●●○○○ **Level 2 · Science** S2.4

Solids, liquids, gases and the water cycle

Ice, water and steam, and the water that goes round and round.

Find out how solids, liquids and gases differ, what melting and drying really are, and how the same water travels from sea to sky and back.

YOU ARE READY FOR THIS BOOK IF

You can say what happens to butter left in the hot sun.

One step up	S3.5 Particles
This book	**S2.4 Solids, liquids, gases and the water cycle**
One step down	S1.4 What things are made of

Contents

S2.4.1 Solids, liquids and gases

S2.4.2 Air is all around us

S2.4.3 Melting and freezing

S2.4.4 Evaporation and drying

S2.4.5 Condensation

S2.4.6 The water cycle

S2.4.7 Clean water

Key words, A to Z

Written and drawn by attnom. Free to read, print and share.

S2.4.1 CHAPTER 1

Solids, liquids and gases

Why does water change shape, but a stone does not?

YOUR GUESS

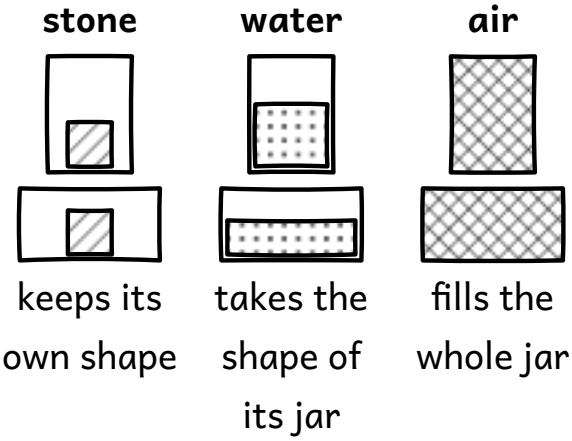
Pick one before you read on. It is fine to be wrong.

- ☐ **A** Water is a soft stone that the cup squashes.
- ☐ **B** Water shrinks to fit the cup.
- ☐ **C** A stone keeps its own shape. Water does not.

BY THE END YOU CAN

- Sort materials into solids, liquids and gases
- Describe how each one keeps or changes its shape

Stones, water and air are all different. See each one in a tall jar and a wide jar.



Each one is in a tall jar and in a wide jar. The water is the same amount in both.

We sort materials into three groups.

A **solid** keeps its own shape. A stone, a spoon and a brick are solids. Put a stone in a cup. It is still the same shape.

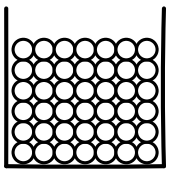
A **liquid** takes the shape of its **container**. A container holds something, such as a cup or a bottle. Pour water from a tall cup into a wide bowl. The shape changes. The amount does not.

A **gas** spreads out to fill any container. Air is a gas. Blow up a balloon. The air spreads to fill all of it.

All materials are made of tiny bits, too small to see. In the picture, the bits are dots.

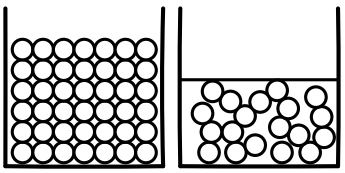
DRAW IT FIRST

Draw the tiny bits in three boxes



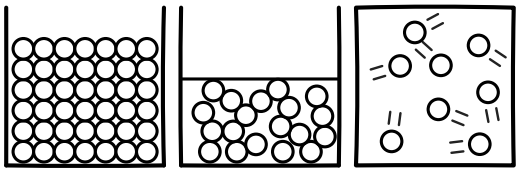
solid

1 Draw a box. Fill it with dots in neat rows, all touching. Write solid.



solid liquid

2 Draw a second box. Fill the bottom with jumbled dots, all touching. Draw a flat top. Write liquid.



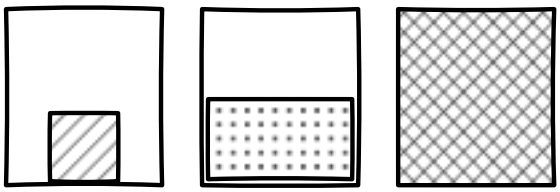
solid liquid gas

3 Draw a third box with a lid. Spread a few dots all through it. Write gas.

In a solid, the bits hold their places. So a solid keeps its shape. In a liquid, the bits slide past each other. In a gas, the bits move about freely.

SEE IT THREE WAYS

As a picture



solid liquid gas

In words

A solid keeps its own shape, and does not spread. A liquid takes the shape of its container. It rests at the bottom. A gas spreads to fill the whole container.

TRY IT

Pour water from cup to bowl

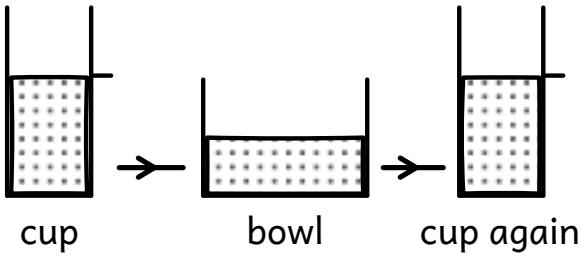
You need: a tall cup, a wide bowl, water, a stone, a rubber band or string.

Be safe: Do not drink the water. Wipe up spills.

1. Half fill the tall cup with water. Put the band at the water level.
2. Pour the water into the wide bowl. Look at its shape.
3. Pour the water back into the tall cup. Where does it reach?
4. Put the stone in the cup, then in the bowl. Does its shape change?

What you will see: In the bowl, the water spreads wide and flat. Back in the cup, it reaches the band again, or nearly. The stone keeps its shape in both.

If you cannot try it, this is what happens.



cup bowl cup again

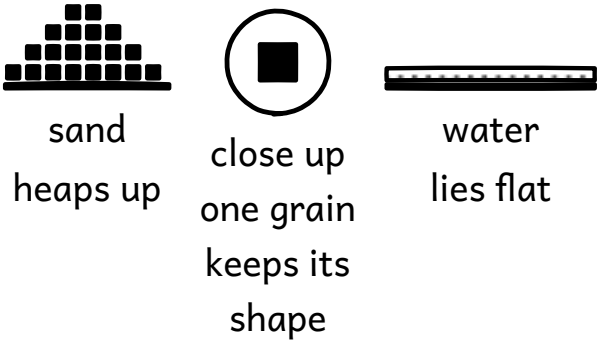
A WRONG IDEA MANY PEOPLE HAVE

~~**Sand pours, so sand is a liquid.**~~

Why it feels right: Sand and salt flow out of a jar, just as water does.

The test that breaks it: Pour a little sand into your hand. Look at a few grains. Pick up one grain. It keeps its shape. Now pour sand onto a plate. It piles up in a heap. Water never piles up like that.

What is true: Sand is a solid. Each grain keeps its own shape. The grains slide past each other, so a heap pours. Salt is the same.



Sand piles up in a heap. Water lies flat.

KEY WORDS

solid
keeps its own shape.

liquid
takes the shape of its container. The amount stays the same.

gas
spreads out to fill any container.

container
a thing that holds something, such as a cup.

BACK TO YOUR GUESS

The answer is C: A stone keeps its own shape. Water does not.

A stone keeps its own shape. Water takes the shape of whatever holds it.

CHECK YOURSELF

Try each one before you look. A wrong answer tells you where to go next.

1. Which of these keeps its own shape?

   A Air

   B A stone

   C Water

   Answer at the back of the book.

2. Mei pours juice from a tall glass into a wide bowl. What stays the same?

   A The shape of the juice

   B Nothing stays the same

   C The amount of juice

   Answer at the back of the book.

3. Kofi says sand is a liquid, because it pours. Is he right?

   A No. Each grain keeps its shape, so sand is a solid.

   B Yes. Anything that pours is a liquid.

   C Sometimes. It is a liquid while it pours.

   Answer at the back of the book.

4. A little gas is let into a closed jar. Where does it go?

   A It sits at the bottom.

   B It stays in a lump where it was let in.

   C It rises to the top and stays there.

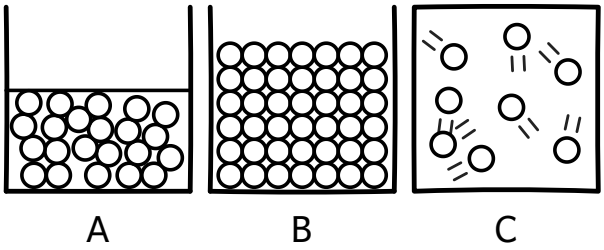
   D It spreads to fill the whole jar.

   Answer at the back of the book.

5. Sort these into solids, liquids and gases. Milk. A spoon. The air in a balloon. A brick. Cooking oil.

   Answer at the back of the book.

6. Look at the three boxes of dots. Which box shows a liquid?



   A Box A

   B Box B

   C Box C

   Answer at the back of the book.

7. Which list has one solid, one liquid and one gas?

   A A stone, sand, air

   B Salt, oil, air

   C Honey, water, air

   Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

A solid keeps its shape. A liquid takes the shape of its container, but the amount stays. A gas spreads to fill any container. Sand pours, but each grain is a solid.

Draw: Draw three boxes. Put neat dots in the first. Make a flat pool of dots in the second. Spread a few dots through the third.

S2.4.2 CHAPTER 2

Air is all around us

Is there anything in an empty cup?

YOUR GUESS

Pick one before you read on. It is fine to be wrong.

- ☐ **A** Yes. An empty cup is full of air.
- ☐ **B** No. An empty cup has nothing in it.
- ☐ **C** Yes. An empty cup has water you cannot see.

BY THE END YOU CAN

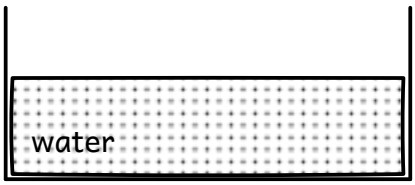
- Show that air takes up space using a cup pushed into water
- Show that moving air can push things, such as a paper windmill

You cannot see ***air***. But you can feel it when a breeze blows on your face. Air is the gas all around us.

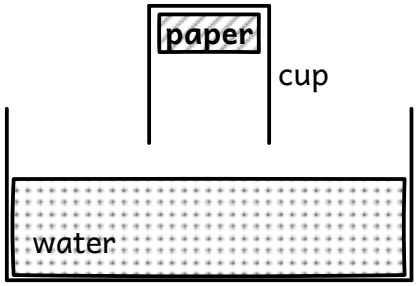
Is an empty cup really empty? Push it into water and see. Turn the cup upside down first.

