



# Sisters in STEM

Stella's  
Activity Pad





# Hi Girls!

My name is Interstella,  
but you can call me Stella STEM!



Have you heard of STEM? It stands for Science, Technology, Engineering and Maths! These subjects help our world develop and make new things for you and me.

I love learning all about STEM, especially the women in STEM who have helped our world become what we know today. I would love to share some stories with you, so you too can see the brilliant things that these women have created. These women were just girls like you and me once, they loved STEM and went on to do amazing things!

Come and join me on an adventure into the world of STEM. There's going to be lots of fun along the way. Let's GO!



# Science

Science helps us to understand how the world works, through things such as experiments and observations. One of my favourite things about science is space! Astronomers are scientists who learn all about outer space, teaching us loads of cool stuff about our Solar System!

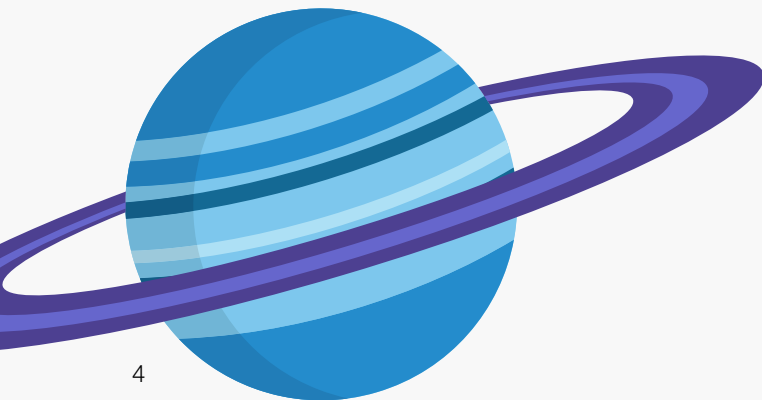
## What is our Solar System?

The Solar System is made up of the Sun, and everything that orbits (circles around) it. This includes the planets and their moons, asteroids, comets and meteoroids.



Pluto is a dwarf planet, so is different from the other planets. It is still a planet because it orbits the Sun, however unlike other planets, it has not managed to clear its surrounding area of other space debris.

A mnemonic is an easy way to remember the order of the planets. The first letter of each word gives you the first letter of the planets, in order:



### The planets are (in order of their distance from the Sun):

<b>M</b> ercury	→	<b>M</b> y
<b>V</b> enus	→	<b>V</b> ery
<b>E</b> arth (you live here!)	→	<b>E</b> nthusiastic
<b>M</b> ars	→	<b>M</b> other
<b>J</b> upiter	→	<b>J</b> ust
<b>S</b> aturn	→	<b>S</b> erved
<b>U</b> ranus	→	<b>U</b> s
<b>N</b> eptune	→	<b>N</b> oodle
<b>P</b> luto (Dwarf Planet)	→	<b>P</b> ots

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# Cecilia Payne-Gaposchkin ★

1900–1979

## Cecilia was a star-gazing genius.

She studied at Cambridge University, however was not awarded a degree because she was a woman.

She discovered that hydrogen was the most common element, and that stars were balls of gas made mostly from hydrogen and helium. Her theory was rejected because it didn't match what people believed at the time, however it was later proved correct and re-published by a man who claimed the theory as his own and took the credit.

