Scottish Water
Always serving Scotland

Water, pure water

First level

Description of module

The module consists of activities designed to develop children's understanding of the way water vapour can condense from the air. This is the basis for later work on the water cycle.

Main experiences and outcomes

Expressive arts
I enjoy creating, choosing and accepting roles, using movement, expression and voice.
EXA 1-12a

Health and wellbeing
I am aware of the need to respect personal space and boundaries and can recognise and respond appropriately to verbal and non-verbal communication.
HWB 1-45b

Literacy and English
When I engage with others, I know when and how to listen, when to talk, how much to say, when to ask questions and how to respond with respect.
LIT 1-02a

Sciences
By investigating how water can change from one form to another, I can relate my findings to everyday experiences.
SCN 1-05a

Social studies
By using a range of instruments, I can measure and record the weather and can discuss how weather affects my life.
SOC 1-12a

Technologies
During practical activities and design challenges, I can estimate and measure using appropriate instruments and units.
TCH 1-13a

SWEDWPW 1 08/13

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Activity

Learning intention
- Pupils gain an understanding of the processes of evaporation and condensation

Success criterion
- Pupils can explain in detail how these processes work in their own terms

Suggestions for teachers

1 Collecting condensation

On a cold day, let the children breathe onto the windows of the classroom (assuming an outside window) and notice what happens. Let each child mop up the water with a tissue and take it back to their seat. Discuss what has happened: water that was inside each child is now on their piece of tissue. This is one reason why we need to drink water – to put back the fluid we breathe out.

2 Where has the water gone?

Carry out the activity as shown on resource sheet 1 and discuss the answers the children give. At this stage, they may only have a very hazy idea of where the water has gone. Through the week, there will probably be a time when the sealed jar has drops of condensation. This can be related back to what happened when they breathed on the windows.

3 Puddles

Draw round puddles in the playground with chalk and notice what happens during the day. Ideally this would be after a night of rain and on a following sunny day. Alternatively, carry out the experiment on resource sheet 2.

Photographs are a good way of recording this.

Being in the playground might well mean that chalk is rubbed off. Perhaps cone off an area of the playground. If the puddle is left a whole day, the children could end up with a series of concentric rings showing the puddle shrinking.

At this stage, the children might come up with a variety of explanations about where the water has gone (soaked into the ground, birds drank it, it just got smaller, children splashed in it etc.), but hopefully they are beginning to understand that it can go into the air. Here, there might be an opportunity to mention clouds and how they are formed.

4 Collecting rain water

Children could also collect rain water in containers in the playground then take them inside, leave on window sill, and measure the water levels dropping as it evaporates.

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Activity
continued

5 Boiling a pan

(Be brave!) Set a pan of water on a ring to continue boiling for as long as possible – until the water vapour is swirling round the ceiling. Make sure you warn other staff, especially the janitor, about this, and you'll probably need a risk assessment. After the experiment, the children will be in no doubt that water can evaporate, form clouds and condense on cold surfaces. You could measure the amount of water in the pan to begin with, and also afterwards, when it cools down.

Please note: this must be a teacher-led demonstration only.

6 Boiling a kettle

A poorer version of the above is to boil a kettle and let the water vapour condense onto a cold dinner plate held over the spout. Or boil the kettle near a window so pupils can see the steam and watch the condensation forming on the window. The analogy with water evaporating from seas, lakes, rivers and damp earth could be drawn. Refer again to cloud formation.

Please note: this must be a teacher-led demonstration only.

7 Explanation activities

If some sort of physical explanation is needed you could do an activity in any open space. Explain that the water can be a gas, a liquid and a solid. In the air, water is a bit like a gas – it can go about wherever it likes. In liquid water, all the little bits get together, but not very close, and when water freezes the water gets together so tightly that it can't move: it has turned to ice.

Tell the children that you are going to call out instructions:

- to start with, they can run about wherever they like without bumping into each other (water molecules would collide, but they don't have to consider health and safety!)
- when the teacher says 'colder, colder' they have to get slower and slower and begin to gather together
- when the teacher says 'cold' they have to link elbows with one or two other children, but they can still jiggle about a bit
- when the teacher says 'even colder, even colder' again they move closer still, and stop jiggling
- when the teacher says 'freeze' they pack closely together and stop moving
- the process can be reversed – 'warmer, warmer' etc. - and repeated.

