Friends in STEM

Activity Pad

Ages
8-12

Hi Everyone!

My name is Stella! My friends and
I are going to teach you all about STEM.

I love all things STEM! STEM stands for Science, Technology, Engineering and Maths. These are the subjects that help our world develop and make new things for you and me.

Throughout history, there have been some super cool people leading the way in STEM. They have been inspirational in their work but also in their quest to ensure everyone has the same opportunities in STEM.

I'm on a mission to prove that STEM is for everyone! Me and my friends will be looking at some of the many inspirational people in STEM today – come and join us!

Let's discover together and find out more on these role models and how they can inspire us. Who knows, maybe one day you'll be in a book just like this one!

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As an astronaut, it is my job to explore space! This means I am launched from Earth in a space rocket, I then get to board the International Space Station. We can do lots of cool science experiments in space since things float due to weightlessness.

Space is my favourite thing about science, whats yours?

‘Leo’ is a constellation of stars in space. The stars in Leo make the shape of a lion.

Hi guys! I’m Aurora and I’m an engineer.

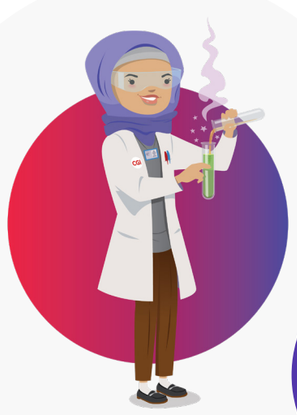
It’s an engineer’s job to design and make things. Being an engineer is a great job if you’re curious about how things work and like to work with your hands.

What would you build if you were an engineer?

An ‘aurora’ is a beautiful natural light display which is sometimes visible at night. The coloured lights are usually only visible near the north and south pole!

Hey everybody! I’m Elara and I’m a scientist. Being a scientist is super cool because I get to do experiments all day – sometimes I’m even allowed to blow things up!

At school I loved science classes because they help us understand the world around us. What’s your favourite thing to learn at school?



‘Elara’ is the name of one of Jupiter’s moons. Jupiter actually has 80 moons in total!

‘Samson’ is the Hebrew word for Sun.

Hello! My name is Samson and I’m a mathematician.

Being a mathematician means I’m good with numbers, but that’s only part of it. The best mathematicians are also creative and good problem solvers!

What’s your favourite way to be creative?

Greta Thunberg

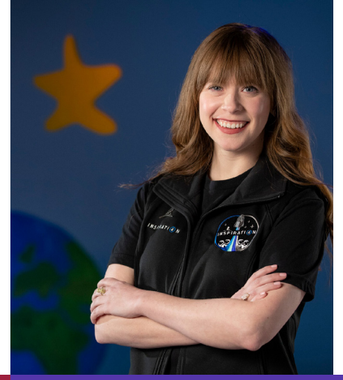
Known for: Challenging world leaders to take immediate action for climate change.

Greta Thunberg is a Swedish environmental activist. This means she does everything she can to slow down climate change.

Climate change is caused by human activities like driving cars, cutting down trees, and creating non-renewable electricity. These actions release harmful greenhouse gases into the air. They create a blanket layer over the Earth which traps all the heat inside – this is called global warming. The extreme change in climate as a result of this is very dangerous for people, animals, and plants everywhere, this is why we must slow it down.

We can all do our bit to slow climate change by:

- Remembering to turn off lights when you leave a room.
- Choose to walk or cycle to school instead of getting a lift.
- Reduce the waste we produce and recycle it when we can.



Hayley Arceneaux

Known for: Was the world's first cancer survivor in space.

Hayley Arceneaux is the youngest American to have been in orbit around planet Earth. Hayley was part of the crew of the Inspiration4, a 2021 space flight.

Hayley is a survivor of cancer. Because of this, she has a man-made leg bone as her original was removed. However, Hayley does not let this hold her back!

When she's not in space, Hayley works in a hospital, treating patients. She is from Louisiana, in the South of the United States.

Science is all around us

Science helps us understand the natural world through experiments and observations.

There are many different types of science, including:

- **Biology (the study of life)**
- **Physics (the study of matter and energy)**
- **Chemistry (the study of the properties of matter and how matter interacts with energy)**

Have you ever wondered why the sky is blue, why steam is released from a boiling kettle, or how a cake rises in the oven? Science answers all of these questions and more!

