States of Matter

Challenge Cards

States of Matter

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Challenge Cards

Can you rearrange the letters in this anagram to make a word to do with changing state?

ezerfing

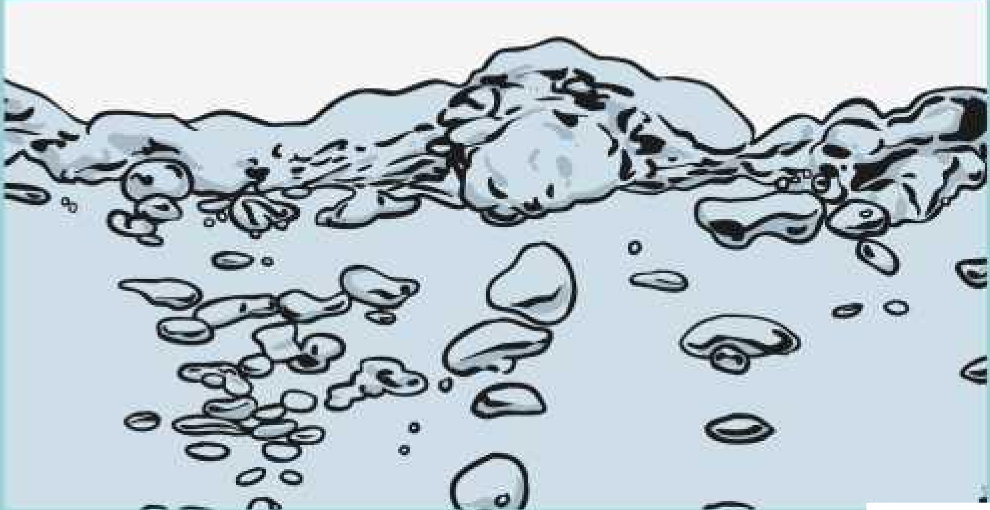
What does it mean?

Can you rearrange the letters in this anagram to make a word to do with changing state?

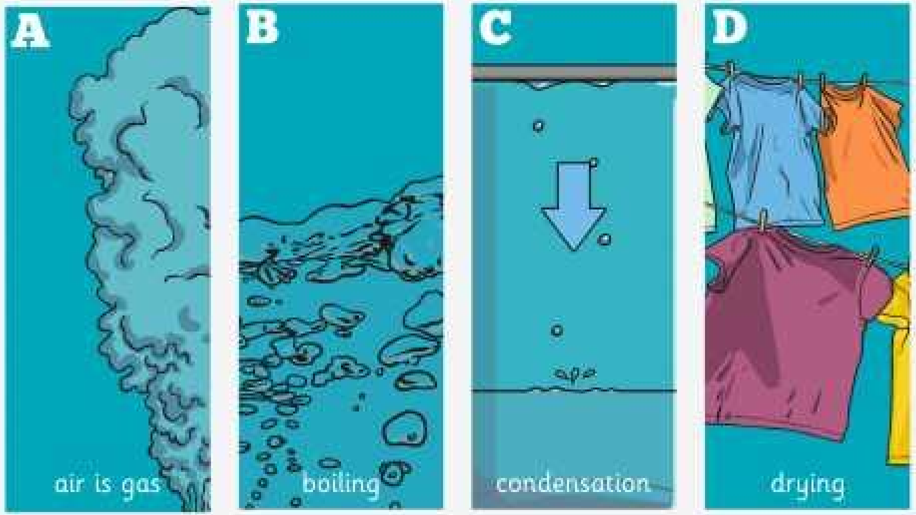
legnimt

What does it mean?

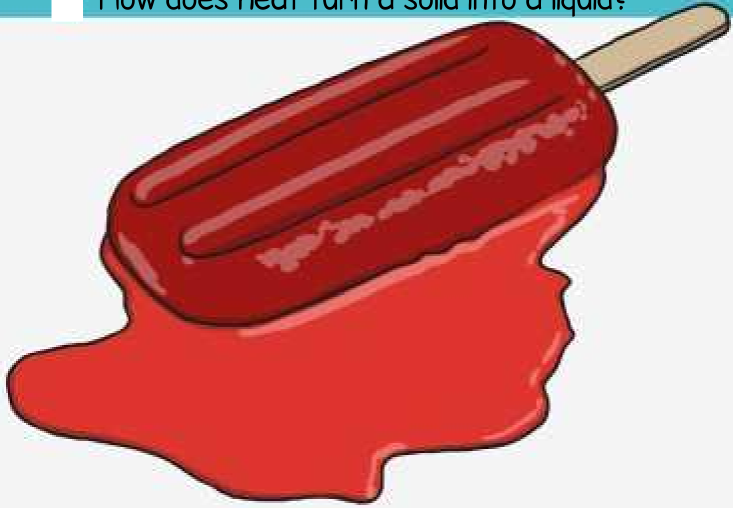
What is the freezing point of water?
What is the boiling point of water?



Can you create an A-Z of states of matter?



How does heat affect the particles in a solid?
How does heat turn a solid into a liquid?



Put the stages of the water cycle in the correct order:

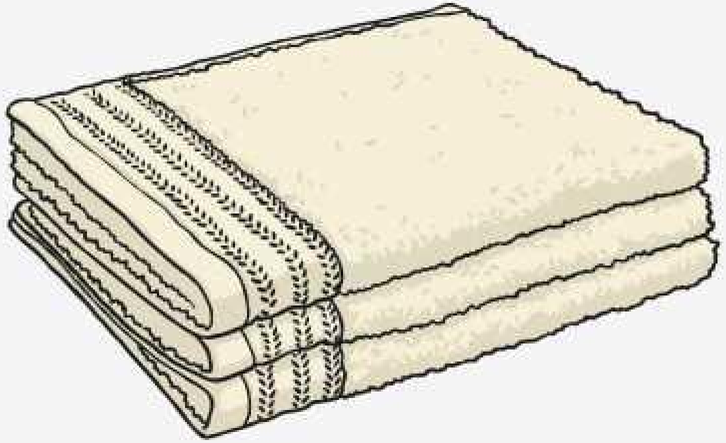
precipitation

condensation

collection

evaporation

Why does condensation form on a bathroom mirror after the shower has been on?



Are these statements true or false?

Evaporation is the process of a solid changing to a liquid.	Water has to be boiling for it to evaporate.
Water freezes at -1°C.	Condensation is the process of a gas changing to a liquid.
When a liquid turns to gas, the particles in the material move slower.	

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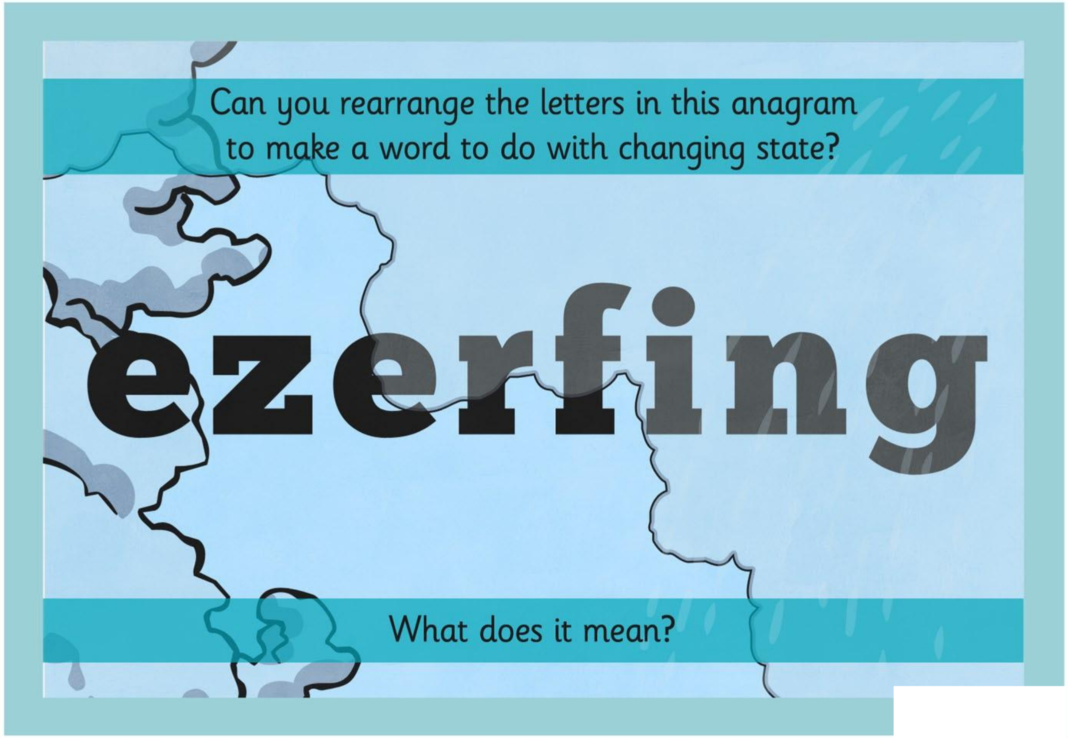
Can you rearrange the letters in this anagram
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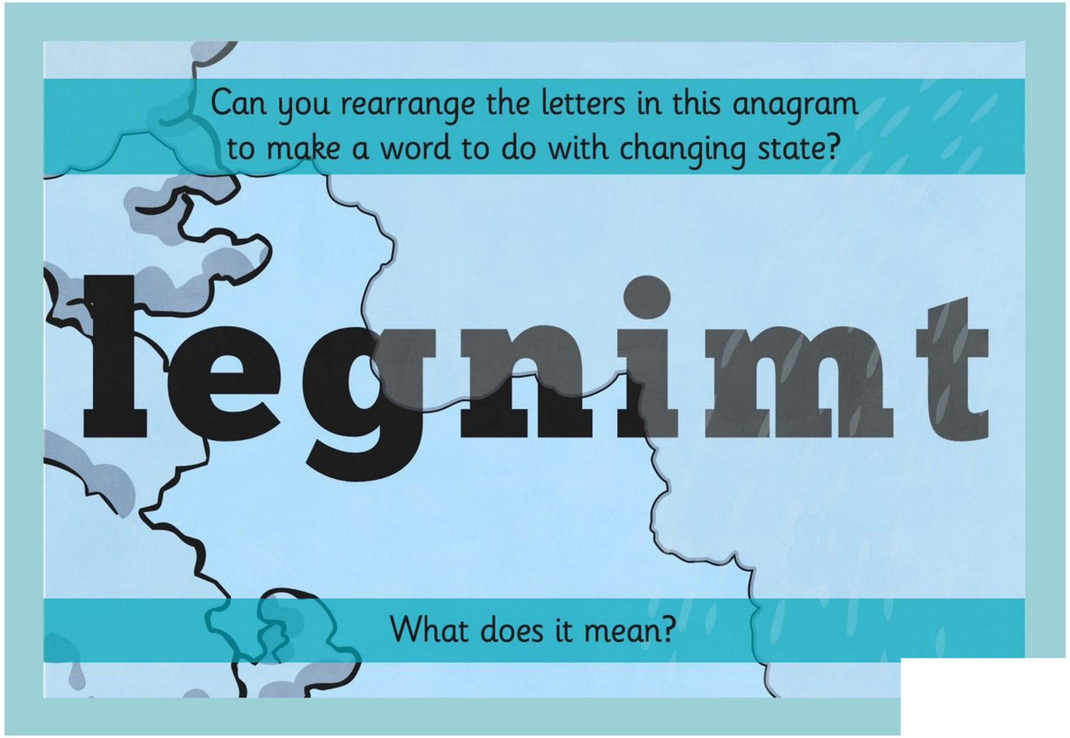
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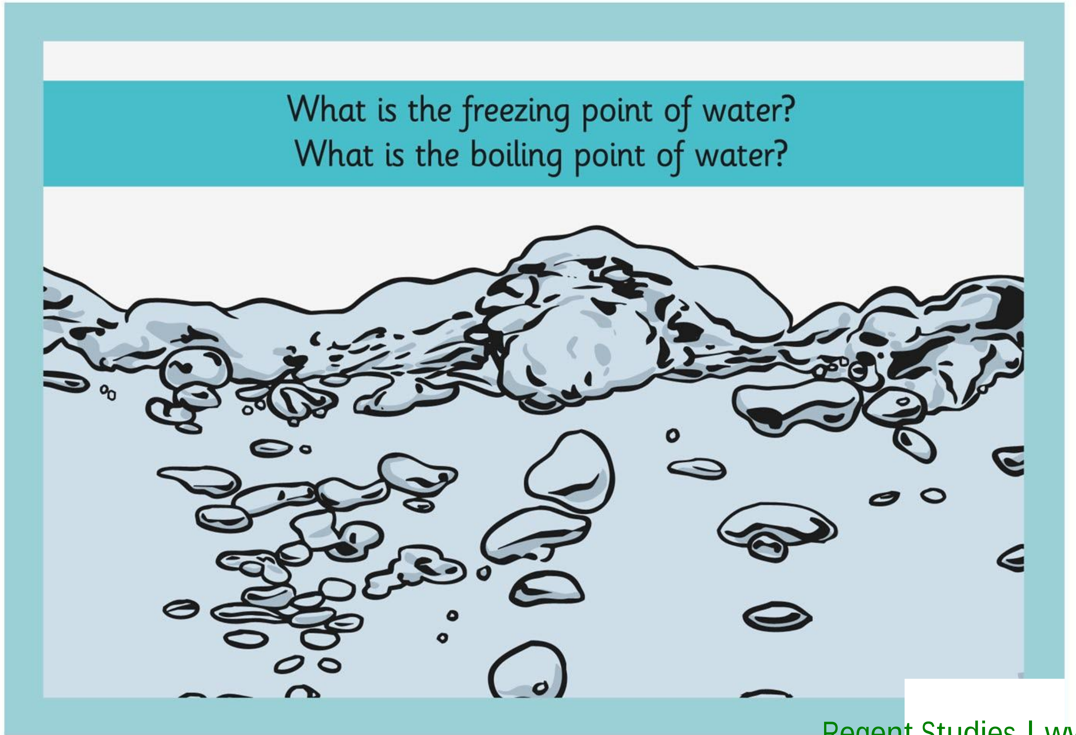
What is the freezing point of water?
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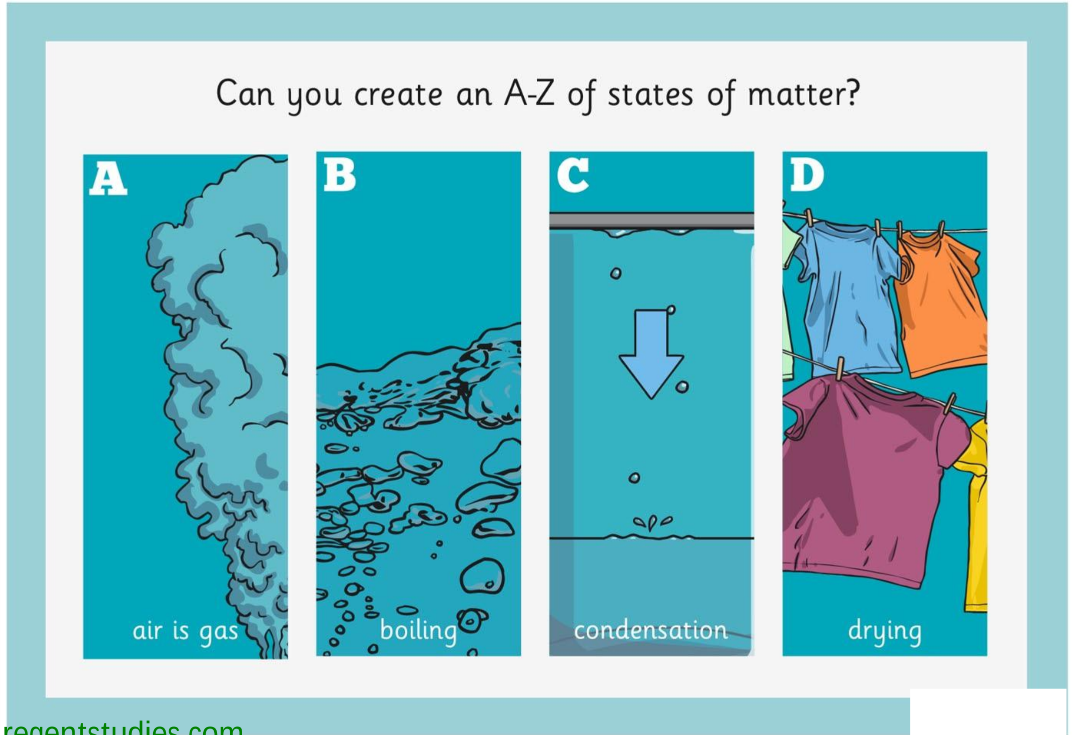
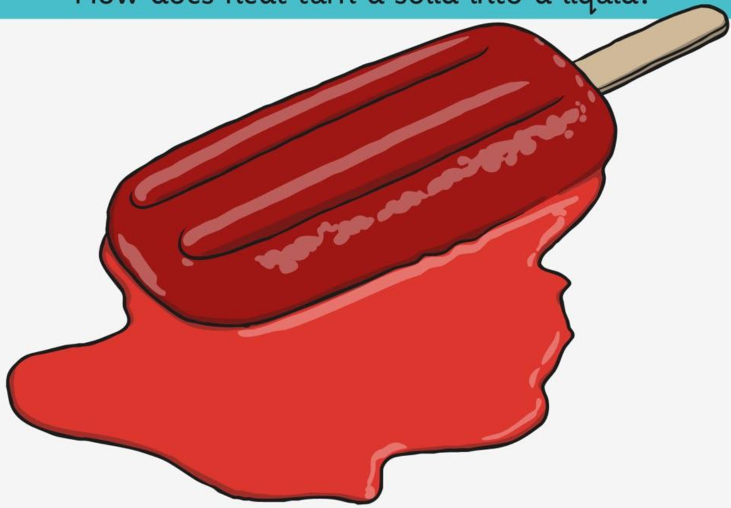

