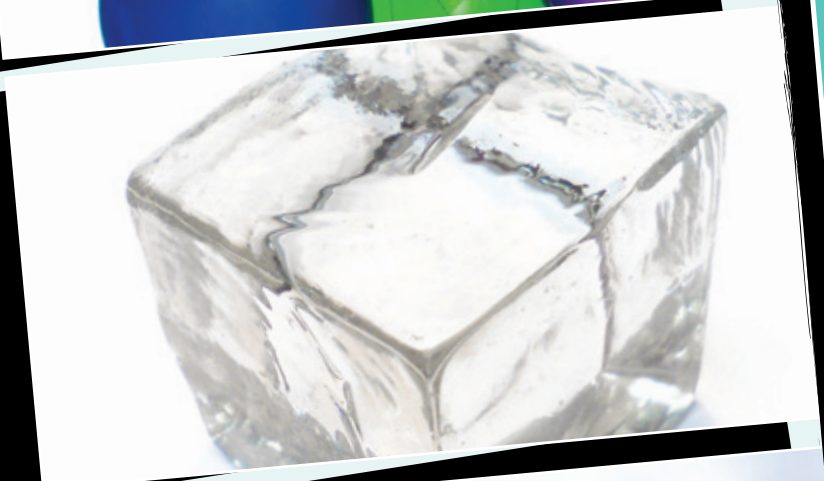
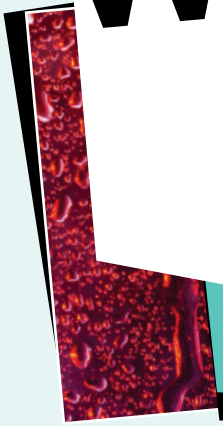




what's the matter?

WORKBOOK

Te Kura
Te Aho o Te Kura Pounamu
THE CORRESPONDENCE SCHOOL

INT205
CURRICULUM LEVEL 2–3

INT205

Contents

SAFETY

Supervisors:

Please ensure that experiments are closely supervised, as many of them involve heating and cooling of materials.

Students:

Always work with an adult.
Read and follow all the instructions carefully.
Do no put any substances in your mouth.
Read the labels on all substances you use for safety warnings and contents.
Take care with any heated materials.
Wear gloves if you are heating materials.
Wear gloves if you are touching substances that are not food.
Keep all the materials used away from your eyes, nose and mouth.
Wash your hands carefully after each experiment.

Introduction

Purpose of the unit

In this unit, you will investigate the three main ways that substances (called matter) exist: solids, liquids and gases.

You are going to carry out a variety of experiments that investigate how solids, liquids and gases can be changed from one state of matter to another when they are heated, cooled or mixed.

Materials you will need

INCLUDED IN THIS PACK:

- 10 balloons
- pipe cleaners
- pack of alum powder.

DEPENDING ON THE EXPERIMENTS YOU CHOOSE, YOU MAY ALSO NEED:

- baking soda
- food colouring
- cornflour, vinegar, salt, sugar, container of cream
- baby or cooking oil
- plasticine or modeling clay
- tinfoil
- variety of kitchen utensils e.g. funnel, glass bowl, saucepan
- scissors, glue and coloured pencils
- scrapbook to record your learning.

How long the unit should take

This unit should take about 4–5 weeks to complete. Allow approximately the following length of time on each section.

PART 1 → 1 WEEK
PART 2 → 1–2 WEEKS
PART 3 → 1 WEEK
PART 4 → 1 WEEK

Please ensure that experiments are closely supervised as many of them involve heating and cooling of materials. Care is also needed with materials that may fizz, explode or expand. Follow all instructions carefully and use only the ingredients specified.

Encourage your student to write down the section and activity when they are recording in their scrapbook.

Learning Outcome

You will observe, describe and compare changes that occur when gases, liquids and solids are heated, or cooled or mixed.

Learning Intentions

PART ONE
I am learning about:
- the characteristics of solids, liquids and gases.

PART TWO
I am learning to:
- carry out experiments
- to observe changes to solids, liquids or gases when they are heated, cooled or mixed
- explain what happens to solids, liquids or gases when they are heated, cooled or mixed.

PART THREE
I am learning to:
- investigate some ways that substances change state and to see if they can be changed back (reversible).

PART FOUR
I am learning to:
- design and carry out an experiment that will show change of state.

PART FIVE
I am learning:
- to write an explanation
- about the deeper features of an explanation.

Supervisor Note
Key discussion questions to think about during this unit

During this unit discuss these questions with your student:
- what is matter?
- what are some ways that matter can be changed from one state to another?
- can matter be changed back to what it was?

Encourage your student to note down their ideas and refer and add to them as they work through the unit.

PART ONE

Learn about solids, liquids and gases.

Learning Intentions

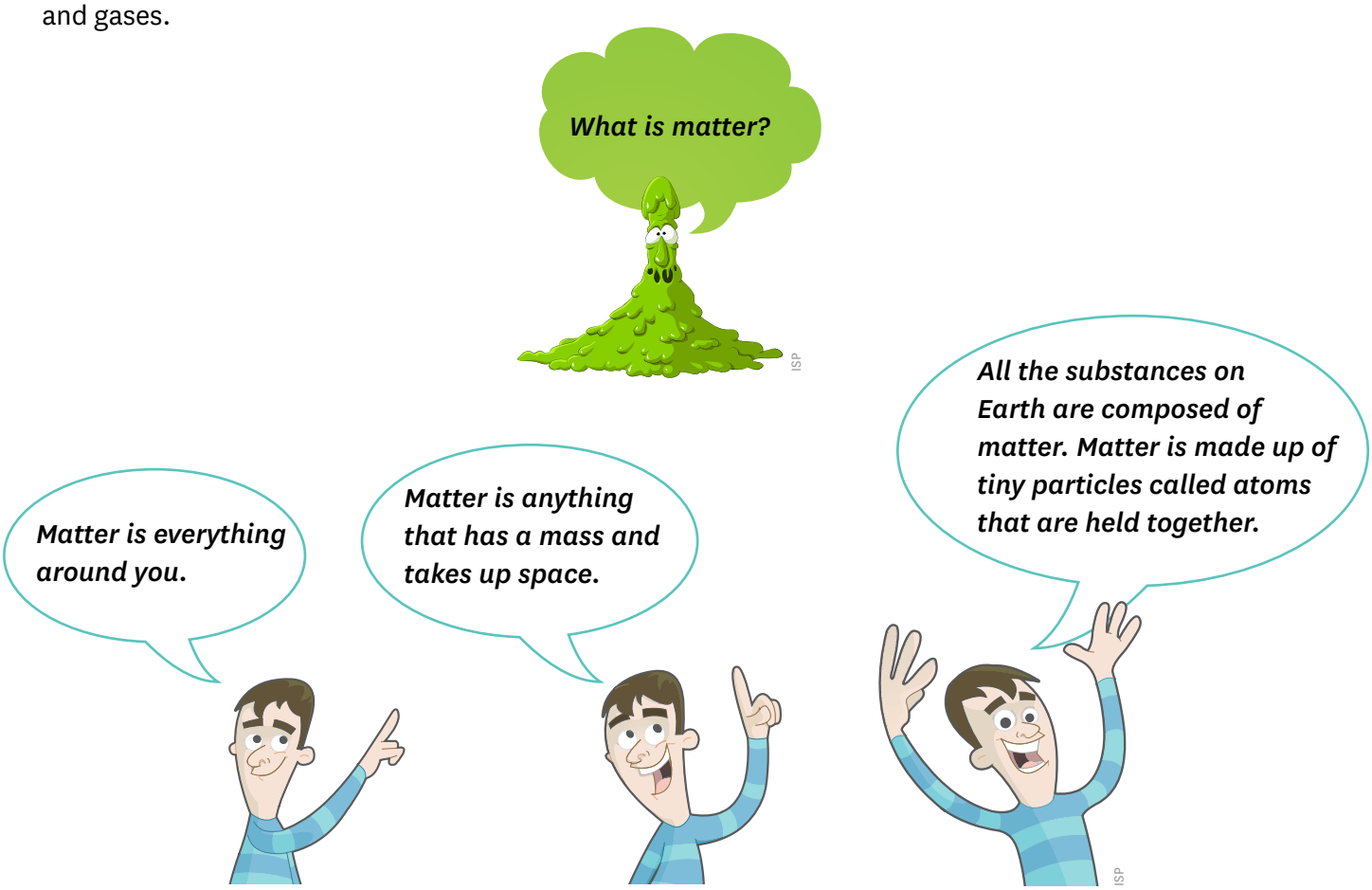
I am learning about:

- the characteristics of a solid
- the characteristics of a liquid
- the characteristics of a gas.

Success Criteria

I will know I have achieved this when I can:

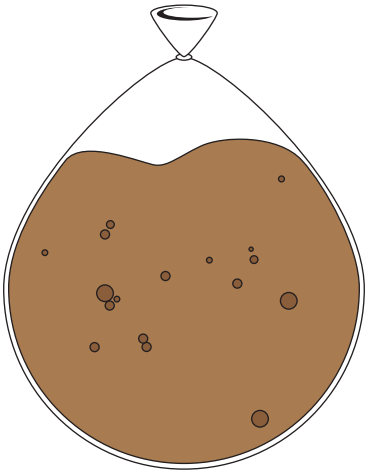
- investigate and write some things about the characteristics of solids, liquids and gases
- find some examples of solids, liquids and gases
- complete the crossword to show that I understand some of the terms we use to talk about solids, liquids and gases.



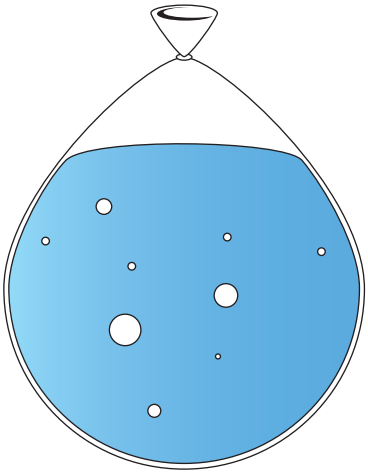
You are going to investigate states of matter called solids, liquids and gases.

What are solids, liquids and gases?

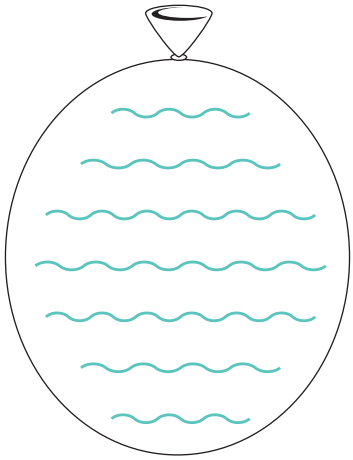
1. Take 3 of the balloons that came with this unit of work.
2. Fill 1 with sand (or rice or salt). You should use a funnel, if you don't have one you could make one from cardboard.
3. Fill 1 with water. Use a funnel.
4. Fill 1 with air (blow it up).
5. Tie the neck of each balloon tightly.
6. Try different actions, such as push, pull, roll, drop (from a low height) and watch what happens to the shape of the balloon.
7. Record the results on the table on page 6.



Sand



Water



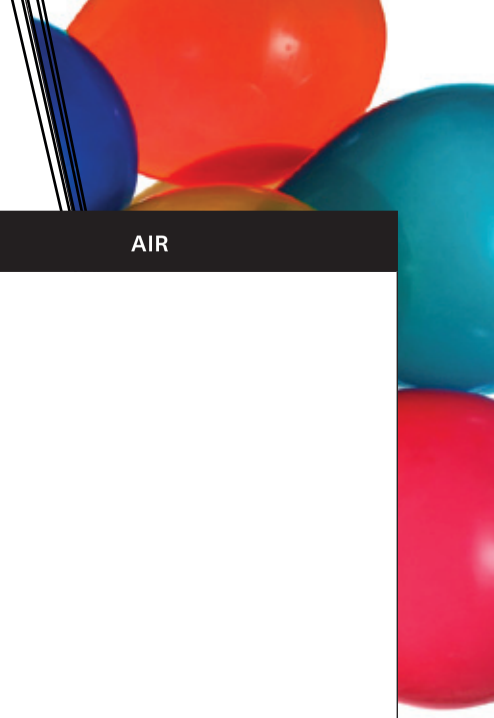
Air

HOW DO THE WATER, SAND AND AIR BEHAVE?

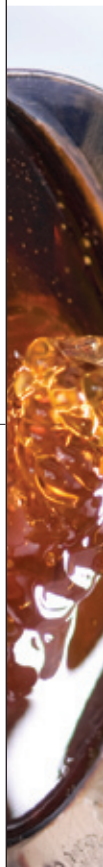
	ACTION	SAND	WATER	AIR
Does it have a definite shape?				
Does it take up space in the balloon?				
Does it have a definite volume (size)?				

Does it move easily or flow?				
Can you change its shape easily? How?				
When the balloon is placed on the ground, what happens?				

Undo each balloon.
Empty each one into another container.



	SAND	WATER	AIR
When the balloon is emptied into a container, what does each substance do?			
When the balloon is emptied into a container how does each substance move?			

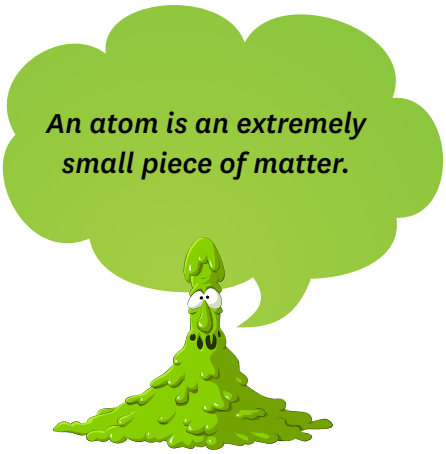


Any other notes or observations.			