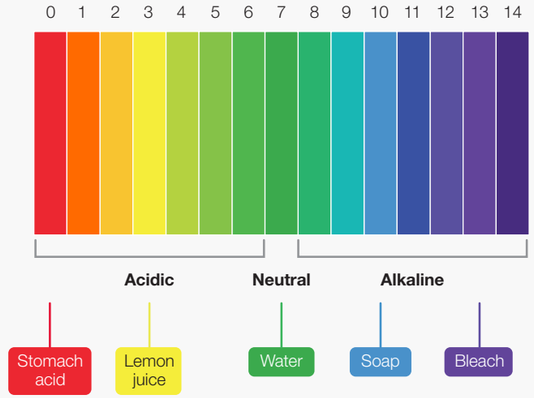
Have you ever seen a PH scale?

A PH scale ranges from 0-14 and tells us how acidic or alkaline a substance is.

- **0-6 on the PH scale is acidic**
The lower the number, the more acidic the substance is.

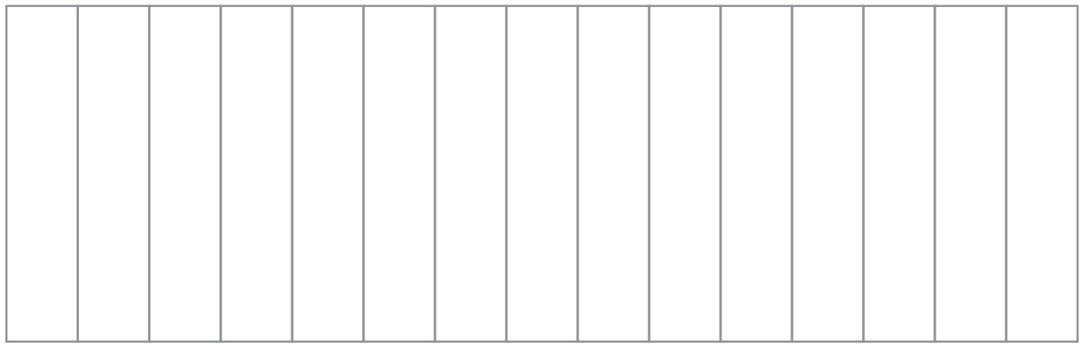
- **8-14 on the PH scale is alkali**
The higher the number, the more alkaline the substance is.

- **7 is neutral (e.g. water)**
So, to recap: anything below 7 is acidic, anything above 7 is alkaline and 7 is neutral.



Are these substances acid, alkali, or neutral?

Colour in the PH scale and draw a line from the substances to the correct place on the PH scale.



Lemon Juice (PH 2.5)

Bleach (PH 13)

Water (PH 7)

Orange (PH 3.8)

Is lemon juice alkaline or acidic?

If a liquid has a PH of 8, is it a strong acid, a weak acid, neutral, a weak alkali, or a strong alkai?

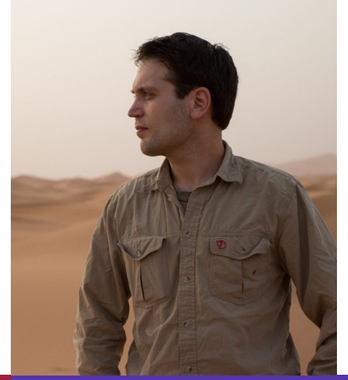
Dr. Hamied Haroon

Known for: Being an advocate for scientists with disabilities.

Dr. Hamied Haroon is a biomedical scientist, this means he works in a lab to create more effective medicine and medical devices.

When Hamied was young he loved science and maths and dreamed of becoming a doctor. He really wanted to make life better for people using his knowledge of science. However, Hamied has a disability which meant it was difficult for him to use his hands, and because of this he was told becoming a doctor would be impossible. Hamied was determined to overcome this, and when he spotted a book called ‘Medical Physics’ he realised there were plenty of ways to work in medicine without being a doctor.

He then went on to study the science behind medicine and used that to help hundreds of people.



Nizar Ibrahim

Known for: Being a Palaeontologist and Lecturer at the University of Portsmouth.

Nizar Ibrahim is a palaeontologist, which is someone who studies ancient fossils, including those belonging to dinosaurs.

When he was young Nizar was very interested in animals and evolution. He was also very adventurous and wanted to explore the world. At university he studied biology and geology, these are the studies of life and rocks respectively. He then went on to get a PhD from a university in Dublin.

Nizar still works at a university but has explored the world looking for fossils. He has even led expeditions to the Sahara Desert in Africa, which is the largest hot desert in the world. His team have discovered giant dinosaur bones, footprints, and prehistoric creatures – including a large crocodile-like predator and a giant flying reptile!