DRAW IT FIRST

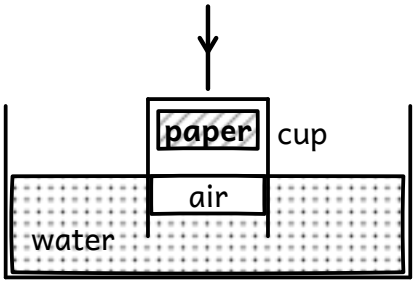
Draw *a* cup pushed into water



1 Draw *a* bowl. Draw the water in it, with dots.



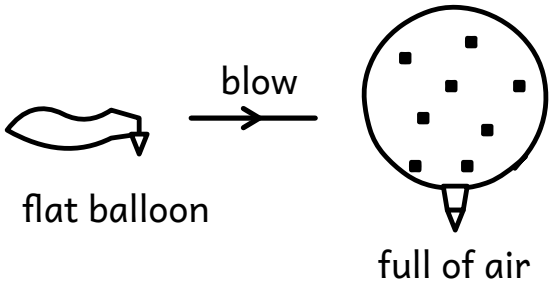
2 Draw *a* cup upside down above the water. Draw *a* ball of paper in the top of it.



3 Push the cup straight down. The air stays in the cup. The water cannot reach the paper.

The cup is not empty. It is full of air. Air takes up **space**. Space is the room that *a* thing takes up. So the water cannot come in. The paper stays dry.

Air is *a* material, like water or *a* stone. It has weight too. A ball full of air is heavier than *a* flat ball.

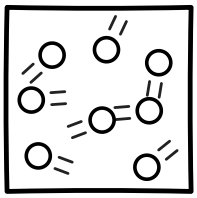


Air takes up room. It makes the balloon big.

Moving air is called **wind**. Moving air pushes things. It pushes a kite, a sail and a leaf. It can also turn a paper windmill.

SEE IT THREE WAYS

As a picture



air in a box

In words

Air is a gas. A gas spreads out to fill all the space it can. A cup that looks empty is full of air.

TRY IT

Make a windmill turn

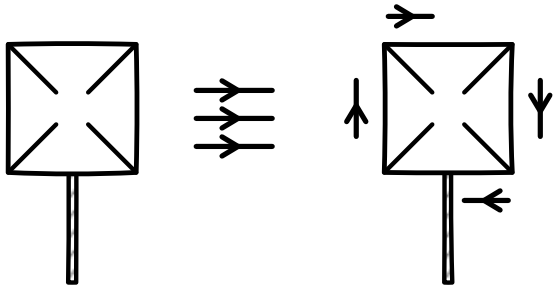
You need: a square of paper, scissors, a pin, a pencil with a rubber on the end.

Be safe: Ask a grown up to help with the pin. Keep it away from your face.

1. Cut a square of paper. Cut from each corner toward the middle. Stop before the middle.
2. Fold every other corner to the middle. Pin them to the rubber on the pencil.
3. Hold the windmill still in still air. Does it turn?
4. Blow on it, or hold it in the wind. What does the air do to it?

What you will see: In still air, the windmill does not turn. Moving air pushes on the paper, and the windmill turns.

If you cannot try it, this is what happens.



still air moving air

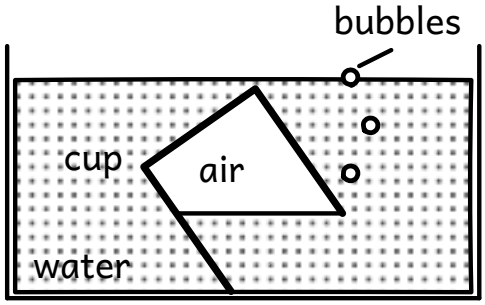
A WRONG IDEA MANY PEOPLE HAVE

~~An empty cup has nothing in it.~~

Why it feels right: You cannot see anything in the cup. It feels light and empty.

The test that breaks it: Push an upside down cup straight down into a bowl of water. Then tip it to one side, under the water. Bubbles rise from the cup. That is the air that was inside.

What is true: An empty cup is full of air. Air is a gas. It takes up space. Water cannot get in until the air goes out.



Tip the cup under water. The air comes out as bubbles.

KEY WORDS

air
the gas all around us.

space
the room that a thing takes up.

wind
air that moves.

BACK TO YOUR GUESS

The answer is A: Yes. An empty cup is full of air.

An empty cup is full of air. Air is a gas. It takes up space.

CHECK YOURSELF

Try each one before you look. A wrong answer tells you where to go next.

1. A cup is pushed upside down into water. A ball of paper inside stays dry. Why?

   A The cup is empty, so nothing is in the way.

   B Paper never gets wet.

   C Air inside the cup keeps the water out.

Answer at the back of the book.

2. Which of these is true about air?

   A Air is nothing at all.

   B Air is a gas that takes up space.

   C Air is a liquid.

   Answer at the back of the book.

3. You blow on a paper windmill. What happens?

   A It turns.

   B It stays still, because air cannot push.

   C It turns, but only in a strong wind.

   Answer at the back of the book.

4. A flat ball and a ball full of air. Which is heavier? Say why.

   Answer at the back of the book.

5. **From an earlier chapter**

   Air goes into a closed jar. Where does it go?

   A It sits at the bottom.

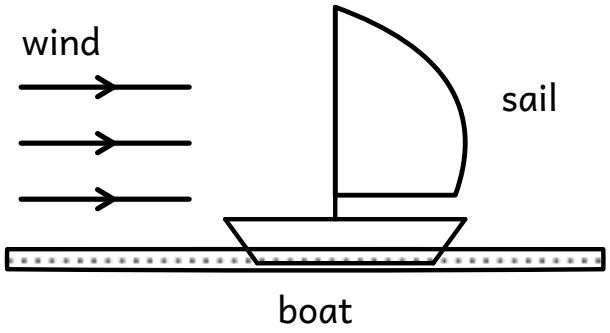
   B It stays in a lump where it went in.

   C It rises to the top and stays there.

   D It spreads to fill the whole jar.

   Answer at the back of the book.

6. The wind blows from the left onto a boat with a sail. Which way does the wind push the boat?



A To the left, back into the wind.

B It does not push. Air is too light.

C To the right, the way the wind blows.

Answer at the back of the book.

7. Leila wants to show that an empty cup holds air. Which test works?

A Look into the cup very hard.

B Pour water in. If water fits, the cup was empty.

C Push it into water the right way up. If water fills it, it held air.

D Push it upside down into water, then tip it.

Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

Air is a gas. It is all around you and takes up space. A cup pushed into water keeps water out because it holds air. Moving air pushes things, like a paper windmill.

Draw: Draw a bowl of water. Push an upside down cup into it. Mark the air in the top of the cup.

S2.4.3 CHAPTER 3

Melting and freezing

Where does my ice go when I leave it in the sun?

YOUR GUESS

Pick one before you read on. It is fine to be wrong.

- ☐ **A** It disappears.
- ☐ **B** It turns into water.
- ☐ **C** It turns into air.

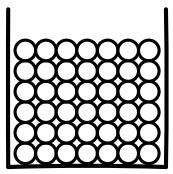
BY THE END YOU CAN

- Explain melting and freezing as changes caused by heating and cooling
- Compare how fast butter melts in sun and shade

Ice is hard. A puddle of water is not. But ice and water are the same material.

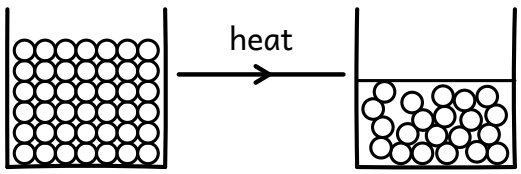
DRAW IT FIRST

Draw ice melting and freezing



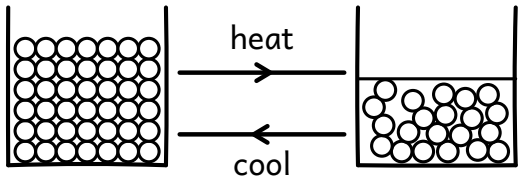
ice

1 Draw a box of dots in neat rows. Write ice.



ice water

2 Draw an arrow to the right, marked heat. Draw a box of loose dots, marked water.



ice water

3 Draw an arrow back to the left. Write cool.

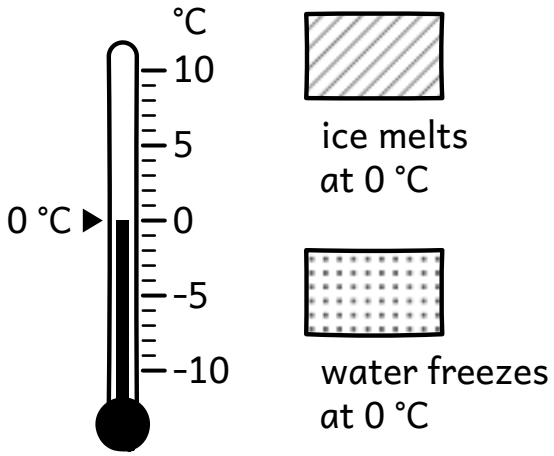
Melting is when a solid turns into a liquid. Heat makes things melt. Ice melts into water. Butter and wax melt too.

Freezing is when a liquid turns into a solid. Cooling makes things freeze. Water freezes into ice. Melted wax freezes back into hard wax.

You can undo both changes. Heat ice and it melts. Cool the water and it freezes again.

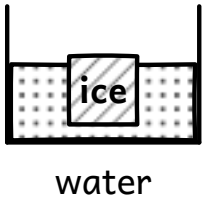
Melting does not change how much water there is. The water weighs the same as the ice did.

Temperature tells how hot or cold something is. We measure it in degrees Celsius, or °C. Pure water freezes at 0 °C. Ice melts at the same temperature.



Ice melts at 0 °C. Water freezes at 0 °C.

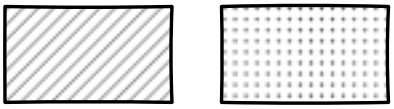
Other materials melt at other temperatures. Butter melts on a warm day. Wax needs more heat. A stone does not melt in the sun.