Solids, liquids and gases – what are they?

Solids, liquids and gases behave differently.

Write your ideas in the solid, liquid and gas shapes on the next page, cut each one out to glue them in your scrapbook.



WHAT IS A SOLID?

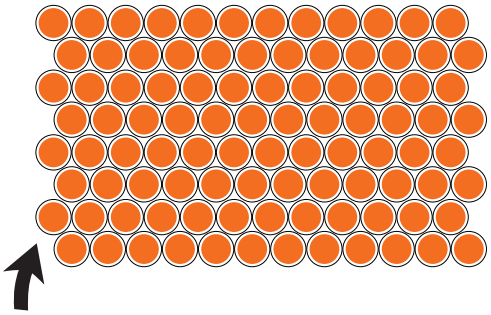
Solid particles are arranged very close together. Solids have a fixed shape.

Solids are usually hard things that will keep their shape when you hold them.

A rock will always look like a rock unless something happens to it.

Wood is a solid, ice is a solid, chairs and tables are solids.

What solids can you find in and around your home? Record your ideas in your scrapbook. You could also find magazine or newspaper pictures, and glue them in.



Solid particles are arranged very close together.

Solid

Liquid

Gas

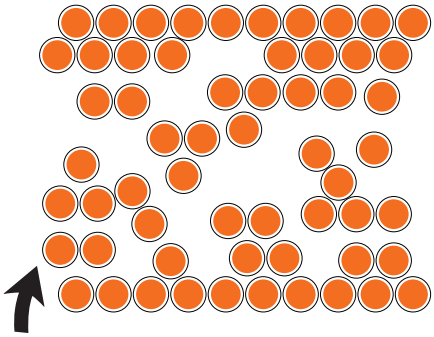
WHAT IS A LIQUID?

A liquid has volume, but it has no fixed shape.
It will fill up a container and take on the shape of the container.

If the cup breaks, the water will spread into a puddle, because there is nothing to hold its shape.
Some liquids are heavy, some are light.
Milk is a liquid, water is a liquid, golden syrup, sauce and oils are liquids.

What liquids can you find in and around your home?
Record your ideas in your scrapbook. You could also find magazine or newspaper pictures, and glue them in.

BSP



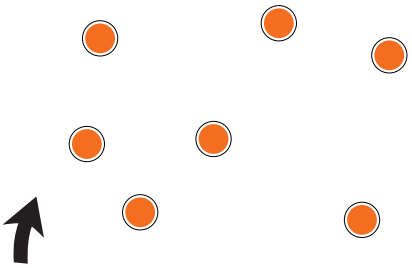
Liquid particles stick to one another, but move around.

WHAT IS A GAS?

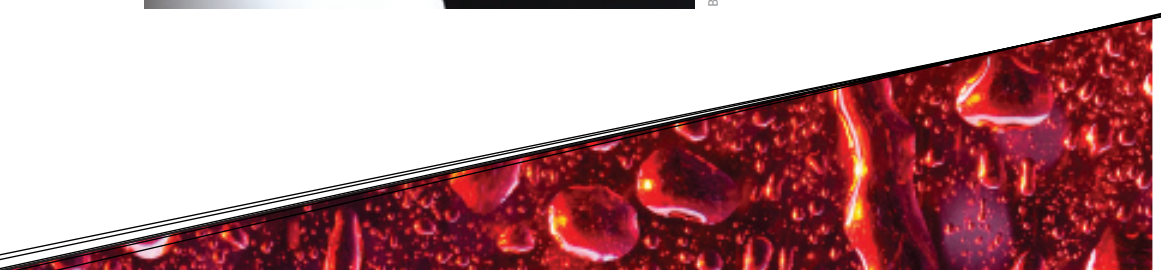
A gas has no definite volume or shape. Gas will expand to fill its container. It can be visible or invisible.
Oxygen is the gas we breathe.
Gas is everywhere; the atmosphere that surrounds Earth is a big layer of gas.
Gases hold huge amounts of energy – so when you open a can of fizzy drink you will feel the carbon dioxide gas rush out of the can.
When you spray something, such as deodorant or fly spray, the gas rushes out the first chance it gets.

What gases can you find in and around your home? Think about what they are they kept in to hold their shape and how the gas is released from its container.
Record your ideas in your scrapbook. You could also find magazine or newspaper pictures, and glue them in.

BSP



Gas particles move away from each other very quickly.



Using this information about solids, liquids and gases, classify the sand, water and air used in the balloon activity.

Sand is a (solid, liquid, gas) _____ because _____

Water is a (solid, liquid, gas) _____ because _____

Air is a (solid, liquid, gas) _____ because _____

States of matter sorting activity

WHAT YOU NEED:

- a piece of A4 paper
- pictures and words (from the next two pages)
- scissors
- glue.

WHAT TO DO:

1. Fold the paper into three equal columns.
2. Cut out all of the words and pictures on the next two pages.
3. At the top of the paper, glue the title: States of Matter.
4. At the top of the columns, glue the words: solids, liquids, gases.
5. Glue the rest of the pictures and words in the correct columns.
6. Glue this into your scrapbook.

States of matter sorting activity

SOLIDS

CARBON DIOXIDE

JUICE

OXYGEN

HELIUM

LIGHT BULB

GASES

PAPER

MAPLE SYRUP

Air (inside the balloons)

LIQUIDS

SAND

GASOLINE

Milk (inside the carton)

Tomato sauce

Snowflake

Icicles

BSP

Air (inside the tyre)

