

WHAT IS TECHNOLOGY?

Technology means using what we know to CREATE and BUILD anything, from wheels and bridges to robots and drones. It's about SOLVING PROBLEMS - whether by inventing a NEW solution, or finding a BETTER way of doing something.

Here are just some examples of the technology you might see around you every day.



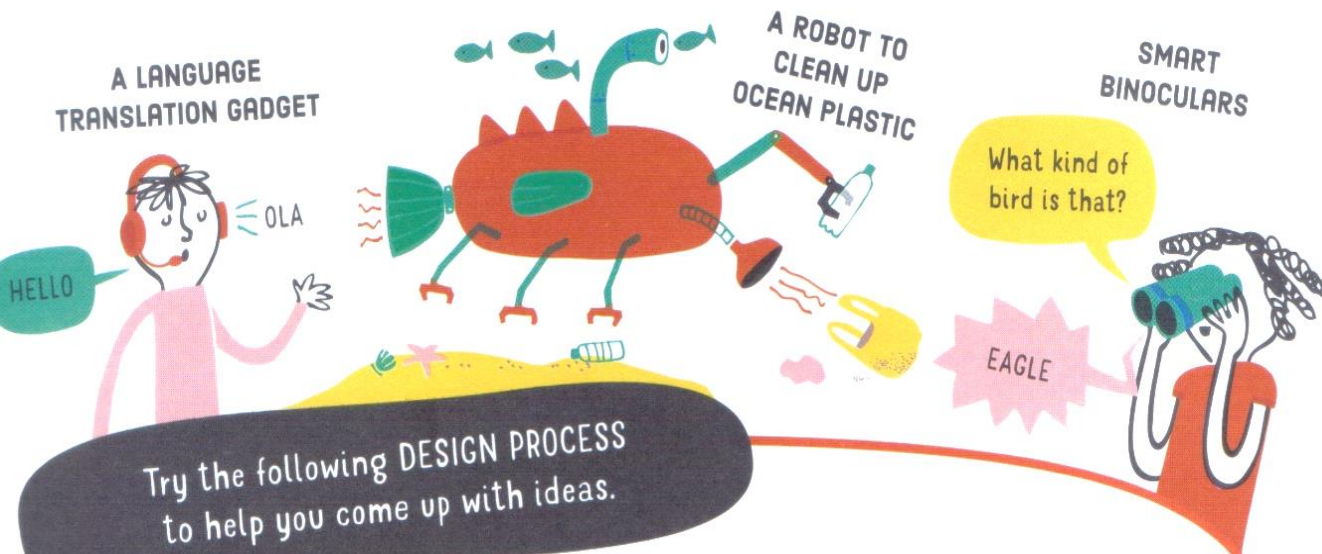
Pick your favourite piece of technology from the page and create a technology profile page-include-

- Who invented it?
- Where it was invented?
- What is it made from?
- What manufacturing processes are involved in making the product?
- How much does it cost?
- Has the technology evolved over time- this means has it changed- got better? If so, how?
- What would your life be like if that technology did not exist?

THE NEXT BIG IDEA

Technology is all about MAKING THINGS POSSIBLE.

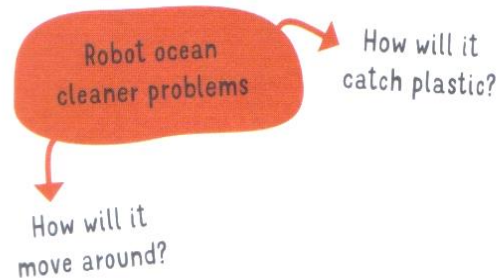
What sort of technology do you want to invent?
Try one of these examples, or think of your own.



WHAT ARE THE PROBLEMS?