Can you create an A-Z of states of matter?
A
air is gas
B
boiling
C
condensation
D
drying

How does heat affect the particles in a solid?
How does heat turn a solid into a liquid?



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States

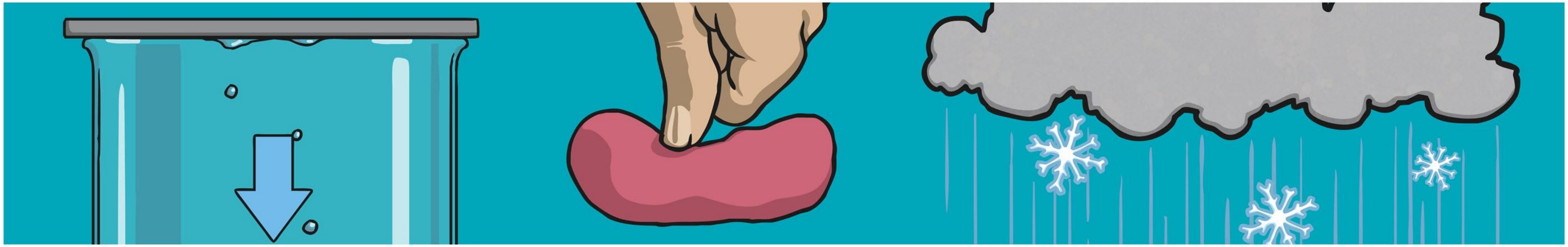
s of M

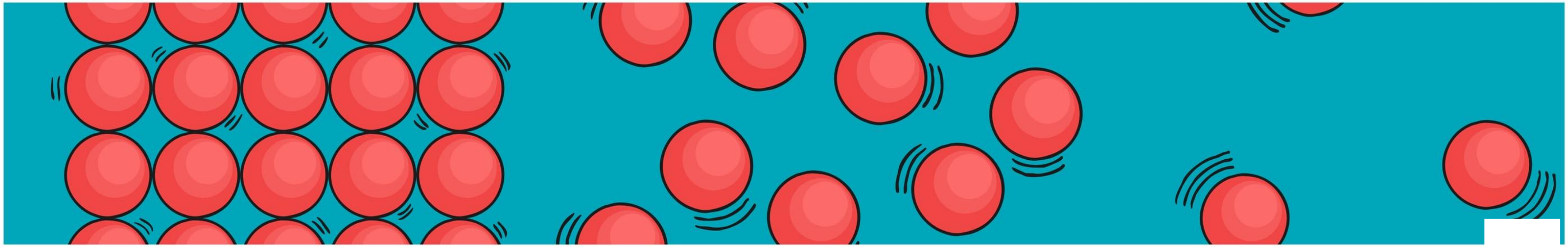
Matter

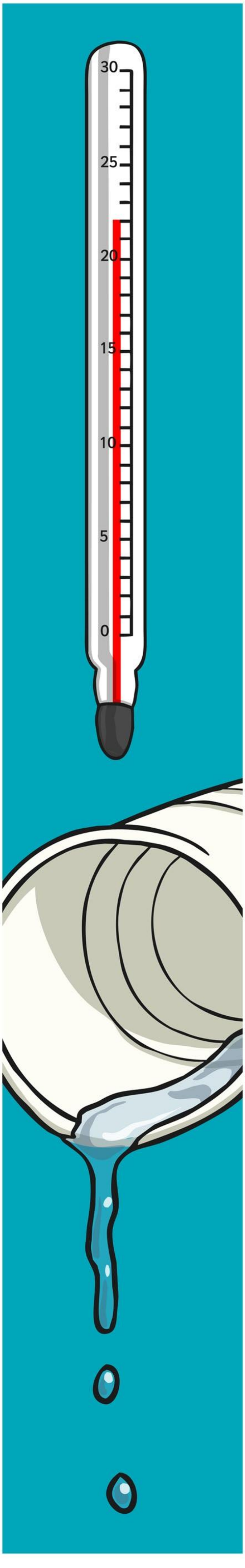
State

s of M

atter

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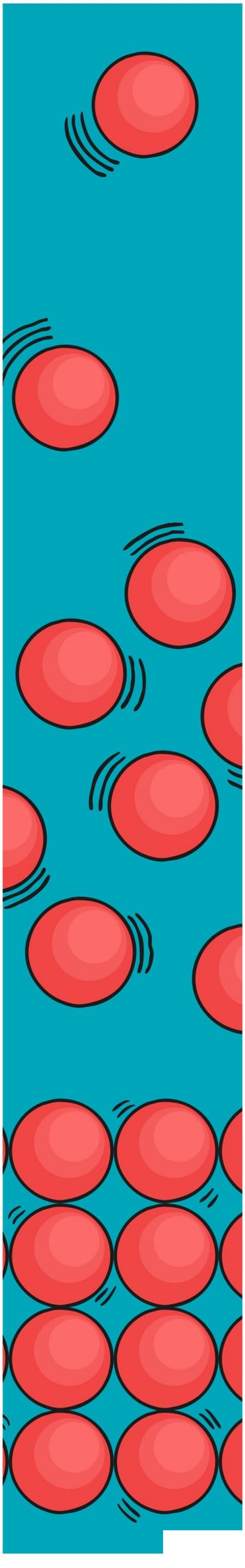