BSP

Aerosol can

BSP

Diving oxygen bottle

BSP

Table

ISP

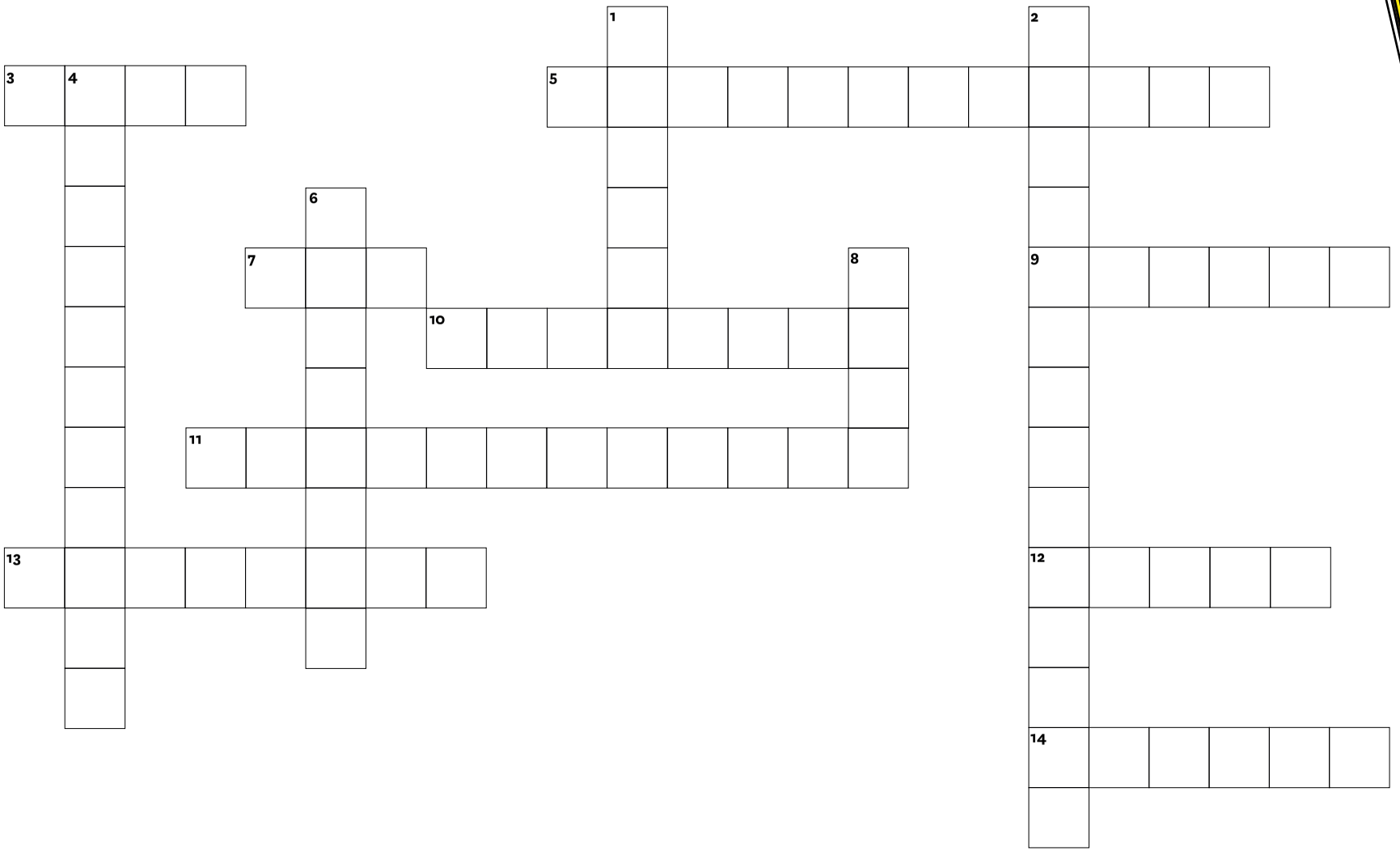
Hot air (inside the balloon)

SXC

Ice cube

States of matter

Complete the crossword puzzle.
Cut it out, and glue into your scrapbook.



ACROSS

3. Water changes from a liquid to a solid state at z___degrees celsius.
5. The change of state of matter from a gas to a liquid.
7. Has no definite volume or shape.
9. Gases exp_____ to fill whatever space is available.
10. Condensed water or liquid on or in objects.
11. The temperature that a substance will change from a liquid to a gas.
12. The basic building blocks of matter.
13. To disintegrate to become a liquid.
14. A form of power such as heat and electricity.

DOWN

1. Things that have a state of matter that has a definite shape and a definite volume.
2. The three forms of matter.
4. The change of state of matter from a liquid to a gas.
6. A small piece of matter.
8. You can change the state of matter by either increasing or decreasing h____t.

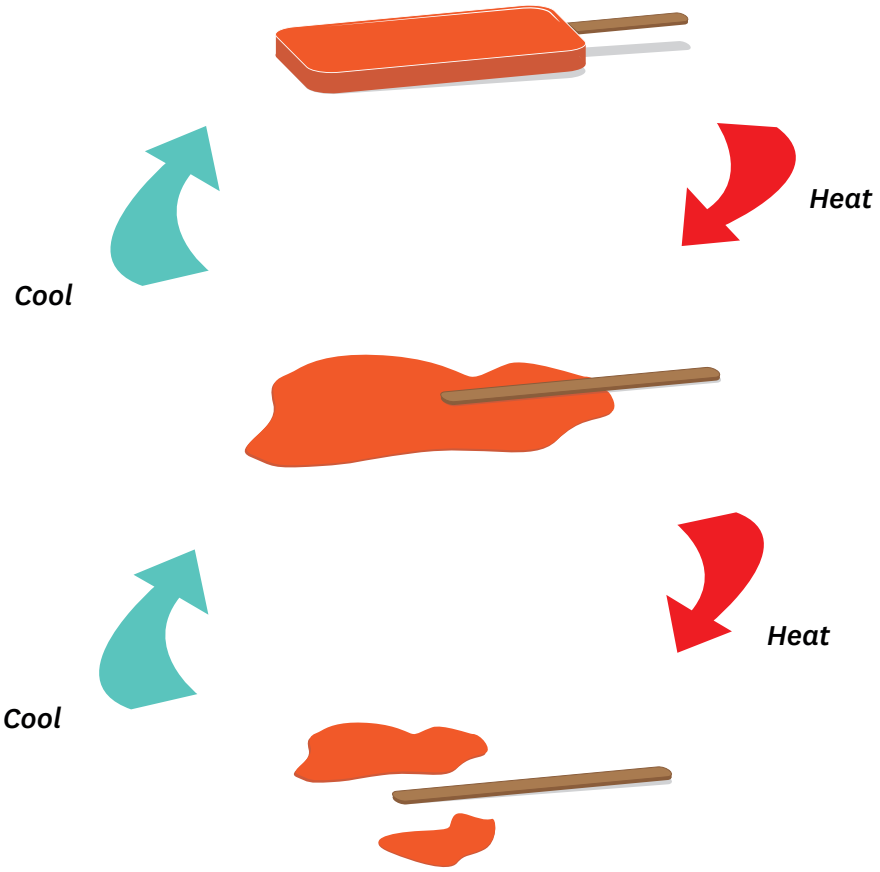
ENERGY	GAS	EXPAND	SOLIDS
MOISTURE	ZERO	BOILING POINT	STATES OF MATTER
ATOMS	EVAPORATION	DISSOLVE	PARTICLE
CONDENSATION	HEAT		

Turn to the answer guide at the back of this book to check your answers.

Changes in matter

Did you know that liquids and solids can change?
In this unit of work, you will explore how liquids and solids can change when they are heated and cooled.

Example: water is a liquid but cool it and it becomes a solid block of ice, heat it up and it becomes a gas as steam.



In part two, you will choose from experiments to explore these processes.

PART TWO

Explore changes to solids, liquids and gases when they are heated, cooled or mixed

Learning Intentions

I am learning to:

- carry out experiments
- observe changes to solids, liquids or gases when they are heated, cooled or mixed
- explain what happens to solids, liquids or gases when they are heated, cooled or mixed.

Success Criteria

I will know I have achieved this when I can:

- carry out an experiment and explain what happened to solids, liquids or gases when they are heated, cooled or mixed
- explain why the changes happened.