### Known for:

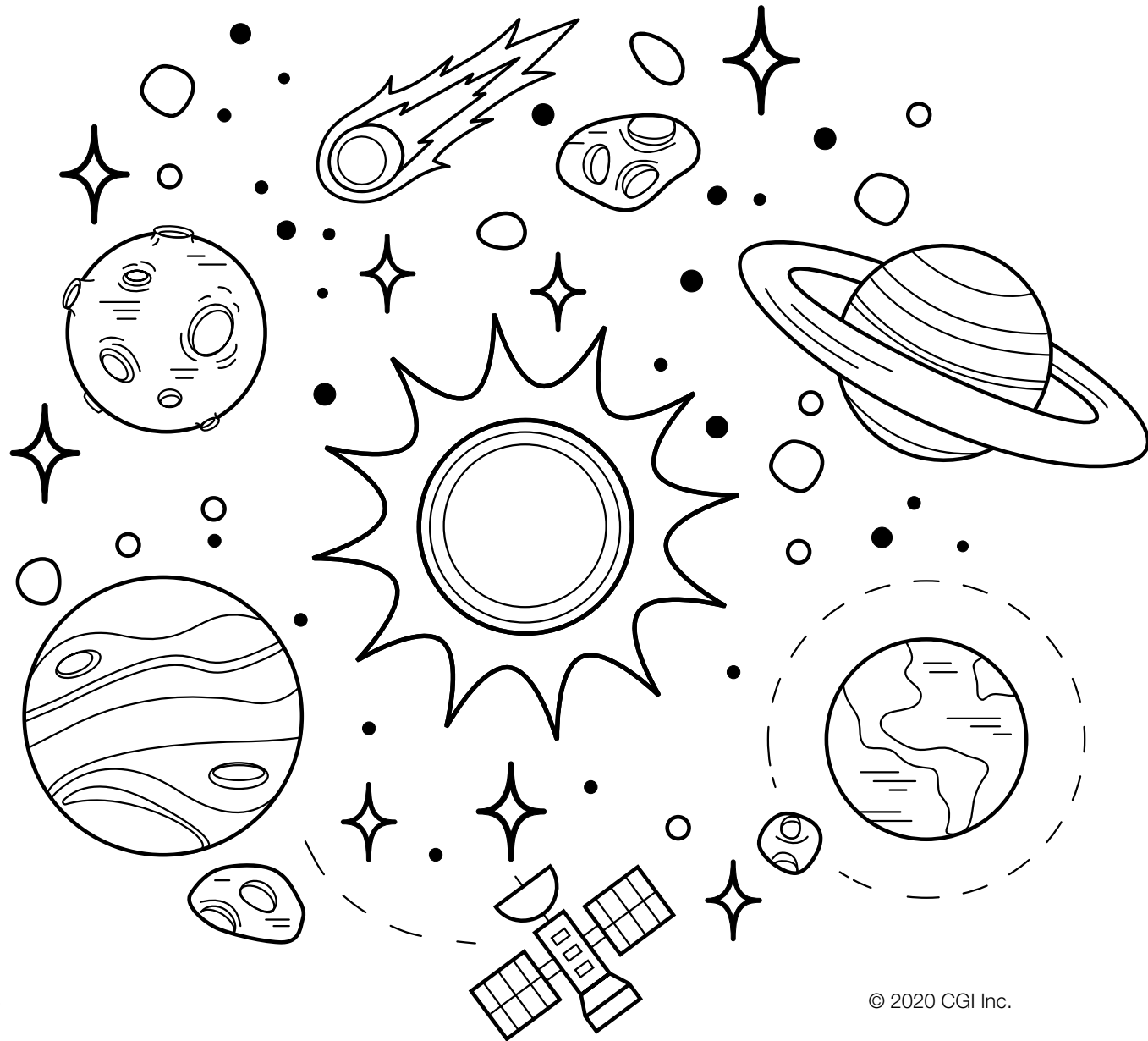
Theorising that stars were mostly made from hydrogen and helium.

American

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# Science

Colour in the picture and circle the items that are planets...



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## Valentina Tereshkova

Born 1937

**Valentina was the youngest woman to go into space and is still the only woman to go into space solo!**

She was recruited by the Space Programme because of her hobby of parachute jumping. She was one of four women selected for the programme, but the only one to make it through the training. The total length of Valentina's space flight was 70 hours and 48 minutes. She orbited Earth 48 times in total (seeing 48 sunrises within the space of three days!).

She was promoted to Lieutenant before her space flight and to Captain during the space flight. She married another astronaut in 1963 and they had a daughter, who was the first child born to parents who had both been into space. Valentina is now a Politician, and has received a number of awards including, 'Hero of the Soviet Union' and 'Order of Friendship'.

