

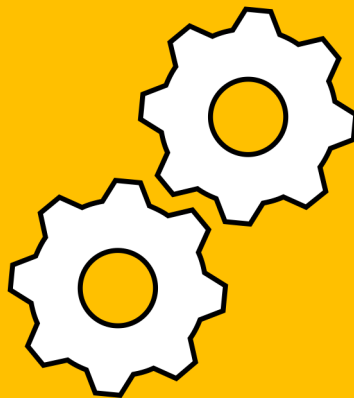
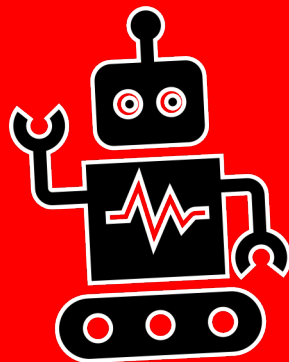
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Science

Technology

Engineering

Arts

Mathematics



High Flyers

Issue 2

MIMICRY – IN ANIMALS

Animals and plants uses mimicry to imitate someone, or something as an adaptation to survive.

Phyllium giganteum

Siliquofera grandis

The Leaf Insect

and the Hooded Katydid

both imitate leaves and this enables them to go unseen by predators. By camouflaging with their surroundings they avoid being eaten therefore these species will go on to breed and pass their genes to their offspring. This process is named Natural Selection. Their offspring will to have this characteristic.

The Viceroy and Monarch butterfly both look similar. They mimic one another as a form of defence against predators. They feed on plants with a bitter tasting chemical. The Monarch feeds on milkweed, which contains toxins which it stores in their bodies and makes them taste bad to the predators.

Viceroy Butterfly
Limenitis archippus

Monarch Butterfly
Danaus plexippus



Science

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MIMICRY – IN PLANTS

Animals and plants use mimicry to imitate someone, or something as an adaptation to survive.



Passion Flower Plants

Passiflora- these have evolved leaves with yellow spots on them.



These look exactly like the eggs of a butterfly. Female butterflies are unable to tell the difference between these and real eggs. As the butterfly believes there are eggs already on the leaves it does not lay its eggs. As a result the passion flower does not get damaged from the eggs when they turn into caterpillars and eat the leaves.

A Bee Orchid

Ophrys apifera has a flower that has evolved to mimic a female bee. Males are attracted to the flower. When the male bee arrives at the flower it ends up pollinating the flower.



The Corpse Flower

Rafflesia arnoldii forms the largest flower in the world! It produces an odour that mimics the smell of rotting flesh to attract insects that land on it and as a result pollinate it.



Science

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KITCHEN SCIENCE: MAKING AN INDICATOR



Indicators are used in science to determine if a substance is an acid or an alkali. Lemons are known to be acidic whereas toothpaste is an alkali. Indicators change colour depending on the pH of the substance.



Method

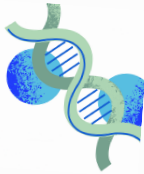
1. Cut up the red cabbage using a knife – take care.
2. Place the cabbage into the saucepan.
3. Pour boiling water over the cabbage and leave for a few minutes. Ask an adult to help you pour the boiling water.
3. Sieve the red cabbage and water into the second saucepan- take care. This is your indicator.
4. Squeeze some lemon juice in to a small pot, add a small amount of indicator. What colour does the indicator turn?
5. Squeeze some toothpaste in to a small pot, add a small amount of indicator, mix well. What colour does the indicator turn?



pH is measured on a scale of 1-14
Acids = pH 1-6
Neutral = pH 7
Alkali = pH 8-14

What you need:

Red cabbage
2 small saucepans
Knife
Kettle for hot water
Sieve
Lemon
Toothpaste
Vinegar
Baking soda
Small pots



Adult supervision required

Now you can see how the indicator works — determine if vinegar and baking soda are acid or alkali?



