

OpenUpScience

Issue 19



Stars Issue

How many stars
are visible in the
sky?

What are some
different types of
stars?

Make your own
pinwheel galaxy!

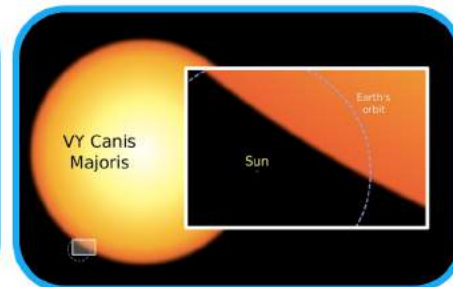
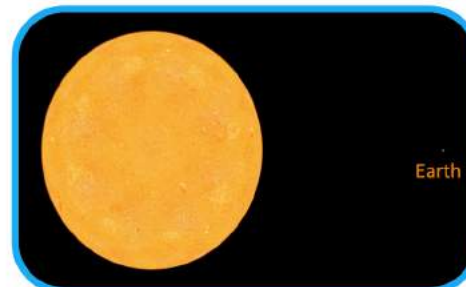
Welcome to
OpenUpScience,
the magazine from Cambridge
Science Centre.
In this issue, we're thinking
about Stars.

Find out more with the
fun activities and
puzzles inside!

Welcome to OpenUpScience

from Cambridge Science Centre.

This issue is all about stars! Stars are massive balls of hot gas in space that make an enormous amount of energy. We can feel this energy as heat from our closest star, the sun, even though it is a whopping 149.5 million km away! There are some stars that are smaller than our Sun, and some that are much **much** bigger like VY Canis Majoris.



The size of the sun compared to the Earth (left) and then to VY Canis Majoris (right)

Did you know..?

After our universe began with the Big Bang, the only elements in existence were hydrogen and helium. All of the other elements were made inside stars. This means that almost everything in the universe, including you, comes from stardust.

