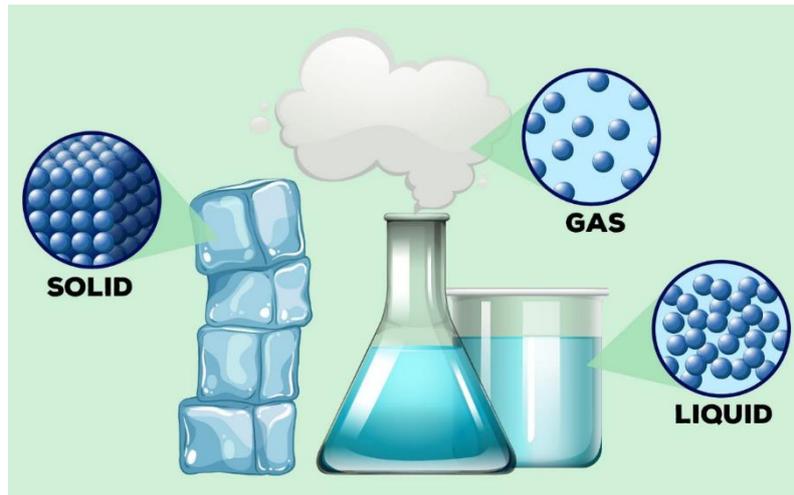


Kirkcaldy High School



N3/4 Science

Water

Name: _____

Class: _____

Teacher: _____

States of Matter

Starter

What's the difference between the objects below?



Learning Intentions

- To identify solids and liquids by their properties and give everyday examples of each.
- To describe the particles in a solid, liquid and gas.



Success Criteria

- I can identify solids and liquids by their properties and give everyday examples of each.
- I can describe the particles in a solid, liquid and gas.

States of Matter

_____ is anything which has a mass and occupies a space.

There are three main states of matter:

- _____
- _____
- _____

States of Matter

Activity: Classify items on the worksheet as solids, liquids and gases.

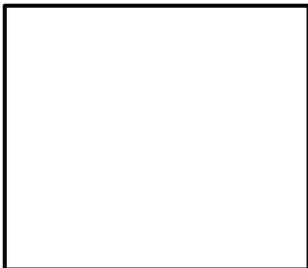
Solid	Liquid	Gas

Extension: Think of some examples of your own and add them to your table.

Particles

All matter is made from tiny _____ called _____.

Particles are always _____.







Properties of solids, liquids and gases

Starter

1. Draw the particle arrangement of a solid, liquid and gas.



Solid



Liquid



Gas

2. Describe how the particles in a solid, liquid and gas move.

Learning Intentions

- To describe the properties of solids, liquids and gases.

Tick me at the end if *you can*

...

Success Criteria

- I can describe the properties of solids, liquids and gases.

Properties of solids liquids and gases

Aim: To investigate the properties of solids, liquids and gases.

	Change Volume? (be compressed)	Change shape?	Flow?
Solid			
Liquid			
Gas			

Changing States

Starter

The three states of matter are solid, liquid and gas.

1. Name a solid _____
2. Name a liquid _____
3. Name a gas _____
4. Describe how solids, liquids and gases are different _____

5. Name something that behaves like a solid and a liquid. _____

Learning Intentions

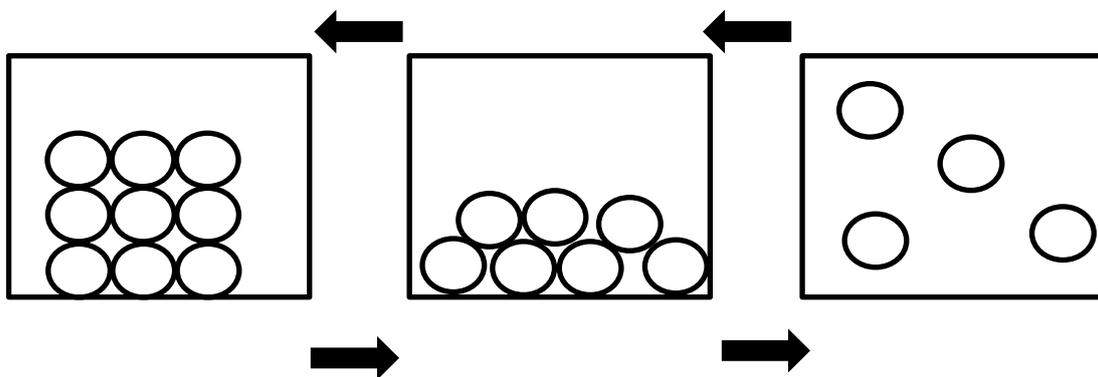
- To explain changes of state.