Science

Adapted from:



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PHOTOGRAPHY-WHO, WHAT, WHY, HOW?

Photography has been used since 1826. It is so accessible for us to take a photograph by using our phones and instantly we have access to an image that we can edit in a number of ways in just a few clicks. What we may not realise is how many decisions we are making as we capture the shot. What we are trying to take a photograph of?

- USING A DSLR CAMERA GIVES YOU MORE CHOICES AND MORE OPPORTUNITY TO REALLY EXPLORE THE MESSAGES THAT YOU WANT TO CONVEY. IT IS A VERY TECHNICAL PIECE OF EQUIPMENT AND ONE, THAT WITH PRACTICE CAN CREATE BETTER AND MORE INFORMED PHOTOGRAPHS. TAKING THE PHOTOGRAPH DOESN'T HAVE TO BE THE END OF THE PROCESS, EDITING DIGITALLY OR PHYSICALLY CAN TAKE A NUMBER OF DIFFERENT DIRECTIONS. EVEN THEN, IDEAS CAN BE FURTHER DEVELOPED, PHOTOGRAPHS DON'T JUST HAVE TO BE HUNG ON THE WALL IN A FRAME. BY ART. ART IS ABSOLUTELY EVERYWHERE AROUND US.

QUESTIONS TO THINK ABOUT WHEN TAKING A PHOTO:

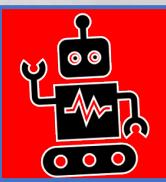
How we are framing it?
What do we want to catch the viewers eye?

Why are we taking the photograph?
For our own memories, to share with a few close friends, family, or further afield on social media?

What mood or feeling are we trying to convey?

What information does that say about us?

When we choose to edit the shot, why are we doing that?



Technology

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GEOMETRIC ART

MANY FORMS OF ART INCLUDE MATHEMATICAL SHAPES, REPEATING PATTERNS OR SYMMETRY.

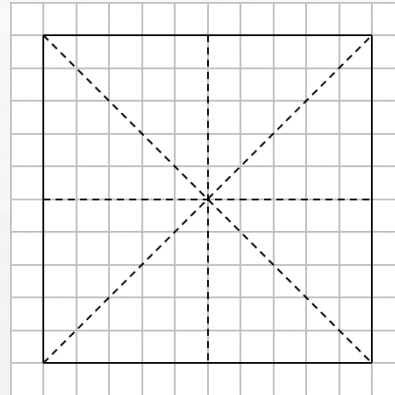
MANY CULTURES AROUND THE WORLD USE GEOMETRIC ART TO DECORATE BUILDINGS OR CREATE DECORATIONS USED FOR CELEBRATIONS.

ONE EXAMPLE OF THIS IS RANGOLI PATTERNS.

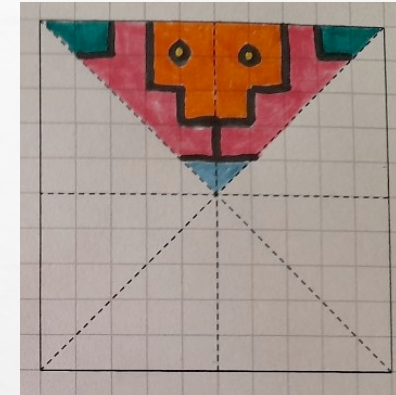
THESE PATTERNS ARE USED BY SIKH AND HINDU FAMILIES TO DECORATE THEIR HOMES ON IMPORTANT OCCASIONS.



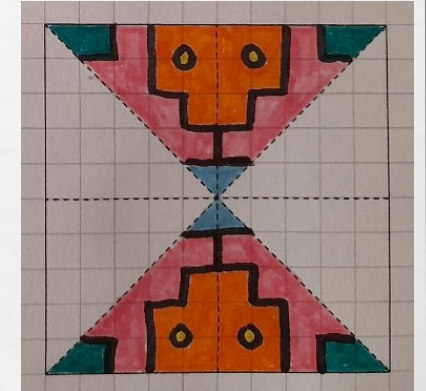
Want to make your own?
You can design symmetrical patterns using these easy steps! Make sure you have a ruler, pencil and squared paper!