Nizar wants to encourage passionate young people to start a career in science and exploration and join his team of researchers!

Dr. Jess Wade

Known for: Promoting equal opportunities for women and girls in science.

Jess Wade is a physicist from the UK. A physicist is someone who uses maths to study the way things move and interact with each other. Jess is so good at physics that she earned a British Empire Medal, which is an award given to her by the crown for her services to physics.

Jess works hard to make sure that women and girls have equal opportunities in STEM. She recently started a project where she writes about female scientists that were overlooked throughout history. She details their achievements on Wikipedia so others can be inspired by them. So far, she has written 300 articles! Her work to encourage girls into science has earned her a Wikipedia article of her own!

Dr. Mae Jemison

Known for: Being the first black woman in space.

Mae Jemison has had lots of jobs, she has been a doctor, a teacher, a businesswoman, and even an astronaut!

Mae studied engineering and medicine at university and went on to work as a doctor. However, it was always Mae's dream to be an astronaut, so in 1985 she applied to the NASA astronaut training program. She was so excited to be accepted as this would make her the first black women ever to train to be a NASA astronaut!

After training really hard, Mae and six other astronauts went to space for eight days! During this time Mae orbited the Earth 126 times. Her job on the space shuttle was to test the crew for motion sickness due to weightlessness. She also studied how tadpoles develop in zero gravity!

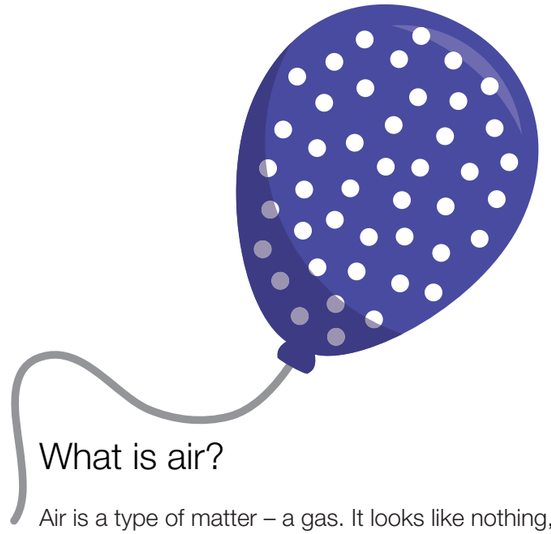
What is physics?

Physics is the scientific study of matter – how it moves, and how it interacts with energy and forces.

Air resistance

- Gravity pulls objects down towards earth. If you jump you will always come back down. That's gravity. Without gravity we would all float away!
- Air resistance slows down a falling object because the tiny particles in the air are getting pushed out of the way, and they push back.
- The larger the object, the more air particles it will need to move out of the way. Therefore, the greater the air resistance against it will be.

Why don't you test this theory by getting two pieces of paper (one big piece and one small piece) and drop them from the same height. See which one hits the ground first!



What is air?

Air is a type of matter – a gas. It looks like nothing, but it's actually made up of millions of tiny particles which are too small to see.

Think of a balloon that you fill with air. As you push more air into the balloon it expands, and if you tie it shut, it remains expanded. This is because a large number of air particles are forced into a confined space, and as a result push against the inside of the balloon. This force means the balloon stays inflated and keeps it's shape.

Can you predict the outcome?

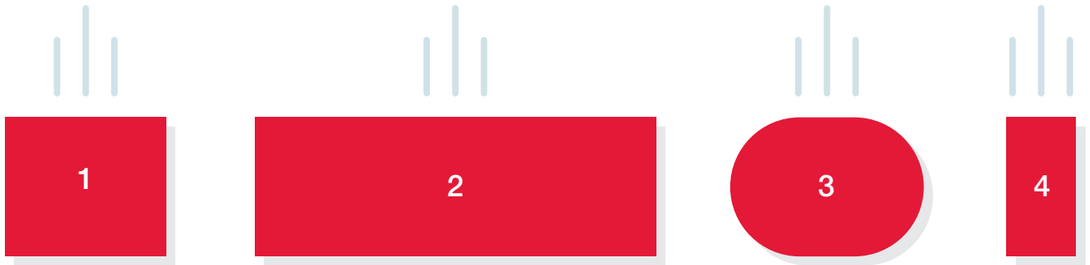
Physicists conduct experiments to test a hypothesis. A hypothesis is something we believe to be true, but needs further investigation.

Can you hypothesise which objects will have the most air resistance, and which will have the least?