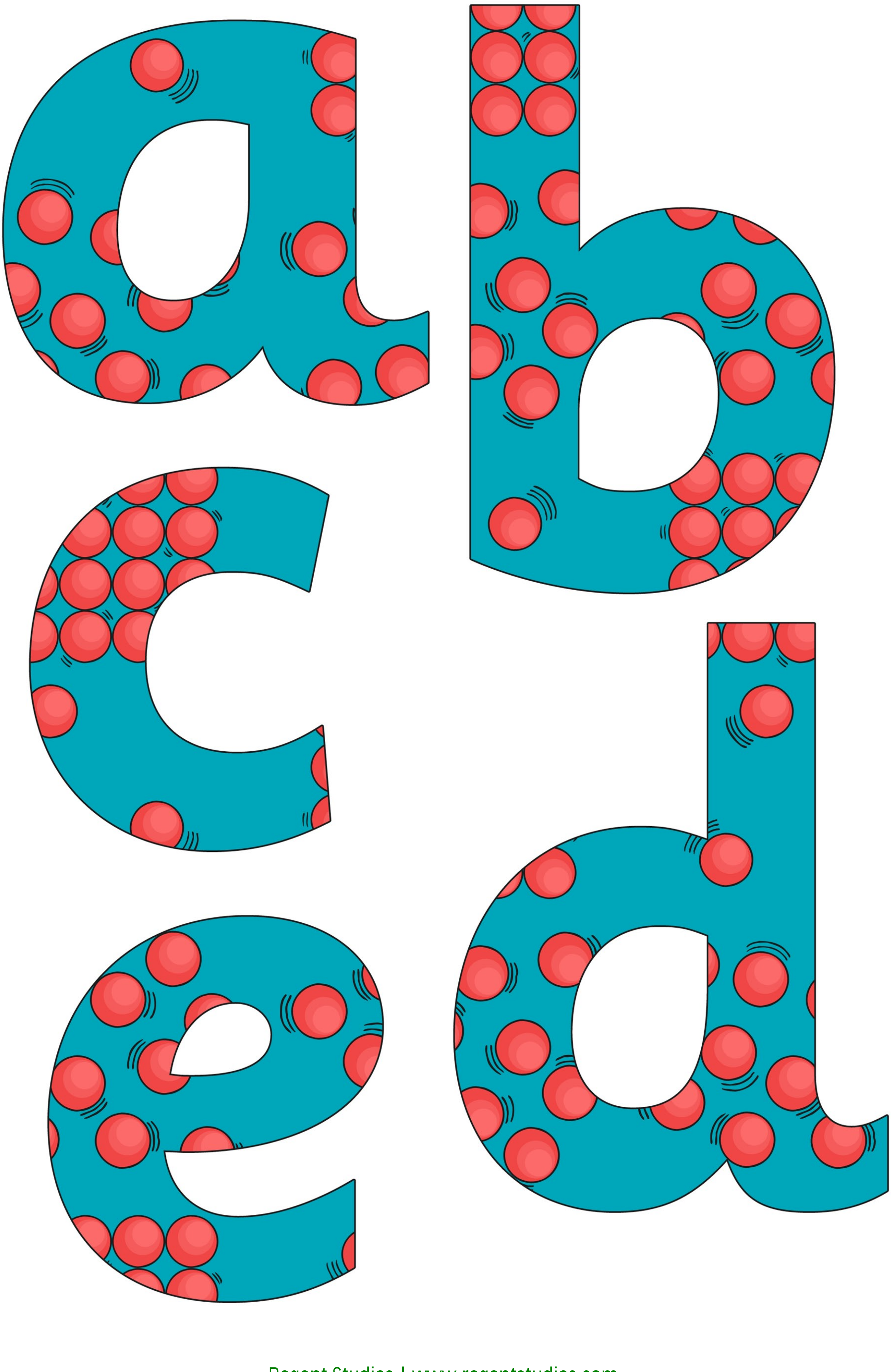
a
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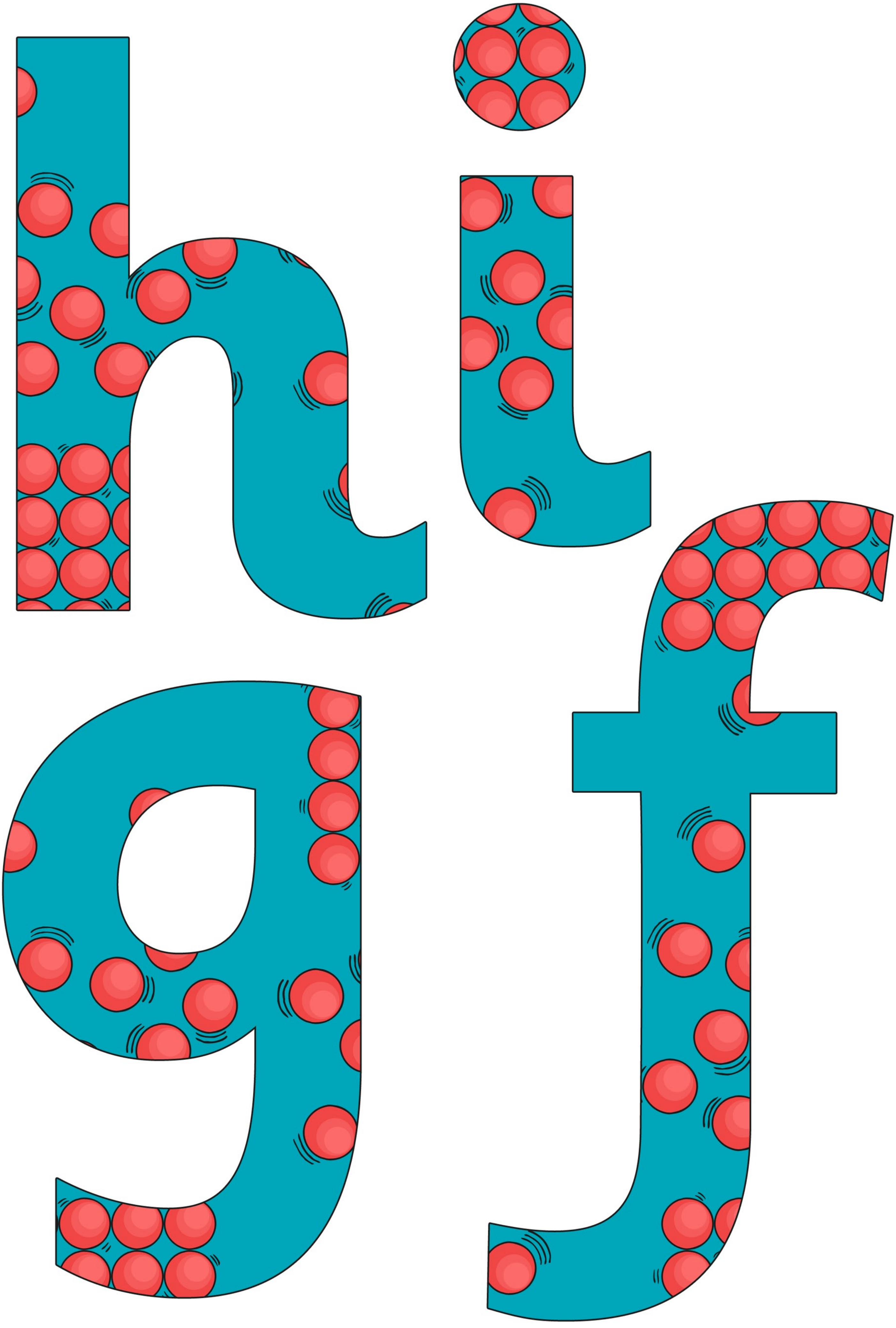
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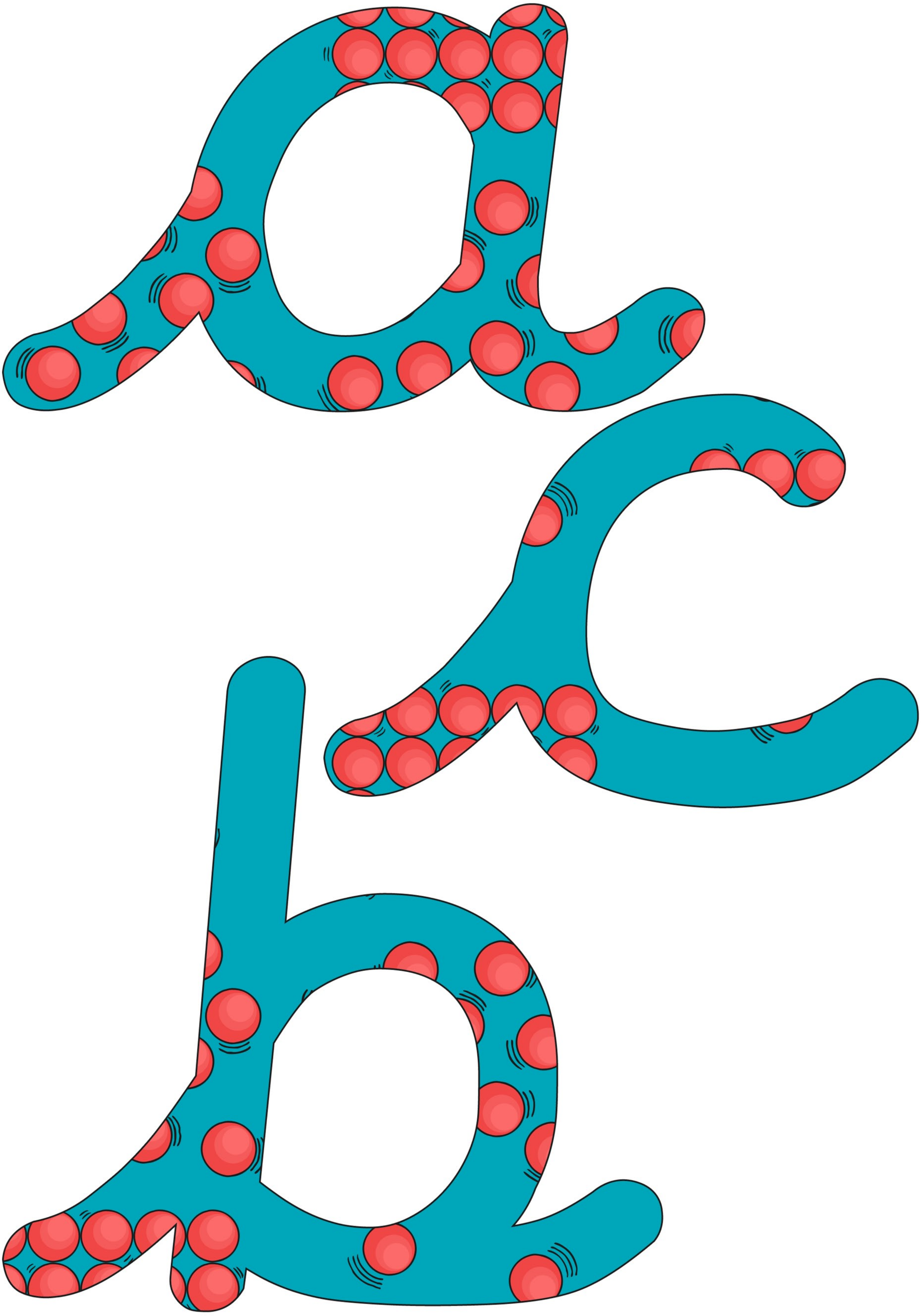