Success Criteria

- I can explain changes of state.

Changing States



Questions

Use the diagrams in the last page to write in what type of change of state is happening in each description

Description	Type of State Change
Chocolate bar becomes gooey in your hand	
Frost forms on a cold window	
Water disappears from a glass in a hot room	
Dew forms on grass in the early morning	
Ice turns back to water in a drink on a warm day	
Puddles disappear from the sidewalk after a sunny day	
Breath shows as mist on a cold morning	
Butter turns into liquid on hot toast	
A soda can sweats in the summer heat	
Water turns to steam while cooking eggs	
Snowman becomes smaller in the sun	
Ice cream turns hard in the freezer	

The Water Cycle

Starter

1. What temperature does ice melt? _____
2. What temperature does water boil? _____
3. What can you remember about the water cycle from primary school?

Learning Intentions

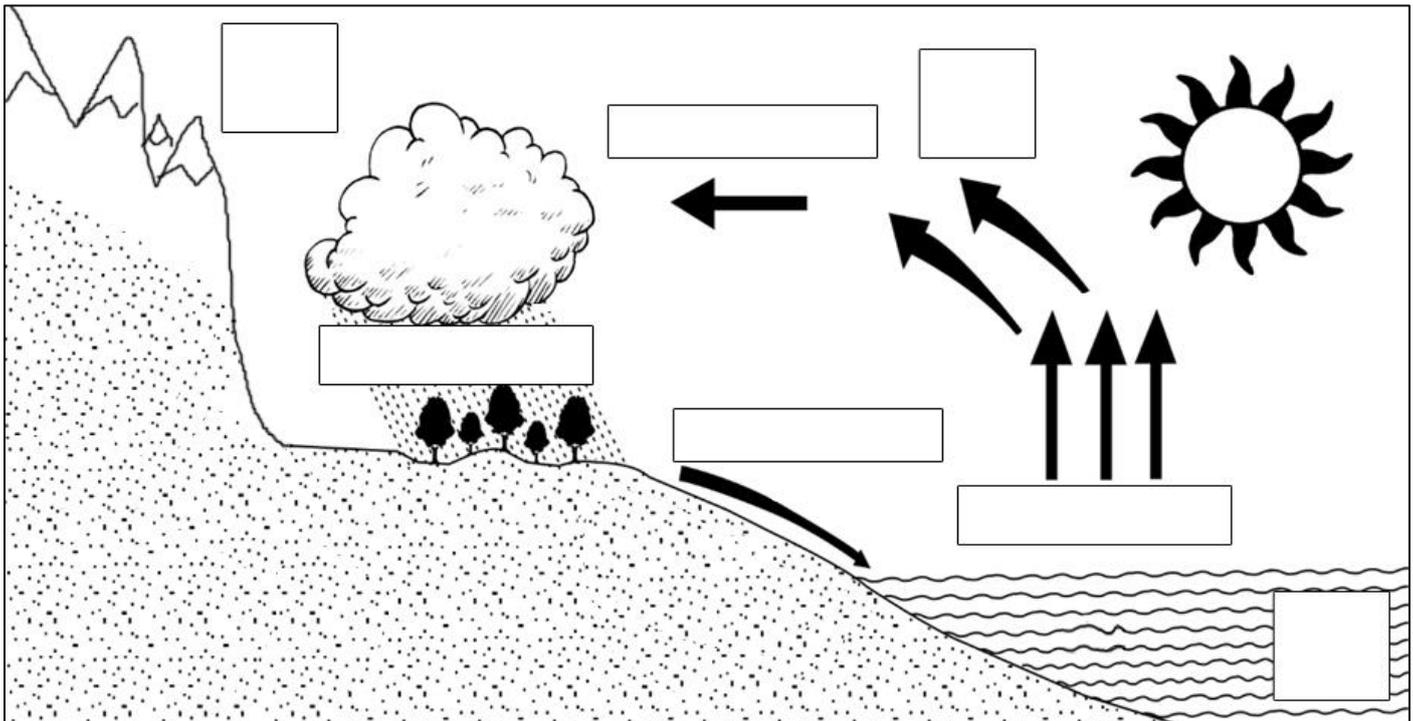
- To explain the water cycle using my knowledge of changes of states.