Remember, we know that the larger the object

→ the more air particles it will need to move out of the way

→ the greater the air resistance against it.



Order the objects from least air resistance acting against it, to greatest air resistance. Write the number of the objects on the dotted lines.

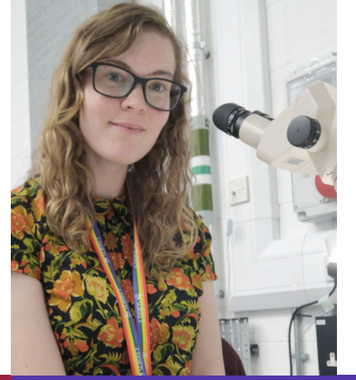
Can you design a simple experiment to test your hypothesis?

Dr. Jane Rigby

Known for: Helping promote and encourage diversity within physics.

Dr. Rigby is an astrophysicist for NASA. Astrophysicists are people who study space – including stars, planets, and galaxies. Dr. Rigby has also won awards for her amazing work encouraging diversity in physics!

As part of her job, Jane got the opportunity to work on the James Webb Space telescope. The James Webb telescope is the biggest and most powerful space telescope ever engineered, which means it can show us parts of the universe we couldn't see before! It is much bigger than a telescope that you can keep in your house – in fact it is as tall as a building and as wide as a tennis court!



Daisy Shearer

Known for: Advocating for neurodivergent people within science.

Daisy Shearer always wanted to study physics but found sitting exams at school difficult. She hated how loud school was and because of this she found it hard to focus on her work.

While she was at university, Daisy wanted to understand why she struggled at school. Eventually she realised her difficulty in exams was not because she wasn't clever, but instead because she is autistic. Some autistic people struggle with communication and can be highly sensitive to sounds. It is also common for people with autism to become very interested in a specific subject – this is true for Daisy and her love of physics. This special interest is great for Daisy as it means she can focus for a really long time on physics without needing a break.

Hartmut Neven

Known for: Being the Vice President of Engineering at Google.

Hartmut Neven is a German scientist who works on quantum computing and robotics at Google.

Quantum computers are similar to normal computers but are much faster. This makes it much easier and faster to solve complex problems. It's Hartmut's job to program these super computers!

Hartmut studied all over the world, including in Brazil, Germany, France, and Israel. That's a lot of travelling! STEM can open up opportunities in many different countries across the world because scientists are needed everywhere.

Katie Bouman

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

Katie is an American engineer and computer scientist. She helped to produce the first image of a black hole. A black hole is a place in space where the gravity is so strong that nothing can escape, not even light!

Katie studied electrical engineering at university in the USA. She then went on to earn a master's degree and a PhD in engineering and computer science – that takes a lot of work!

After graduating university Katie joined the Event Horizon Telescope project, in which her team developed the algorithm which produced the first image of a black hole. A photo of Katie celebrating this huge achievement went viral on the internet. She used her new internet fame to praise her team and their hard work.

Katie now works for the California Institute of Technology, here she studies a type of artificial intelligence called machine learning.

As a result of her many achievements, Katie has won lots of awards. She even has an asteroid named after her!

What is technology?

Do computers talk?

Computers have their own language, just like us. Computers don't understand English, they only understand code, so we have to communicate with them in code to make them understand what we want them to do.

Ciphers

Ciphers are a way of retrieving a hidden message from within another message. The cipher tells you where in the message to look, or what you need to do to get the hidden message. A cipher could be a set of coordinates, each one a different letter. Once you have all the letters they spell out a new message.

Using the coordinates

(1,7) (2,7) (4,7) (1,4) (3,4) (2,7) (5,4) (3,6)

I space m e t space a n

(2,7) (5,4) (1,2) (1,5) (1,4) (3,6)

space a l i e n

I met an alien

7	I		a	m		s	o
6	h	u	n	g	r	y	
5	i		c	o	u	l	d
4	e	a	t		a		
3	v	e	r	y			
2	l	a	r	g	e		
1	b	u	r	g	e	r	
	1	2	3	4	5	6	7

Can you crack the code?

Find the hidden message

Can you use the following cipher to find the hidden message in this text?

Cipher: (1,5) (2,4) (3,3) (4,2) (5,1)

H	A	P	P	Y
E	E	L	S	
A	L	L		
S	A	I	L	
T	O		H	O M E

Break the code to answer the questions!

- Sophie is the oldest.
- Clare is 3 years younger than Sophie.
- Joanna is 8 and the second youngest.
- Marie is 1 year younger than Joanna and 4 years younger than Sophie.