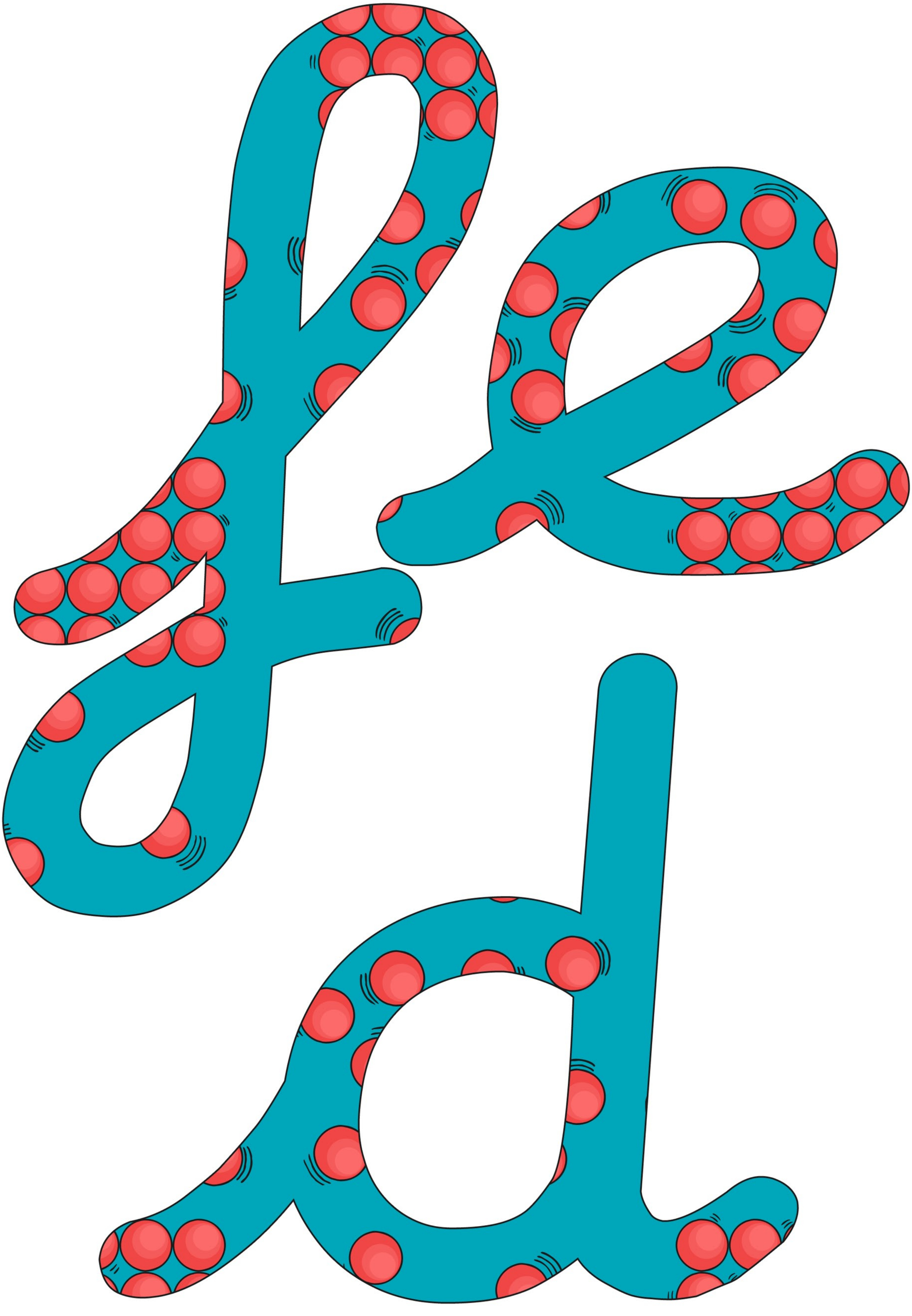
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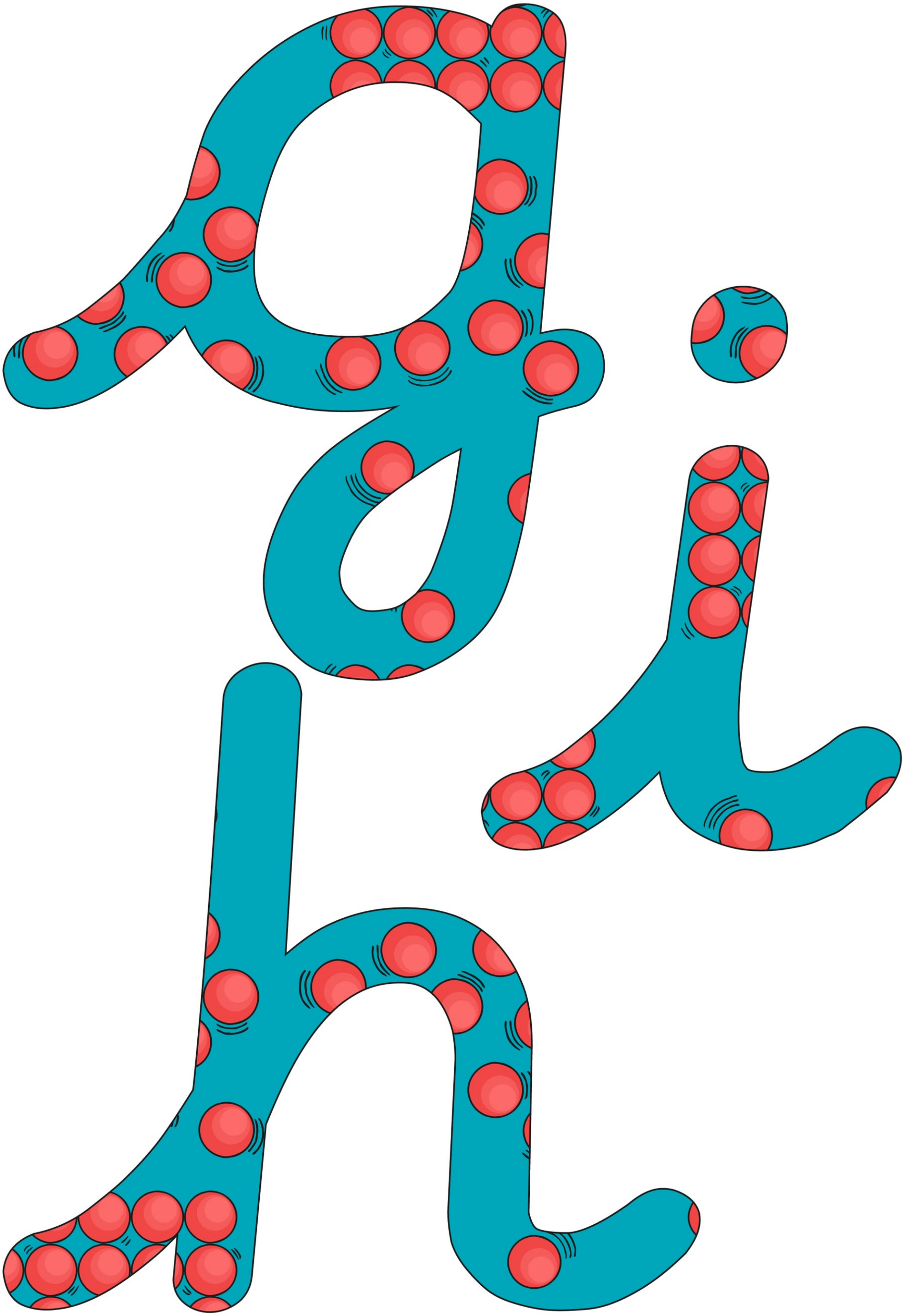
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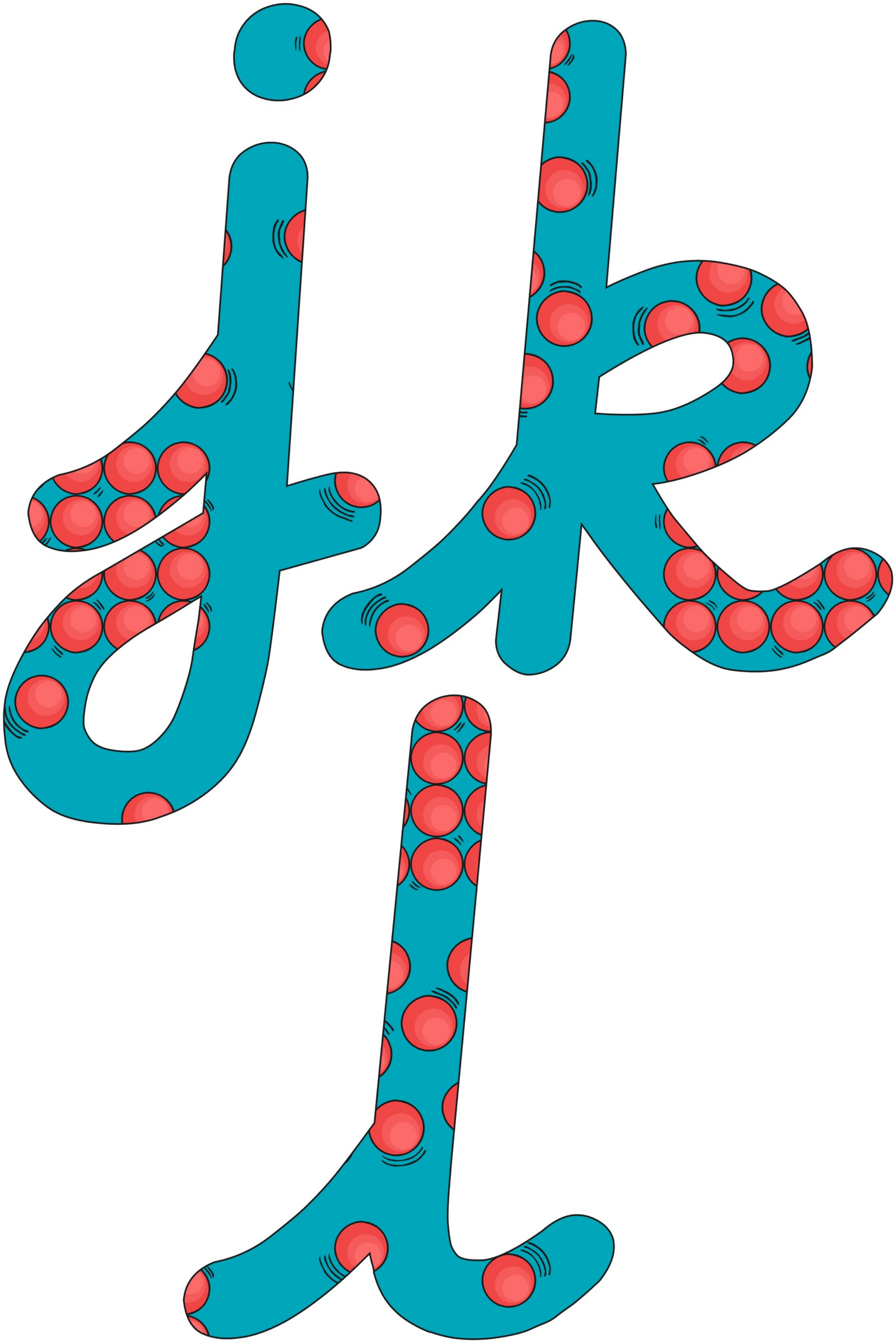
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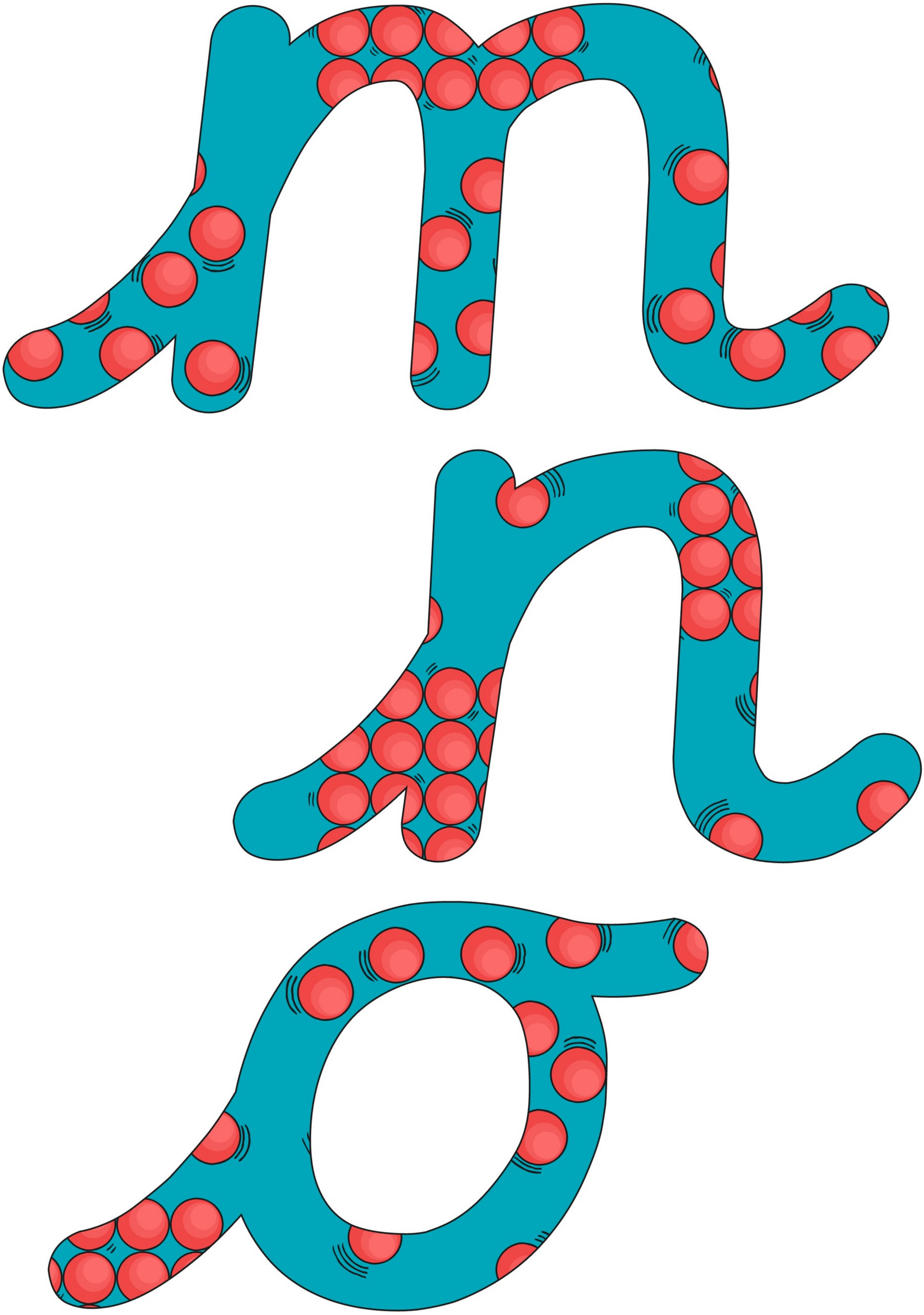