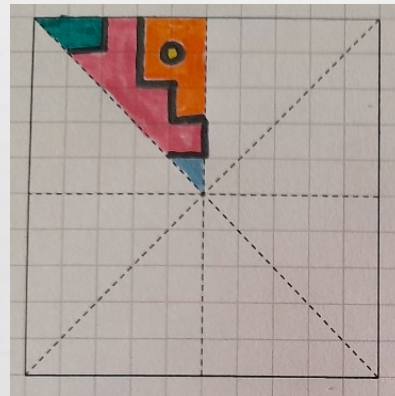
Construct a 10×10 grid. Split the grid into eight sections as shown here.



Reflect your lines in the vertical dotted line of the grid

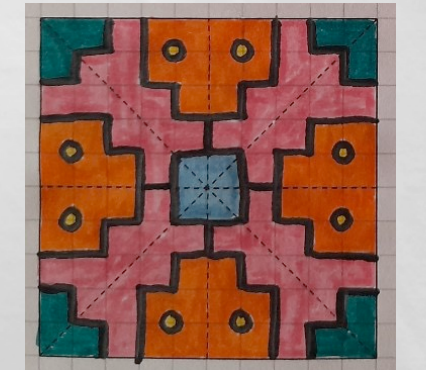


Reflect your lines in the horizontal dotted line of the grid.



Start with the section in the top left. Using the squares as a guide, draw some lines. Be creative.

Reflect your lines in the diagonal dotted lines of the grid.



Mathematics

High Flyers



CRACK THE CODE



Are you good at solving puzzles such as Sudoku, spot the difference, maze puzzle and others? Do you think it was just your lucky day? Actually, you were using computational thinking methods, and you were very good at it.

So, what is computational thinking then? Let's get into it.

Imagine solving a murder mystery and you need to crack the case.

You would gather the clues, break down the mystery into smaller pieces, and use logic to figure out who has done it. That is what computational thinking is all about! Thinking like a computer to solve problems step-by-step, using clear simple instructions and thinking ahead. Otherwise, how would you have solved the mystery, right?

A murder mystery is just like a puzzle, putting pieces together to find the culprit. Every time you are tackling a puzzle, you are using computational thinking methods to without even realising it. As you do it more, you get better at it.

Let's go ahead and solve some puzzles using computational thinking.



Engineering

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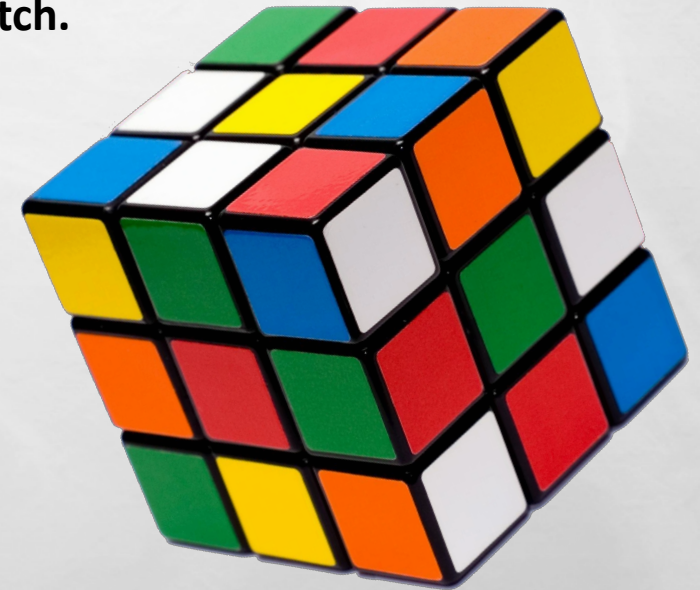
CRACK THE CODE



When you are solving jigsaw puzzles, you are putting the pieces back together to make the image using computational thinking methods.