Russian

### Known for:

Being the first woman in space. She went to space when she was only 26 years old.



# Science

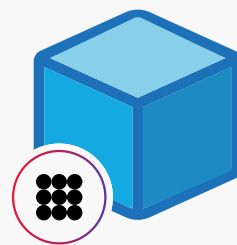
Scientists also study teeny-weeny particles called atoms and molecules. These particles come together to form something called matter. Matter can take three different forms. I bet you know some already!

How about the chairs in your classroom, or the water in your bottle? Even the air you breathe is a state of matter.

## States of matter

Solid, liquid and gas are the three states of matter.

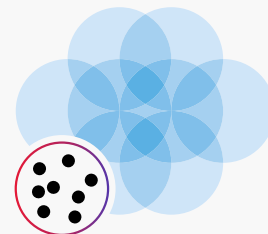
Matter is made up of particles and can change state when energy is added to it, in the form of heat or pressure.



A **solid** contains particles that have no room to move around.

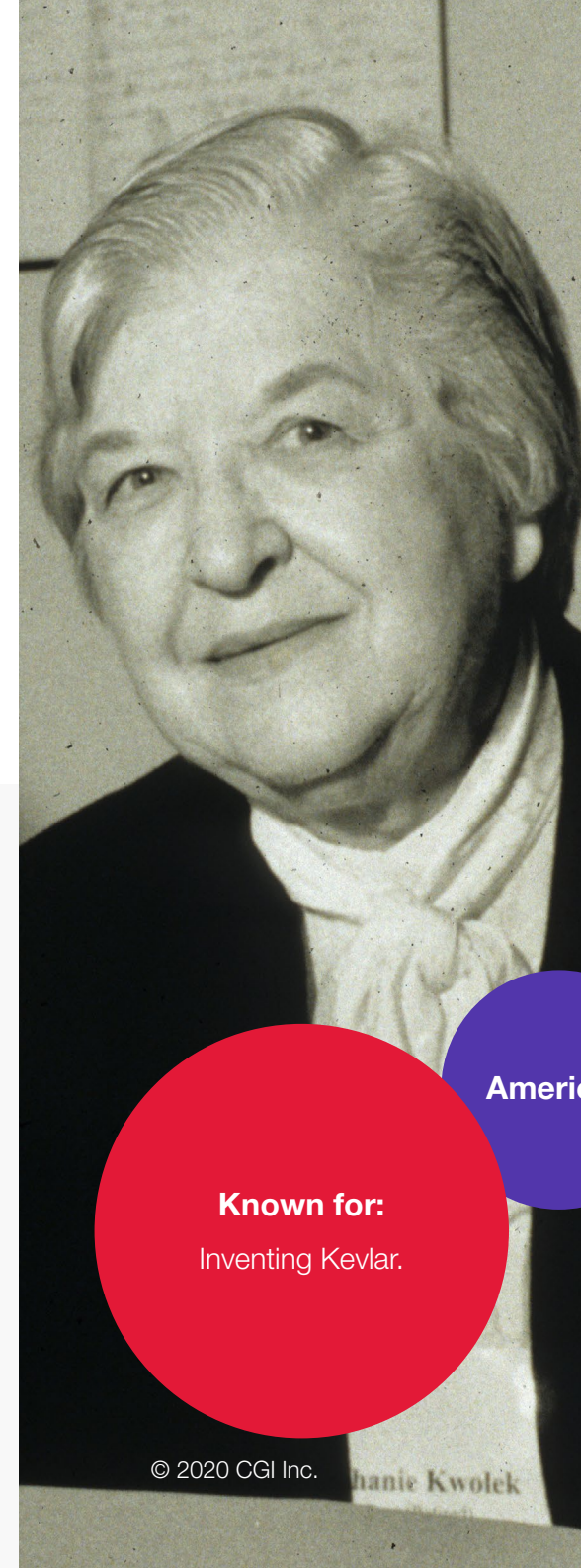


A **liquid** contains particles that can move around but still stay connected to each other.