What to do

Choose at least three experiments to explore heating, cooling and mixing.
Follow the instructions.

Observe the changes in matter from solid to liquid, or liquid to solid.
What happens when matter is heated, cooled and mixed?

Safety: An adult must supervise these experiments as working in the kitchen with boiling water and steam can be tricky!

It's raining in the kitchen

WHAT YOU NEED:

- a saucepan
- water
- ice cubes
- ice cube tray
- potholder/gloves
- an adult to supervise this experiment.

WHAT YOU DO:

1. Put water in the saucepan (fill it about half way).
2. Ask an adult to boil the water until steam rises.
3. Put potholders (or gloves) on your hands to protect them.
4. Hold a tray of ice cubes above the steam.
5. Keep holding the tray above the steam till drops of water form on the bottom of the tray.

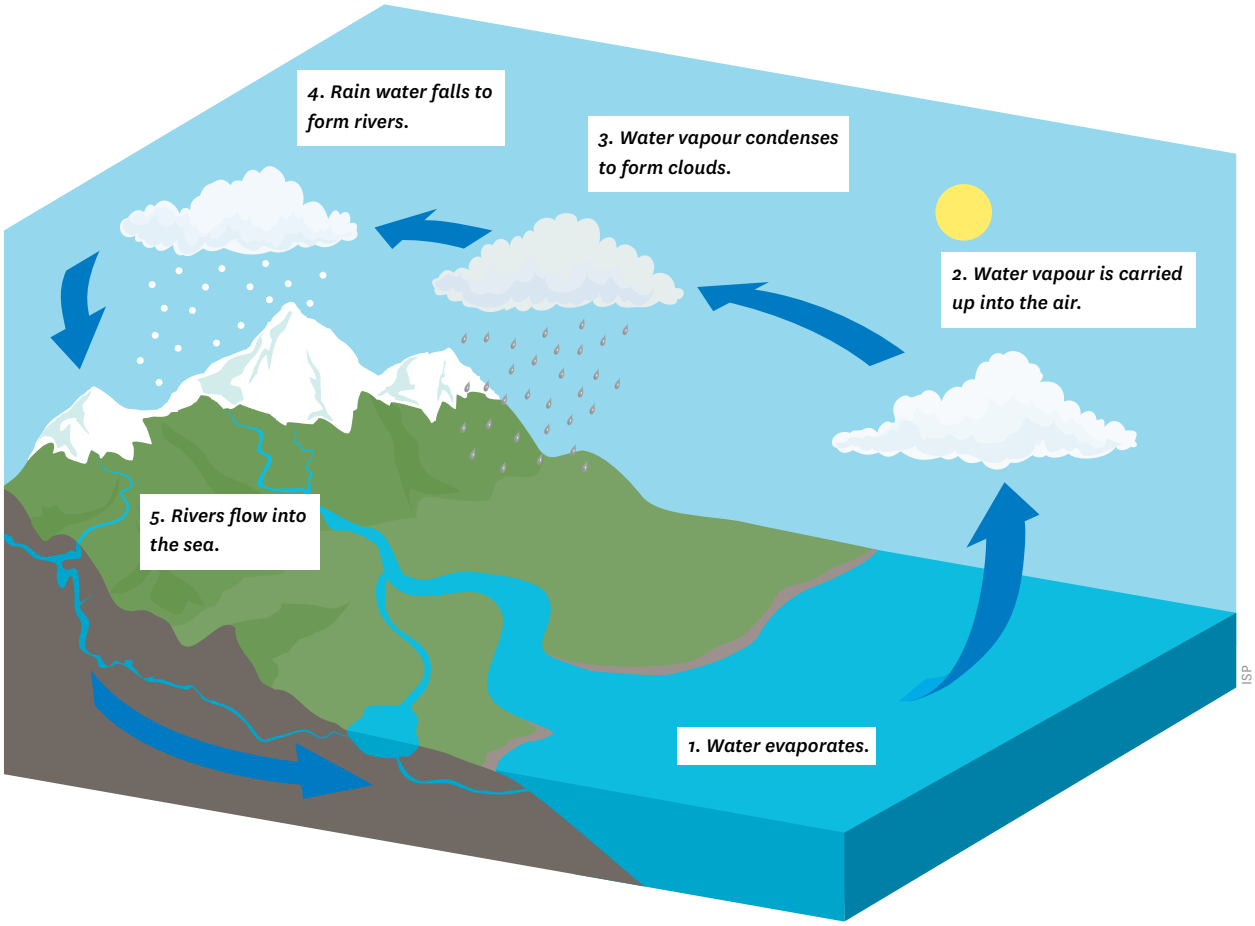
This experiment can also be carried out by holding a glass without ice over the steam. You will see the condensation forming on the glass. If you put the glass in the freezer for a few minutes first, the condensation will form more rapidly.

WHAT HAPPENS?
The drops of water grow heavy and fall like rain.

WHY DOES IT HAPPEN?
- The boiling water changes to steam and evaporates into the air.
- The cold surface of the ice cube tray cools the steam from the boiling water.
- The steam changes back into water as it cools and collects in drops.
- As the drops get bigger and heavier, it rains.

TK

THE WATER CYCLE



1. Water **evaporates** from land and sea.
2. Water vapour is carried up into the air.
3. Water vapour **condenses** to form clouds.
4. Rain water falls and forms rivers.
5. Rivers flow into the sea.

Talk about the water cycle with your supervisor. How does the 'Raining in the kitchen' experiment show how the water cycle works?

Ice needs space

WHAT YOU NEED:

- a small thick plastic drink bottle
- water
- tinfoil.

WHAT YOU DO:

1. Fill the bottle right to the top with water.
2. Cover the top of the bottle loosely with tinfoil.
3. Put the bottle of water into the freezer and leave it overnight.

WHAT HAPPENS?

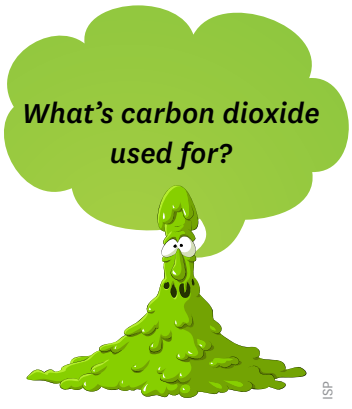
As the water freezes to make ice it pushes the foil up from the top of the bottle.

WHY?

As the water freezes, it expands to take up more space.
In very cold weather water can freeze inside pipes and may cause them to burst.
Wrapping cloth or insulation around the pipes helps to stop the water freezing!

Making a fizz!

Ask an adult to help you with this experiment.



WHAT YOU NEED:

- small plastic drink bottle
- balloon
- 2 teaspoons of baking soda
- vinegar
- funnel
- teaspoon.