Success Criteria

- I can explain the water cycle using my knowledge of changes of states.



The Water Cycle



True, or False

1. Water is only evaporated from oceans during the water cycle.
2. Condensation in the water cycle only happens in the clouds.
3. All precipitation that falls returns directly to the ocean.
4. Transpiration is the evaporation of water from animal bodies.
5. Groundwater does not move or participate in the water cycle.
6. Water vapor is heavier than liquid water, which is why it rises.
7. The sun drives the water cycle by pulling water into the sky.
8. Snow is not part of the water cycle because it is solid.
9. Clouds are made from water vapour.
10. Once water becomes groundwater, it leaves the water cycle permanently.

Task:

Make an animation showing The Water Cycle. It should include...

- Precipitation falling from a cloud onto Kirkcaldy
- Evaporation from the Firth of Forth
- Condensation of water becoming a cloud above Kirkcaldy
- Runoff of water from the Lomond Hills into the Firth of Forth

Solubility

Starter

1. What is meant by the term “soluble”? _____

2. How do we know if a substance is soluble? _____

Learning Intentions

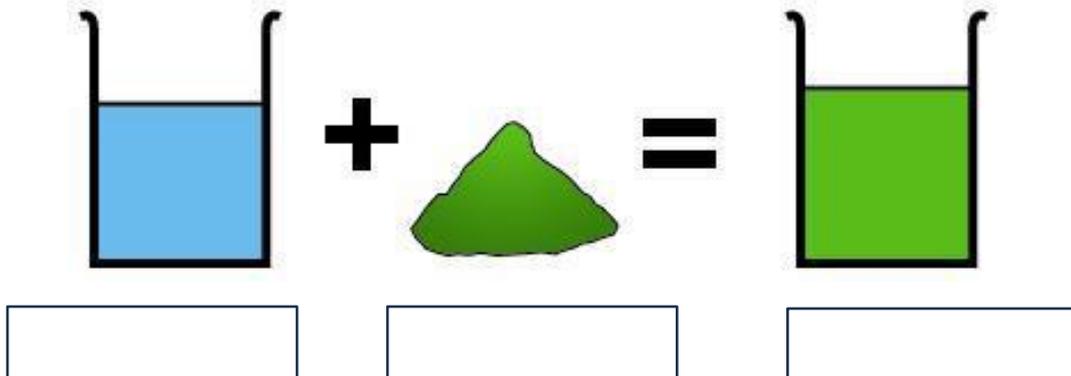
- To explain the terms soluble and insoluble.

Success Criteria

- I can explain the terms soluble and insoluble.



Solubility



Example: _____

Activity: Match the statements with the words below:

solute solution solvent soluble

The liquid in which a solute dissolve: _____

The substance that dissolves in a liquid to form a solution: _____

The product formed when a solute has dissolved in a solvent: _____

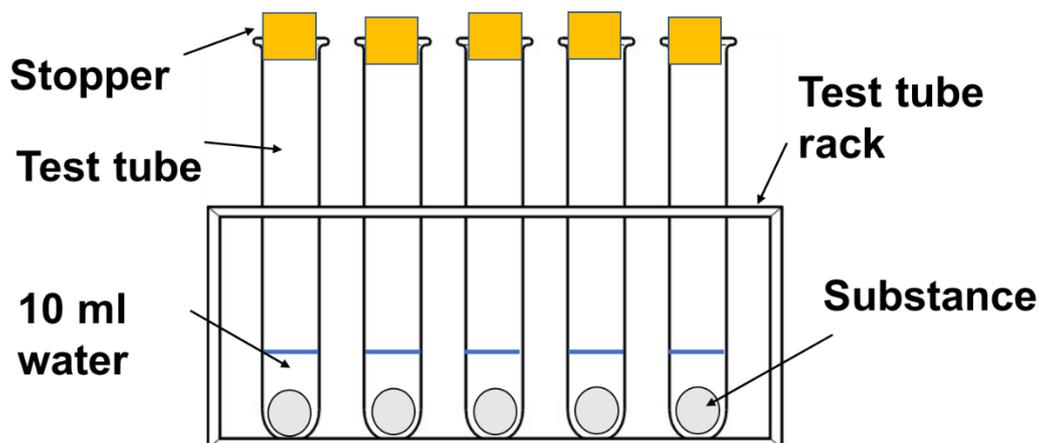
Describes a substance which can dissolve in a solvent: _____

Not all substances are soluble. A substance which cannot dissolve in a solvent is _____. Example: Sand is insoluble in water.

