful with the pin used to pop the balloon.



ACTIVITY 2: CARD SORT GAME - HIGH MASS STARS

Your teacher will give you some cut-out's, place them in the correct order here:

Stage 1 - All stars are born in clouds of gas and dust

Stage 2 - As the dust and gas contracts, it will begin to heat up and start to glow.

Stage 3 - If the centre of the dust and gas cloud contains enough matter it will become hot enough that nuclear fusion can take place. This is the birth of the star! These stars release energy which stop them from contracting and cause them to shine brightly. The Sun is one of these stars.

Stage 4 - The star is running low on hydrogen in its core. Its outer layers will expand outwards. It can grow up to 100 times the size it was when it was a main sequence star.

<p>Stage 5 - The outer layers of gas are ejected from the surface of the star. The core of the star collapses and shines brightly, making the surrounding gas glow.</p>	
<p>Stage 6 - The core of the star has collapsed to about the size of the Earth but still has the mass of the Sun. This means it is very dense. This type of star is made of highly compressed carbon and oxygen. Its surface is very hot and it shines bright and white. This kind of star can look quite faint from a distance because it is so small.</p>	
<p>Stage 7 - Nuclear reactions are no longer taking place inside the star. It will radiate its energy away in the form of light and heat and will slowly cool down and fade. It will take many billions of years to cool right down.</p>	

You have just learnt what will happen to the Sun, but the Sun is not very big compared to other stars. Not all stars start with the same mass and it is this that determines what happens to them. The life cycle of a massive star is different from the life cycle of a lower mass star, like the Sun.

ACTIVITY 3: CARD SORT GAME - HIGH MASS STARS

Repeat the same process but this time for a high mass star.

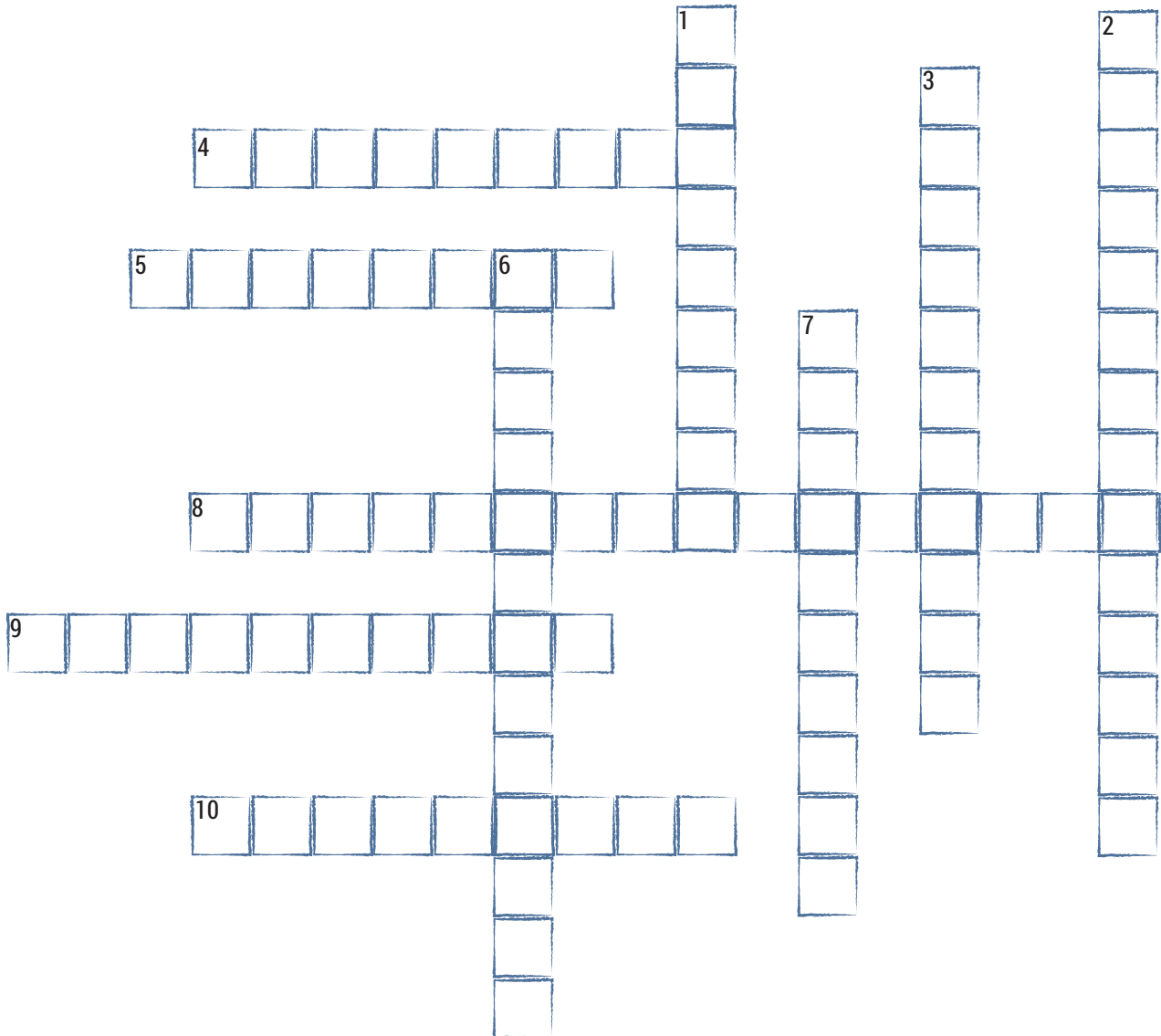
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<p>Stage 4 - When stars with a mass more than 10 times that of the Sun begin to run out of hydrogen, they expand. However, because of their greater mass, these stars begin to fuse heavier elements, which generates even more energy and further expansion. These stars shine red because their vastly expanded surface ends up being cooler.</p>	

Stage 5 - When all the elements that can be fused run out in the core, it collapses in less than a second, causing an explosion and a shock wave that blows the outer layers of the star out into space. This explosion shines very bright (brighter than the whole galaxy) for a short amount of time. This only happens to stars that are greater than 10 times the mass of the Sun.

Stage 6a - During the explosion, the core of the star is crushed. If the core is small, it will form a small dense star about 10 km across. The remains of these stars can spin rapidly on their axis and when their flashes of electromagnetic radiation are detected they are called pulsars.

Stage 6b - If the core of the star is not small, it will collapse to create a very small and very, very dense area of space with a gravitational pull so strong that even light cannot escape.

ACTIVITY 4: CROSSWORD



Across

4. An explosion caused by the collapse of a red supergiant. (8)

5. The dying stage of a star. They become larger and change colour due to the decrease in temperature. (3,5)

8. The Sun is one of these. It is in the steady period of its life, burning hydrogen to helium. (4,8,4)

9. This is what a low or medium mass star will become later in its life. Typically they have the same mass as our Sun, but are around the same size as the Earth. (5,5)

10. A clump of gas and dust that is still gathering mass from the surrounding cloud of gas. (9)

Down

1. Core of a red supergiant that has collapsed. It is so dense that even light can't escape. (5,4)

2. Dust and gas in space which goes on to form stars. (9,5)

3. Core of a red supergiant that has collapsed. They can spin on their axis really fast. (7,4)

6. The joining together of hydrogen and helium atoms to release large amounts of energy. (7,6)

7. Dead star that is no longer hot nor bright. (5,5)