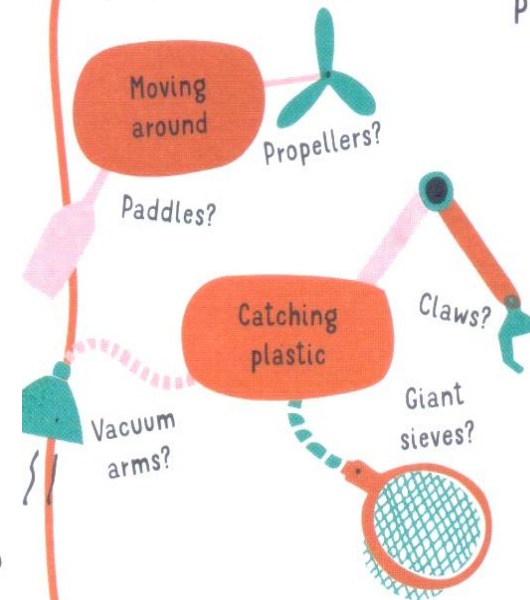
Start by working out WHAT problems you need to tackle. This is known as PROBLEM DEFINITION.

Create a mindmap for your chosen problem. FOR EXAMPLE:



FIND SOLUTIONS

Think of ways your technology could solve those problems. This is known as CONCEPTUALIZATION.



DESIGN IT

DRAW OUT your technology here. Add labels to show what each part does.

ROOM FOR IMPROVEMENT

Technology isn't always about coming up with a brand new idea. Often, it's to do with **DEVELOPING** and **IMPROVING** things that already exist or **COMBINING** technologies to make something better. Here are some examples of technology that could be improved...



Pick one of the examples above, or think of your own. Follow this development process to try to improve it.

WHAT'S BEEN TRIED BEFORE?

Think about improvements that have already been made to try and solve the problem.



ANALYZE IT

Scribble down the **STRENGTHS** and **WEAKNESSES** of the existing technology, and try to think of **IMPROVEMENTS**.

For example:
REUSABLE CUP

STRENGTHS
Reduces waste

WEAKNESSES
Have to remember to bring it

IMPROVEMENT
Reusable cup that people can wear when not in use



DESIGN IT

Design your improved piece of technology below.

TALKING TO MACHINES

Computers work in a language called MACHINE CODE, which is made up of just two symbols - 0 and 1. The 0s and 1s represent the STATE of millions of tiny switches inside a computer's memory chips. They show whether each switch is OFF (0), or ON (1).

Each 0 or 1 is known as a BIT (short for binary digit). Bits can give the computer all sorts of information, from words to images. Shade the ON switches below to reveal an image.



0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0
0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	1	0	0	0	0
0	0	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0
0	0	1	1	1	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0
0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0
0	1	1	1	1	0	1	1	1	0	1	0	0	0	0	0	0	1	1	0	0
0	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	1	1	0
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
0	0	1	1	1	1	1	0	0	0	1	1	1	1	1	0	0	0	0	0	0
0	0	0	1	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
0	0	0	1	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
0	0	0	1	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0

When a letter is typed on a keyboard, it's converted into a set of 8 bits.
This is known as **BINARY CODE**.

BINARY CODE

A	01000001
B	01000010
C	01000011
D	01000100
E	01000101
F	01000110
G	01000111
H	01001000
I	01001001
J	01001010
K	01001011
L	01001100
M	01001101
N	01001110
O	01001111
P	01010000
Q	01010001
R	01010010
S	01010011
T	01010100
U	01010101
V	01010110
W	01010111
X	01011000
Y	01011001
Z	01011010

Use the key to decipher the word
that's been typed here.

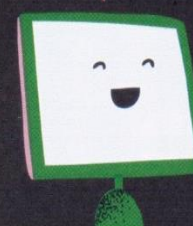
☐ OFF (0)
☒ ON (1)

Try writing
0 or 1 above
each switch.