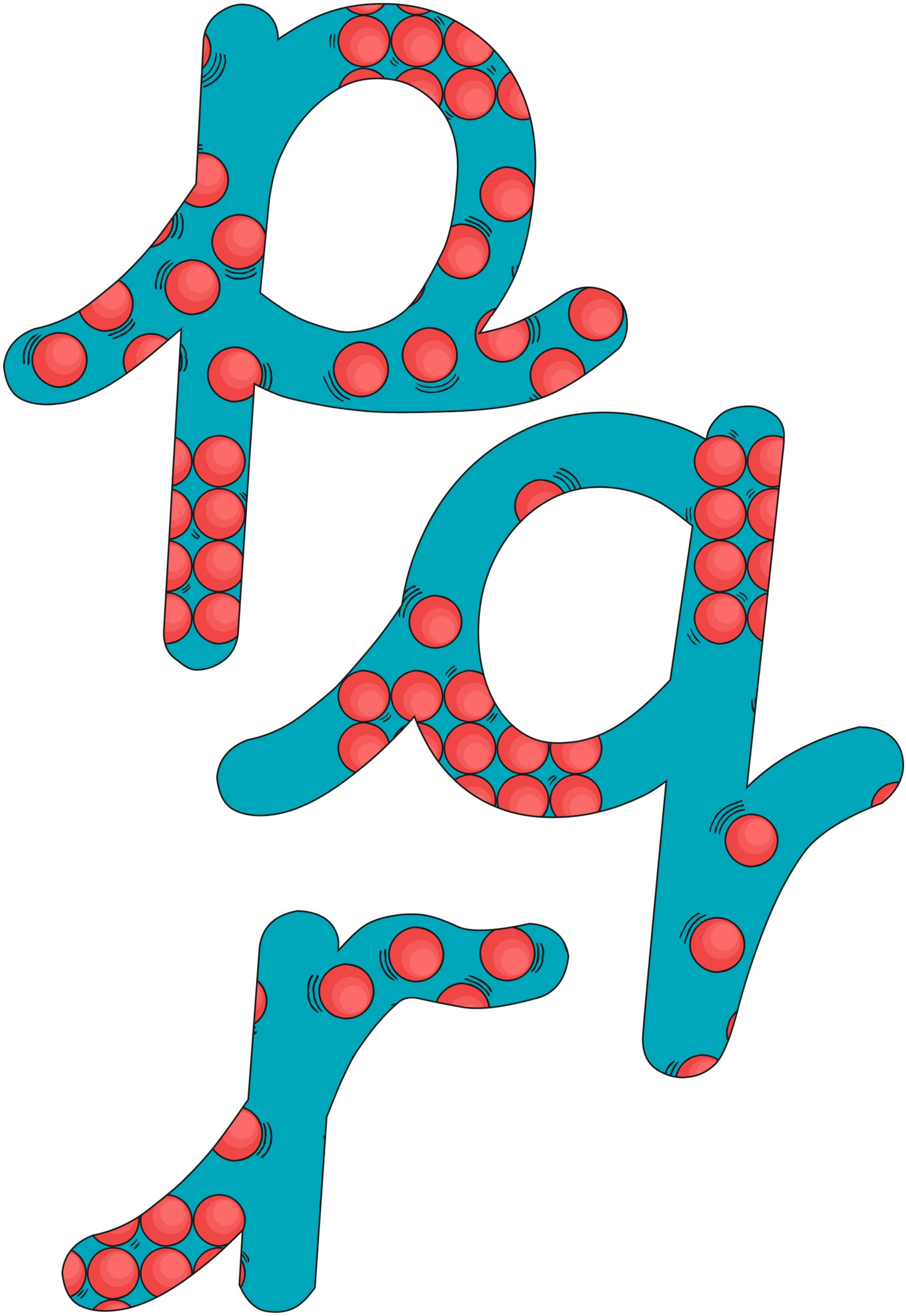
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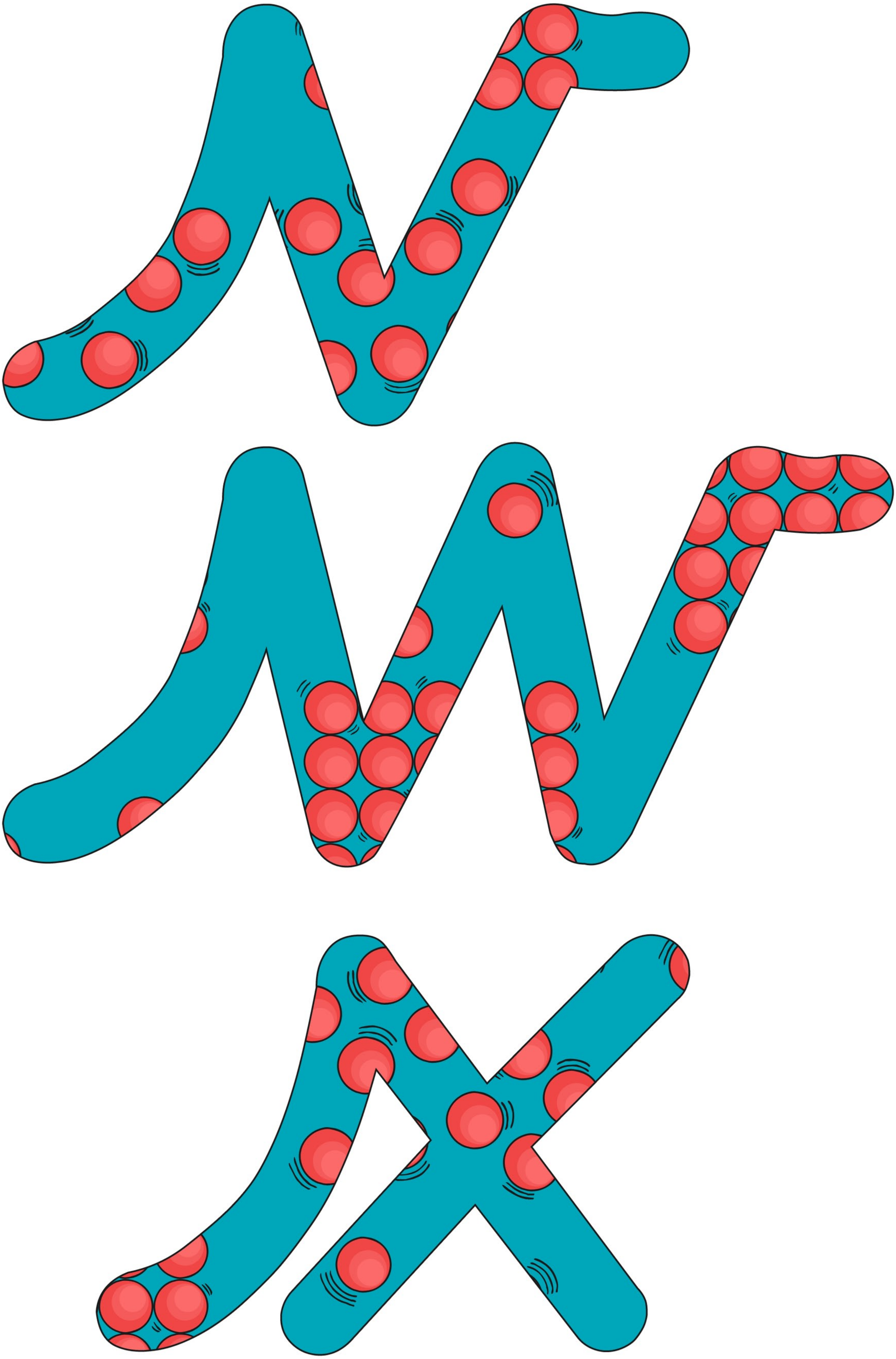
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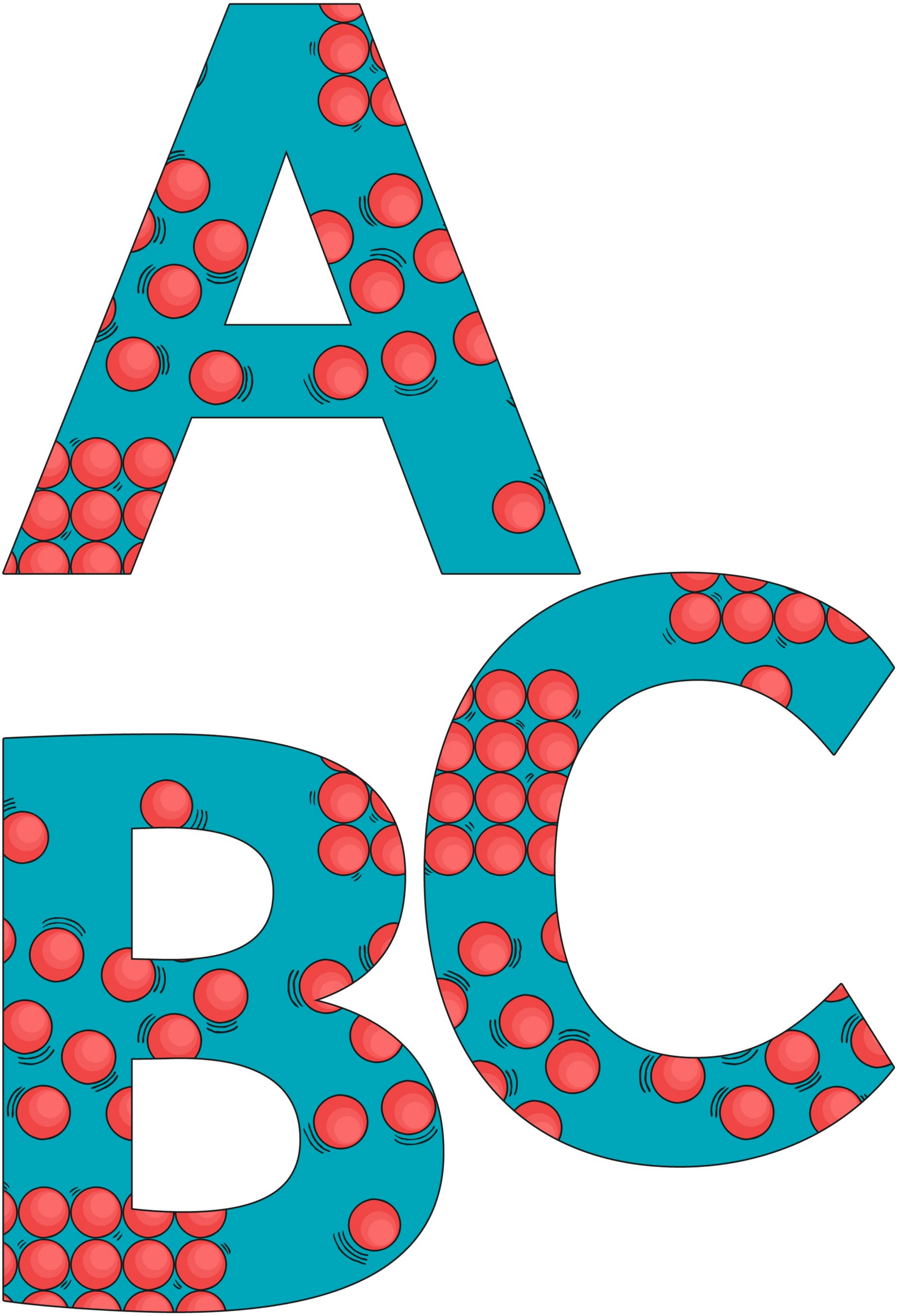
A
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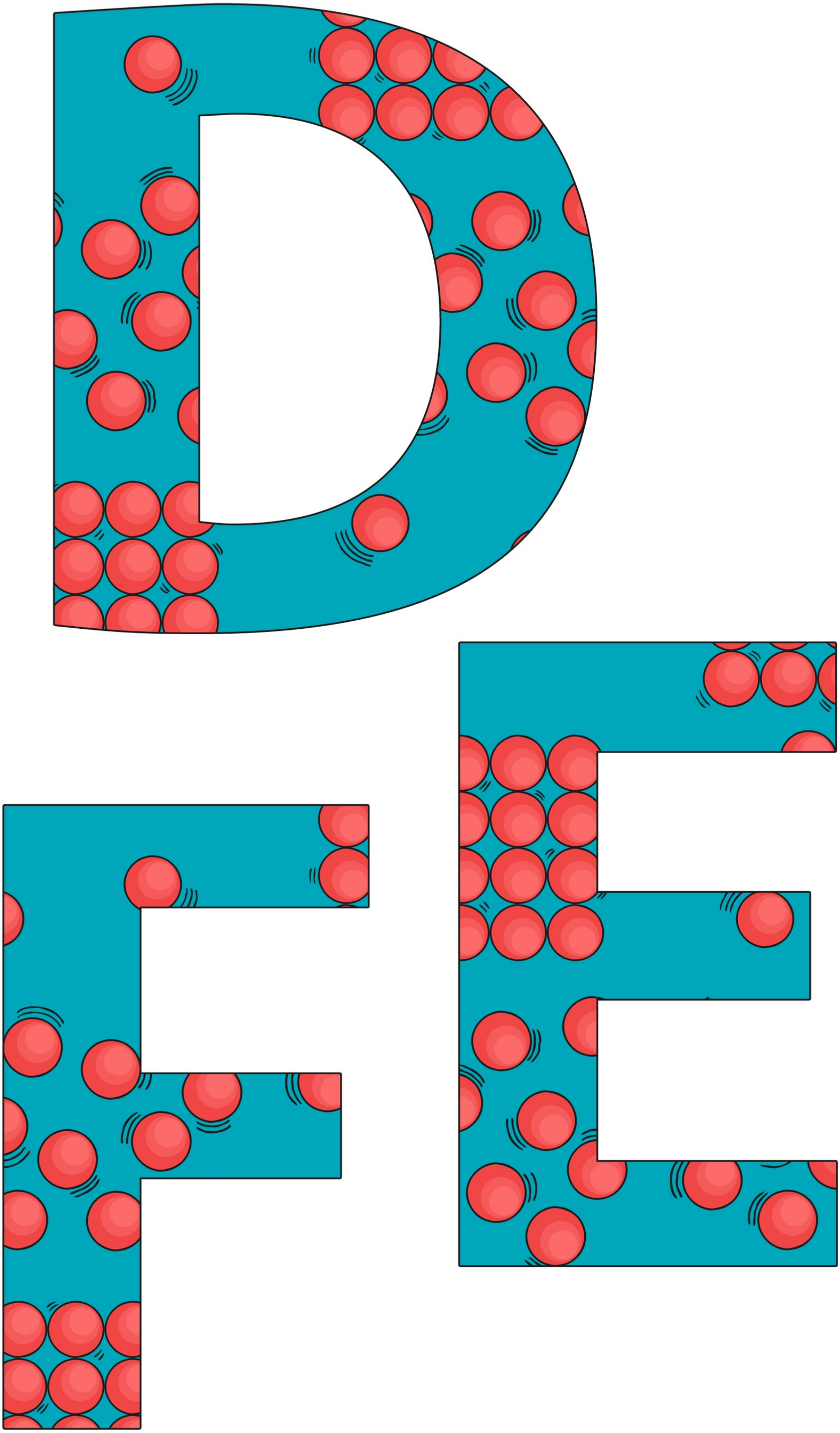
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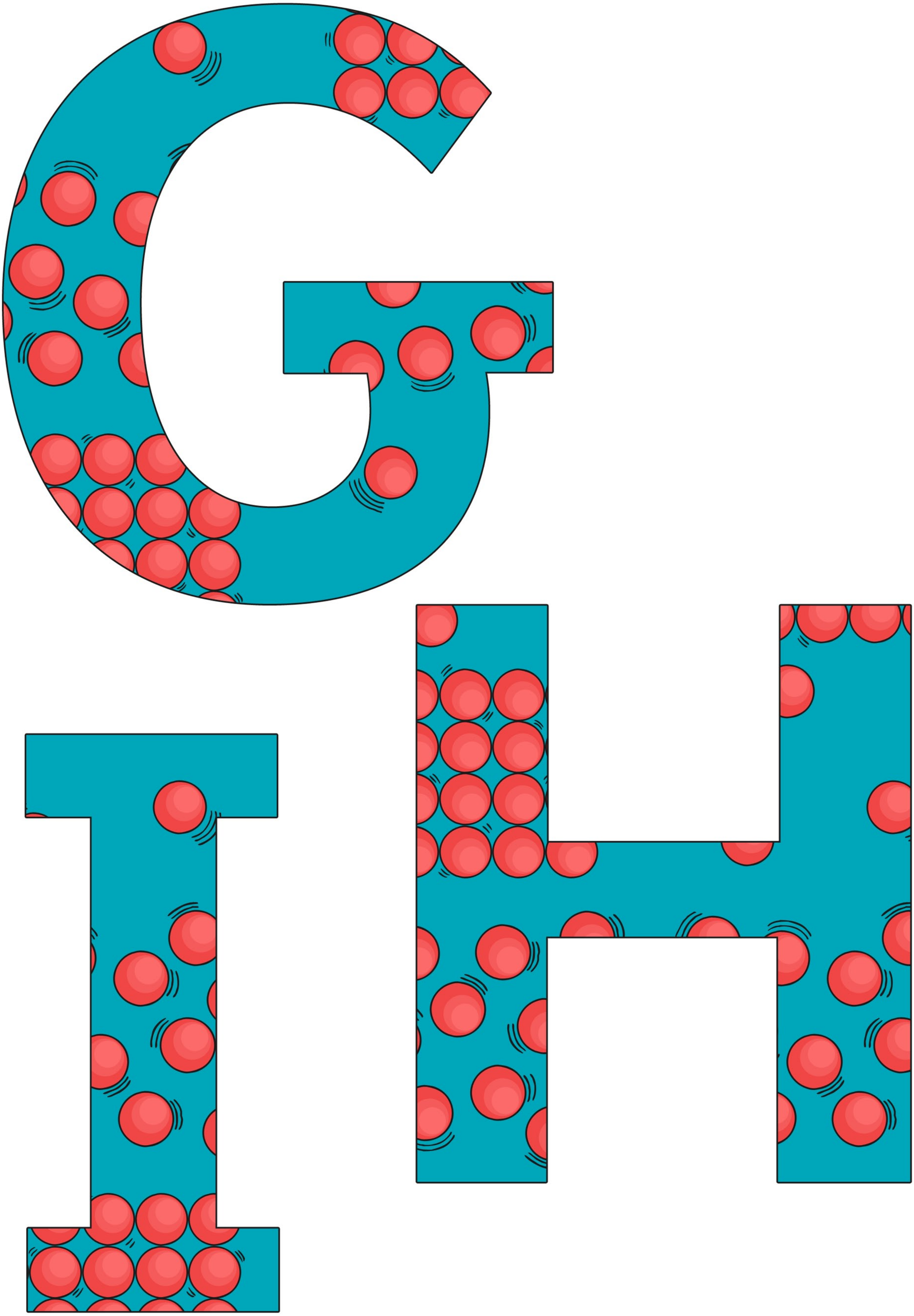