You will use problem-solving skills where you will analyse the pieces, trying to find a strategy to solve the puzzle. By sorting out the pieces in category for example; you will use pattern recognition to put the pieces together where they match.

The skills you would have learned by solving jigsaw puzzles would come handy when you are building 3D models of a shape or more advanced engineering builds.



Engineering

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CRACK THE CODE

	8					3	
2			6	7			1
	6		2	1		7	
5							3
9			7	5			8
4		1	3		9	7	6
	2						1
8		3	1		6	5	9

A logic puzzle is a puzzle solved by using the art of deduction. Logic puzzles can take the form of grids such as the Sudoku which involves using deduction to put the correct number in the grid; answering trivia questions; solving riddles; brainteasers; winning at a board game or verbal reasoning.

During logic puzzles you need to analyse information and identify patterns; and make deductions using the correct information. This is like a computer solving a complex equation.

Now have a go at solving puzzles using computational thinking methods to sharpen your puzzle-powered brain.



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Movie Monsters' Ages Logic Puzzle



7				
40				
100				
105				
505				

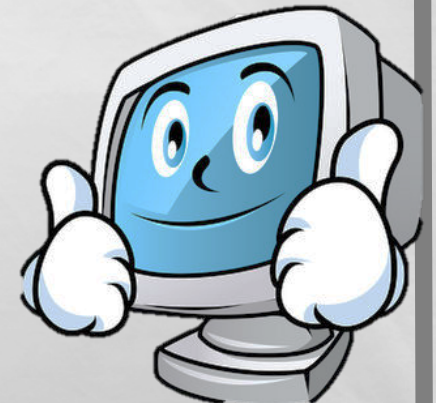
Clues

1. The zombie has been alive for an odd number of years.
2. The vampire's age is a three digit number.
3. The mummy has been alive for exactly four hundred more years than Frankenstein.

Find the correct number by answering the clues provided.

CRACK THE CODE

- I hope you had fun solving these puzzles and now you can also think like a computer through computational thinking!
- Why not create some mind-blowing puzzles for your friends to crack so they can also think like a computer.
- *Keep puzzling and keep thinking like a computer!*



Engineering

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ART CHALLENGE

British artist, Andy Goldsworthy, creates art using natural materials. His land art sculptures are intentionally temporary and left in their environment.

Look at how he has created lines and shapes using the natural materials.

Can you see examples of radial, symmetrical, and asymmetrical balance within his work?

Look at the contrasting colours that capture the viewers attention to look more closely!



Credit Clarey Tale



Credit Pebble Made



Credit Felt Magnet



Credit The art of Education University

*Challenge — Create a land art sculpture
Use natural materials to create a temporary sculpture. Ensure materials remain within the environment they were found.*



Arts

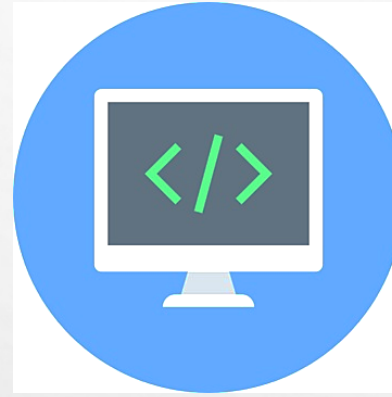
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INSPIRATIONAL FIGURES

Ada Lovelace
1815-1852

**Mathematician and
Writer**



UN Sung
HEROES OF
COMPUTER
PROGRAMMING
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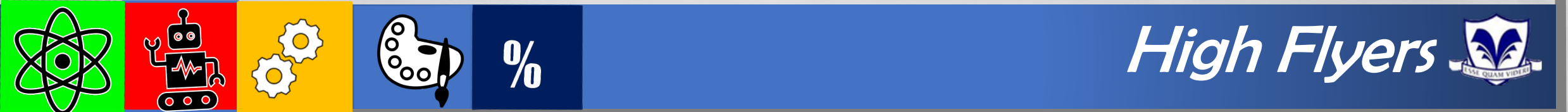
Grace Hopper
1906-1992

**American computer
programmer and
admiral**



Born in 1906, Grace Hopper was a pioneer of computer programming. Hopper was the first to devise the theory of machine-independent programming languages, and the FLOW-MATIC programming language she created using this theory was later extended by others to create COBOL, an early high-level programming language still in use today.

