OpenUp Science

CAMBRIDGE SCIENCE CENTRE

Issue 53
Extreme Weather

Welcome to OpenUpScience

from Cambridge Science Centre.

This issue is all about extreme weather.

Weather is the state of the atmosphere at a particular time. It can be sunny, cloudy, windy, wet, dry and sometimes extreme!

But what causes the weather?

All weather depends on three things...

1. Sunlight
2. Water
3. Air

Different weather happens because the Earth is heated unevenly by the sun.

When air is heated and cooled, it moves around. When warmer air rises up into our atmosphere, it leaves space for some colder air to rush through to where it was. This is wind. When water is heated it can turn into a gas through evaporation (like steam above a kettle) and when it cools it can turn back to liquid, making clouds and rain.

What falls but never hits the ground?

Solution at the back

Hot And Cold Air Balloon

Changes in the weather are caused by changes in the atmosphere. Explore how heat can effect the air with this activity.

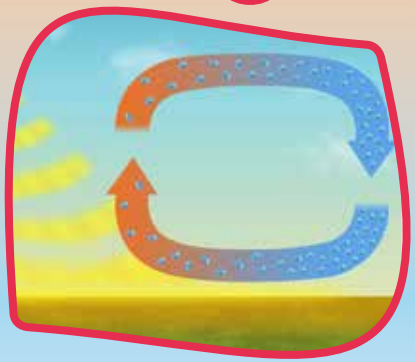
What to do

1. Put a balloon over the top of each bottle.
2. Place a bottle in each of the bowls, standing up.
3. First fill one bowl with ice water around the bottle. Hold the bottle upright around the rim so it stays in the water and wait for one minute.
4. Next, with adult supervision, fill the other bowl with boiling water around the bottle. Remember to hold the bottle around the rim so it stays in the boiling water and wait another minute.

   What happened to each balloon? Why?

What you'll need

- Two bowls
- Two bottles (lids off)
- Two balloons
- Ice water
- Boiling water
- Adult supervision

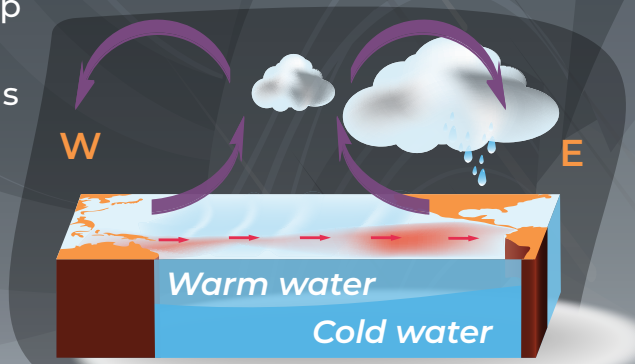


What is happening?

Air isn't made of nothing, it's made of a gas of tiny molecules. Heating up these gas molecules with the hot water means they move quicker, spread out and the air inside the bottle becomes less dense. Less dense things tend to rise up, meaning that the balloon inflates. On a global scale this rising of warm air is called convection and gives us different weather.

El Niño

El Niño is a weather pattern that takes place every 3 - 5 years. Normally, strong winds called trade winds blow across the Pacific ocean from East to West, piling up warm water in the West. During El Niño, these winds weaken and warm water spreads East. This causes extra evaporation and clouds, leading to rain, flood or even cyclones!