Solubility Experiment

Aim: _____

Method:



Results:

Substance	What did you see?	Soluble in Water?
sodium carbonate		
sodium chloride		
sucrose		
flour		
calcium carbonate		
copper chloride		

Conclusion: _____

Evaluation _____

Separation Techniques – Filtration

Starter

1. What do these words mean?
 - a. Soluble _____
 - b. Insoluble _____
2. Name a substance which is soluble. _____
3. Name a substance which is insoluble. _____

Learning Intentions

- To learn how to separate dirt from water.

Success Criteria

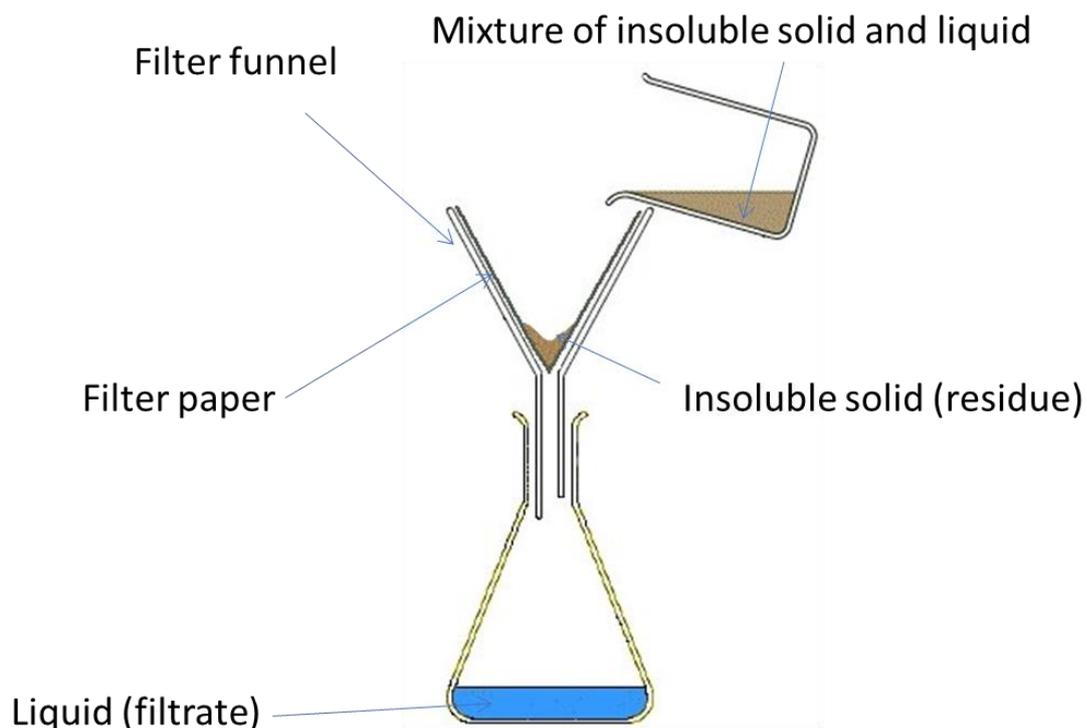
- I can separate dirt from water.



Separating Dirty Water

Aim: _____

Method:



Results: _____

Conclusion: _____

Filtration

We use _____ to separate an insoluble solid from a liquid.

_____ is collected in the filter paper and the _____ is collected in the flask.

Separation Techniques – Evaporation

Starter

1. How would you separate **sand** from **sea water**? _____

2. How would you separate **salt** from **sea water**? _____

Learning Intentions

- To learn how to separate salt from water.