Ada Lovelace, the daughter of the Lord Byron, was a brilliant mathematician. When she was eighteen her talent led to her working extensively with Charles Babbage (the father of computers) on the “analytical engine”. Lovelace’s notes on the analytical engine are important in the early history of computers, with many considering her notes to contain the algorithm for the first computer program.



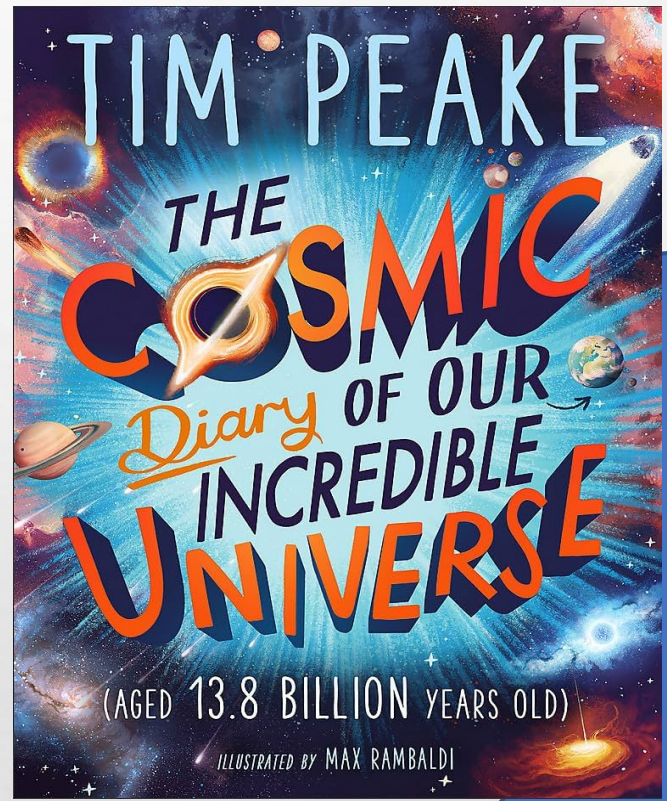
How To Spaghetlify Your Dog and other science secrets of the universe

STEAM BOOKS TO READ

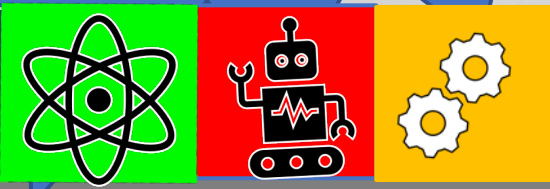
The Cosmic Diary of our Incredible Universe

Have you ever wondered how to slow down time? Or what would happen if the Earth stopped spinning? Or whether you'd be OK if you fell into a black hole? Well, wonder no more.

This book is bursting with fascinating physics facts that will explain everything you want to know, and more, about the curiosities of our cosmos.



Are you bursting to know the answers to REALLY BIG questions? Like, how are stars made? What will we find in a black hole? What even IS antimatter? Put on your seatbelts and blast into space with your guide, astronaut Tim Peake, in this fascinating adventure through space, time and the diary of our truly incredible universe.



ACKNOWLEDGMENTS

High Flyers was produced by Highsted Grammar School to inspire Key Stage 2 students in local primary schools to develop a passion for learning across the curriculum.



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A special thank you to Mrs Longley.



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