Ice floats. Most of it is under the water.

SEE IT THREE WAYS

As a picture



ice
below 0 °C

water
above 0 °C

In words

Heat turns ice into water. Cooling turns water into ice. Both changes can be undone.

In symbols

Pure water freezes at 0 °C. Ice melts at 0 °C. Below 0 °C, water becomes ice. Above 0 °C, ice becomes water.

TRY IT

Sun or shade: which melts butter faster?

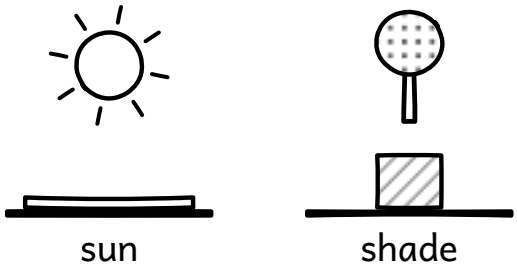
You need: two saucers, butter or a hard cooking fat, a knife, a sunny place, a shady place, a clock or a watch.

Be safe: Do not eat the butter. Do not look at the Sun. A saucer in the sun can get hot.

1. Cut two pieces of butter the same size. Put one on each saucer.
2. Put one saucer in the sun. Put the other in the shade.
3. Look at both every few minutes. Note the time.
4. Which one gets soft and flat first?

What you will see: The piece in the sun melts first. The piece in the shade melts later. In a cool place it may only get soft.

If you cannot try it, this is what happens.



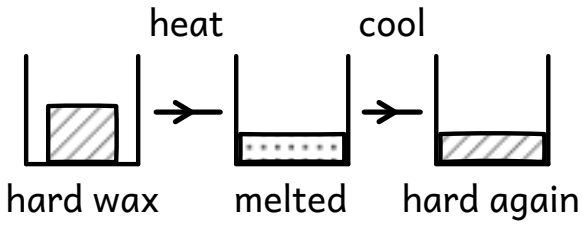
A WRONG IDEA MANY PEOPLE HAVE

~~When a thing melts, it is gone for good.~~

Why it feels right: A puddle does not look like ice any more.

The test that breaks it: A grown up warms a little candle wax in a tin. Stand the tin in a bowl of hot water. The wax melts. The grown up lifts the tin out. Wait. The wax goes hard again. Never touch hot wax or hot water.

What is true: Melting can be undone. Cool the liquid and it freezes again. It is the same material.



Heat melts wax. Cooling makes it hard again.

KEY WORDS

melting
a solid turning into *a* liquid. Heat makes it happen.

freezing
a liquid turning into *a* solid. Cooling makes it happen.

temperature
how hot or cold something is.

BACK TO YOUR GUESS

The answer is B: It turns into water.

The ice melts. It turns into water. Nothing has gone.

CHECK YOURSELF

Try each one before you look. A wrong answer tells you where to go next.

1. What turns ice into water?

   A Heat

   B Cooling

   C Shaking it

Answer at the back of the book.

2. At what temperature does pure water freeze?

   A 100 °C

   B 10 °C

   C −10 °C

   D 0 °C

   Answer at the back of the book.

3. An ice cube is put in a glass of water. What does it do?

   A It sinks to the bottom.

   B It floats with most of the cube above the water.

   C It floats with most of the cube under the water.

   Answer at the back of the book.

4. Ravi puts butter in the sun and butter in the shade. Which melts first, and why?

   A The butter in the shade

   B Both at the same time

   C The butter in the sun. The Sun heats it more.

   Answer at the back of the book.

5. **From an earlier chapter**

   Ice is a solid and water is a liquid. Which keeps its shape in a cup?

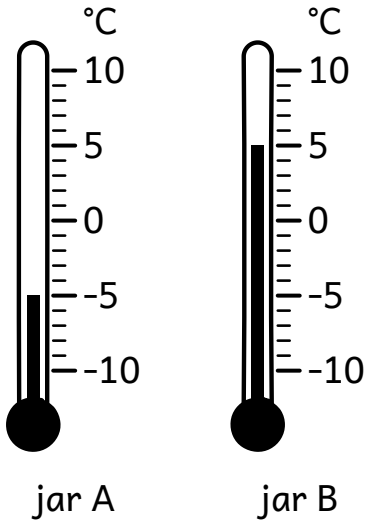
   A Both. Ice is only frozen water.

   B Ice

   C Water

   Answer at the back of the book.

6. Two jars of pure water stand outside all night. Each thermometer shows the air by its jar. In which jar will the water freeze?



A Jar A

B Jar B

C Both jars

D Neither jar

Answer at the back of the book.

7. A grown up warms wax until it melts. Then it cools and goes hard again. What does this show?

A Melting is a change that cannot be undone.

B The wax has turned into a new material.

C Melting can be undone by cooling.

Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

Heat makes a solid melt into a liquid. Cooling makes a liquid freeze into a solid. Pure water freezes and ice melts at 0 °C. Ice floats. Butter melts faster in the sun than in the shade.

Draw: Draw a box of ice and a box of water. Draw an arrow marked heat. Draw an arrow back marked cool.

S2.4.4 CHAPTER 4

Evaporation and drying

Where does the water go when a wet cloth dries?

YOUR GUESS

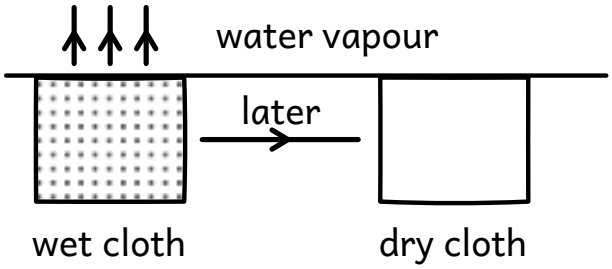
Pick one before you read on. It is fine to be wrong.

- ☐ **A** The water is gone for good.
- ☐ **B** The water goes into the cloth and stays there.
- ☐ **C** The water goes into the air.

BY THE END YOU CAN

- Explain that water evaporates into the air as a gas
- Test which place dries a wet cloth fastest

Hang a wet cloth in the sun. Later it is dry. Where did the water go?



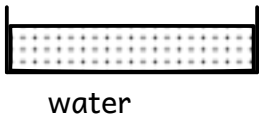
The wet cloth dries. Its water goes up into the air.

The water did not vanish. It went into the air. It turned into a gas. **Water vapour** is water as a gas. **Evaporation** is water turning into water vapour.

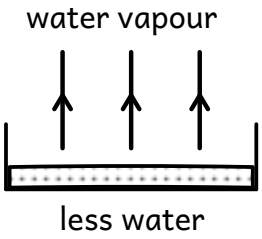
You cannot see water vapour. It mixes with the air.

DRAW IT FIRST

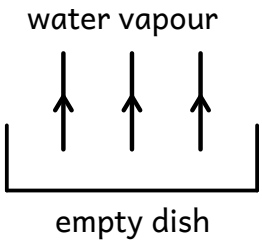
Draw a dish drying out



1 Draw a dish. Fill it with dotted water.



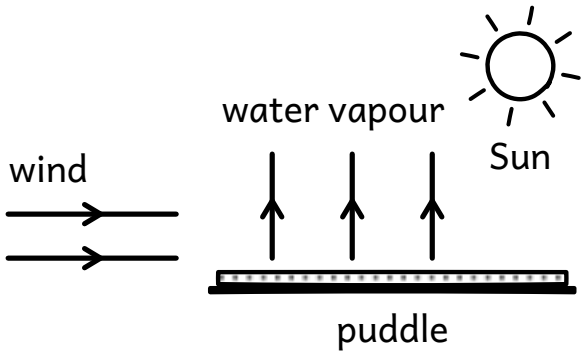
2 Draw less water. Draw arrows going up. Write water vapour.



3 Draw an empty dish. The water is now in the air.

Evaporation goes on all the time, in sun or in shade. It is faster when it is warm. It is faster when wind blows. It is faster when the water is spread out.

Water in a wide dish dries sooner than in a cup. A cold cloth dries too. It just takes longer.



Sun and wind dry a puddle faster. The water goes up as vapour.

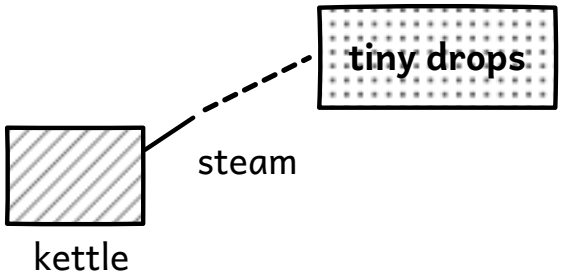
Evaporation is not **boiling**. Boiling is when water bubbles hard all the way through. Pure water boils at 100 °C at sea level. High up a mountain, it boils at a lower temperature.



Boiling is hot and bubbly. Evaporation is quiet, at the top.

Boiling water makes steam. Steam is water vapour. You cannot see it. The white cloud over a kettle is not steam. It is tiny drops of water. A later chapter shows how they form.

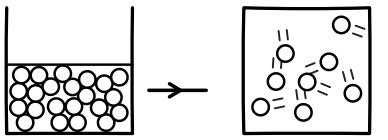
Be safe. Keep well back from a kettle. Never touch steam or hot water.



Steam is the clear part. The white cloud is tiny drops of water.

SEE IT THREE WAYS

As a picture



In words

Water at the top of a puddle slowly turns into water vapour. Water vapour is a gas. It goes into the air.

In symbols

Evaporation: at any temperature. Boiling: pure water at sea level, 100 °C.

TRY IT

Which place dries a cloth fastest?

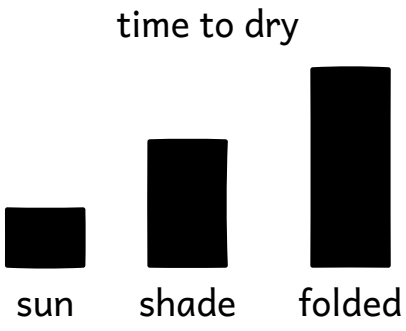
You need: three small cloths the same size, a bowl of water, a sunny place, a shady place, a clock or a watch.

Be safe: Do not look at the Sun. Do not drink the water.