Success Criteria

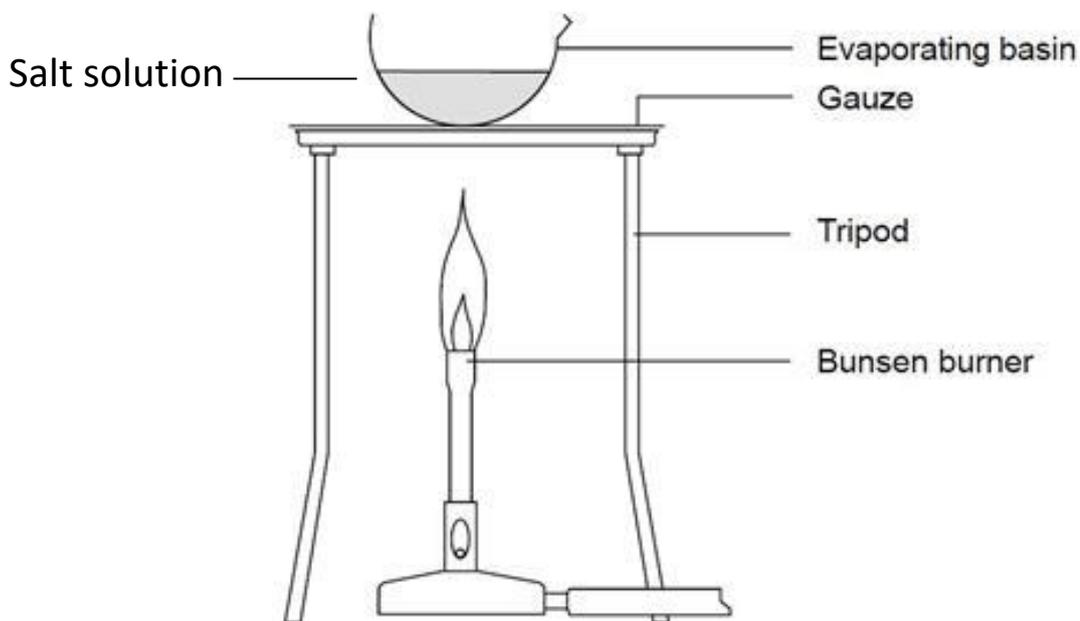
- I can separate salt from water.



Evaporation

Aim: _____

Method:



Results: _____

Conclusion: _____

Evaporation

We use _____ to separate soluble solids from solutions.