Have a break, and make sure the point has been made: the analogy with the behaviour of water in the environment. Move onto the next step, where you explain that one wall is very cold, but not freezing, so this time, when the children run about, they can touch the cold wall, and when they do they can stay there for a time, jiggling, and perhaps attaching to other children who come by.

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Activity
continued

This activity also lends itself to dance or drama, where a teacher or a child could tell the story of a drop of water, whilst the class acts it out. Something like:

"One day, William the water droplet was floating about in the sea. It was a lovely day, and as it got hotter and hotter it made him feel all excited. It made him swim about, getting faster and faster, until finally he went so fast that he shot out of the water and into the air.

He liked it in the air – he could fly about wherever he liked. William flew higher and higher, higher than the birds. Then he noticed that the higher he went, the colder it got. Up where the planes were, it got so cold that he started to move more slowly. He could see lots of his friends up here, and they were going slowly, too, so he linked up with some of them, into bigger and bigger groups until finally they were as big as a drop of rain. And that's what they were – a drop of rain.

They couldn't fly any more, so they started to fall down to earth. They hurtled down towards the earth and ended up with a huge SPLASH in the sea – right back where William had started from.

'Never mind' thought William, 'I like swimming here anyway, and maybe I'll get another chance to fly around again. I wonder where I'll land next time!'"

Creative music-making would enhance the drama. Tinkling raindrops, rainsticks, recorders or whistles with a finger half closing the fipple hole, whooshing sounds of wind and waves, a thunderstorm…

8 Condensation trap

Some children may like survival programmes on TV. A condensation trap could be built to show how pure water can be formed; this technique could save explorers from dying of thirst. The resource sheet 3 diagram shows the process. Children could experiment with different materials, and construct traps in different areas (shady, sunny - which do they think will produce most water?) It is not recommended that the children drink the water, however!
More information about condensation traps can be found on Wikipedia:
http://en.wikipedia.org/wiki/Condensation_trap

9 Where does water go?

Children could gather water in absorbent cotton wool balls before squeezing them to release the water - this replicates clouds and rainfall, then ask them 'where does the water go?'

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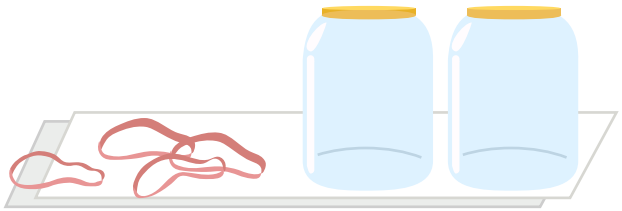
Resource sheet 1

Where does the water go?

Try this experiment to find out where the water goes when a puddle dries up.

You will need:

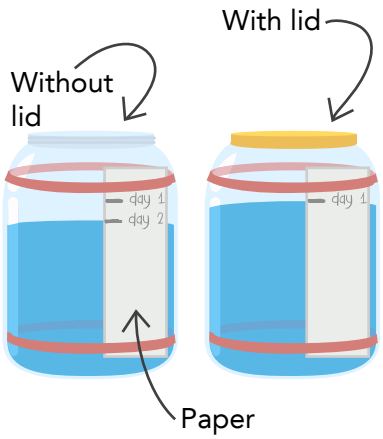
- 2 strips of paper
- 2 jars the same size with lids
- 4 rubber bands



1 Pour 2 cups of water into each jar and screw the lid on to one of the jars.

2 Fasten a strip of paper to each jar and mark the level of the water.

3 Put the jars together on a window sill and leave for 4 days. Mark the level of the water on the paper around the same time every day.



4 Your Results

What happens to the level of the water in the jar without a lid?

What happens to the level of the water in the jar with the lid?

What do you think has happend to the water that is missing from the jar?