A **gas** contains particles that can move freely and usually bump into each other.

Gases do not have a fixed shape. They spread out and change shape and volume to fill up the container they are in!



## Stephanie Kwolek



1923–2014

### Stephanie's invention was bullet-proof!

She got a job at DuPont Chemical Company due to a shortage of men from World War Two. She discovered a waste product that was normally thrown away after an experiment, and convinced the technician to test it for her. They found the fibre to be five times stronger than steel! This fibre later became known as Kevlar, which is the material used to make bullet-proof vests!

American

**Known for:**  
Inventing Kevlar.

# Science

## States of matter

These items are all different states of matter.

Draw each of the items in the correct box. Is it a solid, a liquid or a gas?

Items: Teddy bear • Air in a balloon • Cake • Honey • Clouds • Milk • Apple • Apple juice

Solid	Liquid	Gas



# Alice Ball



1892–1916

**Alice was the first African-American and the first woman to graduate from the University of Hawaii.**

She got a Masters in Chemistry, and went on to work at this university as a Chemistry Instructor when she was only 23 years old.

In this role, she researched treatments for an illness called leprosy. Sadly, Alice died due to a research related accident aged just 24, before she was able to publish her research findings. Upon her death, her findings were taken by the Head of the University, who claimed them as his own. He published the findings under his own name, and Alice didn't get any credit until many years later.

**American**

**Known for:**  
Developing the first useful treatment for leprosy.



# Technology

Technology can be anything that is created by humans to help solve problems and make our lives easier!

Computers are a great example of how technology has done just this. Can you think of a way in which a computer helps to make your life easier?

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## What is a computer?

Computers work by following instructions called Code. The instructions are written by people called Computer Programmers and Software Developers. The instructions tell the computer what to do.

Computers are used for lots of things – writing books, creating videos, making games, creating websites, downloading our favourite music and more!

Not all computers look alike. Here are some examples of different types of computer.



PC



Laptop



Smartphone



Tablet

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# Ada Lovelace



1815–1852

**Ada's work was so influential that she has an entire programming language named after her which is still used today!**

She theorised that the computer could follow a series of simple instructions (known as a programme) in order to perform complicated calculations. She wrote computer programmes before the computers that could perform them were even built. Therefore, she is remembered as the first Computer Programmer.

One of the earliest programming languages was named after her (Ada) and is still used today. She even has her own National Day (the second Tuesday in October) on which the contributions of women in STEM are honoured.

**British**

**Known for:**

Being the first  
Computer Programmer.

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# Technology

## Let's programme a cake!

Making a cake is a lot like coding. We need a list of instructions to tell us how to make the cake, and the instructions must all be in the right order.

My instructions have become muddled.  
Can you help me to figure out the correct order by numbering the list of instructions from 1 to 8?



1	Pour the mixture into the cake tin
2	Put all the equipment on the counter
3	Put the cake tin into the oven and bake the cake
4	Mix the icing in a bowl
5	Take the cake tin out of the oven and place it on the counter to cool
6	Mix flour, eggs, milk and sugar in a bowl
7	Put the icing on the cake
8	Cut and eat the cake

# Katie Bouman



Born 1989

## Katie and her team captured the first image of a black hole!

She led the development of the computer programme that made the breakthrough image possible, captured in 2019.

Before this, no image had ever been taken of a black hole, and it is thought that this may revolutionise our understanding of the universe.