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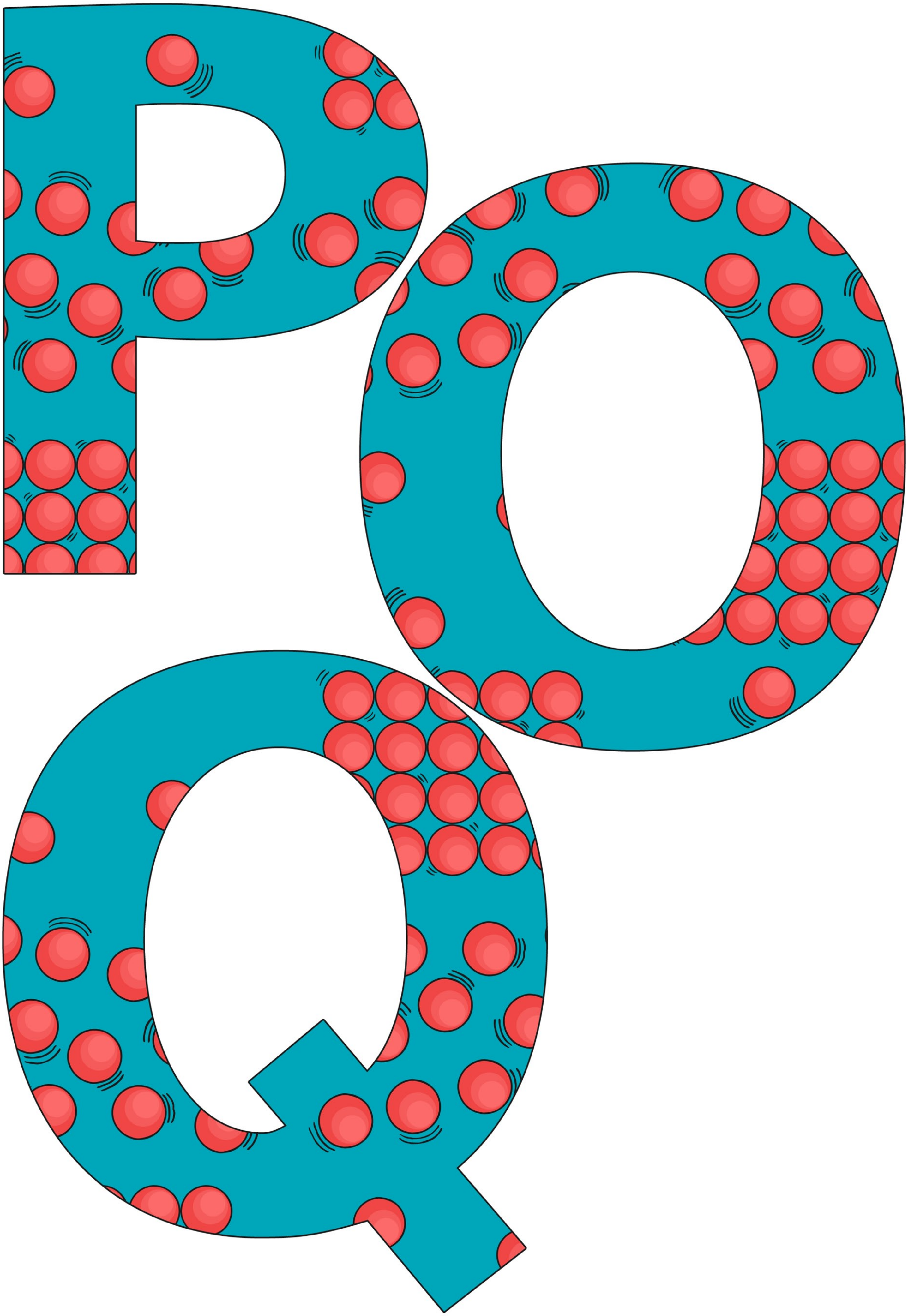
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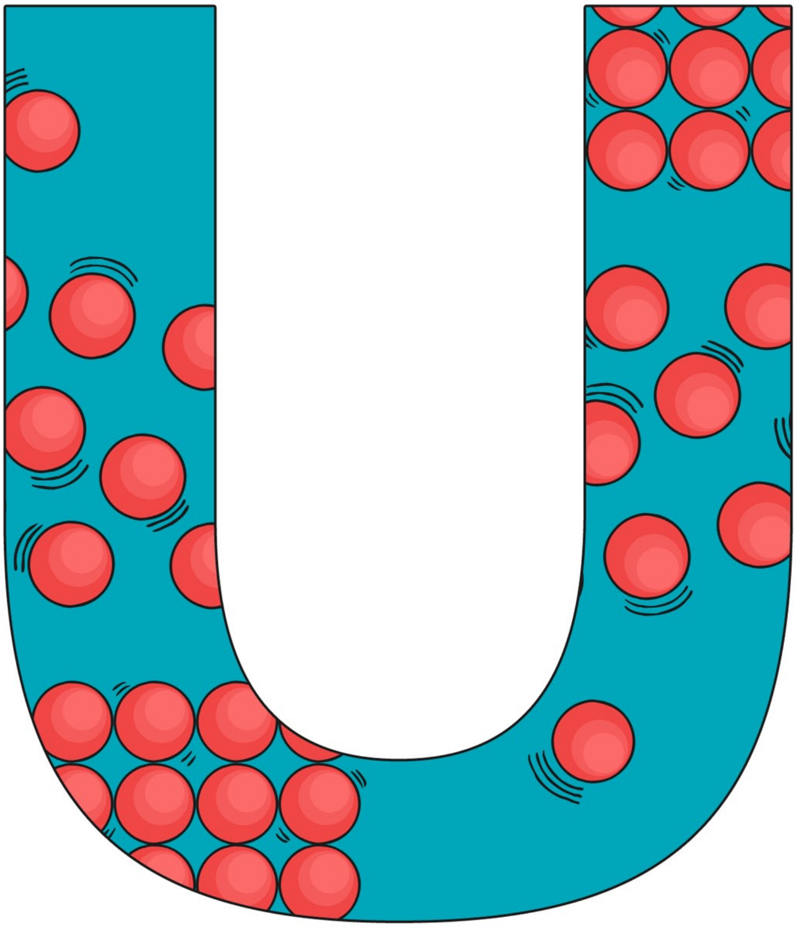
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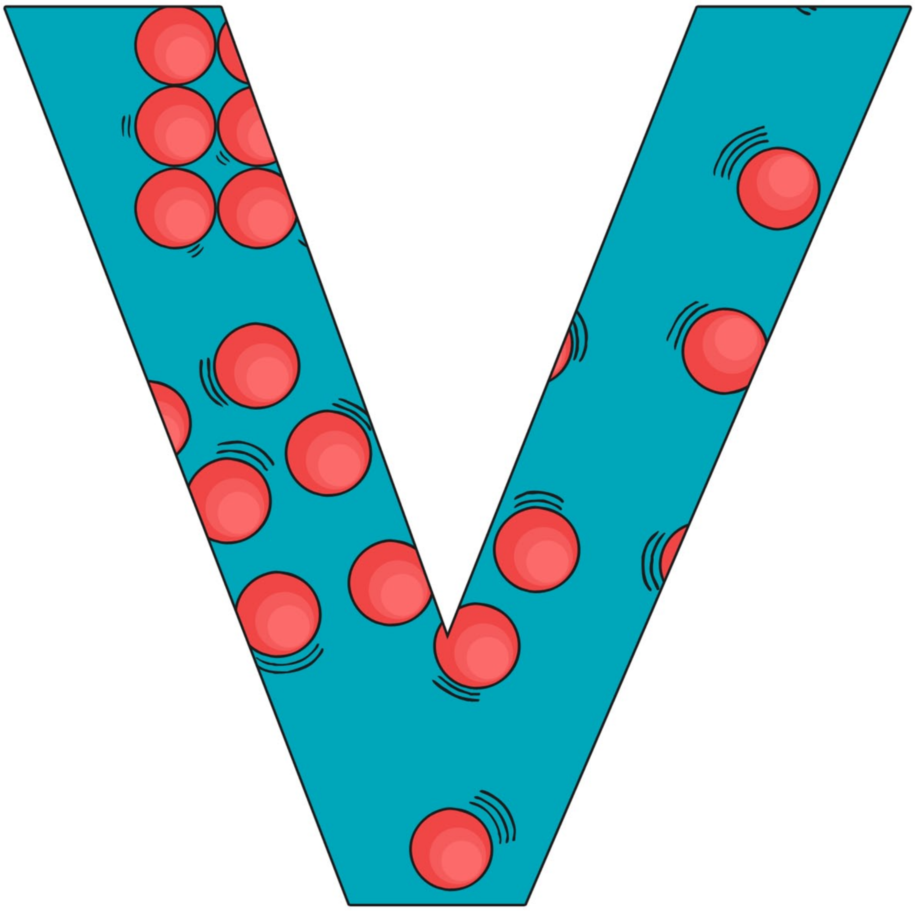
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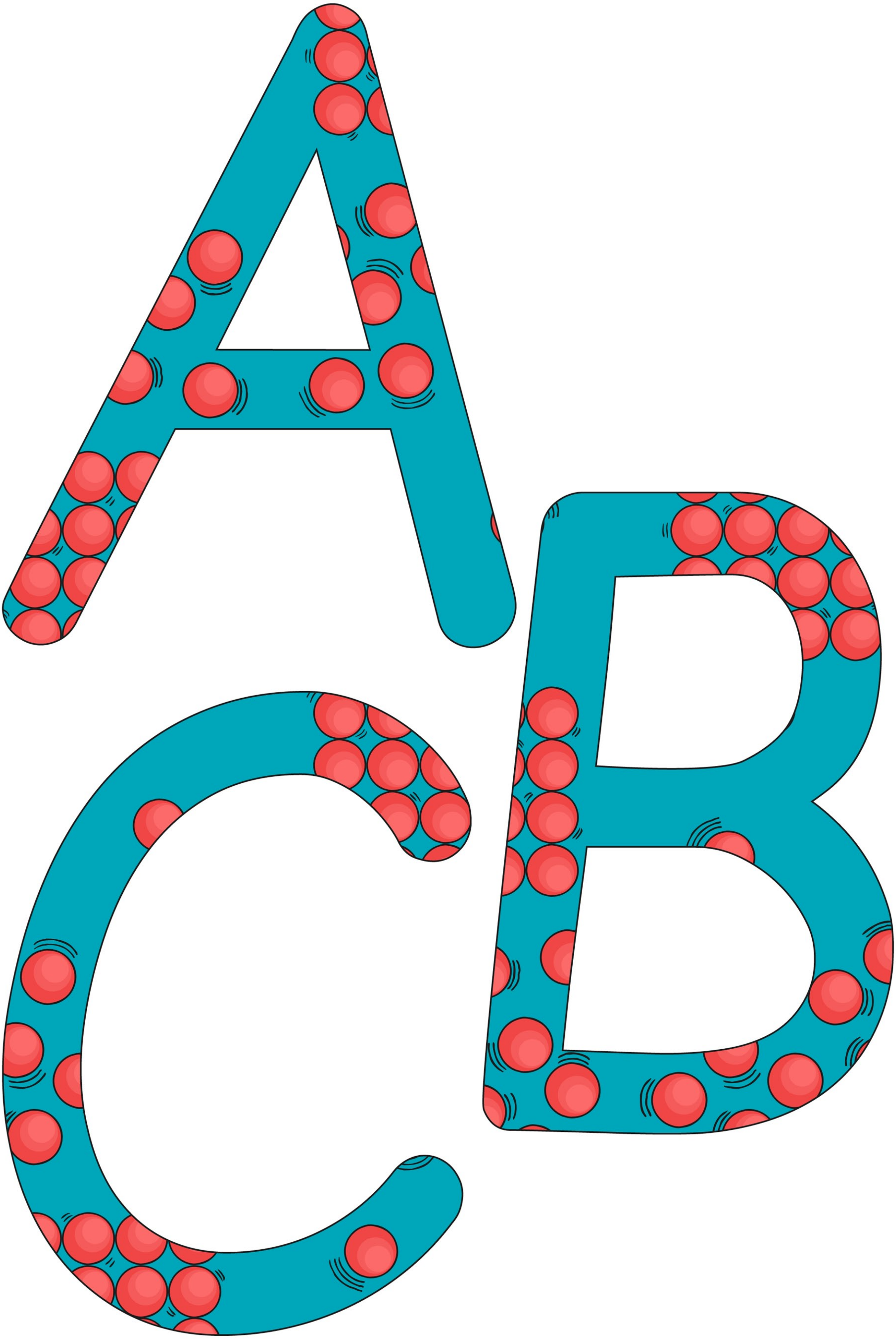
A
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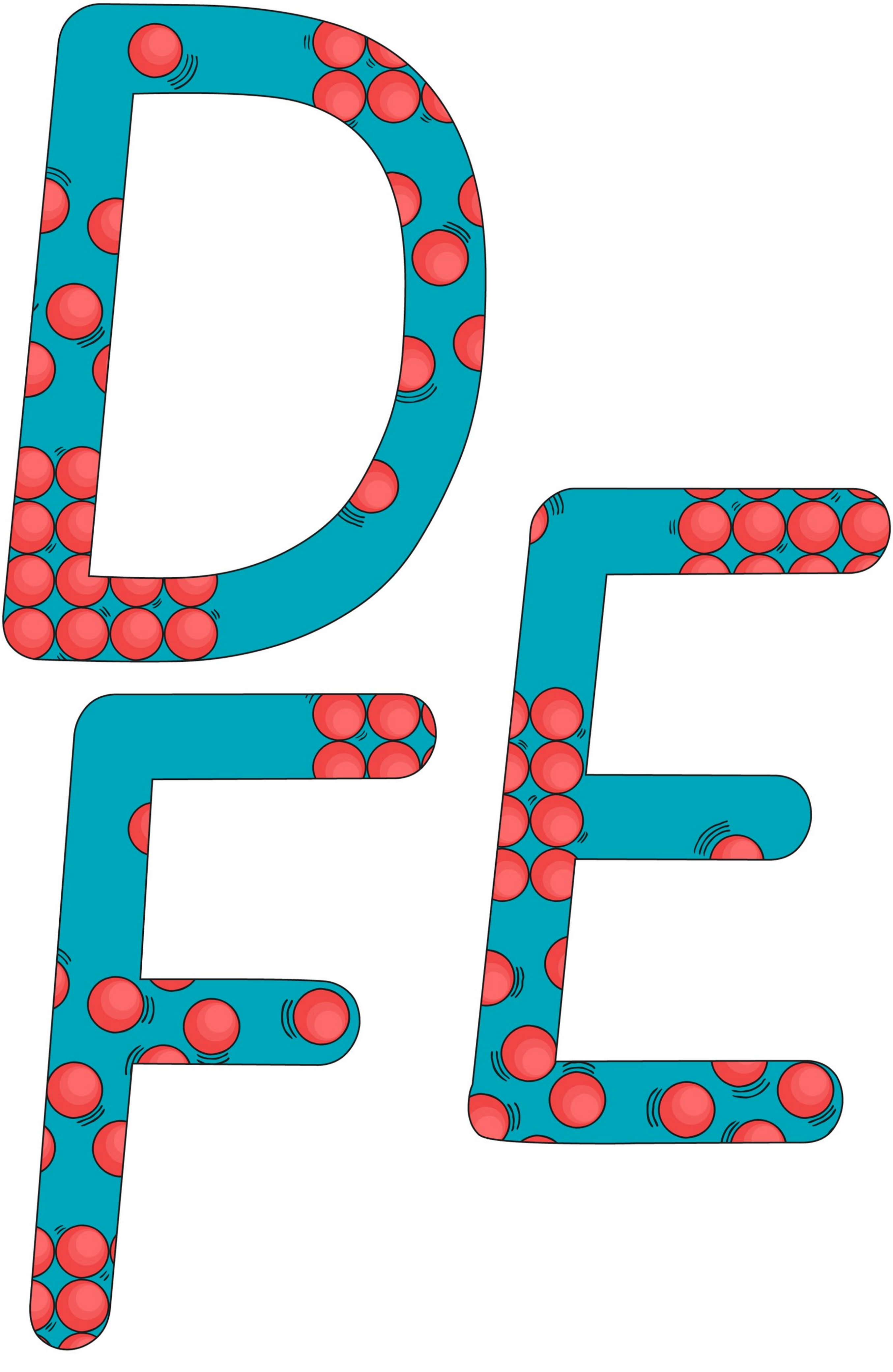