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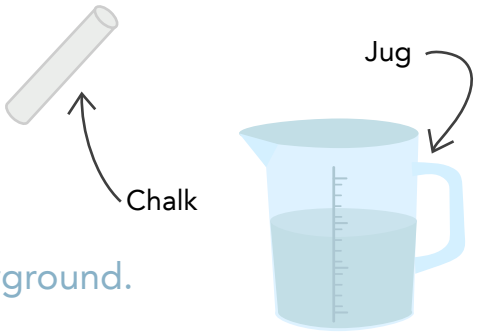
Resource sheet 2

Puddles

You will need:

- A jug
- A piece of chalk



1 Fill the jug with water and take it to the playground.

2 Find a place that will hold water.

3 Pour the water onto the ground. You have made a puddle.

4 Draw around the puddle with the chalk.

5 Look at the puddle after each hour through the day.

6 Your Results

Is the puddle smaller or bigger?

Where has the water gone that is missing from the puddle?

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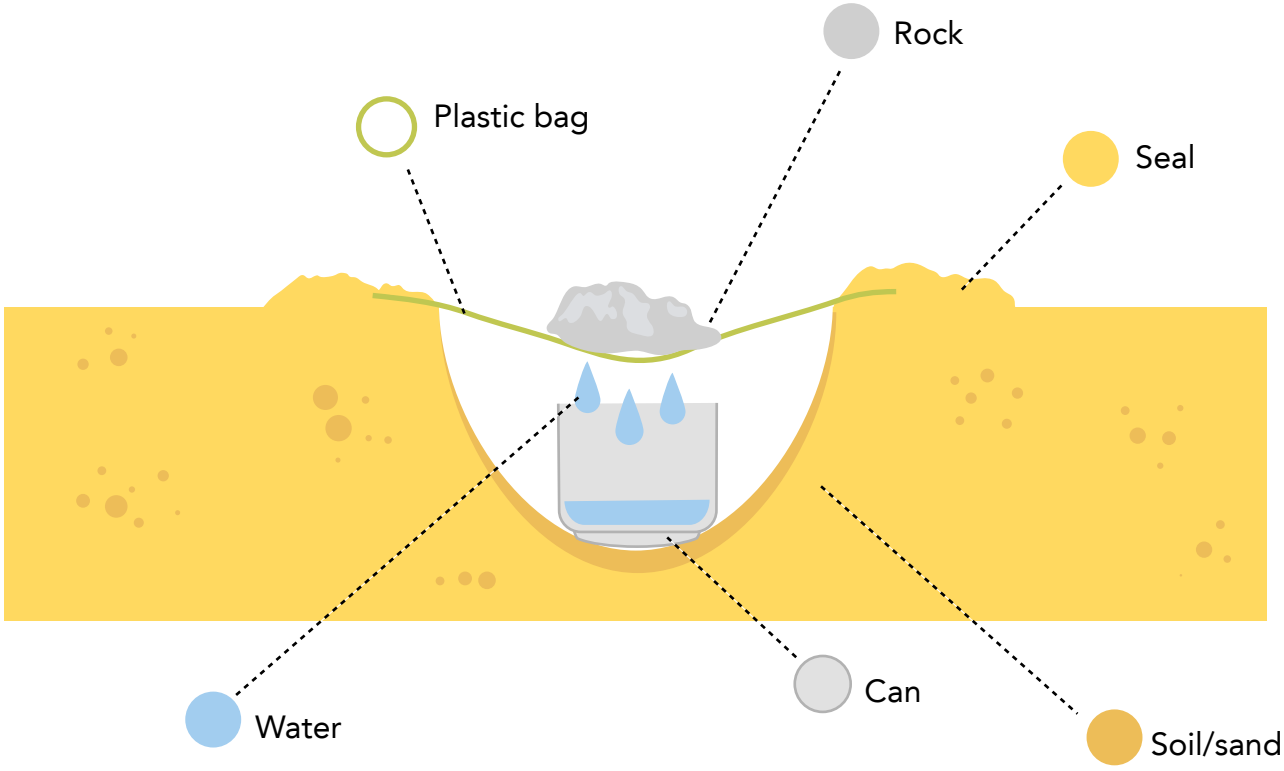
Resource sheet 3

Condensation trap

Water can be formed in a condensation trap.
This diagram shows how a condensation trap could be made.



Answer these questions about your own condensation trap.

1 What was your condensation trap built from?

2 Was your condensation trap built in shady or sunny place?

3 Did it work?

4 Do you think your condensation trap could have worked better? How?