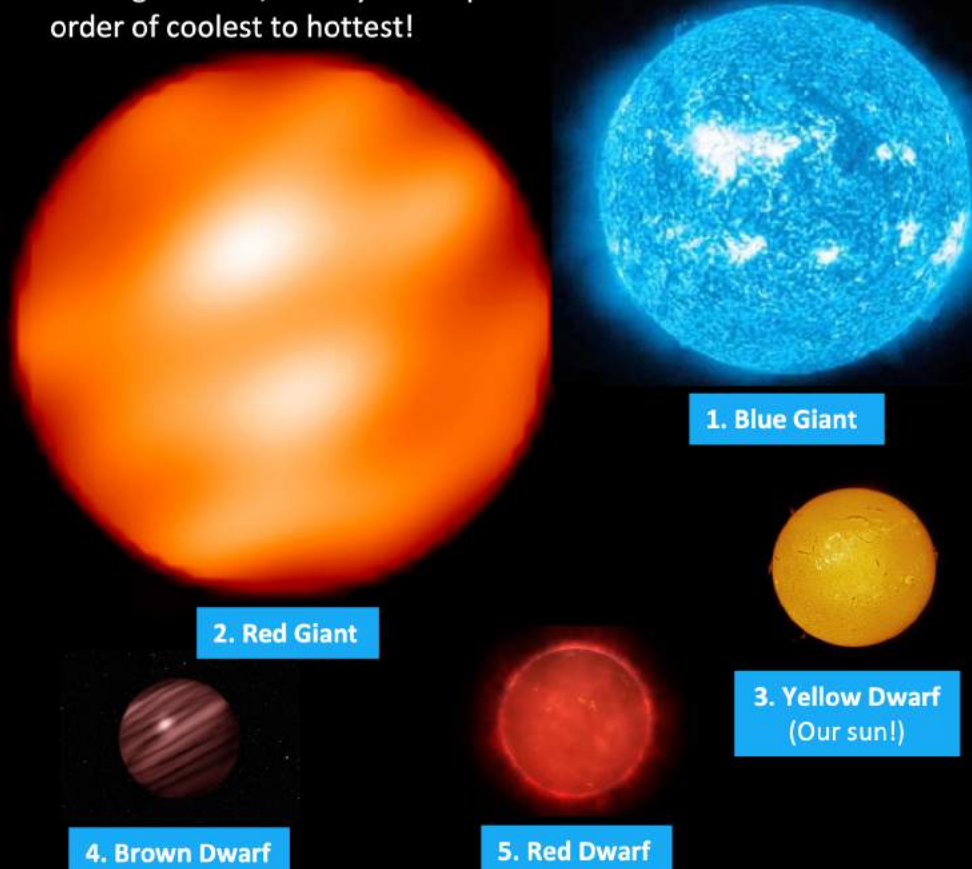


Have you ever heard the song 'Twinkle twinkle little star'? When you look up, you might see the stars twinkle and glimmer but stars don't actually twinkle – they only look like they do because of the movement of Earth's atmosphere.

Spark, Ignite, Fuel, Illuminate

Hot or Not?

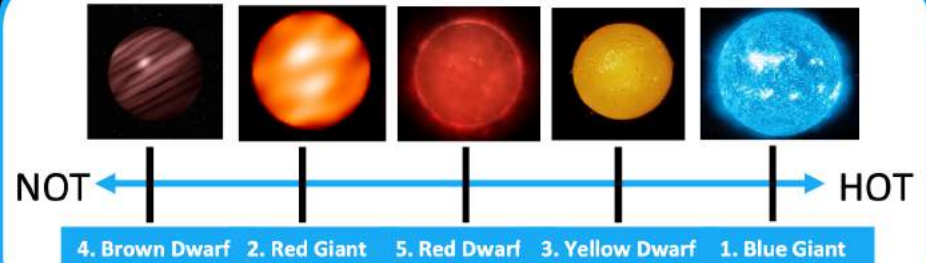
Here are 5 different stars. They're all different sizes, different colours and they're all at different stages of their life. Scientists can work out from a star's size, colour and brightness, how hot the star is. Just by looking at them, see if you can put these stars in order of coolest to hottest!

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NOT ← | | | | → HOT

Hot or Not?

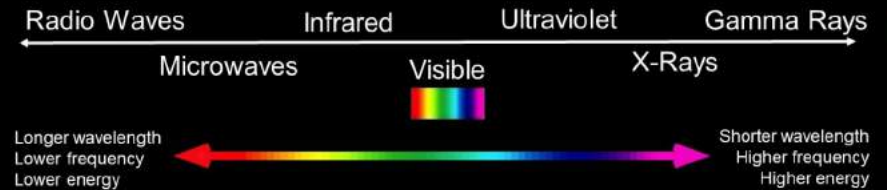
Does your scale look like this one? If not, why not?



What is happening?!

The hotter a star is, the more energy it will give out in the form of light. The light that we see with our eyes is a part of the electromagnetic spectrum of light and different colours of light have different energies.

The Electromagnetic Spectrum



Purple and blue are the highest energy colours that we can see. This means the Blue Giant is giving off the highest energy light, so is burning the hottest. The Blue Giant is also the youngest star so it is burning through its fuel the quickest. The colour spectrum then goes down through yellow, so the Yellow Dwarf, like our sun, is the next hottest. The spectrum then goes down to red, which is the lowest energy light that our eyes can see, so the Red Dwarf and then the Red Giant are next on our scale of heat. Finally the Brown Dwarf is a 'failed' star – it never ignited to start shining, so could be only around room temperature!

Count your stars

Use a little bit of geometry to estimate how many stars in the sky are visible to the human eye.

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What you'll need

- A loo roll tube
- A pen
- Paper
- A calculator
- A helpful friend
- A torch

What to do

1. To do the observing, choose a clear night and a dark location away from street lights.
2. One person is the counter and one is the recorder. The recorder should stand a few metres away so the light they use doesn't affect the counter's night vision.
3. Wait for a minute or two for the counter's eyes to adjust to the darkness.
4. When ready, the counter should hold the loo roll tube to one eye, keep it still, and count how many stars they see.
5. The recorder should write this number on the paper.
6. Repeat this for 9 different areas of the sky, so there are a total of 10 observations.
7. Using a calculator, work out an average for the number of stars. This can be done by adding all the results together, and dividing the answer by ten.
8. Multiply this average by 52 to get an estimate of the number of stars that can be seen from your location.