1. Wet all three cloths in the bowl. Wring each one the same.
2. Spread one cloth flat in the sun. Spread one flat in the shade.
3. Fold the third cloth into a heap. Put it in the shade.
4. Touch each cloth every ten minutes. Which one is dry first?

What you will see: The cloth in the sun dries first. The spread cloth in the shade dries next. The folded cloth dries last.

If you cannot try it, this is what happens.



A WRONG IDEA MANY PEOPLE HAVE

~~When a wet cloth dries, the water is gone for good.~~

Why it feels right: The cloth is dry. You cannot see the water any more.

The test that breaks it: Put a wet cloth in a clear plastic bag. Close it tight. Leave it in the sun for an hour. Look inside the bag. Tiny drops of water cover the inside of the bag. Keep bags away from small children.

What is true: The water went into the air as water vapour. The bag held it in, so some turned back into drops.

KEY WORDS

evaporation
water turning into water vapour.

water vapour
water as a gas. You cannot see it.

boiling
water bubbling hard all the way through. It happens only when water is very hot.

BACK TO YOUR GUESS

The answer is C: The water goes into the air.

The water goes into the air as a gas. Water does not vanish.

CHECK YOURSELF

Try each one before you look. A wrong answer tells you where to go next.

1. A wet cloth dries in the sun. Where does the water go?

    A It vanishes.

    B It goes into the air as water vapour.

    C It goes back into the cloth.

    Answer at the back of the book.

2. Which cloth dries fastest?

    A Spread out in the warm sun

    B Folded in the cool shade

    C Sealed in a plastic bag in the sun

    Answer at the back of the book.

3. Is evaporation the same as boiling?

    A Yes. They are the same.

    B No. Evaporation only happens in the sun.

    C No. Water evaporates even when it is not hot.

    Answer at the back of the book.

4. What is the white cloud above a kettle?

    A Steam

    B Smoke

    C Hot air

    D Tiny drops of water

    Answer at the back of the book.

5. **From an earlier chapter**

   A puddle of ice sits in the morning sun. Later it is a dry patch. What happened, in order?

   A Melting, then evaporation

   B Freezing, then evaporation

   C Evaporation, then melting

   Answer at the back of the book.

6. You want wet washing to dry fast. Give two things you can do.

   Answer at the back of the book.

7. Kofi seals a wet cloth in a clear bag. He leaves it in the sun. Drops form inside the bag. Where do they come from?

   A The bag made its own water.

   B Water left the cloth as vapour and became drops.

   C The water came through the bag from outside.

   Answer at the back of the book.

8. Mei tests where a wet cloth dries fastest. What must be the same for every cloth?

   A The place where it dries

   B The time it takes to dry

   C Nothing. Each cloth can be different.

   D The size of each cloth and how wet it is

   Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

Water evaporates into the air as a gas called water vapour. It does not vanish. It happens at any temperature. It is faster when warm, windy or spread out. Boiling is different. Steam cannot be seen.

Draw: Draw a dish with a little water. Draw three arrows going up from it. Write water vapour above them.

S2.4.5 CHAPTER 5

Condensation

Why is the outside of a cold cup wet?

YOUR GUESS

Pick one before you read on. It is fine to be wrong.

- ☐ **A** The water comes through the cup.
- ☐ **B** The water comes from the air.
- ☐ **C** The cup makes its own water.

BY THE END YOU CAN

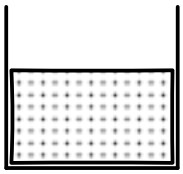
- Explain why drops form on a cold cup or a pot lid
- Explain where the dew on grass comes from

A cup of cold water stands in a warm room. Soon the outside of the cup is wet. Where does the water come from?

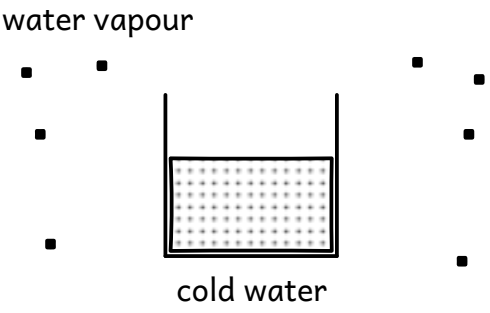
The air holds **water vapour**. Water vapour is water as a gas. You cannot see it. Evaporation put it there.

DRAW IT FIRST

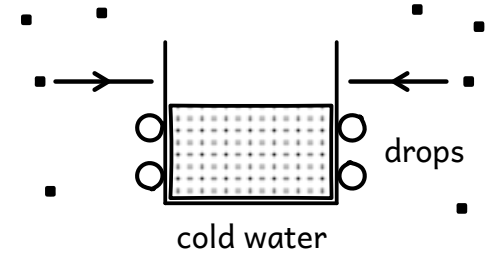
Draw why *a* cold cup gets wet



1 Draw *a* cup of cold water. Write cold water.



2 Draw dots in the *a*ir for water vapour. Write water vapour.



3 Draw arrows from the dots to the cup. Draw drops on the outside. Write drops.

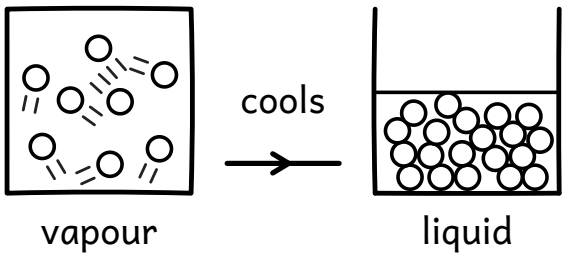
Water vapour in the *a*ir touches the cold cup. The vapour cools. It turns back into liquid water.

Condensation is water vapour turning back into liquid. It happens when the vapour touches something cold.

The drops form on the outside of the cup. That is where the *a*ir touches the cold cup.

SEE IT THREE WAYS

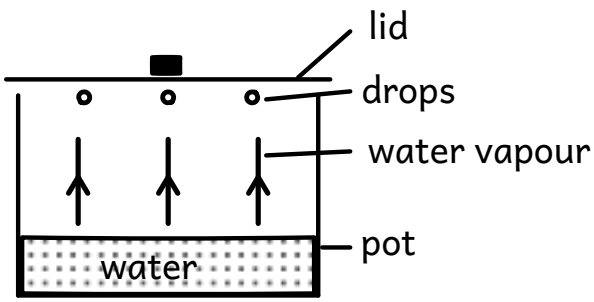
As a picture



In words

Water vapour touches something cold. It cools. It turns into drops of liquid water.

A pot lid does the same. A grown up boils water in a pot. Hot water vapour rises and touches the cooler lid. It turns into drops. The drops run down the lid.

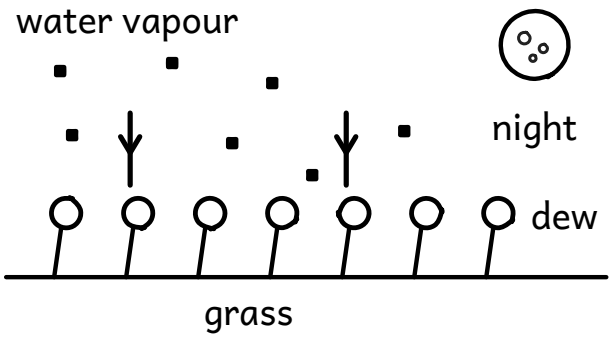


Water vapour touches the cooler lid. It turns into drops.

Be safe. Only a grown up lifts the lid of a hot pot. Steam burns. Never touch hot water, steam or a flame.

Grass gets cool at night. Water vapour in the air touches the cool grass. It turns into tiny drops. These drops are **dew**. Most dew forms on clear, still nights.

Dew is not rain. It does not fall from the sky. It forms right on the grass. It forms on leaves and stones too.



Dew forms on cool grass at night.

Later the Sun warms the grass. The dew evaporates into the air again.

TRY IT

Where do the drops come from?

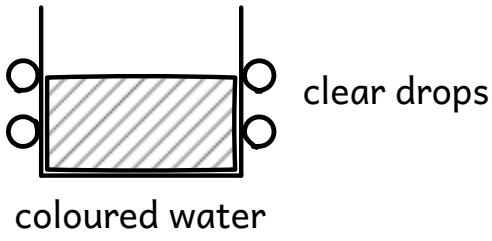
You need: *a* cup, metal if you have one, the coldest water you can get, with ice if you have it, *a* little ink or paint to colour the water, *a* plate, *a* white cloth, *a* warm room.

Be safe: Never drink or taste the water in this activity. Ink and paint are not safe.

1. Fill the cup with the coldest water you can get. Water from *a* clay pot or *a* deep well is good.
2. Stir the ink or paint into the cold water.
3. Wipe the outside of the cup dry. Stand it on the plate.
4. Wait ten minutes. Look at the outside of the cup.
5. Touch *a* drop with the white cloth. Is it coloured?

What you will see: The outside of the cup gets wet with drops. The drops are clear, not coloured. The coloured water did not come through the cup. The drops came from the air. If no drops form, the water is not cold enough. Try on *a* damp day, or add ice if you can.

If you cannot try it, this is what happens.



A WRONG IDEA MANY PEOPLE HAVE

~~The water on a cold cup comes through the cup.~~

Why it feels right: The cup holds water. So the drops on the outside must have leaked out.

The test that breaks it: If you have a fridge, cool a dry, empty cup in it. Bring it into a warm room. Its outside still gets wet. Or fill a cup with cold coloured water. The drops on the outside are clear. Water that came through the cup would be coloured.

What is true: The drops come from the air. Water vapour touches the cold cup and turns into liquid.

KEY WORDS

water vapour
water as a gas. You cannot see it.

condensation
water vapour turning back into liquid on something cold.

dew
tiny drops of water on cool grass and leaves at night.

BACK TO YOUR GUESS

The answer is B: The water comes from the air.

The water comes from the air. Water vapour in the air touches the cold cup. It turns into drops.

CHECK YOURSELF

Try each one before you look. A wrong answer tells you where to go next.

1. Where do the drops on a cold cup come from?

   A From the air

   B Through the cup

   C The cold makes new water

   Answer at the back of the book.

2. What is condensation?

   A Liquid water turning into water vapour

   B Liquid water turning into ice

   C Water vapour turning into liquid drops

   Answer at the back of the book.

3. Amina sees dew on the grass in the morning. Where did it come from?

   A It always means rain fell in the night.

   B The cold night air turned into water.