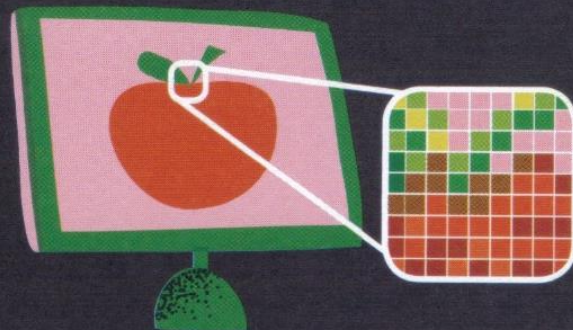


Add your own word in binary code below.
Each line is one letter.

You don't
have to use
all the lines.

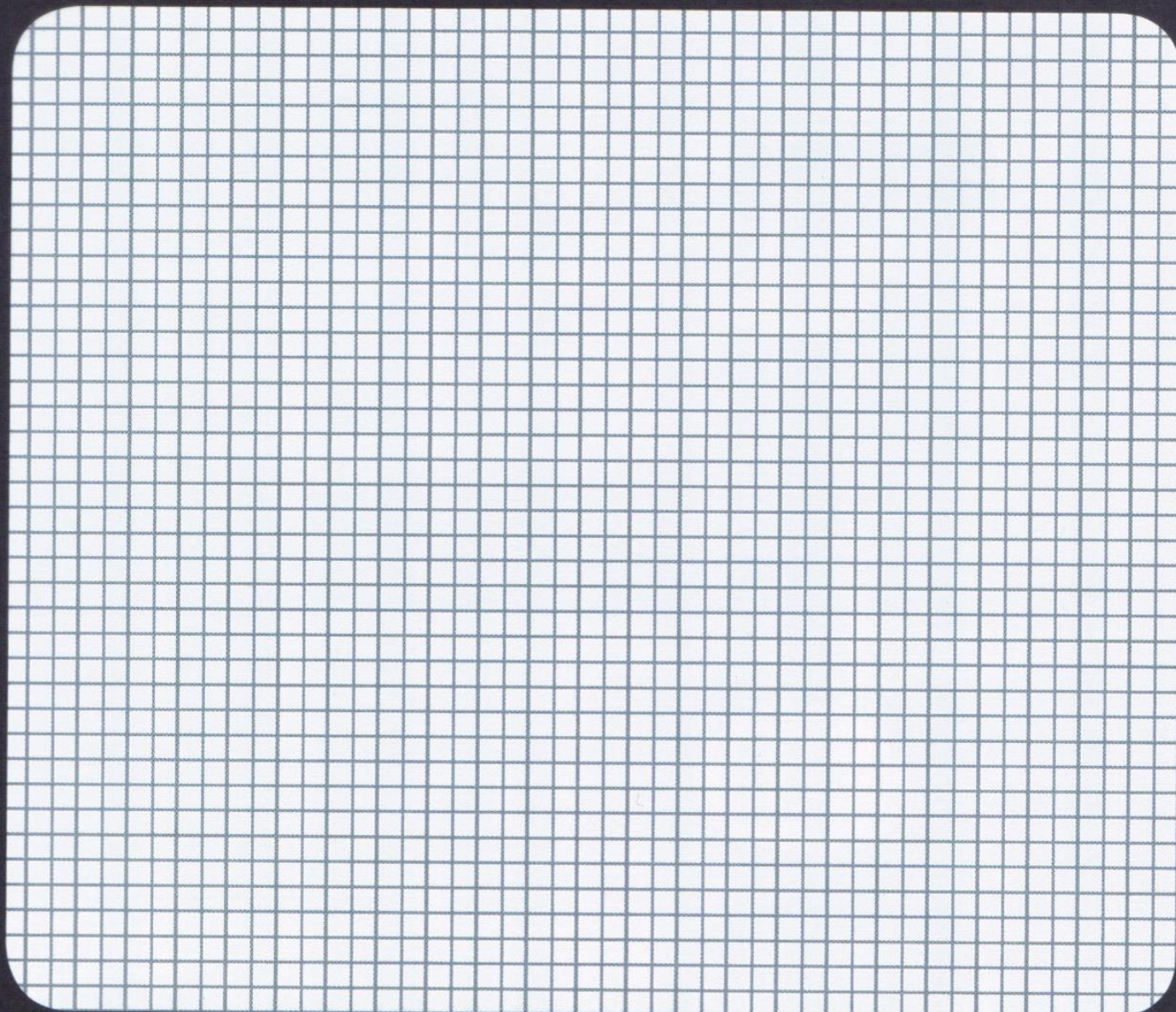


Computer screens are made of **PIXELS** - tiny squares that light up different shades of red, green and blue light, mixed into over **16 MILLION COMBINATIONS**.



Each pixel is just **ONE** hue, but they're so small you barely notice them, until you look up close...