Q. How old is Sophie?

Q. Which two girls are the same age?

Kimberly Bryant

Known for: Founder of 'Black Girls CODE'.

Kimberly Bryant is an electrical engineer from the USA. Electrical engineers create and improve electronic devices and equipment.

A lot of engineers work with computers, so it is important for engineers like Kimberly to know how to program them using code. Kimberly's daughter wanted to learn to code so she could pursue a career in STEM like her mum, of course Kimberly was thrilled. When they were looking for places to learn code, they noticed a lot of the courses were aimed at boys. Kimberly wanted everyone to have the opportunity to learn to code so she created her own organisation which aims specifically at teaching programming to black schoolgirls – and so Black Girls Code was born!

By creating a safe space for black women and girls to learn code, Kimberly helped encourage loads of people to try STEM who never would have considered it before. She is a STEM outreach superstar!

Hank Green

Known for: Using social media to educate people about the world of science.

Hank Green is a science YouTuber who runs a number of YouTube channels with his brother, John, who is an author. He also runs a popular TikTok account.

When Hank was studying, he created 'EcoGeek', a blog to show off new inventions that will help the environment. Hank was designing websites even when he was in school! That's impressive.

Later in life, Hank started two successful YouTube channels 'Crash Course' and 'SciShow'. These channels provide educational videos on a wide range of topics, from the environment, to statistics, to linguistics. Hank wants to encourage people to learn science by making complex concepts easy to understand. If you have never seen a 'SciShow' video, we recommend you take a look!

"No one changes the world alone and no one doesn't change it at all. We are all exceptional, and none of us are." – *Hank Green*

Engineering

Engineers solve problems with their inventions. They love figuring out how and why things work. But before things are built, they need to be planned out, which is called engineering. Do you like engineering things?

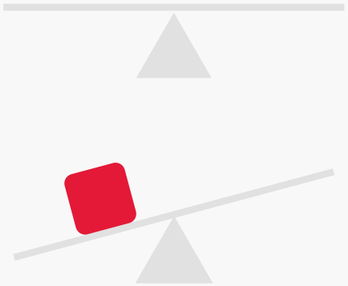
Engineers are creative thinkers, who work in different industries, depending on their area of speciality. Some examples of engineers are: Computer Engineers, Electrical Engineers, Civil Engineers, Aerospace Engineers, and Mechanical Engineers.

Engineers need to understand how things interact with each other in order to invent new things or improve existing things.

What type of engineer would you like to be and why?

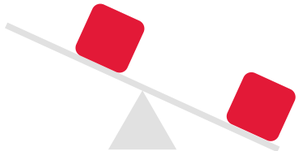
In this experiment, engineers would study how force (the weights) and distance (how far the weights are from the central pivot) affects the movement of the scale. When there are no weights on the scale it is perfectly balanced and remains level.

When a heavy weight is placed on one side of the scale, the scale tips in that direction, making it unbalanced.



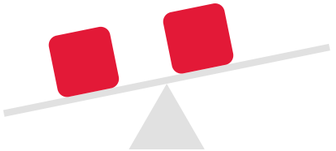
If a lighter weight is placed on the other side of the scale to the heavy weight, but placed further away from the pivot, the scale can be balanced, even though the weight on the right is lighter than the one on the left.

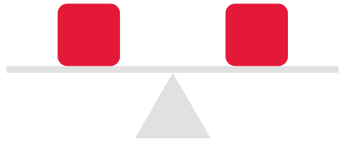
You can test this theory on a see-saw in the playground. How does the see-saw move when you get on? How does the see-saw move when your grown-up gets on the other side, and why?



If an object of the same weight is placed on the scale, but further from the pivot than the first object, then the scale will tip down on the side of the new object even though they are the same weight.

If the new object, of the same weight, is placed on the scales, but closer to the pivot than the original object, then the scales will tip down on the side of the original object.

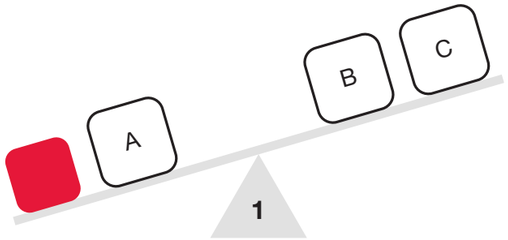




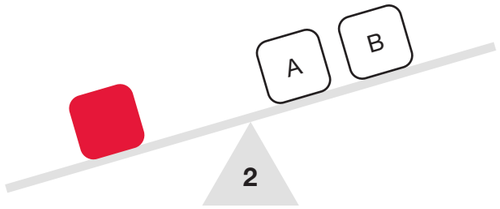
If the two objects of the same weight are placed the same distance from the pivot on both sides, the scale will be balanced.