1. Using a funnel pour about a third of a cup of vinegar into the bottle.

2. Slide the balloon onto the funnel tip.

3. Put two teaspoons of baking soda into the balloon through the funnel.

4. Take the funnel from the balloon carefully without spilling any baking soda.

5. Stretch the mouth of the balloon over the bottle taking care not to let any of the baking soda drop into the bottle.

6. Hold the bottle, lift up the balloon and empty the baking soda into the vinegar in the bottle.

WHAT DO YOU THINK WILL HAPPEN?

WHAT HAPPENS (OBSERVATION)

- The baking soda and vinegar will mix together and cause a change of state.
- They will fizz and foam in the bottle and fill the balloon with gas.

WHY DOES IT HAPPEN? (EXPLANATION)

- When the baking soda and vinegar mix together, they create a gas called carbon dioxide.
- All gases expand to fill any space available, so the carbon dioxide blows up the balloon.

HOW TO RECORD AN EXPERIMENT TO SHOW WHAT HAPPENED

1. Name of the experiment	**It's raining in the kitchen** An **adult** needs to supervise this experiment.
2. What I need (materials)	a saucepan water ice cubes tray potholder or gloves
3. What I will do (process)	put water in the saucepan (fill it about half way) ask an adult to boil the water until steam rises put potholders (or gloves) on my hands to protect them hold a tray of ice cubes above the steam keep holding the tray above the steam till drops of water form on the bottom
4. What I think will happen (prediction)	I think the water will turn into steam and get cold on the ice cube tray. Then it will turn back into water and fall off the tray.
5. What happened (observation)	The boiling water turned into steam and went up to the ice cube tray. It got cold and turned back into drops of water and dripped down like rain.
6. Why I think it happened (explanation)	The steam condensed on the frozen ice cube tray and turned back into water; because it was heavy it dripped down like rain!
7. What I learnt (conclusion)	That water can be heated and it **changes state**, into steam. When steam is cooled it **changes state** back to water.
8. Other Where I see this happening around me.	During the water cycle the water turns into steam, goes up in the sky, then turns back into water and falls down as rain.

Recording your experiment

Choose one of the successful experiments you tried and record what happened on this chart. Complete numbers 1–4 before you do the experiment.

1. Name of the experiment	
2. What I need (materials)	
3. What I will do (process)	
4. What I think will happen (prediction)	
5. What happened (observation)	
6. Why I think it happened (explanation)	
7. What I learnt (conclusion)	
8. Other Where I see this happening around me.	

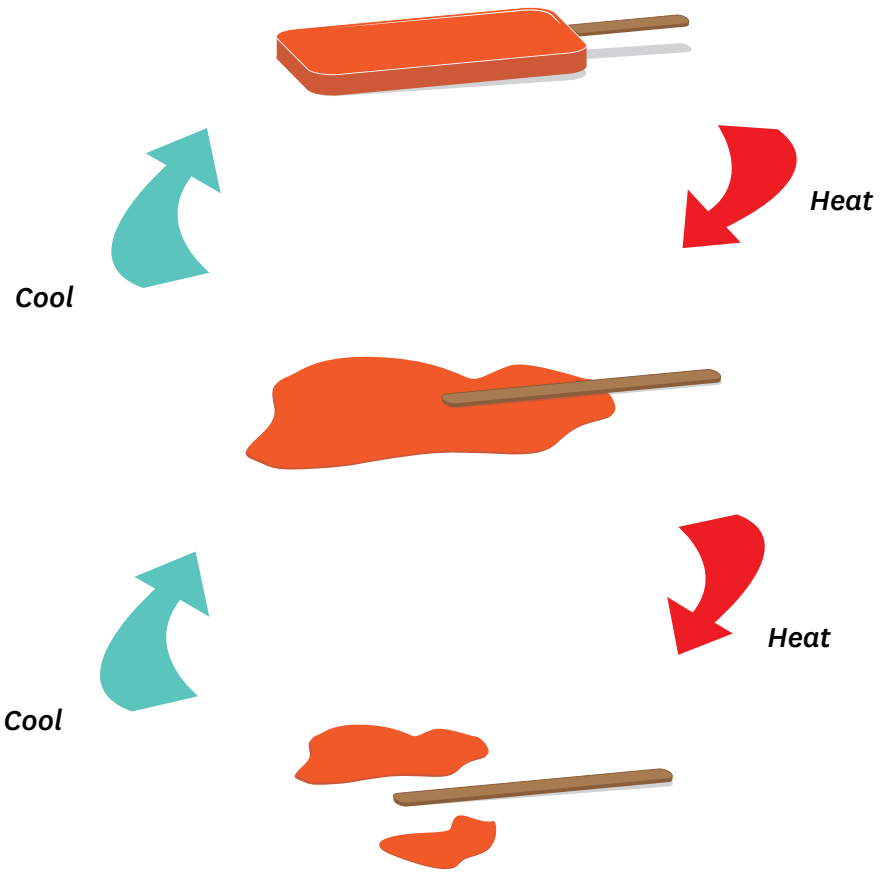
Glue this chart into your scrapbook.

Now you are ready to try some more tricky experiments in Part 3.

PART THREE

Reversibility

This is when a substance changes into one state, then can be changed back to its original state.
For example: heat ice and it becomes water; freeze the water and it reverses back to ice.



The focus for three of the experiments is on **reversibility.** You will be trying different ways of **reversing the change of state.** Some ways that you may like to try reversing the change are:

- mixing
- cooling
- heating
- crushing
- letting sit over night to separate
- adding another ingredient
- two or more of the above
- other ways you want to try.

Learning Intention

I am learning to:

- investigate some ways that substances change state and to see if they can be changed back (reversed).

Success Criteria

I will know I have achieved this when I can:

- try different ways to reverse the change of state
- talk about why it is possible or not possible to reverse the change of state.

Salt crystals

WHAT YOU NEED:

- a glass of cold water
- a glass of hot water
- some salt.

WHAT TO DO

1. Talk about what dissolving is and how to tell if something has dissolved. Predict if the salt will dissolve quicker in the hot or the cold water.
2. Add the salt to the cold water and time how long it takes to dissolve. Repeat with the hot water.
3. Talk with your supervisor about the results and decide on the role of heat in the dissolving process. Is it possible to get the salt back out of the water? How might this be done? Try different ways of getting the solid back again. For example, by leaving in the sun, boiling off the water, putting it through a sieve or strainer.

EXTENSION

Test other easily dissolvable substances. For example, Milo, instant coffee, powdered cordials.

Making jelly

ISP

WHAT YOU NEED:

- a packet of jelly mix
- hot water
- a container to hold the jelly in
- magnifying glass (optional).

WHAT TO DO

1. Look at the jelly crystals, through the magnifying glass (or a microscope), describe them and draw what you see.
2. Make up the jelly following the instructions on the packet.
3. Talk about what happened to the jelly crystals when they were mixed with the hot water. (The crystals dissolve to make the jelly solution.) What will happen next?
4. Allow the jelly to set and discuss the changes with your supervisor. Talk about changing it back (reversibility). Can the jelly be made back into jelly crystals? Why/why not?

In your scrapbook record what you found out. Make a flowchat to show the process of the changes (heating, dissolving, cooling, setting).

