

Welcome to OpenUpScience, the weekly magazine from Cambridge Science Centre. In this issue, we're exploring all things code related! We've got early writing, codes to crack and some modern day coding - computer programming.





























A code is a system of words, letters, pictures or even sounds and gestures used to represent other words or letters - often to hide a secret! If you know the code key then you can decode the message to reveal what it's really saying. Language is even a type of code, using sounds or symbols to represent meaning. You might think of spies using codes to send hidden messages but there are lots of other ways we use code. For example, now we use code to program and talk to computers.

Spark, Ignite, Fuel, Illuminate

Hieroglyphic codex

Write your name in hieroglyphics - using pictures instead of words – a bit like the Ancient Egyptians did.

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

Ancient civilisations used symbols as a sort of code, a bit like some of us use emoji's today!

Q: How do brave Egyptians write?

A: With Hero-Glyphics!

Q: What did the Ancient Egyptian say when he had a nightmare?

A: I want my mummy!

Morse Code

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

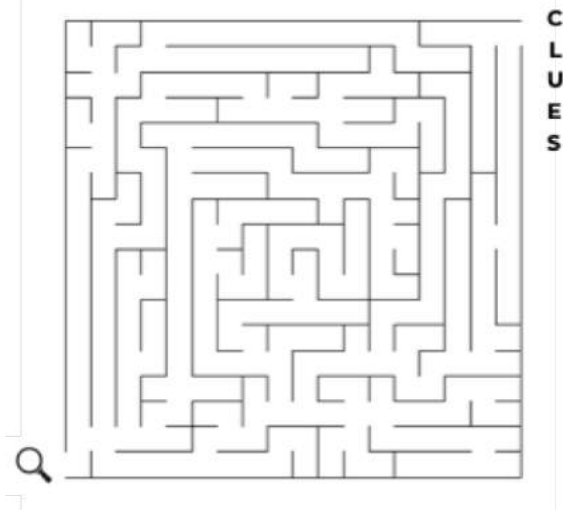
Morse code is a type of code that replaces the letters of the alphabet with dots and dashes. It was invented as one of the first instant messaging systems using electricity and is still used today! Morse code is usually tapped. The dots last one second and the dashes last three seconds.

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Have a go at tapping, stomping or even blinking a secret message to someone in Morse code!

A-maze-ing code breaking

Help the codebreaker get to the clues by finding the way through this maze!



What's the Secret?

Use a Caesar cipher to send and receive secret messages!

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What you'll need

- The cipher template from the centre of the magazine
- Thin card, or a paper plate
- scissors
- A split pin
- Some plasticine or blu-tack
- An inquisitive friend

It's easy to create your own secret message to send to a friend, as long as they also have a copy of the same disc, and know how many letters you have shifted by.

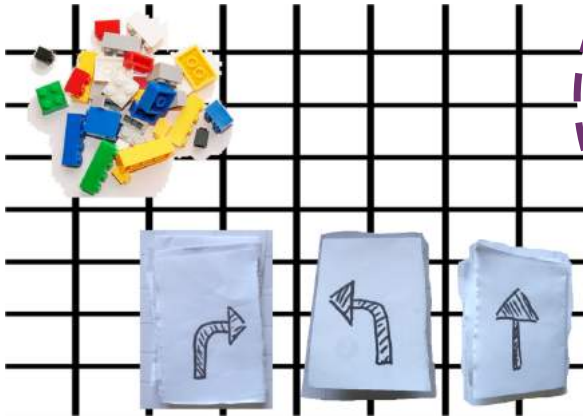
What to do

1. Cut out both parts of the disc template.
2. Stick the larger circle onto some card or a paper plate. Trim the edges and maybe decorate it if you like!
3. Pierce the centre of both pieces of paper with the pin and join the circles together.
4. Decide on the message you want to encode and choose the key for your coded message. The key is the number underneath the letter on the smaller disc. Pick your number and rotate the inner disc so that your chosen number lines up with the letter A on the outer disc. Keep the discs lined up like this to write your coded message.
5. Spell out your message one letter at a time using the outer disc. Convert your message into a secret code by writing the corresponding letter from the inner disc. Do this for each letter of your message.
6. Copy the coded message and give it to your friends and see if they can decipher it (they'll need the key!)

Algorithm Coding Game

An algorithm is a series of step-by-step instructions used to complete a task or solve a problem. Use the game below to create your own algorithm and help your toy find a prize object.