   C The ground gives off drops of water at night.

   D Water vapour in the air cooled on the grass.

   Answer at the back of the book.

4. A grown up boils a pot of water with a lid on. Drops form under the lid. Why?

   A The lid makes new water.

   B Hot vapour touches the cooler lid and turns into drops.

   C The water in the pot freezes on the lid.

   Answer at the back of the book.

5. **From an earlier chapter**

   Wet washing hangs in the wind. Where does its water go as it dries?

   A It vanishes for ever.

   B It goes into the ground.

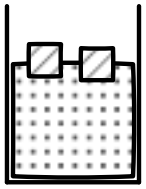
   C Into the air, as water vapour

   Answer at the back of the book.

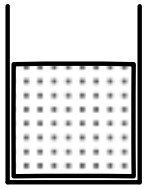
6. Draw a cold cup with drops on the outside. Add arrows to show where the water comes from.

   Answer at the back of the book.

7. Two glasses stand in the same warm room. One holds cold water. One holds warm water. Which glass gets wet drops on the outside?



cold water



warm water

   A The glass of warm water

   B Both glasses

   C Neither glass

   D The glass of cold water

   Answer at the back of the book.

8. Mei puts a dry, empty cup in a fridge. Later she takes it into a warm room. Drops form on the outside. What does this show?

   A The water comes from the air in the room.

   B The cup sweats its own water.

   C The water came through the cup from the fridge.

   Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

Water vapour in the air touches something cold. It cools and turns into drops. This is condensation. It makes drops on a cold cup and dew on grass. The drops come from the air.

Draw: A cold cup. Dots in the air. Arrows to the cup. Drops outside.

S2.4.6 CHAPTER 6

The water cycle

Where does rain come from, and where does it go?

YOUR GUESS

Pick one before you read on. It is fine to be wrong.

- ☐ **A** Rain is new water, made in the clouds.
- ☐ **B** Rain falls once and is lost for ever.
- ☐ **C** The same water goes round and round, again and again.

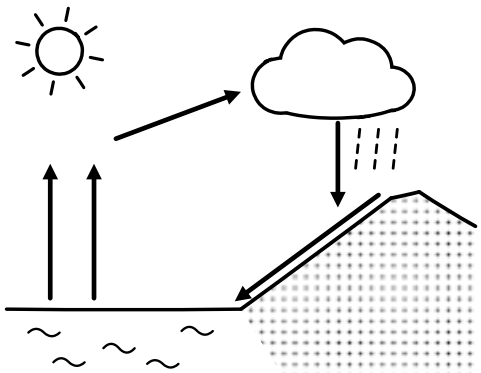
BY THE END YOU CAN

- Draw the water cycle with evaporation, condensation, rain and flow
- Explain how the same water is used again and again

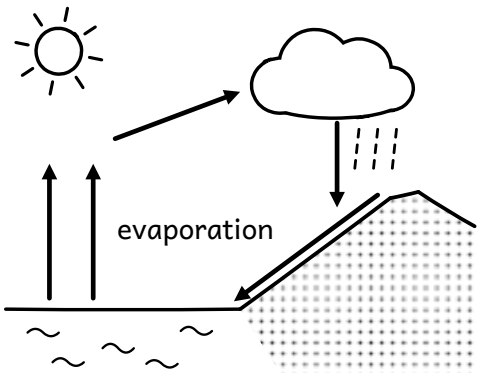
Rain falls on a hill. A river carries it to the sea. The sea does not run out. Where does the water go next?

DRAW IT FIRST

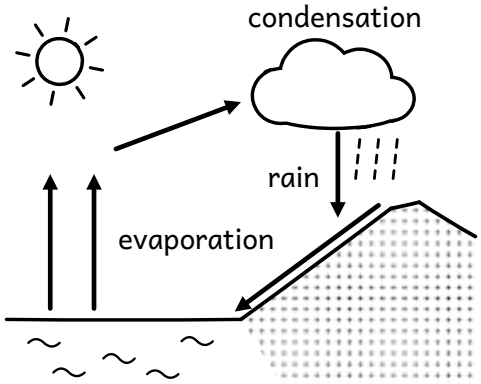
Draw the water cycle



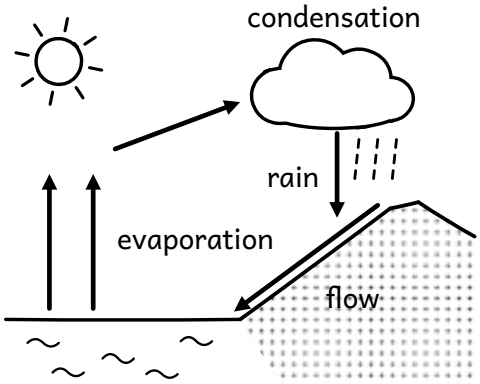
1 Draw the sea, a hill, the Sun and a cloud. Add the arrows and the rain.



2 Write evaporation by the arrows that go up from the sea.



3 Write condensation above the cloud. Write rain by the falling rain.

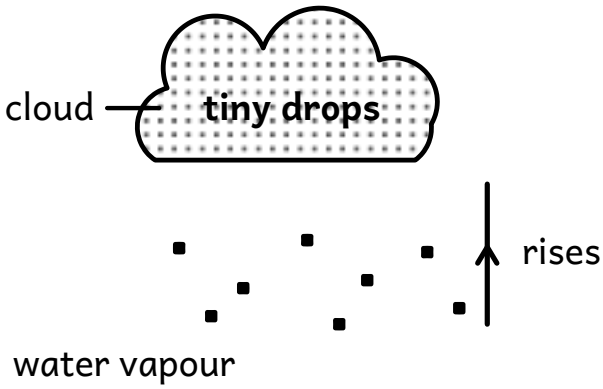


4 Write flow by the arrow that runs down to the sea.

The Sun warms the sea, the rivers and the wet ground. Warm water turns into water vapour and rises. This is **evaporation**. The Sun's heat drives it.

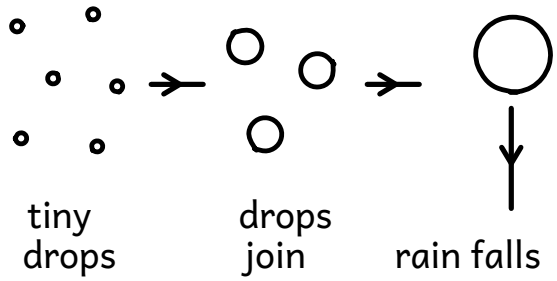
High in the sky the air is cold. The vapour cools and turns into tiny drops. This is **condensation**.

Very many tiny drops make a **cloud**. A cloud is not water vapour. You cannot see vapour. A cloud is tiny drops of water, or tiny bits of ice.



Vapour is clear. A cloud is tiny drops you can see.

The drops in a cloud join and grow. They get too heavy to float. They fall as rain. Where it is very cold, they fall as snow.



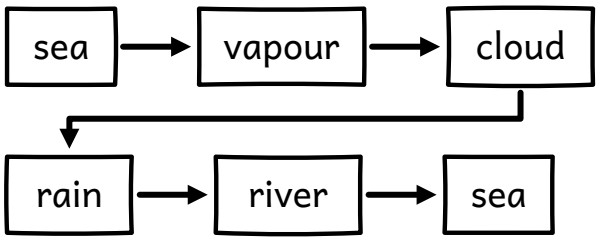
Tiny drops join and grow. Then they fall as rain.

Rain soaks into the ground or runs over it. It flows into streams and rivers. The rivers flow down to the sea. Then the Sun warms the sea again.

The whole round trip is the **water cycle**. It has no start and no end. You can start at any step.

SEE IT THREE WAYS

As a picture



In words

Water goes from the sea into the air as vapour. It makes a cloud. It falls as rain. A river flows back to the sea.

The water on Earth is used again and again. A drop in a puddle may once have been in the sea. It may have been in a cloud, or a river. The same water goes round and round.

TRY IT

Make a small water cycle

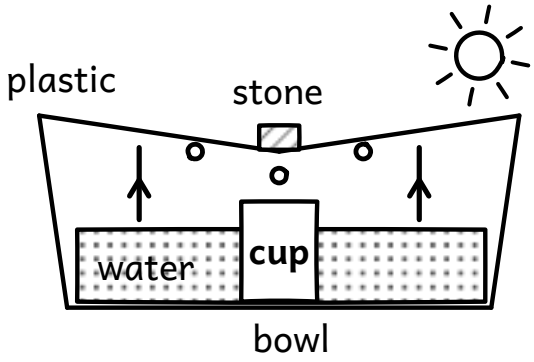
You need: a wide bowl, a small cup that is shorter than the bowl, water, clear plastic, such as a bag cut open, string, a small clean stone, a sunny place.

Be safe: Never drink or taste the water from the bowl or the cup.

1. Pour water into the bowl, about two fingers deep.
2. Stand the empty cup in the middle. Keep the water out of it.
3. Cover the bowl with the plastic. Tie it tight with string.
4. Put the stone on the plastic, over the cup.
5. Leave the bowl in the sun for a few hours.
6. Look at the plastic. Look in the cup.

What you will see: Drops form under the plastic. They run down to the stone and drip into the cup. The Sun warmed the water, and it evaporated. The vapour cooled on the plastic and turned back into drops. This is a small water cycle.

If you cannot try it, this is what happens.



A WRONG IDEA MANY PEOPLE HAVE

~~When a puddle dries up, its water is gone for ever.~~

Why it feels right: You cannot see where it went. The ground is dry.

The test that breaks it: Use the bowl in the sun. You pour no water into the cup. Hours later, it holds water. That water came from the bowl. It went up as vapour and came down as drops.

What is true: The water goes into the air as vapour. It comes back later as cloud and rain. It goes round the water cycle.

KEY WORDS

evaporation
water turning into water vapour.

condensation
water vapour turning back into drops.

cloud
tiny drops of water, or bits of ice, high in the air.

water cycle
the way water goes from the sea to the sky and back.

BACK TO YOUR GUESS

The answer is C: The same water goes round and round, again and again.

The Sun lifts water into the air. It cools, falls as rain and flows back. The same water goes round and round.

CHECK YOURSELF

Try each one before you look. A wrong answer tells you where to go next.

1. What does the Sun's heat do in the water cycle?

   A It makes water evaporate and rise.