American

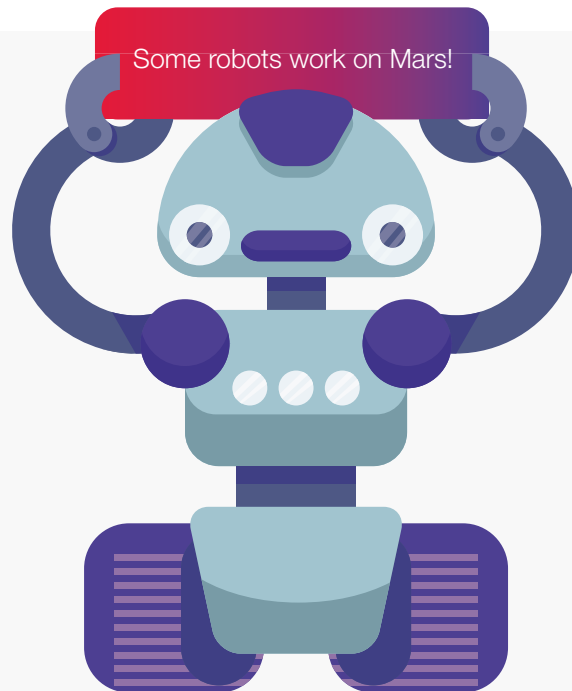
**Known for:**  
Creating the first image of a black hole.



# Engineering

Engineers solve problems with their inventions. They love figuring out how and why things work. But before things are built (or created), they need to be planned out, which is called engineering.

Do you like engineering things? I do. One of my favourite activities is making a robot out of junk modelling and imagining what jobs it might do.



## What are robots?

Robots are machines designed to follow instructions and do lots of different jobs – even the ones humans can't do. Robots only do the specific jobs that a person has built them to do.

Robots are used for lots of things – making cars, fixing things, cleaning, cooking and even having them as friends!

**What have you seen robots do before?**  
**What would you have your robot do?**



# Emily Roebling

1843–1903

**Emily built bridges (literally!) for women in STEM.**

Her husband was the Chief Engineer on the construction project for the Brooklyn Bridge, the longest suspension bridge in the world. However, after he developed a debilitating illness she took over much of the Chief Engineer duties, including day-to-day supervision and project management.

She was the first person to cross the bridge by carriage and today the bridge is marked with a plaque dedicated to her memory.

**American**

## Known for:

Playing a major role in the construction of the Brooklyn Bridge.