Use the pixel grid below to create your own close-up image.



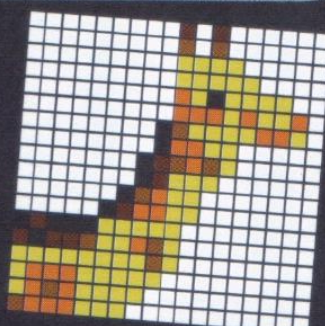
You could try...



A tree



An eye

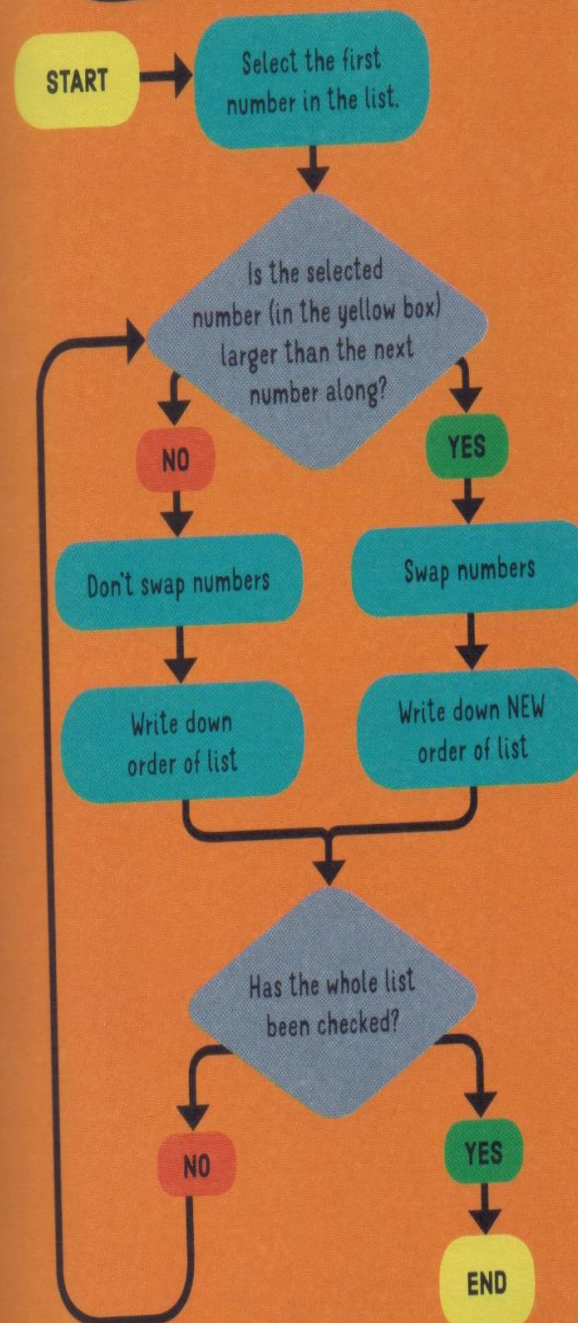


A giraffe

ONE STEP AT A TIME

To work something out, computers need to follow precise, step-by-step instructions. A set of instructions for a specific task is known as an **ALGORITHM**.