Making Porridge

BSP

WHAT YOU NEED:

- half a cup of rolled oats per person
- 1 cup of cold water per person
- a pinch of salt
- saucepan and wooden spoon.

WHAT YOU DO

1. Talk about the qualities of each of the ingredients. For example, salt is a solid and a crystal, with fine grains like sand. Talk about what might happen when it is all mixed together and heated.
2. Combine the water, rolled oats and salt in a saucepan.
3. Bring to the boil and simmer for 2–3 minutes or until the mixture is thick – remembering to stir it to stop it burning. Talk about the process and what is happening with your supervisor as the porridge is cooking.
4. Add more water if necessary to get a thick but flowing consistency.
5. While the porridge is still hot talk about if it is a solid or liquid. Why?
6. Let it cool and investigate how it has changed.

Draw and label the process of what has happened in your scrapbook (heating, mixing, dissolving, cooling).

Crystal creation

WHAT YOU NEED:

- clean jar
- 600 ml hot water
- 100 ml of alum powder
- two spoons
- pipe cleaners
- paper clip
- pencil
- paper towel.

WHAT TO DO

1. Pour hot water into the jar until it is three quarters full. Drop in one tablespoon of powdered alum at a time and stir with another spoon. Keep going until the alum begins to collect on the bottom.
2. Bend the pipe cleaner into whatever shape you want the crystal to be. Bend the paper clip so it makes an S shape and hook it around the pipe cleaner shape.
3. Place the other end of the paper clip around the pencil and lower the pipe cleaner into the solution.
   It should be sitting suspended (**hanging**) in the solution. It can't touch the sides as the crystal will not form properly.
4. Leave it overnight to grow.

ISP

The crystal is now a **solid**. Can this be changed back into a liquid as it was when dissolved in the water? If so, how could you do this?

INFORMATION

Most minerals dissolve in water and will form crystals when cooled.

More minerals can be dissolved in hot water than cold water.

The shape of the crystal will depend on the shape of the mineral.

As the water cools there is less space for the water to hold the dissolved mineral so it slowly turns back into a solid on the pipe cleaner.

EXTENSION

Most minerals will dissolve in water. Investigate other minerals and kitchen substances to see if you can grow crystals. Some examples are salt (sodium chloride) and sugar. Remember to dissolve the substance in hot or boiling water. Do this with your supervisor.

PART FOUR

This part of the unit is to help you design and carry out your own experiment.

Contact your teacher to tell them you are up to part four and discuss your experiment. Your teacher will help you.

Learning Intention

I am learning to:

- design and carry out an experiment that will show change of state.

Success Criteria

I will know I have achieved this when I can:

- design my own experiment including a question and a prediction
- record accurate measurements
- explain what happened and why it happened.

In this section you have the opportunity to design your own experiment using the information you have learnt so far. You could:

- carry out one of the experiments you have already done but change one thing
- extend the experiment by carrying it out a number of times but with different conditions. For example, using hot, cold and warm water, placing the experiment in different locations
- carry out an experiment you have read about
- plan your own experiment. If you select this option talk to your teacher about what you are going to do.

Designing an experiment

Design your own experiment following the steps below.

PROCESS

1. **What I want to find out**

You will need to start your experiment with a question. Some ways you could think of questions are:

- look back over the experiments you have done so far
- think about what you have noticed in one of the experiments
- what you want to find out more about
- what you have discovered about **changes of state** that you would like to test out?

Some examples of experiment questions are:

1. Does adding more yeast to the mixture increase the amount of gas given off?
2. Does adding more baking soda to vinegar make it give off more gas?
3. Does salt water evaporate like normal water?
4. Does adding baking soda to water make gas?
5. Can the crystals be made to grow faster?
6. Remember to think about how the questions could be answered. How is it going to be measured?

Once you have decided on your question, or if you need help with your question, contact your teacher.

2. Do background research

Once you have decided on what you want to experiment with, do some reading about it. You can get information from the library or internet. To do this you will need to think about what the key words are in your question. These are what you use to search with.
For example, does adding more **yeast** to the mixture increase the amount of **gas** given off?

3. Predict

What do you think will happen in the experiment?

4. Process

The process is stating what materials you need to do the experiment and what you are going to do. You will need to record the following in your scrapbook:

- materials – list the materials you will need and how much you will need
- diagram – draw a diagram of the experiment and label each part
- instructions – write the instructions for what you are going to do.

5. Observe what happens

You will need to watch carefully what happens and record what you see in an organised way. This may involve measurements such as weight, length, time or volume. Your teacher may have sent you some mathematics units about measurements. Tables are a good way to record and organise any measurements you take.

6. Explain how and why it happened

This part is about stating how it happened and why, this is called an explanation.
To help you do this part of the experiment use the Explanation notes, beginning on page 42.
Your teacher may also send you ENW309 Writing an explanation.

If you need help with any steps in this process, contact your teacher.

Recording your experiment

Record what happened on this chart.

1. Name of the experiment	
2. What I need (materials)	
3. What I will do (process)	
4. What I think will happen (prediction)	
5. What happened (observation)	
6. Why I think it happened (explanation)	
7. What I learnt (conclusion)	
8. Other Where I see this happening around me.	

Glue this chart into your scrapbook.

APPLICATION

It is now time to think about how **states of matter** (solids, liquids or gases) happen around us naturally and how people use the states.

Some of the ways **change of state** occurs in the environment are:

- water cycle (water in the sea turning to steam then clouds and then finally to rain)
- liquefaction (soil turning into a liquid during an earthquake)
- volcanoes and eruptions
- making of glaciers
- ice shelves in the North and South Poles.

Some of the ways people use **states of matter** are:

- cooking, for example, frozen foods
- making mechanical parts for example, melting plastic and injecting it in into moulds to set
- cars – petrol as a liquid then turns to a gas when it is burnt by the engine.

OWN RESEARCH

It is your turn now to find other ways that **changes of state** happen around us.

Record this in your scrapbook.

PART FIVE

Learning Intention

I am learning:

- to present an oral explanation
- to write an explanation
- about the deeper features of the text of an explanation.

Success Criteria

I will know I have achieved this when my explanation:

- clearly explains how and why something happened
- includes the deeper features of an explanation.

The purpose of an explanation is to explain **how** something works or **why** something happens.

Deeper features of an explanation

AN AUDIENCE GRABBER

An explanation is written for an audience and you need to grab your audience's attention right away.

A CATCHY TITLE

Beat it! – How an egg beater works
The cutting edge – How scissors work
Stick it! – How a cellotape dispenser works
Airborn candyfloss – How clouds are formed

A RHETORICAL QUESTION

A rhetorical question doesn't need an answer.
Did you know that ...?
Can you believe ...?
Guess what ...?
Is it a circle? Is it a crescent? What is it?

LANGUAGE FEATURES

Once you have grabbed your audience's attention, you need to hold it by using the following language features.

ACTION VERBS

Action verbs are verbs that describe what is happening or what something is doing.

