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Opening extract from

How the Weather Works

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Where does rain come from?

Even though we can't see it, air contains water in the form of invisible water vapour. As air rises, it cools, which turns the water vapour into tiny droplets. These stick to particles of dust and other droplets, growing bigger to make clouds. When the drops become heavy enough, they fall as rain, which runs into oceans, rivers and lakes. The sun shines on the water, warming it so that some turns back into vapour, which travels upwards to start the cycle again. Phew!

Wind

Condensation
Water vapour cools and turns into droplets, which clump together and make clouds.

Evaporation
Water is heated by the sun and turns into vapour.

Precipitation
Droplets fall back to earth. Precipitation is the name for all water that falls from the sky.

Infiltration
Water soaks slowly into the ground.

Run-off
Water runs over the land and collects in lakes, rivers and oceans.

Groundwater
Once the water has soaked into the earth, it becomes groundwater.

The water cycle

The earth has only a certain amount of water, which keeps moving between the ocean, the air and the land.

Pull

What happens if it is sunny and rainy at the same time? Pull the tab to find out!

Types of rainfall

To make clouds and rain, something needs to force air to rise and cool. So what makes this happen?

Frontal rainfall



When warm air meets cold air, the warm air is pushed above the cold air. As it rises, vapour in the air turns to droplets.

Pull

Convectional rainfall

When the sun heats the ground, the air directly above warms up, then rises. As the air cools, water vapour turns into droplets, clouds form and it rains.



Relief rainfall



Pull

When moving air reaches a large obstacle, such as a hill or a mountain, it is forced to rise over the top. This cools the air down, causing rain.

Too much, too little

Different places on earth have different amounts of rain throughout the year. Some countries have too much and others have too little, leading to very difficult conditions.

Floods



Flooding happens if a river rises and overflows its banks after days of heavy rain or melting snow. In cities, concrete and tarmac make flooding worse because the water can't be absorbed by the ground.

Droughts





Droughts happen when there is less rain than expected for several months or even longer. Some plants and animals have amazing techniques to cope with these dry conditions. The darkling beetle, for example, collects dew on its body to drink.

What is lightning?

In a thunderstorm, water and ice particles rub against each other inside the clouds, creating an electric charge that zaps down to earth as lightning. Lightning heats up the air, causing it to expand and collapse rapidly, which produces a rumble of thunder.



Experiment

Place a small, empty jar upright in a large bowl. Pour 3 centimetres of water into the bowl. Cover the bowl with cling film so it is airtight and put a pebble on top, above the jar. Place the bowl in a sunny spot for a few days. What happens?

Rain, hail or snow?

Did you know that water can be a gas, a liquid or a solid? When it falls from the sky, it can take many forms, depending on how cold it is in the clouds and above the ground. You might end up with soaking rain, lumps of hail or powdery snowflakes.

Sleet

Sleet is a mixture of snow and rain.

The story of a raindrop

Every minute of the day, about 100 million tonnes of rain fall on the earth!

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The earth has only a certain amount of water, which keeps moving between the ocean...

A rainbow!

As sunlight passes through millions of water droplets, it is bent and split into different colours to form a rainbow.

...tail to find out!

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Rain

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1



My story has no beginning and no end, and it's been repeating itself for the billions of years I've existed.

Let's start with the ocean. Sometimes I like to drift around in there for thousands of years at a time. When I want to travel, I just sunbathe on the ocean's surface on a bright, breezy afternoon. There I get heated by the sun and turned into vapour.



I rise up into the sky, then glide along with the wind. When I get cold, I turn into liquid or ice and float away in the clouds with millions of other droplets. Usually I spend about ten days in the air.

When I get too heavy to stay in the clouds, I fall back to earth – and I always end up somewhere new!

2



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...you are a meteorologist and you've been keeping a record of the weather for a month. Which was the wettest month?