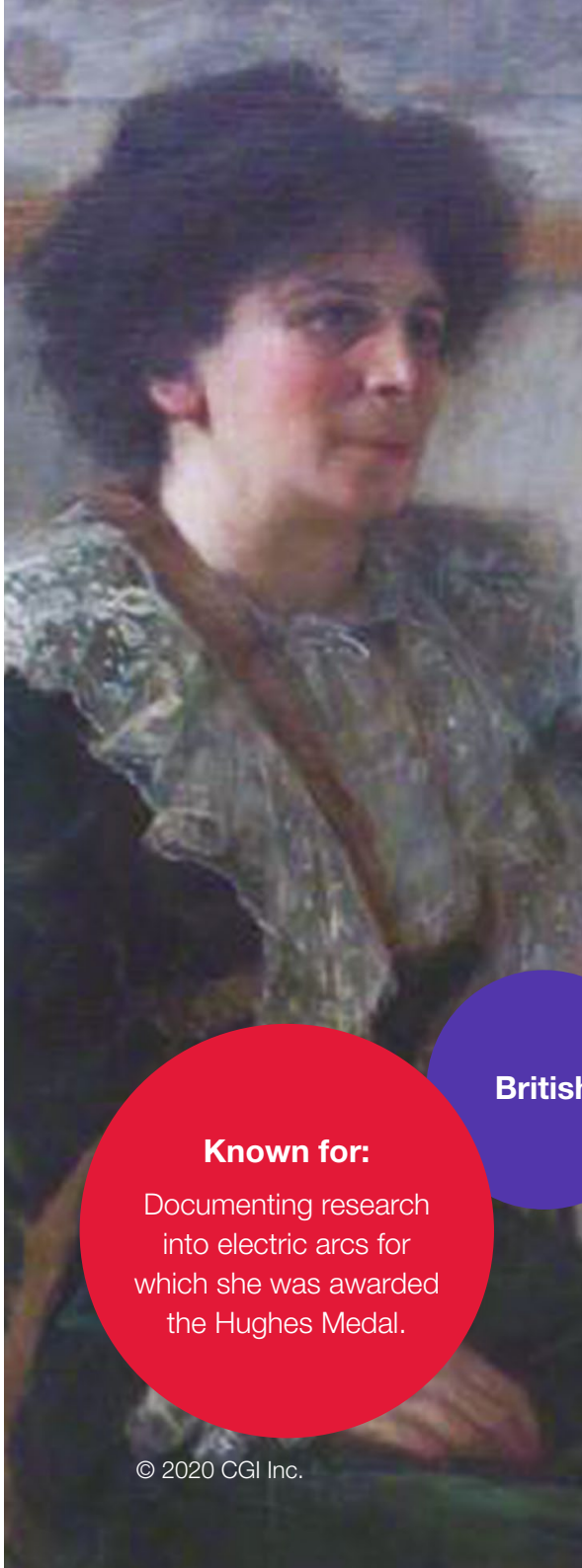
# Engineering

## Colour me in!

Colour each square of the robot using the colour-coded numbers.  
For example, 3 should be coloured grey.

				3	3	3	3	3				
				3	1	3	1	3				
				3	3	3	3	3				
				3	6	6	6	3				
	4	4	3	3	3	3	3	3	3	4	4	
	4	4	3	5	5	5	5	5	3	4	4	
	3		3	5	2	2	2	5	3		3	
	3		3	5	2	2	2	5	3		3	
7	7	7	3	5	2	2	2	5	3	7	7	7
7		7	3	3	3	3	3	3	3	7		7
				3	3		3	3				
				3	3		3	3				
				3	3		3	3				
			7	7	7		7	7	7			

1	Yellow
2	Orange
3	Grey
4	Blue
5	Purple
6	Black
7	Red



# Hertha Ayrton



1854–1923

**Hertha was the first woman to be elected into the Institution of Electrical Engineers.**

When her father died when she was eight, she was sent to live with her Aunt, who ran a school, and it was here Hertha came to love maths and science. She went on to study maths at college, however, she was not awarded a degree because she was a woman. Despite this, she went on to attend the University of London, and then become a teacher, whilst doing her own projects on the side.

Many of her projects were published in ‘Mathematical Problems and their Solutions’ in the Educational Times. She was an active member of the Women’s Suffragette movement, and activists, including Emmeline Pankhurst, who had gone on hunger strike, often recovered at her home.

British

### Known for:

Documenting research into electric arcs for which she was awarded the Hughes Medal.

# Maths

Maths is all around us. We use maths to tell the time, to play games, to build things and do all sorts of different work.

I will even be using maths to help me divide up some pizzas later on. I'll be using fractions to do this and I'll need your help!



$\frac{1}{4}$   $\frac{1}{2}$   $\frac{3}{4}$

## What are fractions?

Fractions are parts of a whole thing or number. Here is an example of a fraction :  $\frac{1}{4}$  (one quarter).

The top number is called the numerator and the bottom number is called the denominator.

A simple way to think of fractions is by imagining them as slices of pizza. If you divide a pizza into 6 slices and someone takes 2 slices, then they have a fraction of  $\frac{2}{6}$ .



# Julia Robinson

1919–1985

## Julia was an award-winning, maths genius!

As a child, Julia got sick with both Scarlet Fever and Rheumatic Fever and by the time she was better, had missed two years of school. In only one year, working with a tutor for three mornings a week, she was able to cover four years worth of school work!

She returned to school and by her final year she was the only girl in her maths and physics classes. She did very well and received awards in both subjects, as well as the Bausch and Lomb Medal for the Best Science Pupil.

She later worked as a mathematician in a university and published a number of papers that aided in the solution of a number of problems.

American

### Known for:

Solving various mathematical problems.