_____ evaporates and leaves behind the solid _____ in the evaporating dish.

Distillation

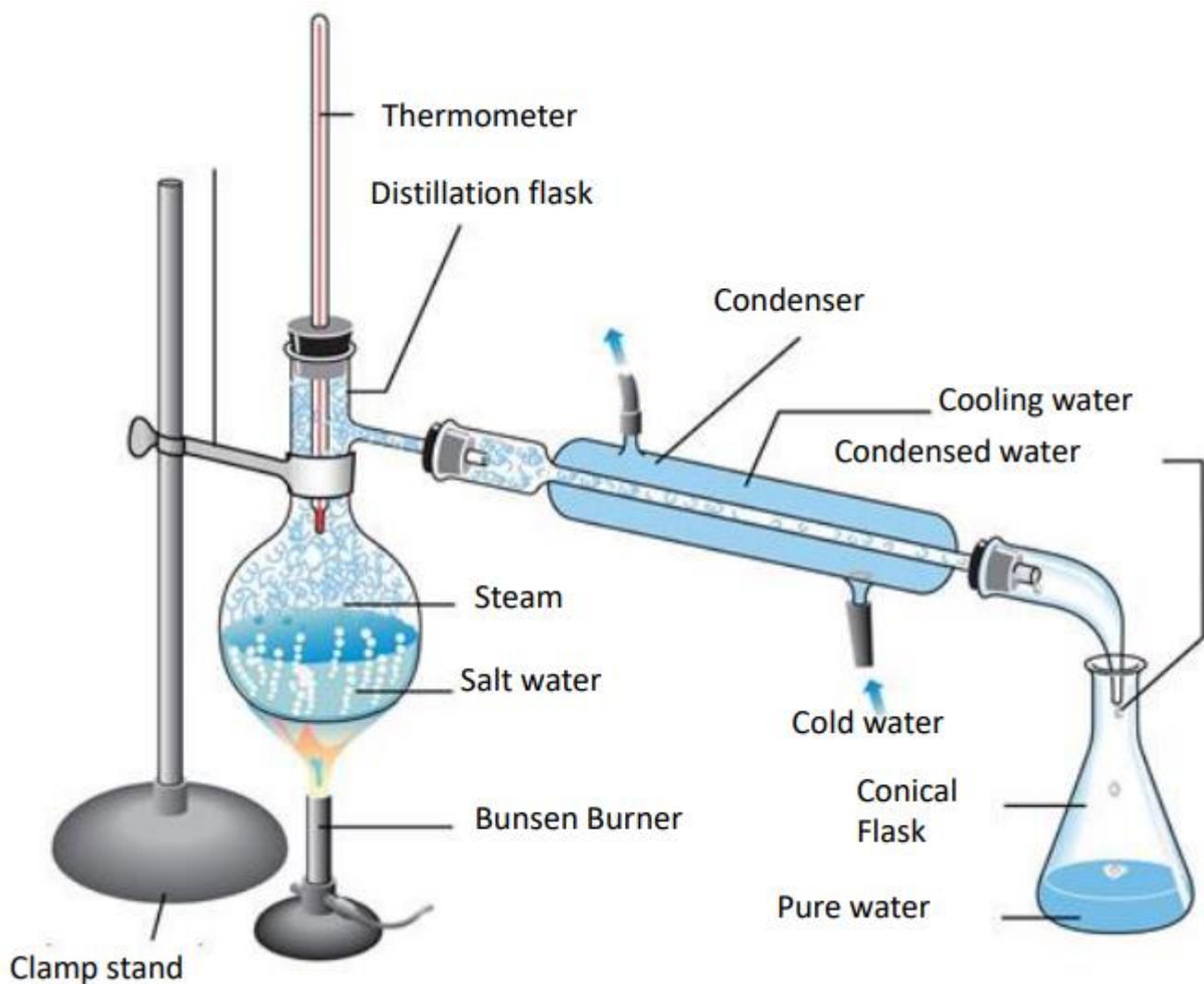
Starter

Learning Intentions

- To learn about distillation

Success Criteria

- I can make an indicator from plants
- I can determine if an indicator is effective or not



True, or False

1. You can only use distillation with one liquid at a time.
2. The liquid that boils the slowest always goes into the other container first.
3. Distilled water has nothing at all in it — not even water stuff.
4. One type of distillation works for every mixture of liquids.
5. When a liquid is boiling, its temperature doesn't change.
6. The thermometer in distillation tells you how hot the flame is.
7. In distillation, every part of the mixture turns into gas one at a time.
8. Water turns back into gas inside the first container during distillation.
9. Distillation works because some liquids get hot and turn into gas faster than others.

Task:

- You are stranded on a desert island
 - The only water is salty seawater.
 - There are beaches.
 - There are fruit trees.
 - There are fish in the sea, and squirrels in the woods.
- Design a poster with your survival plan. Include the ways that you are going to make sure you have...
 - Food.
 - Shelter.
 - Drinking Water.
 - Entertainment.

Acids and Bases

Starter

You are cooking chicken for a stir fry, list 2 different ways to speed up the cooking process?

Why does keeping vegetables in the fridge prevent them from rotting quickly?

Learning Intentions

- To learn about acids and bases in our home

Success Criteria

- I can identify examples of acids and bases
- I can state the difference between an alkali and a base
- I can determine if a substance is acidic or basic using an indicator



Acids

_____ have a _____ taste. The word "acid" comes from the Latin word, _____, meaning "sour".

Acids are found in our food and drinks. Acids are important as they:

- Contribute to the _____ of food.
- _____ food preventing food rotting.
- Essential for providing _____ _____ for our body.

Bases

Bases are another group of chemicals, the _____ of acids.

- We use *weak* bases daily for **cleaning purposes**.
- An _____ is a base, but alkalis also **dissolve in water**.

Acid

Opposite of base

Base

Opposite of acid

Alkali

Also dissolves
in water

Indicators

Indicators are special substances used to tell the difference between acids and bases. Their colours are affected by acids and bases.

Indicator	Colour in acid	Colour in base
Litmus		
Methyl Orange		
Bromothymol Blue		
Phenolphthalein		

The pH Scale and Universal Indicator

Starter

Vinegar is an acid we use on our chips.

Why do you think we couldn't use hydrochloric acid on our chips?

Explain your answer.

Learning Intentions

- To learn about the pH scale
- To identify everyday acids and alkalis



Success Criteria

I can identify the pH of a substance using universal indicator

I can identify everyday acids and alkali



The pH scale

Acids: substance with a pH less than 7

Base: substance with a pH more than 7

Colour and label the pH scale below

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
---	---	---	---	---	---	---	---	---	---	----	----	----	----	----

Measuring the pH of Household Items

Aim: To find out which household items are acids and which are alkalis.

