



penUp Science



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Issue 52
All about
me

Welcome to OpenUpScience

from Cambridge Science Centre.

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This issue is all about you!

The scientific study of what makes you, you, is called **Genetics**.



This area of science looks at things called genes and how characteristics are passed on from one generation to another.

But what is a gene?

A gene is a small section of DNA that carries instructions for a cell to make certain proteins.

But what is DNA?

Our bodies are made up of tiny building blocks called cells.



Inside almost all of our cells, there is a bit called the nucleus. This is like the brain of the cell.

Inside the nucleus there is a long, twisted, molecule called DeoxyriboNucleic Acid or DNA. Each DNA molecule is too small to see, but it is very very long. In each cell there is about 2m of DNA.

The genes along the DNA strand provide all of the instructions that are needed to make you

and all of the instructions that are needed for a living thing to grow and develop.

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The Same But Different

Genetics helps explain why things look similar to their parents, but not exactly the same.

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We inherit two copies of each gene - one from each of our parents. The two copies have little differences between them and that's what makes each of us unique.



Our genes might control lots of things about us - like what blood group we are, what colour our eyes are, or whether or not we have freckles but our genes alone don't fully explain what makes us, us!

Our environment, or the experiences that we grow up with also influence what we are like. For example some things about us, like whether we can read, swim or speak another language are not inherited characteristics, but are influenced by how we live.



Can you spot the six differences between the groups?



Solutions at the back

Strawberry DNA

Every bit of your body is made up of tiny things called cells. Inside the nucleus of all your cells, apart from your red blood cells, is DNA - the body's instruction manual for how to make you. DNA is in all living things, including plants. You can extract some real DNA from a strawberry just using things you have around your home.

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What you'll need

- 2 tbsp washing up liquid
- 450ml water
- 2 tbsp salt
- 3 strawberries
- 3 tbsp of hand sanitiser containing alcohol
- Ziplock bag
- Sieve
- 2 glasses

What to do

1. Put the hand sanitiser in the freezer overnight so that it is cold.
2. Put the water, washing up liquid and salt into a glass and gently mix for a couple of minutes.
3. Put the strawberries in the ziplock bag. Seal and squish with your hands so that there are no large lumps of strawberry left.
4. Open the ziplock bag and pour in the soapy mixture.
5. Close the ziplock bag and continue squishing the strawberries so that it's all mixed in.
6. Pour the mixture through the sieve and into the second glass to get rid of any lumps of strawberry.
7. Pour the cold sanitiser into the mixture while stirring it.
8. A white cloudy layer will start to form between the hand sanitiser and the strawberry mush as the layers start to separate. The white stuff is the strawberry DNA!

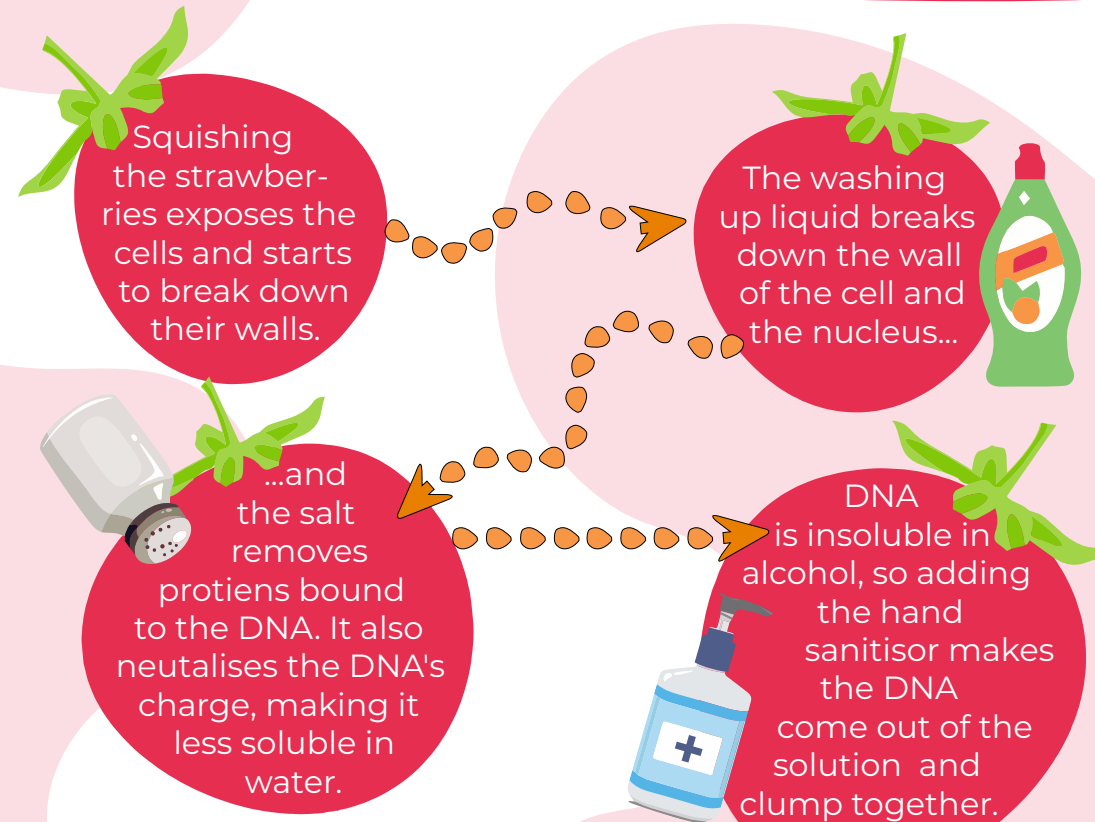
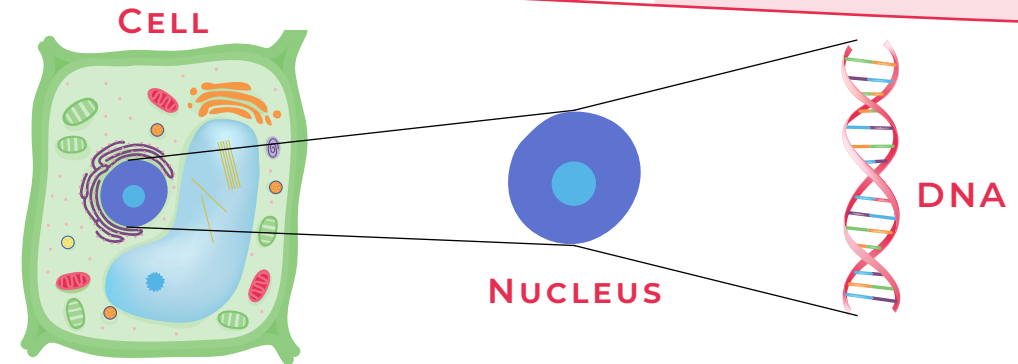
Using a strawberry works well because each cell has 4 times the amount of DNA in each cell as ours do!