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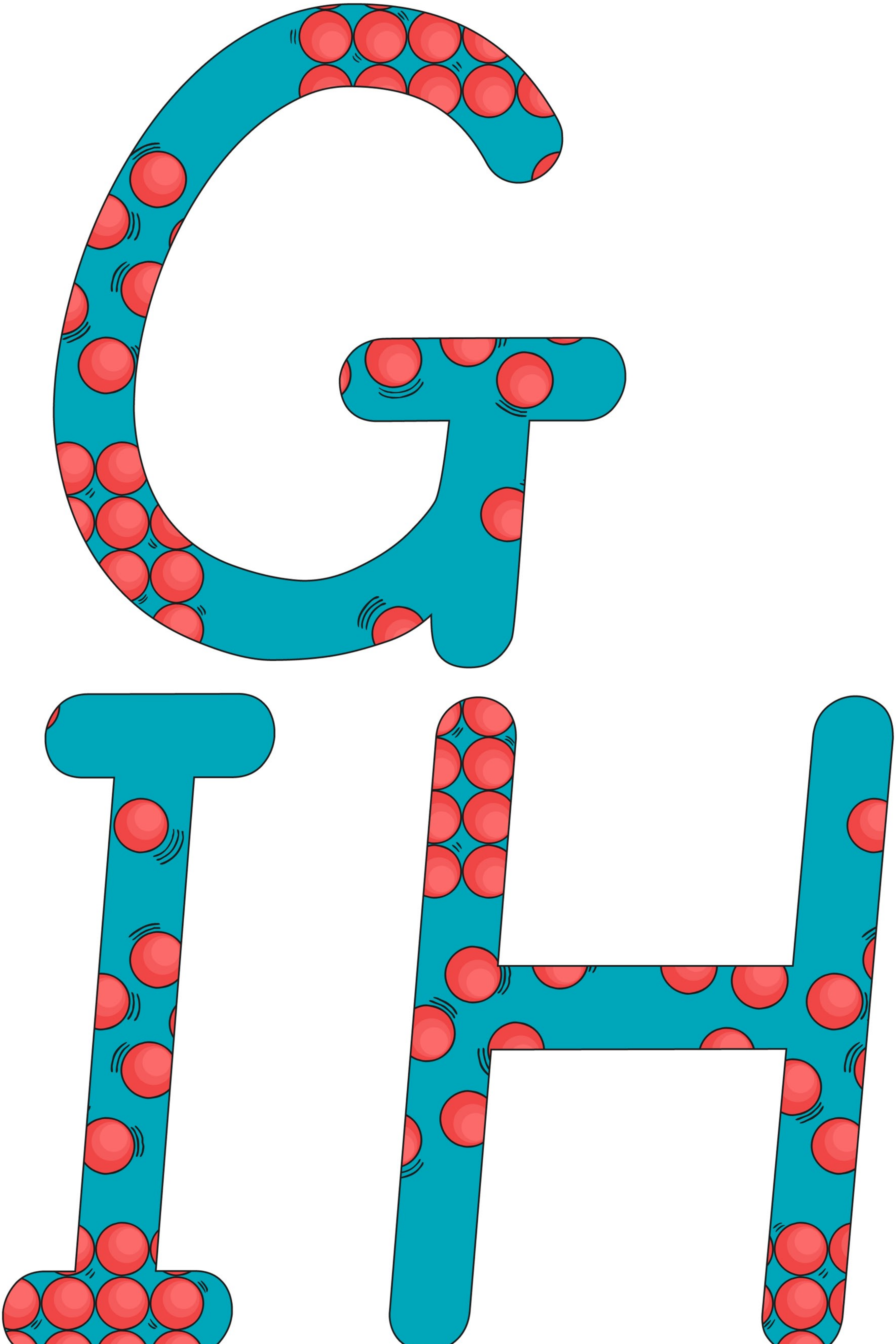
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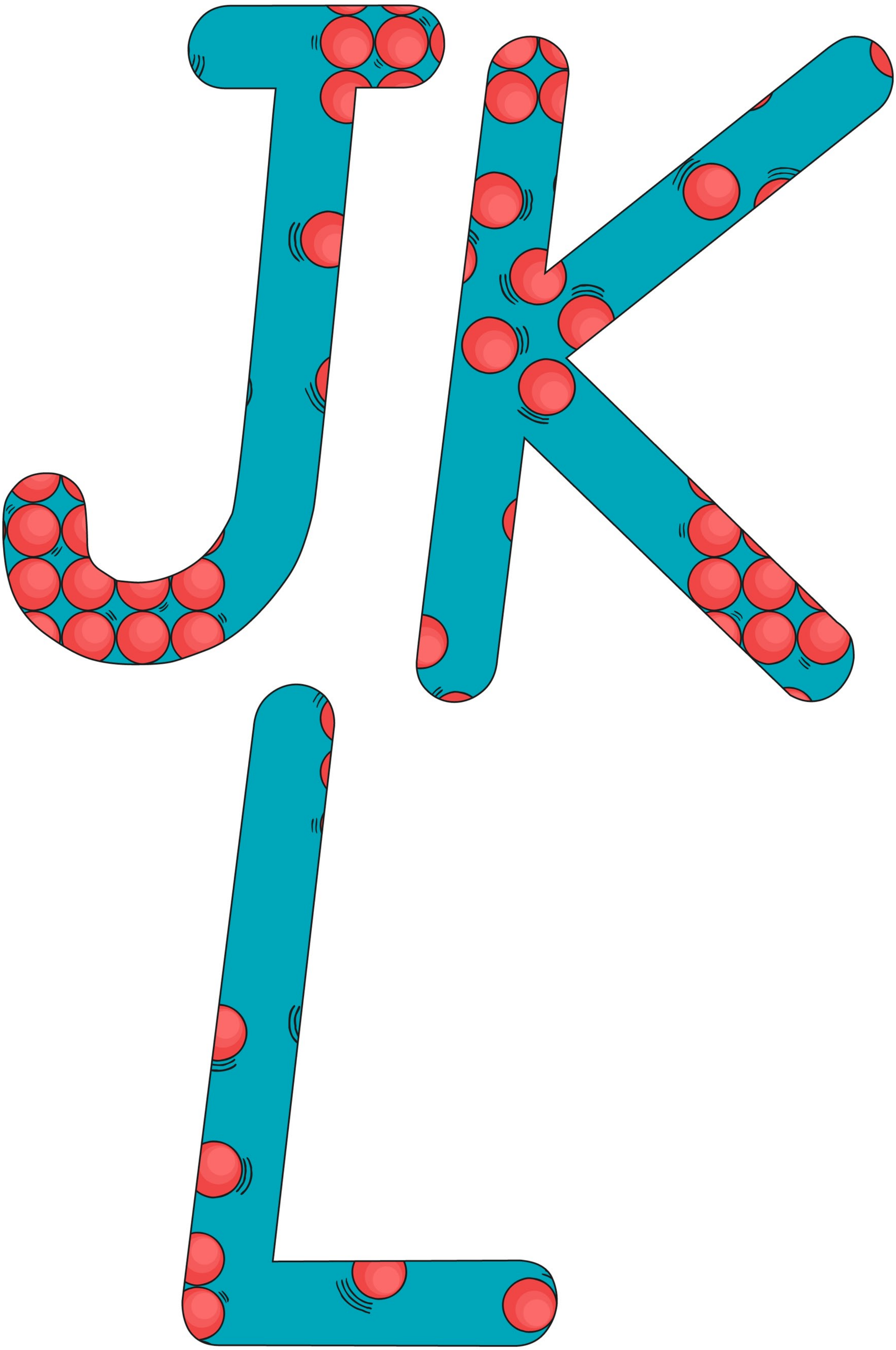
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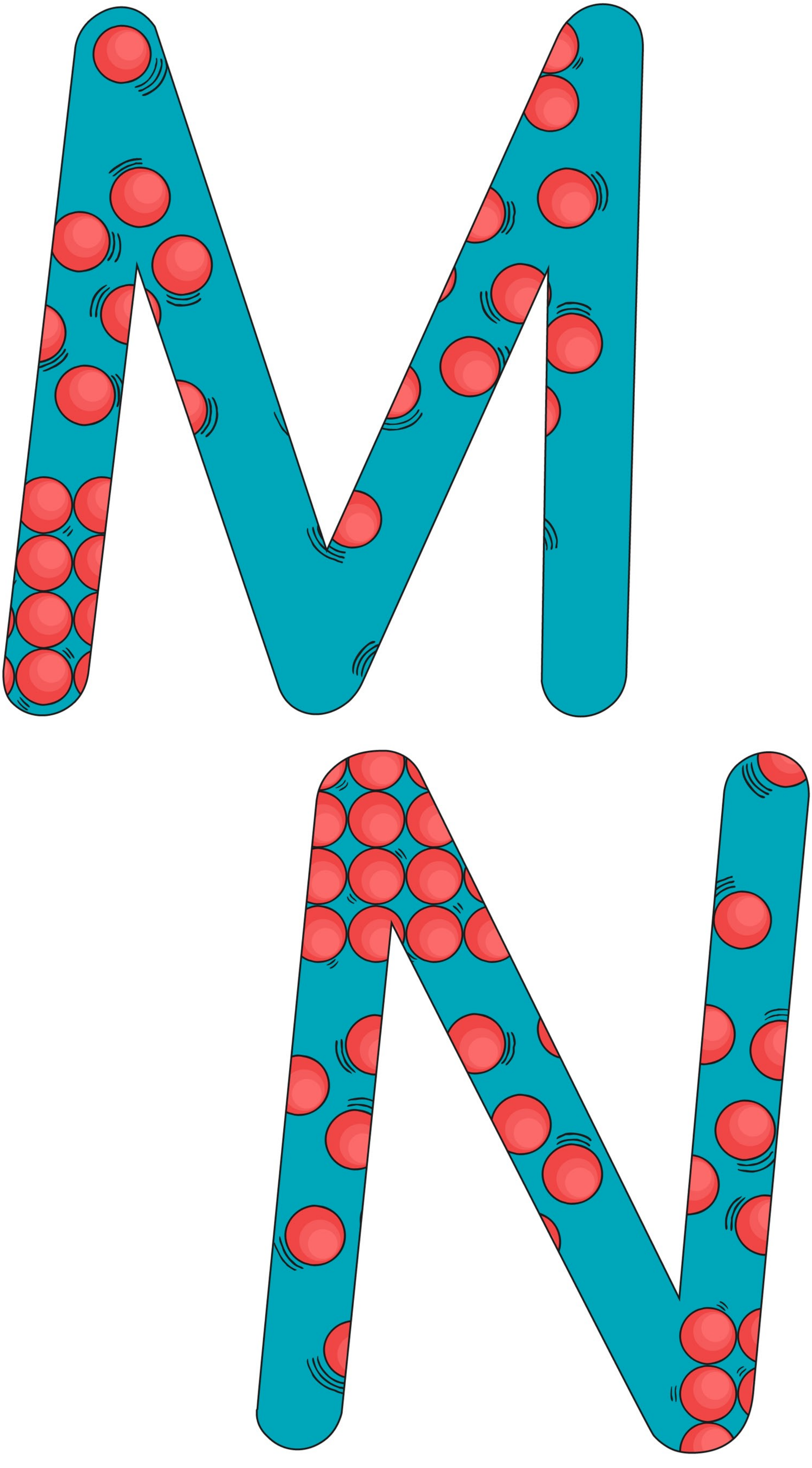
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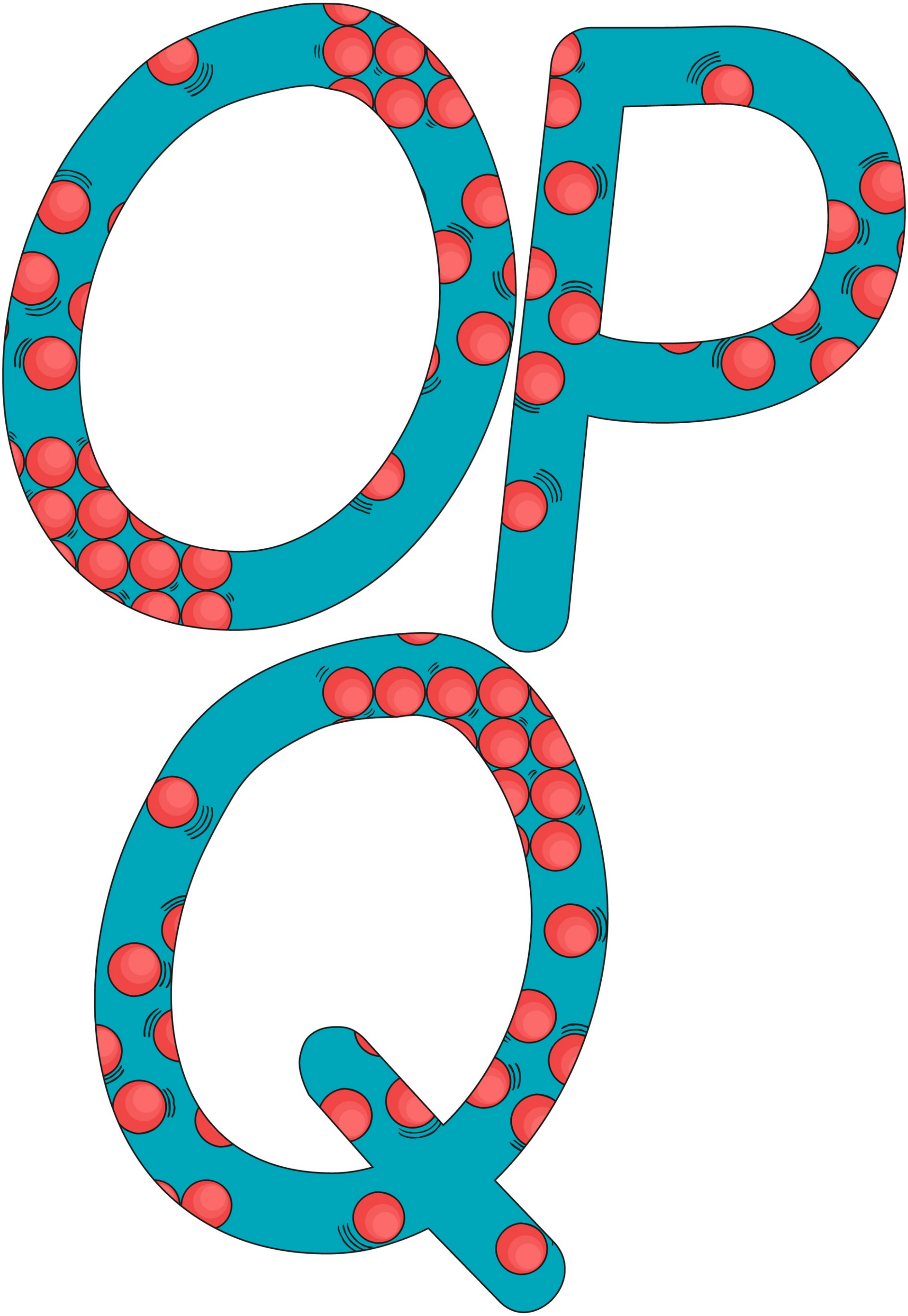