What you'll need

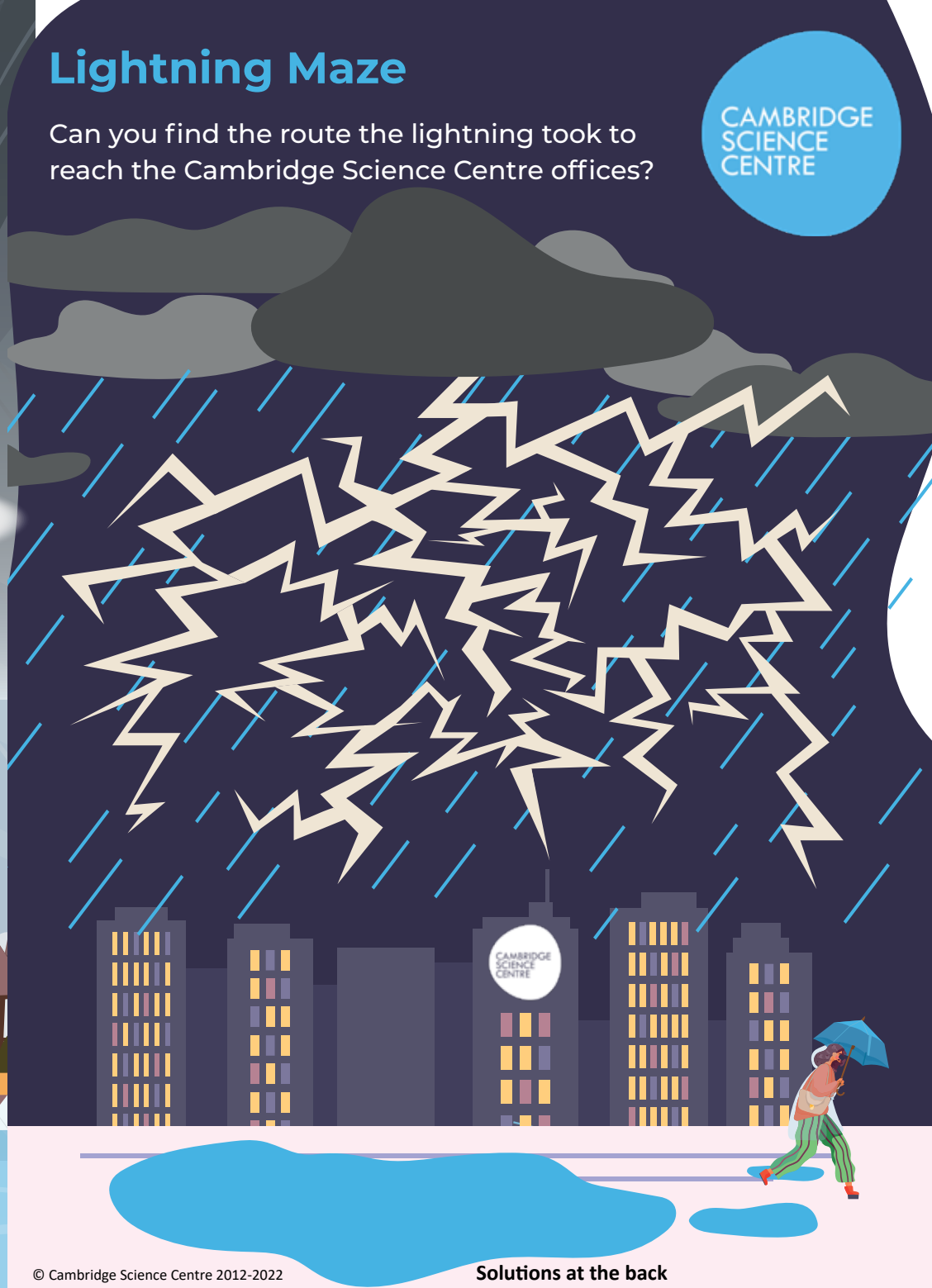
- Vegetable Oil
- Blue and Red paint
- Hairdryer
- A rectangular container
- A cup
- Cold water
- A spoon
- Paper
- A Pen
- Adult supervision

What to do

1. Write East and West on opposite ends of your paper and place the container in the middle.
2. Pour water into the container until it is about 3/4 full.
3. Mix some blue paint into the water. This is your cold ocean water.
4. In your cup, mix some oil with some red paint. This is your 'warm ocean water'.
5. Gently pour the hot ocean water onto the cold ocean water. You should find that it floats.
6. With adult supervision, use the hairdryer to blow across the container East to West. This is the normal trade wind.
7. Turn off the hairdryer and watch what happens to the hot water in El Niño when the trade winds stop.