Can you make the scales balance?

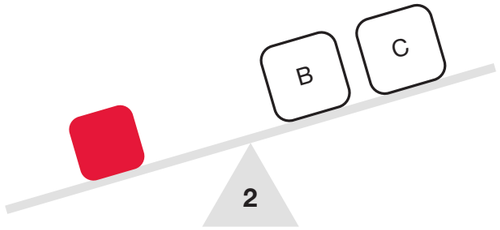
1. On the scale to the right, which position should you place a heavier weight in order to balance the scale?



2a. Using the scale to the right, in which position would you place the smaller weight in order to balance the scale?



2b. In which position would you place the larger weight to balance the scale?



Bisi Ezerioha

Known for: Being the CEO and Chief Engineer at Bisimoto Engineering.

Ndubuisi ('Bisi') Ezerioha is an engineer and a professional race car driver. While Bisi was young he developed an interested in science, specifically chemistry. He also loved cars and wanted to know how they were powered.

His curiosity led him to start university aged only 15, which is very young! Most people are much older when they go to university. At university he studied chemical engineering and went on to gain a master's degree.

Once he left university he started researching different types of medicine. However, his real passion was still motorsports, so not long after, Ezerioha started his own engine design company. During this time, he created extremely powerful engines and raced in some very fast cars. Over his 20 year drag racing career he won loads of races and awards for engine design. It was his scientific skills which set him apart and helped him achieve his dreams!

Mark Rober

Known for: His Youtube channel where he invents gadgets for his audience of over 20 million subscribers.

Mark Rober is a YouTuber from the United States. He makes videos on science and gadgets.

Before he started making videos on YouTube, Mark worked for NASA as an engineer. He helped to create the Curiosity rover, a robot designed to explore Mars!

Mark has always enjoyed inventing things. When he was young, he created a pair of goggles that stopped you from crying when you were cutting onions!

John O. Dabiri

Known for: Designing a new generation of wind turbines based on the movements of fish.

John O. Dabiri is a Nigerian-American engineer who studies fluids (liquids and gases). He has used his knowledge of fluids to study how jellyfish move in the ocean. Jellyfish swim by pushing themselves through the water with their tentacles, this is a very interesting process and modelling it requires a lot of complex maths. Liking maths is important to engineers and scientists as it is the language they use to solve problems.

While studying jellyfish in the ocean, John was inspired to design a new more efficient wind turbine. Wind turbines transform wind into electricity which is great for the environment. He was interested in how schools of fish move in the sea, and he designed a wind turbine which copied this action.

These new wind turbines can be placed closer together than traditional ones and this means more electricity can be produced in a smaller space. Traditional wind turbines are very tall which means they can interfere with birds and bats, but John's new turbines solve this problem!

Mamokgethi Phakeng

Known for: She is the first black woman in South Africa to obtain a PhD in mathematics.

Mamokgethi Phakeng is a South African mathematician. Mathematics is the study of numbers and structures. It is a massive subject and is useful in all of the other STEM subjects.

Mamokgethi founded the Adopt-A-Learner project which provides scholarships every year to learners in rural areas who are really good at mathematics. A scholarship is when somebody else pays for you to study. There are different scholarships for different groups of people who might not otherwise get the chance to study their favourite subjects.

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.

Squaring and taking the square root of a number are the opposite of each other.

Squaring

A number squared is just the number multiplied by itself.

$4^2 = 4 \times 4 = 16$

So we say, 4 squared equals 16

Think of squaring a number as making a square with a length and height of your number.
So 4 squared is a 4 by 4 square. If you count the squares you have your answer.

A Civil Engineer would need to calculate square roots when they build roads coming off a hillside.

Square root

The square root of a number is the number which must be multiplied by itself to get the original number.