The **FLOWCHART** below shows an algorithm designed to sort a list of numbers into order of size.

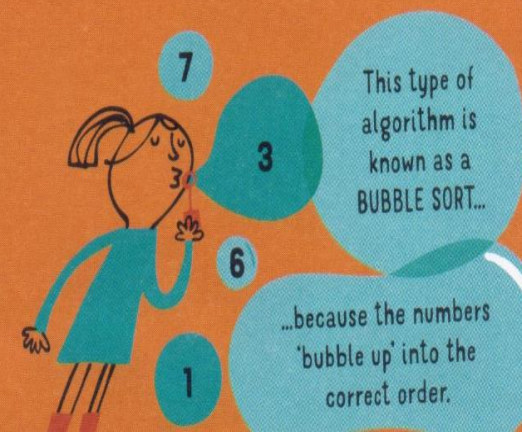


TRY IT YOURSELF

Use the flowchart to put this list of numbers in order from **SMALLEST** to **BIGGEST**. Each time you run through the flowchart, write the new list on the next row.

6	1	3	9	7

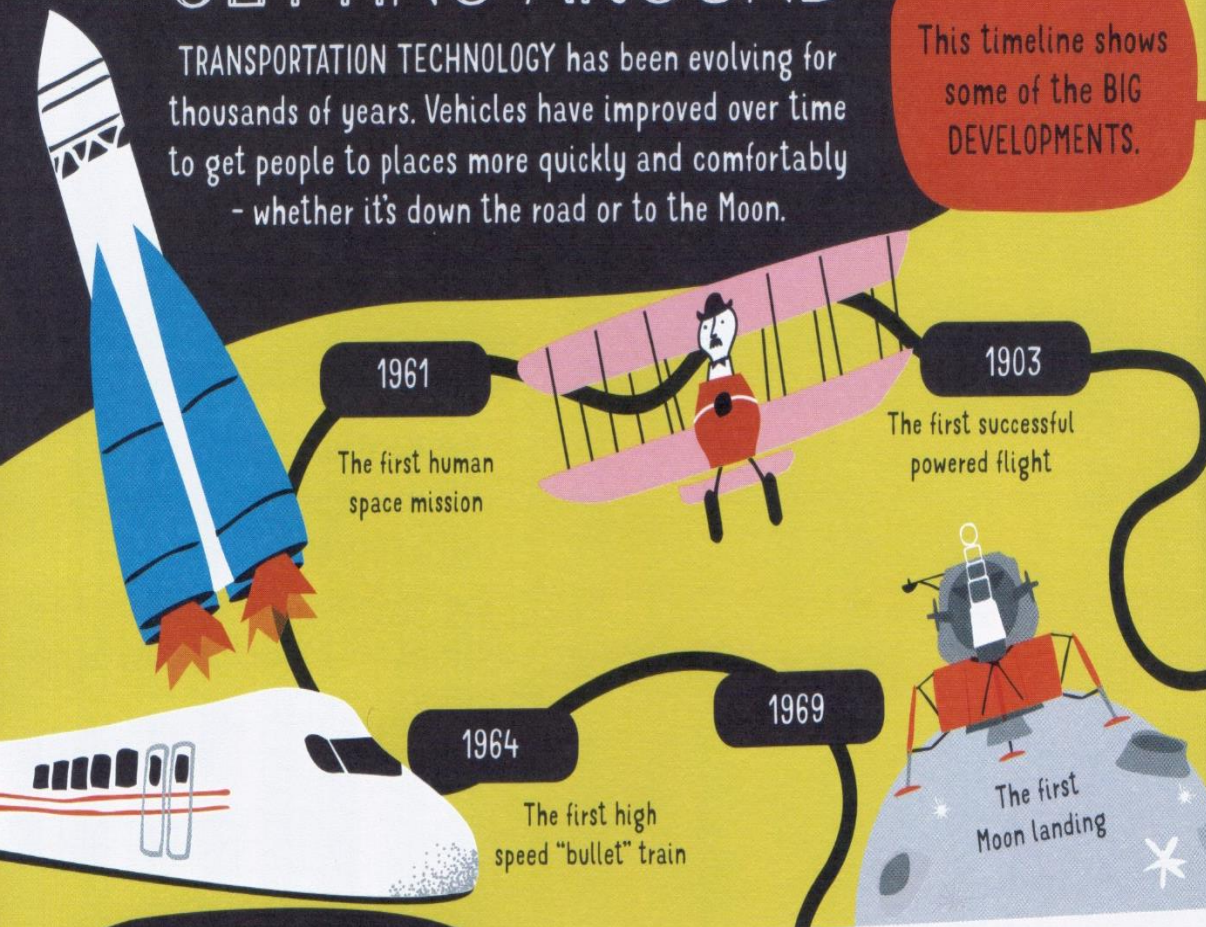
The yellow boxes show **WHICH** number you need to check each time.