Lightning Maze

Can you find the route the lightning took to reach the Cambridge Science Centre offices?



Solutions at the back

Wild Weather!

The world record for the largest hailstone is 20.3cm. That's nearly as wide as this magazine from top to bottom - you wouldn't want that falling on you!

If tornadoes weren't scary enough for you, try a fire tornado! These are formed when a whirl of wind meets a wildfire.

In dry landscapes, strong winds can whip up sand and other particles. These sandstorms can completely cover whole cities!

Glory clouds are rare and form low in the atomsphere. They look like rolling bands and can reach up to 1000km.

Ever heard the saying 'It's raining cats and dogs'? Well, in Texas on the 30th December 2021 it rained fish! A type of tornado called a waterspout formed over water. The waterspout pulled up some water and some fish got dragged along too. It then rained over the city Texarkana and the fish came back down!

Tornado In A Jar

Make something that looks like a tornado inside a jam jar!

What you'll need

- A large jar
- Hand sanitiser
- Water
- (Optional) glitter

What to do

1. Fill the jar about 3cm from the top with water.
2. Add one pump or squeeze of hand sanitiser.
3. (Optional) Add a sprinkle of glitter. This will be the debris.
4. Shake the jar to mix it all up.
5. Hold the top and bottom of the jar and spin it in a circle, keeping it level with the floor. You should see a vortex forming.

A tornado is a violently spinning column of air that stretches from a thunderstorm to the ground. Tornados start with a really powerful thunderstorm - but not all thunderstorms turn into tornados! In a tornado, rising air starts to spin. This makes what scientists call a vortex that then reaches down to touch the ground! The fastest tornado wind speed measured is 486kmph. A tornado with wind speeds of more than 480kmph can rip concrete pavements up from the street as easily as we'd pull the peel off an orange. Yikes!

What Weather Words

Fill in the letters to build up all the weather words.

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Start with

1	2	3	4
R	A	I	N

21	13	6	2	1
C	L	E	A	R

11	14	8	4	9	6	1	7	11	19	1	12

7	13	6	6	11

21	13	19	8	9	7

7	4	19	10	18	2	13	13

18	1	19	7	11

10	3	4	9

16	13	3	17	17	2	1	9

14	6	2	11

What Weather Words

Continued...

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11	6	12	5	6	1	2	11	8	1	6

14	2	3	13

14	8	12	3	9	3	11	15

2	11	12	19	7	5	14	6	1	6

18	19	20

9	6	10

11	19	1	4	2	9	19

1	2	3	4	16	19	10

Why should you avoid tornado chasers? Because they're always passing wind!

Solutions at the back

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Fog In A Jar

Fog is when you get a cloud at ground level. Fog can completely cover a landscape, making it an eerie white. Discover how fog and clouds are formed with this activity.

What to do

1. Take the lid off the jar and, with help from an adult, pour boiling water into the jar so it's about third full.
2. Hold the lid upside down and fill it with ice to make it cold.
3. Pump one small spray of hairspray into the jar. This is like the particles of dust or pollen in the air.
4. Place the upside down lid on the jar with the ice still on top and watch it fill with fog!

What you'll need

- A large jar
- Ice
- Boiling water
- Hairspray
- Adult supervision

What is happening?

Fog and clouds are just big clumps of water droplets. In this activity, the cold air from the ice cubes collides with the warm, moist air in the jar causing the water to condense on the particles of hairspray, forming an eerie fog. In our atmosphere, water vapour condenses on particles when the vapour hits cold air.

