



penUp Science



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Issue 49
Technology

Welcome to OpenUpScience

from Cambridge Science Centre.

This issue is all about Technology and has been supported by Citrix.



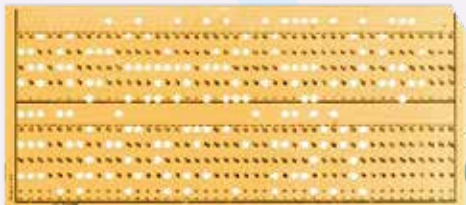
What do you think about when you think of technology? Electronics and computers are only part of modern technology, but many discoveries had to be made before they were designed as we know them today.

The first computer...

The 'Difference Engine'.

It was invented in the 1830s by an English inventor named Charles Babbage, who was both a student and professor at Cambridge University.

Modern computers and mobile phones use electricity, but it wasn't yet used in the same way that we do, so Charles Babbage designed a mechanical computer. Think of a mechanical computer as a wind-up toy car, but with 50,000 moving parts. It was so complicated that Babbage never completed it.



These punched cards were used to enter instructions into the machine. Holes are punched on each column to represent characters, and together produce a line of code. Each card is inserted in a punch card reader to assemble the program.

The largest punch card program was from the 1950s and used 62,500 punch cards. In the image below, a woman stands next to the punch cards used in this program.



Answer: It had a hard drive!

Today, computers work by combining hardware and software. Hardware is the computer's physical parts: keyboard, mouse, monitor, speakers, wires, and circuits. A circuit board contains the microprocessor, which is the computer's brain, also called the central processing unit (CPU).

It handles all the information that goes into and comes out of the computer like numbers, words, pictures, sounds. The memory, the hard disk drive, stores it.

Why did the computer turn up late for work?



Did you know?

The first electronic computers were invented around 80 years ago and were so big that just one could fill a whole large room

...now a computer can fit in your hands!



Word Search

Cross the words out on the wordsearch. Then read across the table and write the letters that are left on the lines below to reveal the answer.



Solutions at the back

HELP!
WHY IS MY COMPUTER SQUEAKING?

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

- Hard drive
- Internet
- Server
- Program
- Bit
- Code
- CPU
- Remote
- Hardware
- Virtual
- Router
- Cookie
- Network
- Software
- App

Write out the remaining letters in order here

!

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Working Together



Citrix use computers and technology to help separate parts of different organisations, like Ebay, the NHS and universities, work together.

There are **500** people logged into the Citrix workspace.

300 people want to use a writing app.

250 people want to use a drawing app.

100 people want to use a writing and drawing app at the same time.

The rest are using other apps in the Citrix workspace.

Which of these diagrams reflects the Citrix workspace correctly?

A. Citrix Workspace

B. Citrix Workspace

C. Citrix Workspace

D. Citrix Workspace

Wi-Fi Blocker

Find out which materials block Wi-Fi the most!



Wi-Fi Blocker Results

Record the results of your experiments here. What do you notice? What other materials would you like to try?



	Control	Baking Tray	Cardboard	Tin foil
Wi-Fi Strength				

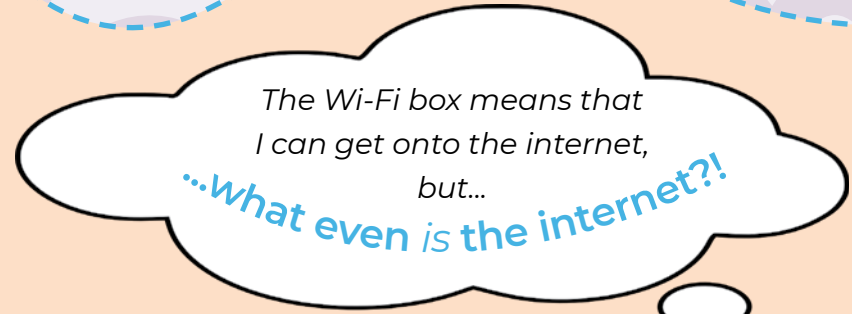
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What to do

1. Set up a phone around 1m away from the router.
2. Open up the Wi-Fi analyser app or go to Wi-Fi settings on the phone.
3. Look at the current signal strength and write (or draw it) in the results table. This is your baseline reading.
4. Place your first material between the router and the phone. Place it close to the router, but not touching.
5. Look at the signal strength and write (or draw) the new reading.
6. Repeat this process for all the different materials.

Which material caused the largest drop? Which materials didn't make any difference? Can you think of any other materials to try and see the results.

Wi-Fi travels on radio waves. These waves can become blocked, absorbed or reflected by certain materials. Different materials will affect the signal in different ways. Materials that are conductors, such as metal, will absorb some of the radio waves, whereas insulators such as cardboard or paper, will allow waves to freely travel through.