The number 52 comes from the geometry of the loo roll tube and thinking of the night sky as half a sphere. Drop us an email if you would like to know more!

Galaxies

Early in the 1900's, astronomers noticed that there were some puzzling fuzzy objects in the sky that didn't look like normal stars. They came in different shapes – some were round, some were stretched and some looked like they had spiralling arms. But what were they? Galaxies!

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A galaxy is a collection of lots of stars (usually between 100 million and 500 billion stars!). Our galaxy is called the Milky Way. The Milky Way is bustling with activity and contains hundreds of millions of stars!



Galaxies which look blue in colour have lots of young stars in them and galaxies that have old stars in them look red in colour.

There are lots and lots of galaxies in the night sky, even the bits of the sky that look empty at first. If we look closer and magnify using a powerful telescope, we can see that the dark bits of the sky are full of galaxies. Imagine holding a grain of sand up to the sky with your arm stretched out. In that small area of the sky there will be up to 1000 galaxies. Imagine how many galaxies - and stars - there are in the whole night sky!

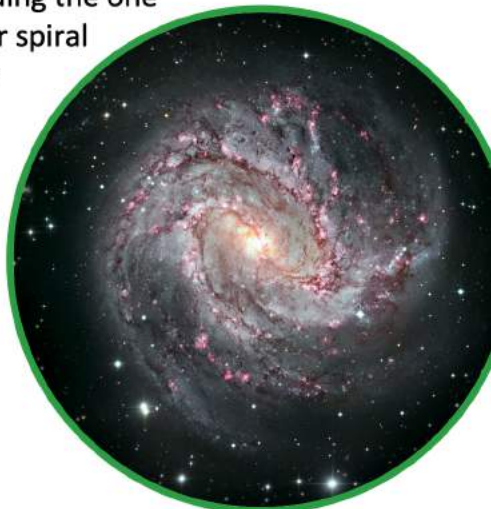
The Pinwheel Galaxy

A spiral galaxy consists of a central bulge surrounded by a rotating disk of stars. The bulge is made of old, dimmer stars packed tightly together. Some are also thought to contain supermassive black holes! Most galaxies are thought to be spiral galaxies, including the one we live in – the Milky Way. Another spiral galaxy that is close to us is Messier 101, or the Pinwheel Galaxy.

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What you'll need

- Pinwheel Galaxy template
- A push pin
- A pencil with an eraser on the end
- Glue
- Scissors



What to do

1. Carefully read all the instructions (the template is on the back of this page!)
2. Cut around the Messier 101, or Pinwheel Galaxy, template.
3. Cut down the white lines.
4. Bend all the corners back so that the outer white dots line up together behind the centre dot. Use the glue to stick the arms in place and leave with a weight on it until the glue dries.
5. Pierce the pin through these holes from the front, so the head of the pin becomes the centre of your spiral galaxy.
6. Holding the pencil on a flat surface with one hand, push the pin into the side of the eraser.
7. Hold the pencil up and blow on the pinwheel to make the galaxy spin!

Pinwheel galaxy template

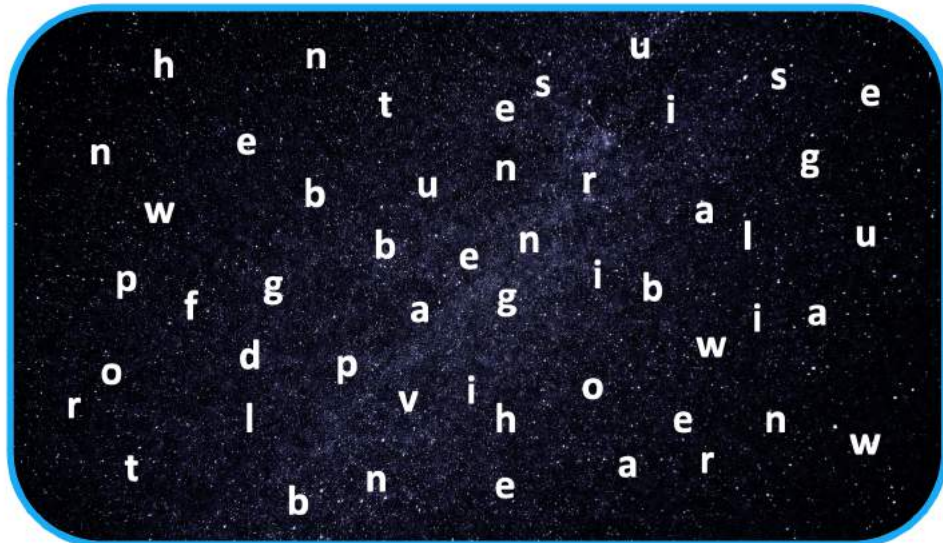
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Written in the stars

Cross out the letters that spell the answers to the clues. When you have done them all, the leftover letters can be arranged to spell out a hidden phrase.