   B It makes new water.

   C It pushes the rain down.

   Answer at the back of the book.

2. What is a cloud made of?

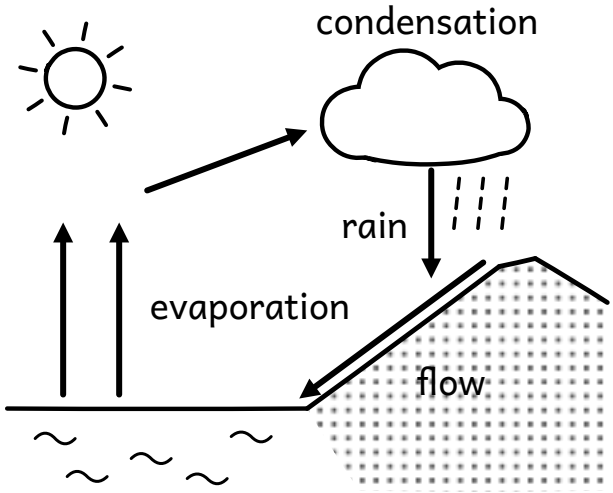
   A Water vapour

   B Tiny drops of water, or bits of ice

   C Smoke

   Answer at the back of the book.

3. Look at the picture. Where does the water cycle start?



   A At the sea

   B In the cloud

   C On the hill, where the rain falls

   D It has no start.

   Answer at the back of the book.

4. Rain falls on a hill and runs into a river. Where does the water go next?

   A It is lost for ever.

   B Back up to the cloud at once.

   C To the sea

   Answer at the back of the book.

5. **From an earlier chapter**

   Snow lies on a hill. The Sun warms it. What happens to the snow?

   A It freezes harder.

   B It melts into liquid water.

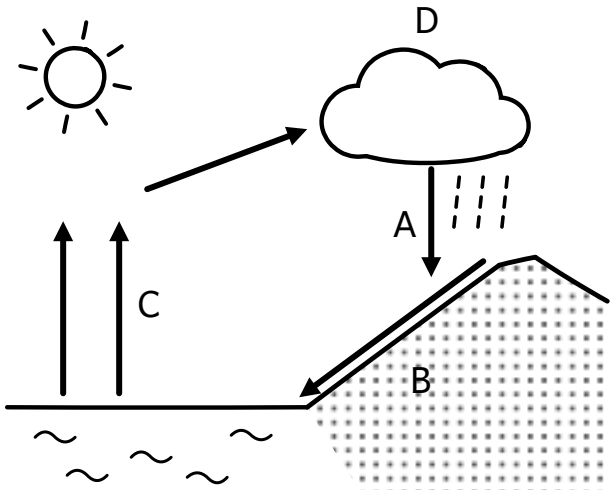
   C It stays as snow when it is warm.

   Answer at the back of the book.

6. Draw the water cycle. Show evaporation, condensation, rain and flow.

   Answer at the back of the book.

7. Look at the picture. Which letter shows condensation, where vapour cools into tiny drops?



A Letter A

B Letter B

C Letter C

D Letter D

Answer at the back of the book.

8. Kofi says today's rain is new water, made in the clouds. Is he right?

A No. It is water that has gone round and round.

B Yes. Clouds make new water.

C No. Rain is used up, so there is less water each year.

Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

The Sun's heat makes water evaporate. The vapour cools into drops. They make clouds. Rain falls and rivers flow to the sea. The same water goes round and round.

Draw: Sea, Sun, cloud and arrows going round. Write the four steps.

S2.4.7 CHAPTER 7

Clean water

If water looks clear, is it safe to drink?

YOUR GUESS

Pick one before you read on. It is fine to be wrong.

- ☐ **A** Yes. If I can see through it, it is safe.
- ☐ **B** Yes, if it has been through a cloth.
- ☐ **C** Yes, if it tastes fresh.
- ☐ **D** No. Clear water can still hold germs.

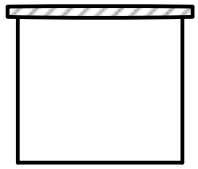
BY THE END YOU CAN

- Separate sand from water with a cloth filter
- Explain why salt that dissolves passes through a filter
- Explain why filtered water still needs boiling before drinking

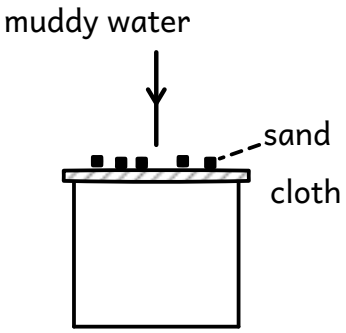
Mei has a jar of muddy water. She wants to clean it. Can a cloth do the job?

DRAW IT FIRST

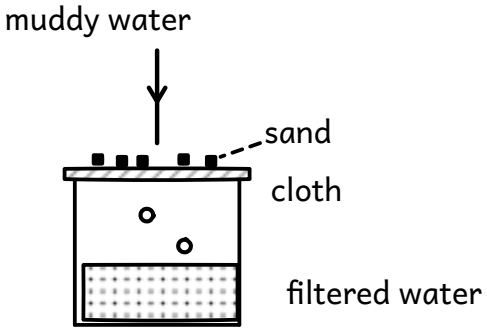
Draw *a* cloth filter



1 Draw *a* cup. Tie *a* cloth over its top. Write cloth.



2 Pour muddy water on the cloth. The sand stays on top. Write muddy water and sand.



3 Water drips into the cup. Write filtered water.

Muddy water has bits in it. The bits are sand and soil. You can see them. They do not **dissolve**. To dissolve is to mix into water. The pieces get too small to see.

Salt and sugar dissolve. Sand does not.

A **filter** has tiny holes. Water goes through the holes. Bigger bits stay behind. A cloth is *a* filter.

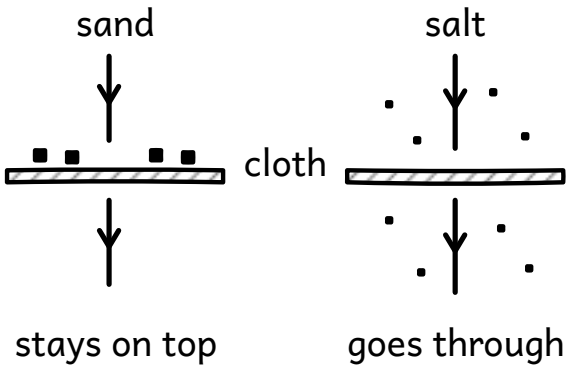
The holes in the cloth are too small for sand. They are big enough for water. So the sand stays on the cloth.

Now stir salt into water. The salt seems to vanish. It has dissolved. It broke into pieces too small to see. They are mixed all through the water.

Pour the salty water through a cloth. The salt goes through with the water. Its pieces are far smaller than the holes. Sugar does the same.

SEE IT THREE WAYS

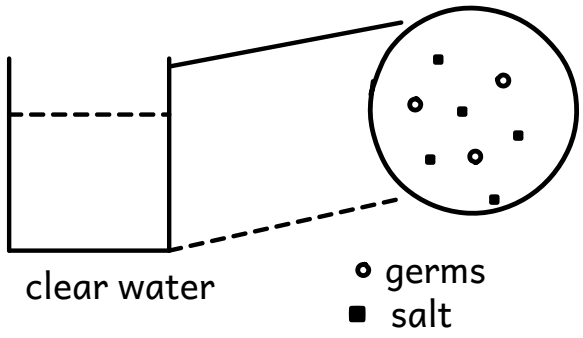
As a picture



In words

Sand is bits you can see. The cloth holds them back. Salt dissolves into pieces too small to see. They go through the cloth with the water.

Water can hold **germs** too. Germs are living things so small that you cannot see them. Some germs make people ill. They are small enough to go through a cloth. So clear water can still have germs in it.



Clear water can hold germs and salt. You cannot see them.

Be safe. A grown up must boil water before anyone drinks it. It must bubble hard for one minute. Above 2 000 m up a mountain, boil it for three minutes. Then it must cool. Boiling kills germs. It does not take out salt. Never touch hot water, steam or a flame.

TRY IT

Filter sand, then test salt

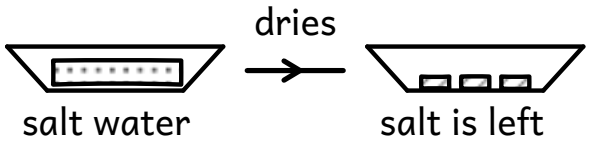
You need: two cups, a clean cloth and string, a spoon of sand, a spoon of salt, water, a saucer, a sunny place.

Be safe: Never drink or taste the water in this activity.

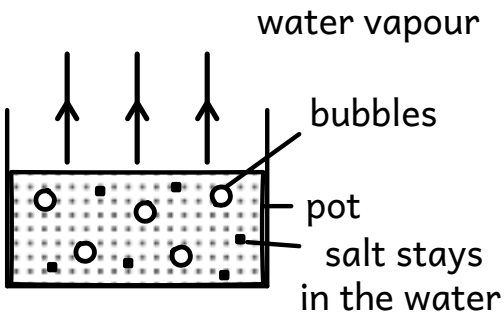
1. Stir a spoon of sand into a cup of water.
2. Tie a clean cloth over the mouth of the second cup.
3. Pour the sandy water slowly onto the cloth.
4. Look at the cloth. Look at the water in the cup.
5. Wash both cups and the cloth. Stir a spoon of salt into a cup of clean water. Wait until the salt is out of sight.
6. Tie the cloth over the other cup. Pour the salty water through it.
7. Pour a little of it onto a saucer. Put the saucer in the sun.
8. When the saucer is dry, look at it.

What you will see: The cloth holds back the sand. The water in the cup has no sand. The salty water goes through the cloth too. When the saucer dries, a white crust is left. It is salt. The salt went through the cloth with the water. Only the water rose into the air.

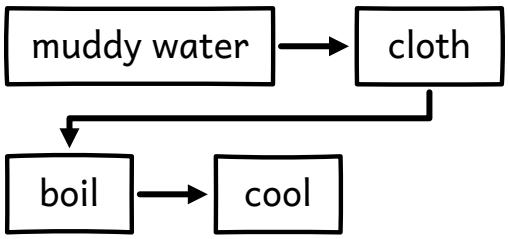
If you cannot try it, this is what happens.