This also works with bananas, kiwi or raspberries!

Strawberry DNA

How does this activity work? Well, the DNA is inside the nucleus of the cell, and each step has a role in extracting it...

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Emoji Genetics

A gene is a section of DNA that tells your body how to make a certain part of you. Every person has two copies of each gene - one from each parent. Use a coin to decide which gene for these emoji characteristics will show.

What you'll need

- A coin
- Paper
- Colouring pencils
- This page!

What to do

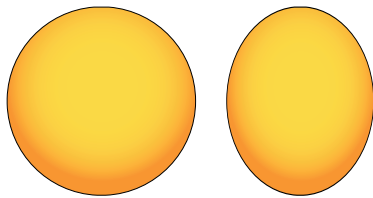
1. Start with the face shape. Flip the coin. If it lands on heads, draw a round face shape on your paper and if it lands on tails draw an oval face shape.
2. Flip the coin 4 more times to work through the other traits and build your emoji.

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Face Shape

Heads

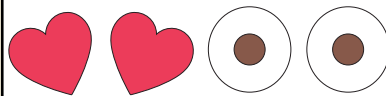
Tails



Eye Shape

Heads

Tails



Mouth

Heads

Tails



Hair

Heads

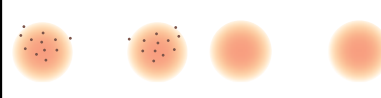
Tails



Freckles

Heads

Tails



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Who Are You Wordsearch

Can you find all the words?

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What things make you *you* that aren't entirely genetic (for example skills, hobbies and likes)?

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

Solutions at the back

INHERITED
GENETICS
DNA
BIOLOGY

TRAITS
CELLS
LIVING
INSTRUCTIONS

NUCLEUS
UNIQUE
INDIVIDUAL
YOU

Send us a photo of your emojis to
[openupscience@
cambridgesciencecentre.org](mailto:openupscience@cambridgesciencecentre.org)

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Inherited Traits

How similar how are you to your parents? An inherited trait is a characteristic that you get from one of your biological parents. See how your family group compares to each other.

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What to do

1. Start at the centre of the wheel on the next page.
2. Identify which half corresponds with your hair colour and follow it onto the next section.
3. Continue to move outwards, following sections that apply to you.
4. When you get to the last trait, look at the number on the edge of the wheel.
5. Get your family group to follow the inherited traits wheel to get a number and put them in the table. How do you compare to your family group?

TRAITS TABLE

Name	Number

Using only 5 inherited traits there are 32 possible combinations...

Imagine how many combinations there are if we consider ALL of our inherited characteristics... these are the little genetic variations that make each of us unique!



Inherited Traits Wheel

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In 2001, scientists made a map of all the genes that make a person - this complete DNA sequence is known as the human genome. About 99.9% of DNA of every person on the planet is the same - it's the 0.1% that makes us unique.

Fingerprints



Fingerprints are somewhat influenced by genetics but also by chance, which means no two fingerprints are the same - not even with twins! Explore yours with this activity.

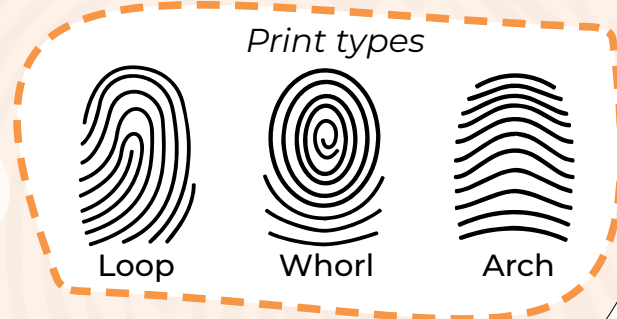
What you'll need

- Paper
- A pencil
- Sticky tape
- Friends and family to test

Try testing your family and comparing. Are they similar?

What to do

1. Scribble the pencil onto the piece of paper until a small area is covered in graphite.
2. Press a finger onto the graphite until it is covered in grey.
3. Get a bit of tape and press your finger onto the sticky side. Stick the fingerprint onto the table below and identify its type.



My left hand

My prints

Print type

My right hand

My prints

Print type

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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

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

Did you know...

If you unravelled all of the DNA from every cell in your body it would stretch over 110 billion miles and be able to stretch to the Sun and back over 600 times.



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through hands-on activities.
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the other exciting things we do!



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Fuel, Illuminate**

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you think!**
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to improve,
so let us know
what you liked -
or didn't like -
about this
issue!

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