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Answers at the back

1. The _____ galaxy, also known as Messier 101
2. The name of our nearest star
3. Explosion of a star
4. A young and very hot star
5. A 'failed' star that's not very hot at all

Hidden phrase: _____

Download a stargazing App on your smart phone. Point the phone at a star or group of stars in the night sky and the App will tell you what you're looking at!

Design a supernova

A supernova is an extremely powerful explosion of a star. A supernova is so bright that it can outshine a whole galaxy of stars when it explodes. The colours inside a supernova depend on how powerful the stars explosion was, what the star contained, and how soon after the explosion you are viewing the supernova.

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What you'll need

- A piece of filter paper
- A glass of water
- Felt tip pens

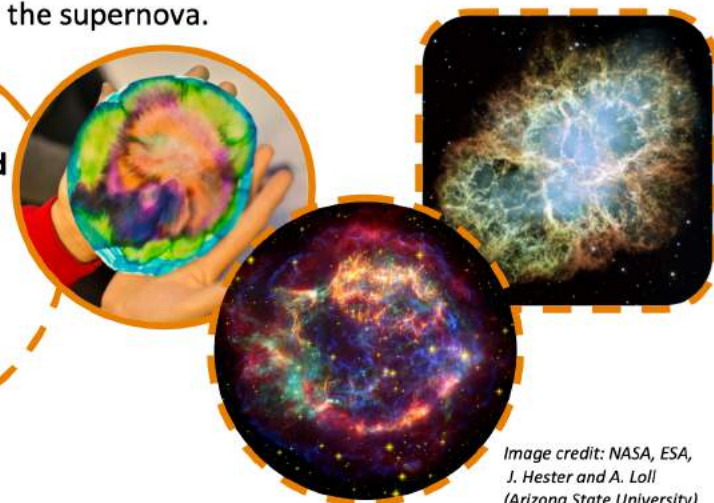


Image credit: NASA, ESA,
J. Hester and A. Loll
(Arizona State University)

What to do

1. Colour your supernova on the filter paper in felt tip pens. Because a supernova is an explosion in space, it should be mostly symmetrical with the centre of the explosion in the middle of the filter paper.
2. Dip your fingers in the glass of water and gently splash the filter paper to make the colours all merge together. This is like the gas and bits of the star floating around together in space.
3. Pin up the filter paper and leave it to dry.

Keep your eyes open!

January 2011, a 10-year-old girl discovered a new supernova in a galaxy 240 million light years away

Written in the stars solution

1. Pinwheel
2. The Sun
3. Supernova
4. Blue Giant
5. Brown Dwarf



Hidden phrase:
BIG BANG

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Comedy Corner

What does a star win in a competition?

A constellation prize

Why didn't the sun go to University?

Because it already had thousands of degrees!

Sherlock Holmes and Dr Watson were going camping. They pitched their tent under the stars and went to sleep. Sometime in the middle of the night, Holmes woke up Watson and said: "Watson lookup in the sky and tell me what you see." Watson replied: "I see millions and millions of stars." Holmes said: "And what do you deduce from that?" Watson replied: "Well if there are billions of stars, and even if a few of those have planets, it's quite likely there are some planets like Earth out there. And if there are few planets like Earth out there, there might also be life." And Holmes said: "Watson, you fool, it means somebody stole our tent!"



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Tell us what you think!
We always want to improve, so let us know what you liked – or didn't like – about this issue!



Find out what else we're up to:



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Cambridge Science Centre

is all about empowering children and young people to discover science for themselves through hands-on activities. While the centre isn't open as normal at the moment, we're finding new ways to reach the families that need us most – like this magazine!

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