For example:

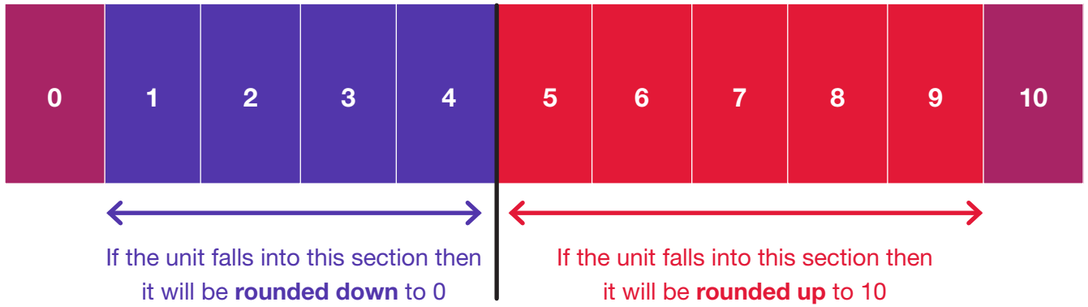
$\sqrt{16} = 4$

So we say, the square root of 16 is 4

To get the square root of a number, make a square and figure out what length and height the square would need to be so that the total area of the square equals your number (remember that your length and height need to be the same).

Rounding

Rounding is a term we use in maths to make numbers simpler and easier to use.



You can apply this to rounding with tens, hundreds, even thousands!

Here are some examples of how we round numbers to the nearest 10:

0 ←	3
	9 → 10
10 ←	11
	17 → 20
20 ←	24
	28 → 30
100 ←	101
	256 → 260

Can you help to solve these maths problems?

What is the square root of 9?

Tip: make these 9 squares into one larger square. Remember a square has equal sides.

Can you help me round these numbers to the nearest ten?

I have done the first one for you.

13 rounds down to / rounds up to **10**

47 rounds down to / rounds up to ---

102 rounds down to / rounds up to ---

81 rounds down to / rounds up to ---

31 rounds down to / rounds up to ---

79 rounds down to / rounds up to ---

56 rounds down to / rounds up to ---

STEM Wordsearch

G	L	I	B	X	Y	M	Y	N	A	M	U	O	B	E	I	T	A	K	F
K	R	T	D	N	Q	F	O	V	G	J	Z	G	M	I	L	W	L	J	E
A	C	E	P	C	M	A	E	J	E	M	I	S	O	N	U	X	U	S	D
H	E	R	T	N	A	Y	E	U	Q	O	N	W	Z	H	K	U	U	O	B
A	R	N	J	A	N	E	R	I	G	B	Y	D	V	M	I	A	N	S	K
R	C	G	O	H	T	C	S	I	E	N	M	O	I	N	T	E	S	K	I
T	R	Y	H	D	B	H	D	S	C	I	D	H	E	R	N	N	F	C	M
M	R	T	N	S	E	M	U	C	X	P	A	Z	E	H	M	E	S	N	B
U	N	I	O	J	G	A	I	N	O	R	I	R	E	S	T	C	A	F	E
T	R	I	D	S	V	F	M	S	B	R	A	I	N	D	J	R	H	O	R
N	G	H	A	E	E	N	A	I	F	E	M	L	V	E	Z	A	O	K	L
E	I	R	B	S	A	P	R	O	H	E	R	Y	S	D	T	Y	I	N	Y
V	K	E	I	Y	B	A	U	S	Q	C	I	G	S	A	R	E	R	D	B
E	A	B	R	P	Z	P	Y	Y	C	R	W	C	Y	W	L	L	E	E	R
N	R	O	I	I	B	S	Q	U	N	U	A	M	E	S	S	Y	Z	W	Y
A	D	R	N	S	I	P	B	X	S	O	O	S	C	S	P	A	E	P	A
S	D	K	S	A	N	E	E	R	G	K	N	A	H	E	K	H	I	W	N
A	N	R	D	S	L	X	O	C	U	X	P	M	W	J	N	O	S	T	T
S	V	A	H	A	M	I	E	D	H	A	R	O	O	N	U	I	I	R	N
M	A	M	O	K	G	E	T	H	I	P	H	A	K	E	N	G	B	S	T

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KIMBERLY BRYANT

HANK GREEN

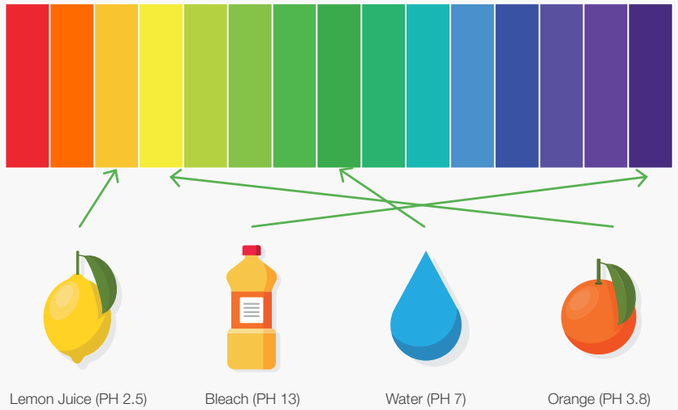
Well, it looks like we've reached the end of our journey through STEM. We had lots of fun – we hope you did too!