Only the water rises. The salt stays behind. So rain is not salty, even when it came from the sea.



Boiling kills germs. The water rises, and the salt stays.



A cloth takes out sand. A grown up boils the water. Then it cools.

A WRONG IDEA MANY PEOPLE HAVE

~~**If water is clear, it is safe to drink.**~~

Why it feels right: Dirty water looks muddy. So water that looks clear must be clean.

The test that breaks it: Stir salt into water until it looks clear. Pour it through a cloth. It stays clear. Dry a little in a saucer in the sun. White salt is left. Clear water can hold things you cannot see. Do not taste it.

What is true: Clear water can hold salt, sugar and germs. A cloth does not take them out. A grown up must boil water before anyone drinks it.

KEY WORDS

filter
something with tiny holes. Water goes through. Bigger bits stay behind.

dissolve
to mix into water in pieces too small to see.

germs

living things too small to see. Some make people ill.

BACK TO YOUR GUESS

The answer is D: No. Clear water can still hold germs.

Clear water is not always safe. A cloth holds back sand and mud. It does not stop germs. A grown up must boil water before anyone drinks it.

CHECK YOURSELF

Try each one before you look. A wrong answer tells you where to go next.

1. Which of these does a cloth filter hold back?

   A Sand

   B Salt that has dissolved

   C Germs

   Answer at the back of the book.

2. Ravi pours salty water through a cloth. Is the salt still in the water?

   A No. The cloth keeps the salt.

   B No. The salt turned into water.

   C Yes. Dissolved salt goes through the cloth.

   Answer at the back of the book.

3. Tariq filters muddy water through a cloth. It looks clear. What must a grown up do before anyone drinks it?

   A Nothing. Clear water is safe.

   B Pour it through the cloth again.

   C Leave it to stand for a day.

   D Boil it hard, then let it cool.

   Answer at the back of the book.

4. Salty water goes through a cloth. A grown up then boils it. Is the salt gone?

   A Yes. Boiling takes out the salt.

   B No. Boiling kills germs but leaves the salt.

   C Yes. The cloth already took the salt out.

   Answer at the back of the book.

5. **From an earlier chapter**

   Sand, water and steam. Which one is a liquid?

   A Water

   B Sand

   C Steam

   Answer at the back of the book.

6. Draw a cloth filter. Show where the sand stays and where the water goes.

   Answer at the back of the book.

7. Water from a stream is clear and cold. Can you tell by looking if it is safe?

   A Yes. Clear water is safe.

   B No. Germs are too small to see.

   C Yes, if it tastes fresh.

   Answer at the back of the book.

8. Ravi stirs sugar into water until it vanishes. Where is the sugar?

   A It turned into water.

   B It is gone. Nothing is left.

   C It is in the water, in pieces too small to see.

   Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

A cloth filter holds back sand and mud. Salt and sugar dissolve, so they go through. A cloth does not stop germs. Clear water is not always safe. A grown up must boil water before anyone drinks it.

Draw: A cup with a cloth on top. Sand on the cloth. Drops in the cup.

Key words, A to Z

Every key word in this book, what it means, and the chapter that teaches it.

air
the gas all around us. S2.4.2

boiling
water bubbling hard all the way through. It happens only when water is very hot. S2.4.4

cloud
tiny drops of water, or bits of ice, high in the air. S2.4.6

condensation
water vapour turning back into liquid on something cold. S2.4.5, S2.4.6

container
a thing that holds something, such as a cup. S2.4.1

dew
tiny drops of water on cool grass and leaves at night. S2.4.5

dissolve
to mix into water in pieces too small to see. S2.4.7

evaporation
water turning into water vapour. S2.4.4, S2.4.6

filter
something with tiny holes. Water goes through. Bigger bits stay behind. S2.4.7

freezing
a liquid turning into a solid. Cooling makes it happen. S2.4.3

gas
spreads out to fill any container. S2.4.1

germs
living things too small to see. Some make people ill. S2.4.7

liquid
takes the shape of its container. The amount stays the same. S2.4.1

melting
a solid turning into a liquid. Heat makes it happen. S2.4.3

solid

keeps its own shape. S2.4.1

space
the room that a thing takes up. S2.4.2

temperature
how hot or cold something is. S2.4.3

water cycle
the way water goes from the sea to the sky and back. S2.4.6

water vapour
water as a gas. You cannot see it. S2.4.4, S2.4.5

wind
air that moves. S2.4.2

Answers

S2.4.1. Solids, liquids and gases

1. **A stone**

   A stone is a solid. A solid keeps its shape in a cup or a bowl.

   - **If you chose A:** Air spreads to fill any container. It is a gas.
   - **If you chose C:** Water takes the shape of its container. It is a liquid.

2. **The amount of juice**

   The juice takes a new shape in the bowl. No juice is added or lost, so the amount is the same.

   - **If you chose A:** A liquid takes the shape of its container. The shape changes.
   - **If you chose B:** No juice was added or lost. The amount stays the same.

3. **No. Each grain keeps its shape, so sand is a solid.**

   Look at one grain. It keeps its shape. The grains slide past each other, so a heap of sand pours.

   - **If you chose B:** Sand and salt pour, but each grain keeps its shape. They are solids.
   - **If you chose C:** Sand does not change. It is a solid when it pours and in a heap.

4. **It spreads to fill the whole jar.**

   A gas spreads out to fill any container. It reaches the top and the bottom.

   - **If you chose A:** A liquid rests at the bottom. A gas spreads to fill the whole jar.
   - **If you chose B:** A gas does not stay in one lump. It spreads out in every direction.
   - **If you chose C:** A gas spreads in every direction, not only up. It fills the whole jar.

5. **Solids: spoon, brick. Liquids: milk, cooking oil. Gas: the air in a balloon.**

   A spoon and a brick keep their shape. Milk and oil take the shape of their container. Air spreads to fill the balloon.

6. **Box A**

   In a liquid the dots touch but slide past each other. They fill the bottom, under a flat top.

   - **If you chose B:** The dots in box B sit in neat rows. They hold their places. That is a solid.
   - **If you chose C:** The dots in box C are far apart, all through the box. That is a gas.

7. **Salt, oil, air**

   Salt is a solid. Oil is a liquid. Air is a gas. Salt pours, but each grain keeps its shape.

   - **If you chose A:** Sand pours, but each grain keeps its shape. Sand is a solid, so this list has two solids.
   - **If you chose C:** Honey is thick, but it takes the shape of its jar. It is a liquid. This list has no solid.

S2.4.2. Air is all around us

1. **Air inside the cup keeps the water out.**

   Air is a gas, and it takes up space. The water cannot fill the place where the air is.

   - **If you chose A:** The cup is not empty. It holds air, and air takes up space.
   - **If you chose B:** Paper gets wet in water. Here the air keeps the water away from it.

2. **Air is a gas that takes up space.**

   Air spreads to fill any container, so it is a gas. It takes up space too.

   - **If you chose A:** Air is a material. It takes up space and has weight.
   - **If you chose C:** A liquid takes the shape of its container. It rests at the bottom. Air is a gas. Go to S2.4.1.

3. **It turns.**

   Moving air pushes on the paper, so the windmill turns.

   - **If you chose B:** Moving air can push. It pushes a sail, a kite and a windmill.
   - **If you chose C:** Even a gentle puff of moving air pushes the paper. A strong wind pushes harder.

4. **The ball full of air. Air has weight.**

   Air is a material, so it has weight. The extra air makes the full ball a little heavier.

5. **It spreads to fill the whole jar.**

   Air is a gas. A gas spreads out to fill any container.

   - **If you chose A:** A liquid rests at the bottom. A gas spreads to fill the whole jar. Go to S2.4.1.
   - **If you chose B:** A gas does not stay in one lump. It spreads out in every direction. Go to S2.4.1.
   - **If you chose C:** A gas spreads in every direction, not only up. It fills the whole jar. Go to S2.4.1.

6. **To the right, the way the wind blows.**

   Moving air pushes on the sail. It pushes the boat the way the wind goes.

   - **If you chose A:** Moving air pushes things the way it moves. The wind blows to the right.
   - **If you chose B:** Air is light, but moving air still pushes. A sail catches the push.

7. **Push it upside down into water, then tip it.**

   Bubbles of air rise from the tipped cup. That is the air that was in it.

   - **If you chose A:** You cannot see air. A good test shows what air does.
   - **If you chose B:** Water pushes the air out as it goes in. The air was there first.
   - **If you chose C:** Water fills an open cup either way. That does not show the air. Push it in upside down, then tip it.

S2.4.3. Melting and freezing

1. **Heat**

   Heat makes a solid melt into a liquid. Ice melts into water.

   - **If you chose B:** Cooling makes water freeze into ice. Heat makes ice melt.
   - **If you chose C:** Shaking does not change ice. It melts when it is heated.

2. **0 °C**

   Pure water freezes at 0 °C, and ice melts at 0 °C.

   - **If you chose A:** That is very hot. Water freezes when it is cooled to 0 °C.
   - **If you chose B:** At 10 °C, ice melts. Water freezes at 0 °C.
   - **If you chose C:** Pure water freezes at 0 °C. It does not need to get colder.

3. **It floats with most of the cube under the water.**

   Ice floats on water. Most of the cube is under the water. A small part is above it.

   - **If you chose A:** Ice floats on water. Most of it is under the water, but it does not sink.
   - **If you chose B:** Most of an ice cube is under the water. Only a small part sticks up.

4. **The butter in the sun. The Sun heats it more.**

   Heat makes butter melt. The sun heats it more than the shade does. So it melts faster.

   - **If you chose A:** The shade is cooler. The sun gives the butter more heat, so that piece melts first.
   - **If you chose B:** The pieces are the same, but the sun heats one more. That piece melts first.

5. **Ice**

   Ice is a solid. A solid keeps its own shape.

   - **If you chose A:** Ice and water are the same material. But only the ice keeps its shape. Water takes the shape of the cup. Go to S2.4.1.
   - **If you chose C:** Water takes the shape of its cup. It is a liquid. Go to S2.4.1.

6. **Jar A**

   Jar A is below 0 °C. Pure water freezes when it is cooled to 0 °C or below.

   - **If you chose B:** Jar B is above 0 °C. Water does not freeze there.
   - **If you chose C:** Both are cold, but only one is below 0 °C. Water freezes below 0 °C.
   - **If you chose D:** Water freezes anywhere that is cooled to 0 °C or below. It does not need a freezer.