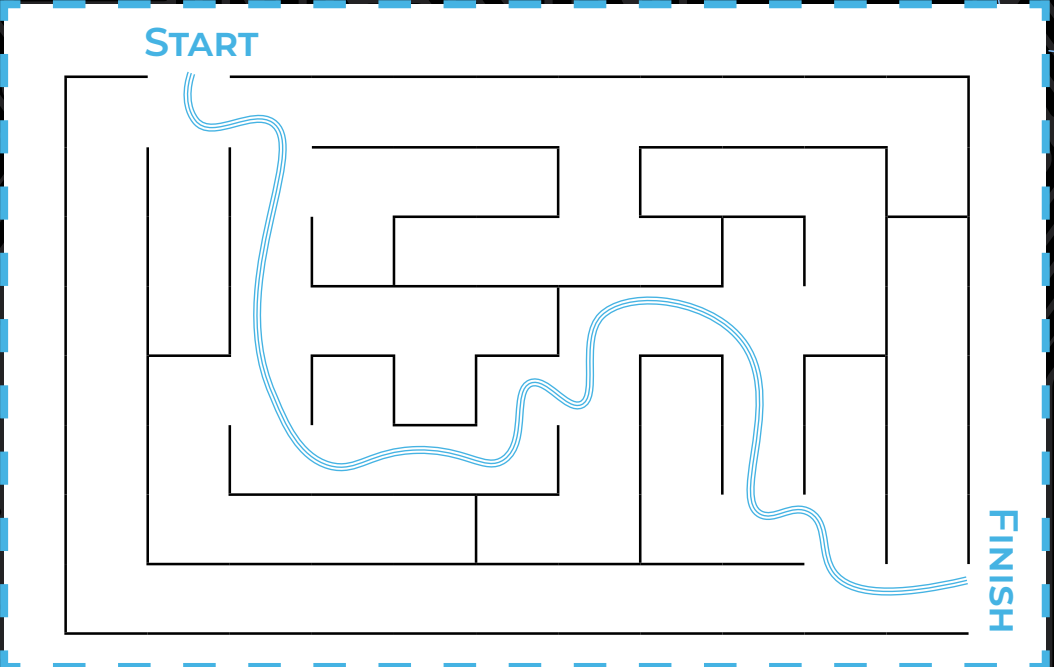
You might have heard of it, but what is the Internet? The Internet is not one place, it's billions of computers, all connected. When you connect to the internet, you are just communicating with someone else's computer. When you open Google, you're talking to Google's computer. If you want to visit the Citrix website, you're asking their computer for information!



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An Easy Maze, But Not For Everyone

A computer at Citrix has found a solution to this maze. But the path is very long! Can you help us find a shorter route?



What is happening?!



at Citrix is to make computers smarter by telling them what to do, so that they stop making silly mistakes.

Computers can sometimes arrive at a solution in the silliest way possible, like in this maze. Humans can find the obvious answer immediately, without even thinking! One of the jobs

Did You Know...



Every computer connected to the Internet has a unique address so that your computer can be identified. It's called an IP address and you can find yours by googling 'my ip'.

You can spell the word 'typewriter' using the top row of your keyboard.

You can get internet at the top of Mount Everest, the tallest mountain in the world!

Computers work by using logic to figure out if something is true or false, and therefore what to do. Can you solve this logic problem below?

Four friends are solving a puzzle and decide to see who can solve it the fastest.

After the puzzle race is finished, this is what they each say:

Alice: "At least I beat Danny."

Ben: "Cara beat me again..."

Cara: "I won!"

Danny: "I can't believe I didn't beat Ben"

Can you work out who came last?

Solutions at the back

Make Pizza Like A Computer



Computers don't need to make food. But if they did, they'd probably follow this recipe!

What to do

1. Get an adult to help with the hot bits.
2. Heat the grill to high.
3. Lightly toast the crumpets in a toaster or under the grill.
4. Mix the passata, ketchup, and oregano together in a bowl.
5. Chop your chosen toppings into small pieces.
6. Line a baking tray with foil.
7. Spread the sauce over the crumpets.
8. Top the crumpets with veggies and cheese.
9. Arrange the crumpets on the tray.
10. Grill for 4 minutes, or until the cheese is golden and bubbling.
11. Leave to cool slightly before eating.

What you'll need

- 6 crumpets
- 4 tbsp passata
- 4 tbsp ketchup
- ½ tsp dried oregano
- Toppings of your choice (peppers, tomatoes, sweetcorn, etc.)
- 75g cheddar, grated
- An adult



What is happening?!

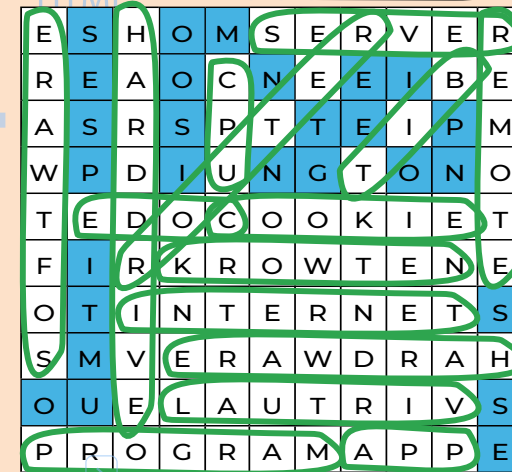
Much like you making your pizza, computers simply follow recipes. Everything they do, from blasting astronauts to the moon to sending emails, is done this way. Programmers teach computers what to do using special recipes called 'algorithms'. The ingredients are called variables, and the steps are called instructions. So, the next time you play a game or send a text, think about it like a restaurant kitchen. Your computer is cooking a lot of dishes and following a lot of recipes, all at the same time, just like a head chef!

Puzzle solutions



If you have any questions or want to send us a photo of your experiments, drop us an email at openupscience@cambridgesciencecentre.org

HELP!
WHY IS MY COMPUTER SQUEAKING?



s o m e o n e i s s t e p p i n g
o n i t s m o u s e !



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