Remember that STEM is all around us; it makes the world go round and lets us do really cool things. Without STEM, we would not have lots of the things that are part of everyday life, like mobile phones, cars, medical equipment, and so much more.

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

Answers

Page 8



Is lemon juice acidic or alkaline?

Alkaline

If a liquid has a PH of 8 is it a strong acid, a weak acid, neutral, a weak alkali or a strong alkali?

Weak alkali

Page 12

4 **3** **1** **2**

Page 16

Did you break the code?

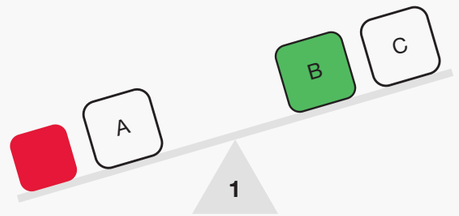
Sophie is 11

Clare and Joanna are both 8

Page 20

1. On the scale below, which position should you place the heavier weight in order to balance the scale?

B

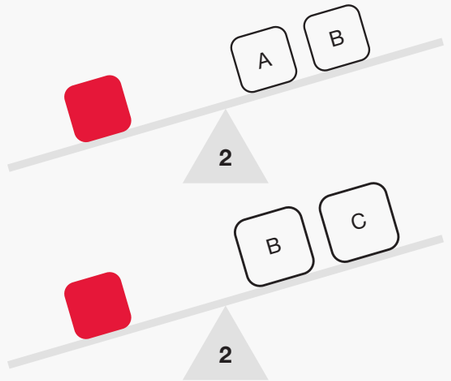


2a. Using the scale below, in which position would you place the smaller weight in order to balance the scale?

B

2b. In which position would you place the larger weight to balance the scale?

A



Answers

Page 25

Find the square root of nine by making these nine squares into one larger square:

Can you help me round these numbers to the nearest ten?

13 rounds down to 10

47 rounds up to 50

102 rounds down to 100

81 rounds down to 80

31 rounds down to 30

79 rounds up to 80

56 rounds up to 60

Page 26

G	L	I	B	X	Y	M	Y	N	A	M	U	O	B	E	I	T	A	K	F
K	R	T	D	N	Q	F	O	V	G	J	Z	G	M	I	L	W	L	J	E
A	C	E	P	C	M	A	E	J	E	M	I	S	O	N	U	X	U	S	D
H	E	R	T	N	A	Y	E	U	Q	O	N	W	Z	H	K	U	U	O	B
A	R	N	J	A	N	E	R	I	G	B	Y	D	V	M	I	A	N	S	K
R	C	G	O	H	T	C	S	I	E	N	M	O	I	N	T	E	S	K	I
T	R	Y	H	D	B	H	D	S	C	I	D	H	E	R	N	N	F	C	M
M	R	T	N	S	E	M	U	C	X	P	A	Z	E	H	M	E	S	N	B
U	N	I	O	J	G	A	I	N	O	R	I	R	E	S	T	C	A	F	E
T	R	I	D	S	V	F	M	S	B	R	A	I	N	D	J	R	H	O	R
N	G	H	A	E	E	N	A	I	F	E	M	L	V	E	Z	A	O	K	L
E	I	R	B	S	A	P	R	O	H	E	R	Y	S	D	T	Y	I	N	Y
V	K	E	I	Y	B	A	U	S	Q	C	I	G	S	A	R	E	R	D	B
E	A	B	R	P	Z	P	Y	Y	C	R	W	C	Y	W	L	L	E	E	R
N	R	O	I	I	B	S	Q	U	N	U	A	M	E	S	S	Y	Z	W	Y
A	D	R	N	S	I	P	B	X	S	O	O	S	C	S	P	A	E	P	A
S	D	K	S	A	N	E	E	R	G	K	N	A	H	E	K	H	I	W	N
A	N	R	D	S	L	X	O	C	U	X	P	M	W	J	N	O	S	T	T
S	V	A	H	A	M	I	E	D	H	A	R	O	O	N	U	I	I	R	N
M	A	M	O	K	G	E	T	H	I	P	H	A	K	E	N	G	B	S	T

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