7. **Melting can be undone by cooling.**

   Heat melts wax and cooling sets it. The wax is the same material all the way through.

   - **If you chose A:** Cooling the melted wax made it hard again. Melting can be undone.
   - **If you chose B:** It is the same wax. It melted, and then it froze again.

S2.4.4. Evaporation and drying

1. **It goes into the air as water vapour.**

   Water evaporates. It turns into a gas, water vapour, and mixes with the air.

   - **If you chose A:** Water does not vanish. It goes into the air as water vapour.
   - **If you chose C:** The cloth is dry, so the water has left it. It is in the air.

2. **Spread out in the warm sun**

   Water evaporates faster when it is warm and spread out.

   - **If you chose B:** A folded cloth in the shade dries slowly. Warm and spread out is faster.
   - **If you chose C:** The bag keeps the vapour in, so the cloth stays wet. The water must reach the open air.

3. **No. Water evaporates even when it is not hot.**

   Evaporation happens at any temperature, but slowly when it is cold. Boiling needs water to be very hot.

   - **If you chose A:** Boiling needs a lot of heat. Water also evaporates when it is cool.
   - **If you chose B:** Water evaporates in the shade too. It is just slower.

4. **Tiny drops of water**

   Steam is clear. The white cloud is tiny drops of water.

   - **If you chose A:** Steam is water vapour, and you cannot see it. The cloud is something else.
   - **If you chose B:** There is no fire in the water. The cloud is made of water.
   - **If you chose C:** Air is clear, and you cannot see it. The white cloud is made of water.

5. **Melting, then evaporation**

   Heat melts the ice into water. Then the water evaporates into the air.

   - **If you chose B:** It was already ice. The sun heated it, so it melted first. Go to S2.4.3.
   - **If you chose C:** The ice melts first into water. Then the water evaporates. Go to S2.4.3.

6. **Spread it out. Hang it in the sun and the wind.**

   Water evaporates faster when it is warm, windy and spread out.

7. **Water left the cloth as vapour and became drops.**

   The cloth dried. Its water went into the air in the bag as vapour. Some turned back into drops.

   - **If you chose A:** A bag cannot make water. The water was in the wet cloth.
   - **If you chose C:** The bag is closed plastic. Water does not come through it. The drops came from the cloth.

8. **The size of each cloth and how wet it is**

   In a fair test only the place changes. The cloths are the same size and equally wet.

   - **If you chose A:** The place is the one thing she changes. It is different for each cloth.
   - **If you chose B:** The time is what she measures. It will be different.
   - **If you chose C:** Then she could not tell what made the difference. A fair test changes one thing.

S2.4.5. Condensation

1. **From the air**

   Water vapour in the air touches the cold cup. It cools and turns into drops.

   - **If you chose B:** A dry cold cup with nothing inside still gets wet. And coloured water gives clear drops.
   - **If you chose C:** Cold does not make water. The water was in the air as vapour.

2. **Water vapour turning into liquid drops**

   Condensation is water vapour turning back into liquid. It happens on something cold.

   - **If you chose A:** That is evaporation. Condensation goes the other way. Go to S2.4.4.
   - **If you chose B:** That is freezing. In condensation, a gas becomes a liquid. Go to S2.4.3.

3. **Water vapour in the air cooled on the grass.**

   The grass was cool. Vapour touched it and turned into drops of dew.

   - **If you chose A:** Dew is not rain. It forms on the grass from the air.
   - **If you chose B:** Air does not turn into water. Only the water vapour in the air turns into drops.
   - **If you chose C:** Dew forms from vapour in the air. It does not rise as drops from the ground.

4. **Hot vapour touches the cooler lid and turns into drops.**

   The vapour cools on the lid and turns back into liquid. This is condensation.

   - **If you chose A:** No water is made. The water was in the pot, as vapour.
   - **If you chose C:** The lid is not cold enough to freeze water. The vapour cools into liquid drops. Go to S2.4.3.

5. **Into the air, as water vapour**

   The water evaporates. It turns into water vapour that you cannot see.

   - **If you chose A:** Water does not vanish. It evaporates into the air as vapour. Go to S2.4.4.
   - **If you chose B:** The washing hangs in the air. Its water evaporates into the air. Go to S2.4.4.

6. **A cup with drops on the outside. Arrows point from the air to the cup.**

   The drops come from water vapour in the air. They do not come from inside the cup.

7. **The glass of cold water**

   Vapour in the room touches the cold glass and turns into drops. The warm glass is not cold enough.

   - **If you chose A:** The outside of that glass is not cold. Vapour turns into drops only on something cold.
   - **If you chose B:** Only a cold glass cools the air that touches it. The warm glass stays warm.
   - **If you chose C:** The drops do not come from inside the glass. They come from the air, on a cold glass.

8. **The water comes from the air in the room.**

   Vapour in the room touched the cold cup and turned into drops. The cup held no water.

   - **If you chose B:** The cup was empty and dry. It had no water to sweat.
   - **If you chose C:** The cup was dry when she took it out. The drops came later, from the air.

S2.4.6. The water cycle

1. **It makes water evaporate and rise.**

   The Sun warms the sea and wet ground. Water turns into vapour and rises.

   - **If you chose B:** The Sun does not make water. It moves water into the air.
   - **If you chose C:** Rain falls because the drops get heavy. The Sun's heat lifts the water.

2. **Tiny drops of water, or bits of ice**

   Vapour cools high up and turns into tiny drops. Many drops make a cloud.

   - **If you chose A:** You cannot see water vapour. You can see a cloud. A cloud is drops. Go to S2.4.4.
   - **If you chose C:** Smoke is not water. A cloud is drops of water, or ice.

3. **It has no start.**

   Each step leads to the next. The last leads back to the first. It goes round and round.

   - **If you chose A:** The water in the sea came from rivers and rain. The cycle goes round. You can start anywhere.
   - **If you chose B:** The cloud was made from vapour that rose from the sea. The cycle has no start.
   - **If you chose C:** The rain on the hill came from a cloud. The cloud came from vapour that rose from the sea.

4. **To the sea**

   Rivers flow down to the sea. Then the Sun warms the sea, and the water rises again.

   - **If you chose A:** Water is not lost. It flows to the sea and rises again.
   - **If you chose B:** The water must first evaporate. The Sun's heat drives that. Go to S2.4.4.

5. **It melts into liquid water.**

   Heat melts ice and snow. The water then flows down toward the sea.

   - **If you chose A:** Warmth does not freeze things. Warmth melts ice and snow. Go to S2.4.3.
   - **If you chose C:** Snow is ice. Heat melts it, and the water runs downhill. Go to S2.4.3.

6. **The sea, the Sun, a cloud and a hill. Arrows go up, to the cloud, down as rain and back.**

   Water goes up and makes clouds. It falls as rain and flows back to the sea.

7. **Letter D**

   Vapour cools high in the sky and turns into tiny drops. The drops make the cloud, at D.

   - **If you chose A:** A is where rain falls from the cloud. Condensation is where the cloud forms.
   - **If you chose B:** B is the water flowing down the hill to the sea. Condensation is in the sky.
   - **If you chose C:** C is where water rises from the sea as vapour. That is evaporation. Go to S2.4.4.

8. **No. It is water that has gone round and round.**

   The same water goes round the water cycle again and again. It is not made new or used up.

   - **If you chose B:** Clouds do not make water. They hold water that rose from the sea and the land.
   - **If you chose C:** Rain is not used up. It flows to the sea, rises again and falls again.

S2.4.7. Clean water

1. **Sand**

   The holes are too small for sand. They are big enough for water, dissolved salt and germs.

   - **If you chose B:** Dissolved salt is in pieces too small to see. They pass through the cloth.
   - **If you chose C:** Germs are tiny. They go through the holes in a cloth.

2. **Yes. Dissolved salt goes through the cloth.**

   The salt broke into tiny pieces. They go through the holes with the water. A dried saucer shows the salt.

   - **If you chose A:** A cloth holds back only bits you can see. Dissolved salt is too small.
   - **If you chose B:** Dissolved salt is still salt. Dry a little of the water and white salt is left.

3. **Boil it hard, then let it cool.**

   A cloth holds back sand. It does not stop germs. Boiling kills germs.

   - **If you chose A:** Clear water can hold germs. A cloth does not take them out.
   - **If you chose B:** A cloth cannot stop germs, so a second go does not help. Boiling kills them.
   - **If you chose C:** Standing lets mud sink. The germs stay in the water.

4. **No. Boiling kills germs but leaves the salt.**

   The water becomes vapour. The salt stays behind in the pot.

   - **If you chose A:** Only the water rises as vapour. The salt stays in the pot.
   - **If you chose C:** A cloth cannot take out dissolved salt. It goes through with the water.

5. **Water**

   A liquid takes the shape of its cup. Its amount stays the same. Water is a liquid.

   - **If you chose B:** Sand is made of hard grains. It is a solid. Go to S2.4.1.
   - **If you chose C:** Steam is water vapour. That is water as a gas. Go to S2.4.4.

6. **A cup with a cloth over it. The sand sits on top of the cloth. Water drips through into the cup.**

   The holes in the cloth are too small for sand. They let the water through.

7. **No. Germs are too small to see.**

   You cannot see germs or dissolved salt. A grown up must boil the water before anyone drinks it.

   - **If you chose A:** Clear water can hold germs and salt. You cannot see them.
   - **If you chose C:** Never taste water to test it. You cannot taste or smell most germs.

8. **It is in the water, in pieces too small to see.**

   Sugar dissolves into tiny pieces that mix all through the water. They are still there.

   - **If you chose A:** Dissolved sugar is still sugar. Dry some of the water and the sugar comes back.
   - **If you chose B:** Nothing is lost. The sugar is in the water, in pieces too small to see.

About this book

For learners who can read short sentences. In many schools this fits children of about 8 to 10, and older learners can use it too. Activities use water, ice, a cup, a cloth and the sun. Any heating needs a grown up. A learner can work alone: every exercise has its answer and the reason for it.

Written and drawn by attnom. Edition 1.0, 2026-11-08.

This book is free. You may read it, print it, copy it and share it with anyone.

The newest copy is at https://attnom.com/academy/solids-liquids-gases-and-the-water-cycle.