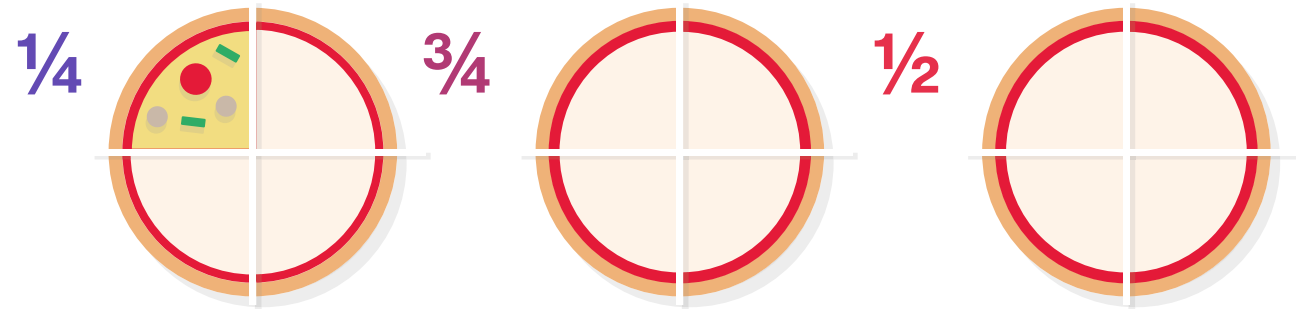




# Maths

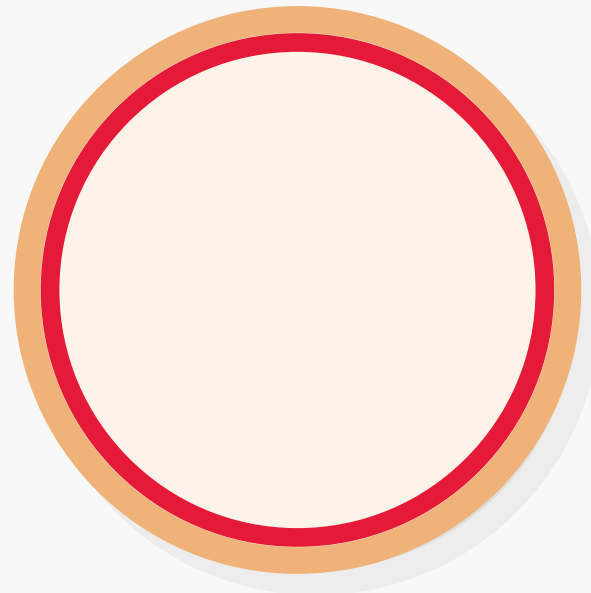
Can you help me get these pizzas ready for the party?

I have coloured in the first pizza fraction.  
Can you do the rest? The fraction tells you how much of the pizza needs to be coloured in.



Pizza party!

Can you create your favourite pizza and then divide it into 6 equal slices for you and your friends?



# Florence Nightingale



1820–1910

**Perhaps the most famous nurse in the world!**

She served as a nurse during the Crimean War, and spent her night rounds giving care to wounded soldiers. This is where she got her nickname, 'The Lady with the Lamp.'

When she arrived at the hospital where she served during the war, there was an incredibly high death rate, and patient records were a mess.

Florence discovered that many of the deaths were caused by poor hygiene practices by staff. So she set about changing people's routines and habits, through things like hand washing and cleaning well, and saved many lives. She was the first woman to be awarded the 'Order of Merit'.

**British**

**Known for:**

Being a Nurse and a Statistician.





Well girls, it looks like we've reached the end of our journey through STEM. I had lots of fun – I hope you did too!

Remember that STEM is all around us; it makes the world go round and lets us do really cool things. Without Women in STEM, we might not have lots of the things that are part of everyday life, like portable x-rays that you get at the dentist or hospital, and sports equipment that uses Kevlar, such as snowboards, racing car parts or canoes, and so much more.

If you're interested in learning more about Women in STEM, there are loads of great books to read and women to learn about. Ask your teachers and parents about these, and see what else you can learn!



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