Fog can make it really hard to see, but mix fog with air pollution and you get something even worse - smog.
In 1952, London experienced a great smog. It lasted for 4 days and people couldnt see anything more than 1m in front of them!

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*

14	6	2	11
H	E	A	T

10	3	4	9
W	I	N	D

11	14	8	4	9	6	1	7	11	19	1	12
T	H	U	N	D	E	R	S	T	O	R	M

11	6	12	5	6	1	2	11	8	1	6
T	E	M	P	E	R	A	T	U	R	E

1	2	3	4	16	19	10
R	A	I	N	B	O	W

7	13	6	6	11
S	L	E	E	T

14	2	3	13
H	A	I	L

14	8	12	3	9	3	11	15
H	U	M	I	D	I	T	Y

7	4	19	10	18	2	13	13
S	N	O	W	F	A	L	L

2	11	12	19	7	5	14	6	1	6
A	T	M	O	S	P	H	E	R	E

21	13	19	8	9	7
C	L	O	U	D	S

18	19	20
F	O	G

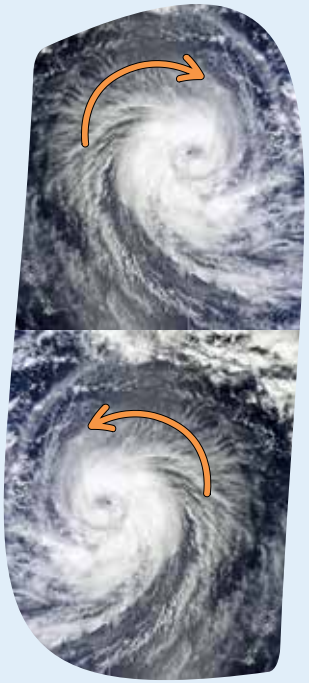
9	6	10
D	E	W

11	19	1	4	2	9	19
T	O	R	N	A	D	O

16	13	3	17	17	2	1	9
B	L	I	Z	Z	A	R	D

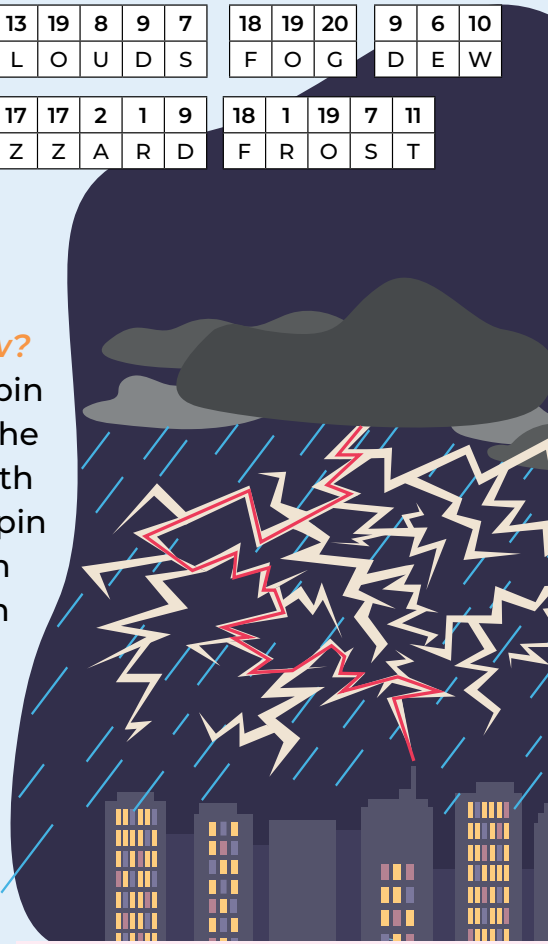
18	1	19	7	11
F	R	O	S	T

What falls but never hits the ground?
The temperature



Did you know?

Hurricanes spin because of the way the earth spins. They spin clockwise in the southern hemisphere and anti - clockwise in the northern. Wild!



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

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