Method:

Draw your method below

Results:

SUBSTANCE	COLOUR	pH (0-14)	ACID or ALKALI
Baking soda			
Fizzy water			
Salt (sodium chloride)			
Distilled (pure) water			
Lemon juice			
Orange juice			
Oven Cleaner			
Soap solution			
Vinegar			
Washing Soda			
Ethanol			

Natural Indicators

Starter

What is an indicator?

What would be the characteristics of a good indicator?

Learning Intentions

- To make a natural indicator from plants

Success Criteria

- I can make an indicator from plants
- I can determine if an indicator is effective or not



Investigating Natural Indicators

Aim: To investigate which plant part is the best indicator

Results:

Plant Part	Colour in Acid	Colour in Alkali
Root (red onion, beetroot)		
Leaves (red cabbage)		
Fruit (blueberries, raspberries)		

Conclusion: *What is the answer to your aim?*

Evaluation: *How could you improve your experiment?*

Reducing Water Usage

Starter

Write down as many dark coloured natural substances that you can think of, that might make good indicators.

Learning Intentions

- To understand where water comes from.
- To investigate what happens when there is too much, or too little water.



Success Criteria

- I understand where water comes from
 - I can state what happens when there is too much, or too little water.
-

The Scottish Government is really concerned about there being too much, or not enough water.

- Design a leaflet to be sent to homes.
- It should include...
 - The logo of the Scottish Government.
 - The percentage of the earth that is covered by water.
 - A graph showing water consumption in different countries.
 - Where water comes from before it comes out of the tap.
 - Why chlorine, and fluoride are often added to tap water.
 - What happens if there is not enough water.
 - What happens if there is too much water.
 - Three ways to save water at home.

International Water Supplies

Starter

Write down three ways we can save water.

Learning Intentions

- To understand issues with water supplies in other countries.



Success Criteria

- I understand issues with water supplies in other countries

Task

You are part of a team working for the United Nations (UN).

Your job is to help a country where people do not always have safe drinking water.

The UN has asked you to investigate water supplies so you can make a plan to help.

Your team will investigate:

- Source/Origin – Where does water come from in different countries?
- Rivers, lakes, underground wells, rainfall, glaciers.
- Extraction – How do people get the water?
- Wells, pumps, pipes, dams, bottled water, water trucks.
- Use – What do people use water for?
- Drinking, farming, washing, industry, power.
- Conflicts, Benefits & Issues
- Benefits: clean drinking water, healthy people, crops growing.
- Conflicts: sharing rivers between countries, water shortages, pollution.
- Issues: cost of clean water, drought, flooding.

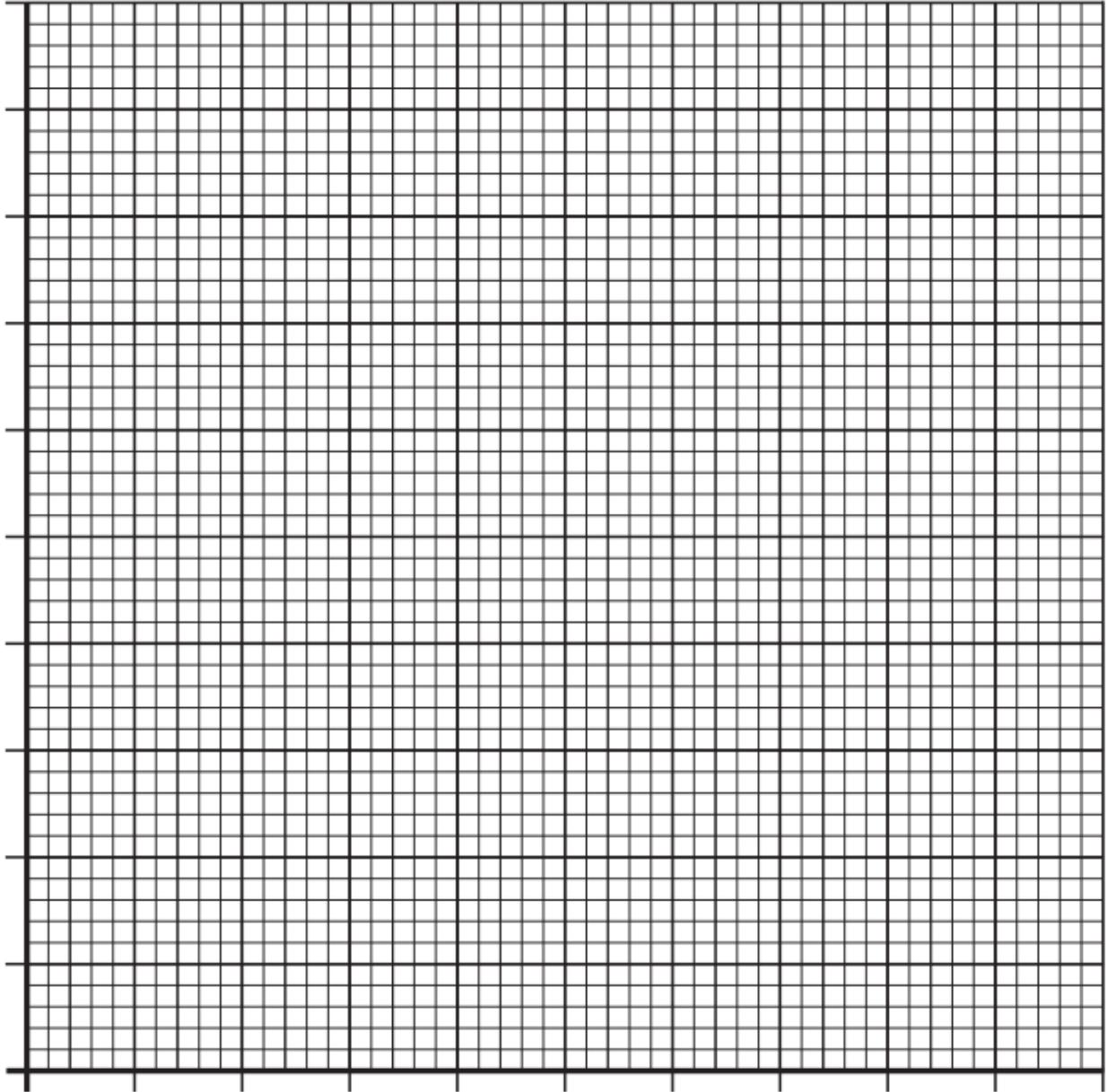
Create a short presentation or poster:

- Choose a country
- Where does water in your chosen country come from?
- How is it taken out or collected?
- What is it mainly used for?
- What problems happen with water supplies there? (e.g. too little, too much, dirty water, fights over water).
- What are the benefits if water is managed well?

Sentence starters you could use:

- “Water in ____ comes from...”
- “People get water by...”
- “They use it for...”
- “The problems are...”
- “One benefit is...”

Additional graph paper for numeracy tasks:



Extension Tasks

Word Search

L	F	I	O	S	P	N	N	Z	Z	U	U	O	E
L	P	R	T	E	E	A	A	L	I	Q	U	I	D
P	R	E	C	I	P	I	T	A	T	I	O	N	M
T	N	T	S	N	S	N	T	N	I	I	I	E	C
O	O	U	O	S	N	O	A	R	D	I	L	O	S
A	I	L	L	A	A	T	L	S	E	T	E	I	O
G	T	O	U	G	T	W	N	U	I	P	U	T	T
O	A	S	B	N	O	E	I	N	T	I	O	N	A
M	R	S	L	I	M	N	G	I	T	I	A	R	P
A	T	G	E	Z	S	N	V	N	S	P	O	N	P
T	L	T	V	E	S	O	L	V	E	N	T	N	G
T	I	L	A	E	I	N	R	U	N	O	F	F	I
E	F	P	A	R	T	I	C	L	E	S	R	I	N
R	T	T	O	F	E	B	O	I	L	I	N	G	L

ATOMS
BOILING
GAS
FREEZING
NONNEWTONIAN
MELTING
SOLID
SOLUTE
PROPERTIES
SOLUBLE
PRECIPITATION
PARTICLES
FILTRATION
RUNOFF
MATTER
SOLUTION
LIQUID
SOLVENT

Play this puzzle online at : <https://thewordsearch.com/puzzle/5921021/>

Extra Questions:

1. What are the three common states of matter? _____

2. In which state of matter do particles have the most energy and move freely?

3. Which state of matter has a definite shape and volume?

4. What happens to the particles in a solid when it is heated?

5. Why does a gas take the shape and volume of its container?

6. What is the process called when a liquid turn into a gas?

7. When water freezes, what state of matter does it change into?

8. How is condensation different from evaporation?

9. What role does the Sun play in the water cycle?

10. What is filtration used for? Give an example.

Draw a comic strip on one of the topics. Ask your teacher for ideas.

Colouring Sheet