GETTING AROUND

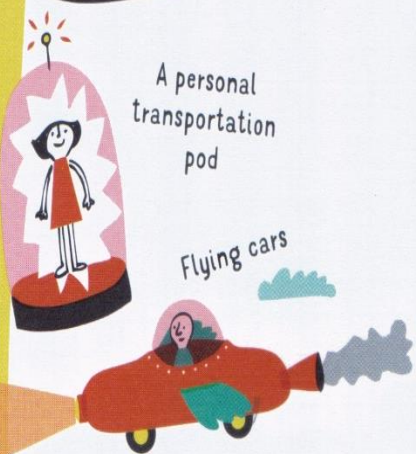
TRANSPORTATION TECHNOLOGY has been evolving for thousands of years. Vehicles have improved over time to get people to places more quickly and comfortably - whether it's down the road or to the Moon.

This timeline shows some of the BIG DEVELOPMENTS.



DESIGN YOUR OWN

What comes next?
Sketch your ideas for the
TRANSPORTATION OF THE FUTURE.



Smart cars and roads that talk to each other about driving conditions

Bad traffic!

Change route...

BEEP
BEEP

The earliest boat discovered so far

Around 8,000BC



The first wheeled vehicles

Around 3,500BC



Around 2,000BC

Horses trained to pull carts and chariots



A LONG TIME LATER...

1817



The first bicycle

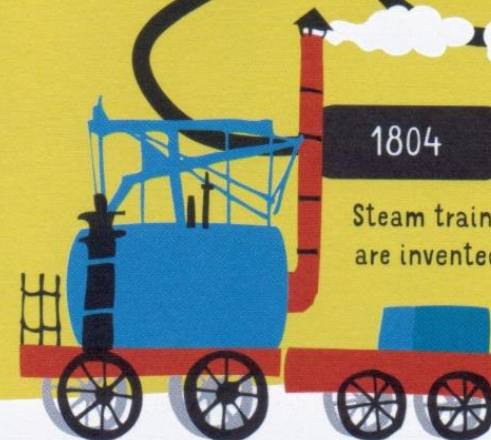
1886



The first car with an 'internal combustion' engine (powered by burning fuel)

1804

Steam trains are invented



1783

The first hot air balloon flight with people



PACKET PUZZLE

The information computers send through the internet is broken up into pieces, known as PACKETS. This means the information travels quickly, but doesn't always arrive in the right order.

HOW IT WORKS

A computer searches for INFORMATION - such as an image.



The request spreads out through the internet until it finds another computer that can help.



Another computer responds and sends the image, split into four packets.

The packets take different routes through the internet...



...and arrive in the wrong order.



The computer puts them back together.

TRY IT YOURSELF

A computer has sent you an image split into 16 packets, printed on the next page. Copy the template, or print it from the Usborne QUICKLINKS website, and cut out the pieces.

Can you put them back together so that they make a whole image again?