- The water falls.
- The temperature changes.
- The sun sets.

ADJECTIVES, SIMILIES AND METAPHORS

Adjectives are words that describe nouns like: bright, sparkling, wonderful, simple.
Similies use **as** or **like** to compare, 'as green **as** pounamu.'
Metaphors compare things but don't use the words as or like, 'clouds are balls of candyfloss.'

TIME SEQUENCED WORDS TO SHOW THE ORDER THAT THINGS HAPPEN

Firstly	Then	Next
After this	Following	Finally

SCIENTIFIC OR TECHNICAL WORDS ARE WORDS THAT ARE SPECIFIC TO A TOPIC

For example, evaporate, condense, dissolve, expand.

Read the explanation on the next page for how clouds form and find examples of the language features. Note how illustrations support the writing.

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Airborn candy floss

I see clouds like giant balls of candy floss and I wonder why they are floating in the sky.

Firstly, as the sun warms the Earth, some of the moisture that is in the lakes, oceans, rivers and in the ground evaporates and rises into the Earth's atmosphere.

Then, as the moisture keeps rising like a helium balloon, the atmosphere gets colder and colder. Eventually the air temperature reaches the point at which dew forms. At this point, moisture condenses out of the air and water droplets form. Finally, these droplets combine to form a cloud.

So next time you look up into the sky, wondering if clouds are balls of candyfloss, you will know how they are formed.

ACTIVITY ONE

ORAL EXPLANATION

BEFORE YOU WRITE AN EXPLANATION YOU WILL:

- plan your oral explanation
- practice delivering it in a clear voice
- learn what you will say, so you only need to look at your notes occasionally.

Choose one of the experiments you did and prepare an oral explanation to tell someone how you think a change of state happened.
Plan your oral explanation using the thinking frame on the next page.

USE WORDS AND PHRASES LIKE:

- I want to explain why
- There are several reasons for this
- The chief reason is
- Another reason is
- A further reason is
- So now you can see why.

If you are able to, record or get someone to video your oral explanation to send to your teacher.

ASK FOR FEEDBACK ON:

- how well you gave your oral explanation
- what you did really well
- what you could improve on next time you give an oral explanation.

PLANNING AN ORAL EXPLANATION

Question Explain
Key words to use in the oral explanation
Introductory sentence: What are you trying to explain? How When Why Where
What points do you need to include? What are the key words, ideas or information that you will need to use to answer the question? Decide on examples to support your ideas/illustrate your point.
How will you sequence your explanation? Decide how to order your ideas and choose some linking words that may be suitable.
How will you end your explanation? Is there a general statement that you can make to sum up your ideas?

PLANNING A WRITTEN EXPLANATION

Organise your information on the Explanation Thinking frame below.
Then:

- write your draft
- edit your draft and make any changes
- check that you have included the deeper features
- ask somebody else to read your draft and suggest any changes
- publish your explanation.

EXPLANATION THINKING FRAME

Title (make it an audience grabber)
Introduction (describe your topic)
Paragraph two When, where and why it happens. Use the present tense.
Paragraph three More about when, where and why it happens
Conclusion with impact and comment

Publish your explanation either in your scrapbook or in a digital format. Use digital photos or observational drawings to add information and detail.

MY EXPLANATION:

- ☐ has a title that identifies what the explanation is about
- ☐ has an audience grabber at or near the beginning
- ☐ begins with a definition or description of the topic
- ☐ is organised into paragraphs
- ☐ is written in the present tense
- ☐ has a variety of sentence beginnings and lengths
- ☐ has action verbs
- ☐ uses time sequenced words such as firstly, next, following, finally
- ☐ includes descriptive language such as adjectives, similes and metaphors
- ☐ uses scientific words to describe the topic
- ☐ has a conclusion with impact
- ☐ is published in a format that will help others to understand my explanation.

WHAT TO DO NOW

Complete the evaluation form on the next page.
Return your scrapbook and any other recording you did, to your teacher.

Checklist of items to return to your teacher:

- ☐ scrapbook with experiments
- ☐ oral explanation
- ☐ published written explanation
- ☐ other activities I want my teacher to see and comment on.

Glossary

Carbon dioxide	A colourless, odourless, gas, formed during respiration, combustion and organic decomposition. Examples of use: food refrigeration, fizzy drinks, fire extinguishers.
Change of state	Occurs when something changes into something different.
Chemical property	Is any property that becomes evident during a chemical reaction or change.
Condensation	The change in form water goes through when it turns from a gas to a liquid.
Crystal	A solid formed by a repeating, three-dimensional pattern of atoms, ions, or molecules.
Evaporation	To convert into vapour.
Experiment	A test under controlled conditions that provides evidence and proves something.
Expand	To spread out.
Oxygen	A colourless, odourless, tasteless, gas that occurs free in the atmosphere. It is the most common element in the Earth's crust, and is essential to life processes.
Physical property	The physical characteristics of a substance.
Substance	Something that has mass and occupies space.

HIGHLIGHT THE BOX THAT BEST APPLIES TO YOUR LEARNING.

LEARNING INTENTION	NOT ATTEMPTED	HAD A GO	SUCCEEDED	DID VERY WELL	DID AN EXCELLENT JOB
I am developing an understanding of the characteristics of solids, liquids and gases.		Learning about the characteristics of a solid, a liquid and a gas.	Described some of the characteristics of a solid, a liquid and a gas.	Described the characteristics of a solid, a liquid and a gas and gave examples.	Confidently described the characteristics of a solid, a liquid and a gas and gave examples.
I can describe and compare changes that occur when gases, liquids and solids are heated, or cooled or mixed.		Described changes that occur when gases, liquids and solids are heated, or cooled or mixed.	Described and compared changes that occur when gases, liquids and solids are heated, or cooled or mixed.	Described and compared changes that occur when gases, liquids and solids are heated, or cooled or mixed and gave examples.	Confidently described and compared changes that occur when gases, liquids and solids are heated, or cooled or mixed and gave examples.
I can carry out an experiment.		Beginning to show an understanding of carrying out a scientific experiment.	Includes the steps of carrying out an experiment.	Includes the steps of carrying out an experiment with some detail.	Includes the steps of carrying out an experiment accurately with detail.
I can write an explanation.		Provided an explanation.	Provided an explanation detailing **how** and **why** something happened.	Provided a clear, effective explanation detailing **how** and **why** something happened.	Provided a clear, effective explanation detailing **how** and **why** something happened. The reader is fully informed.

Something new I learned in this unit was

I would like my teacher to comment on

Supervisor comment

Teacher comment

Answer guide

Part 1, page 20.

				1 s							2 s			
3 z	4 e	r	o	5 c	o	n	d	e	n	s	a	t	i	o	n
	v				l							a			
	a				i							t			
	p			7 g	a	s					8 h	9 e	x	p	a	n	d
	o				r		10 m	o	i	s	t	u	r	e		s					
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	t				c											m					
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	o				e											t					
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