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What you'll need

- Two pieces of plain A4 paper
- A pen
- A pair of scissors
- 10 or more small objects such as Lego

What to do

1. Create a grid on an A4 piece of paper of at least 8 by 8 rectangles (see above). You can do this using a ruler and drawing halves across the page, but it doesn't have to be too neat.
2. Make your directional cards. Cut out around 15 small rectangles of paper and draw out 5 left turn arrows, 5 right turn arrows, and 5 forward (and back) arrows.
3. Gather around 10 small objects or toys such as Lego figures.
4. Randomly arrange these on different rectangles on the grid.
5. Pick 1 toy or object which will follow your directions to another object
6. Create a sequence of direction cards to direct your object or toy to it's goal, whilst avoiding other objects, or going off the board.

Binary Quiz Solver

Computers see everything as a combination of 1's and 0's – even letters! This is called Binary code. Its useful in computers because 1 and 0 can represent 'on' and 'off', like a switch on a light. Each letter has a unique combination of 1's and 0's. Using the binary code key below, see if you can crack the answers to these questions!

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A	01000001	H	01001000	O	01001111	V	01010110
B	01000010	I	01001011	P	01010000	W	01010111
C	01000011	J	01001010	Q	01010001	X	01011000
D	01000100	K	01001011	R	01010010	Y	01011001
E	01000101	L	01001100	S	01010011	Z	01011010
F	01000110	M	01001101	T	01010100	(Answers on the back page)	
G	01000111	N	01001110	U	01010101		

Q1. What letter can you swim in?

Answer: 01000011 or _____

Q2. What letter makes a good drink?

Answer: 01010100 or _____

Q3. What letter grows in a pod?

Answer: 01010000 or _____

Q4. What is a pirates favourite letter?

Answer: 01010010 or _____

Notice how each letter is made of a combination of eight 1's or 0's?

We call the 1's and 0's 'bits' from squishing together the words 'binary' and 'digit'. 8 bits = 1 byte, which is the amount of information your computer needs to make a letter. A mobile phone has thousands of millions of bytes of storage – that's a lot of 1's and 0's!

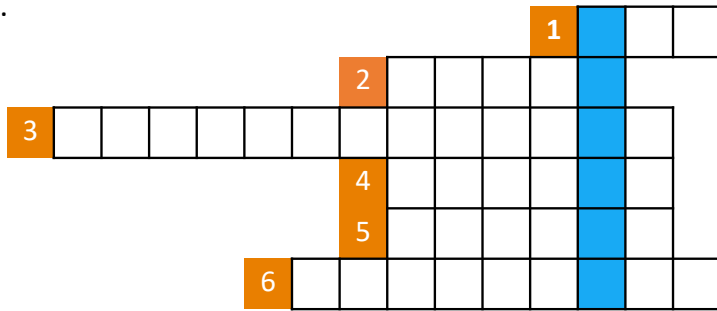


Did you know...?

When a computer code has a mistake in it, we say it has a bug, but the first computer bug was actually a bug! A little moth got stuck inside an early computer and it stopped working.

Code word reveal puzzle

Codes are sometimes used to send secret messages. Fill in the answers to reveal the hidden code word in blue.

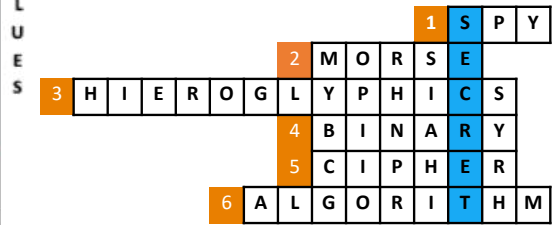
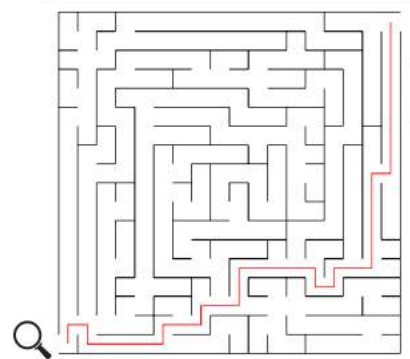


- 1 The people that work undercover and sometimes use code to communicate
- 2 The code that uses dots and dashes
- 3 The symbol code used by Ancient Egyptians
- 4 The code that is made of 1's and 0's
- 5 A way of coding that mixes up the letters
- 6 A step-by-step instruction to complete a task

This Week's Challenge

Make your own code out of emojis
Send us a message in your code and a key to your code to: OpenUpScience@cambridgesciencecentre.org

Puzzle Solutions



Next Issue: Blood

Find out all about blood and our hearts that pump it around our bodies

Send us your work! OpenUpScience@cambridgesciencecentre.org

Send us your questions! Look out for the answers on:

[Science@6 - YouTube, Monday, 6pm](#)

Want to try coding your own game? Visit:

online.thecodezone.co.uk/challenge/pong

Brought to you by The Code Zone



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We are kindly supported by our Executive Council:



Quiz Answers: Q1 – C, Q2 – T, Q3 – P, Q4 – R