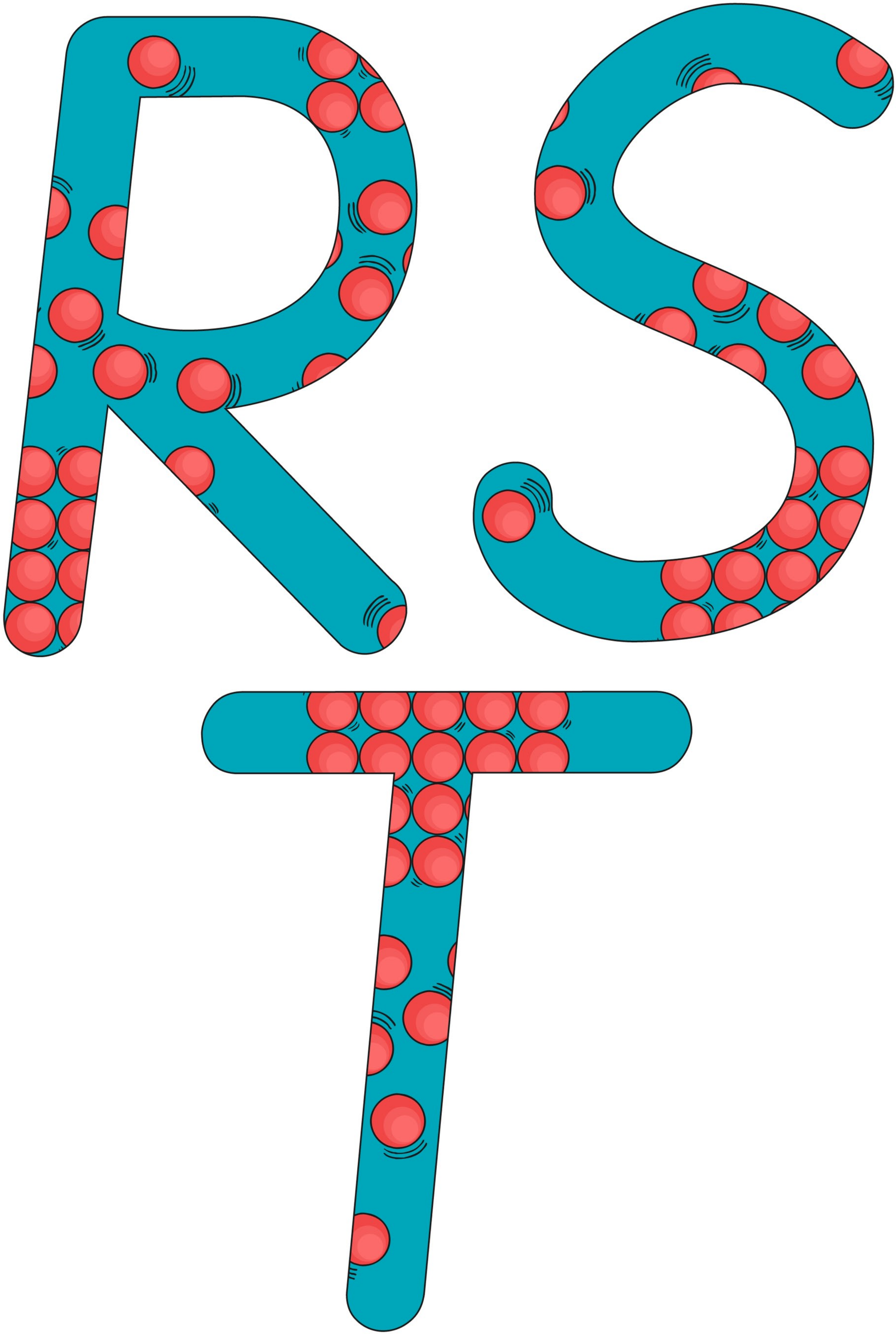
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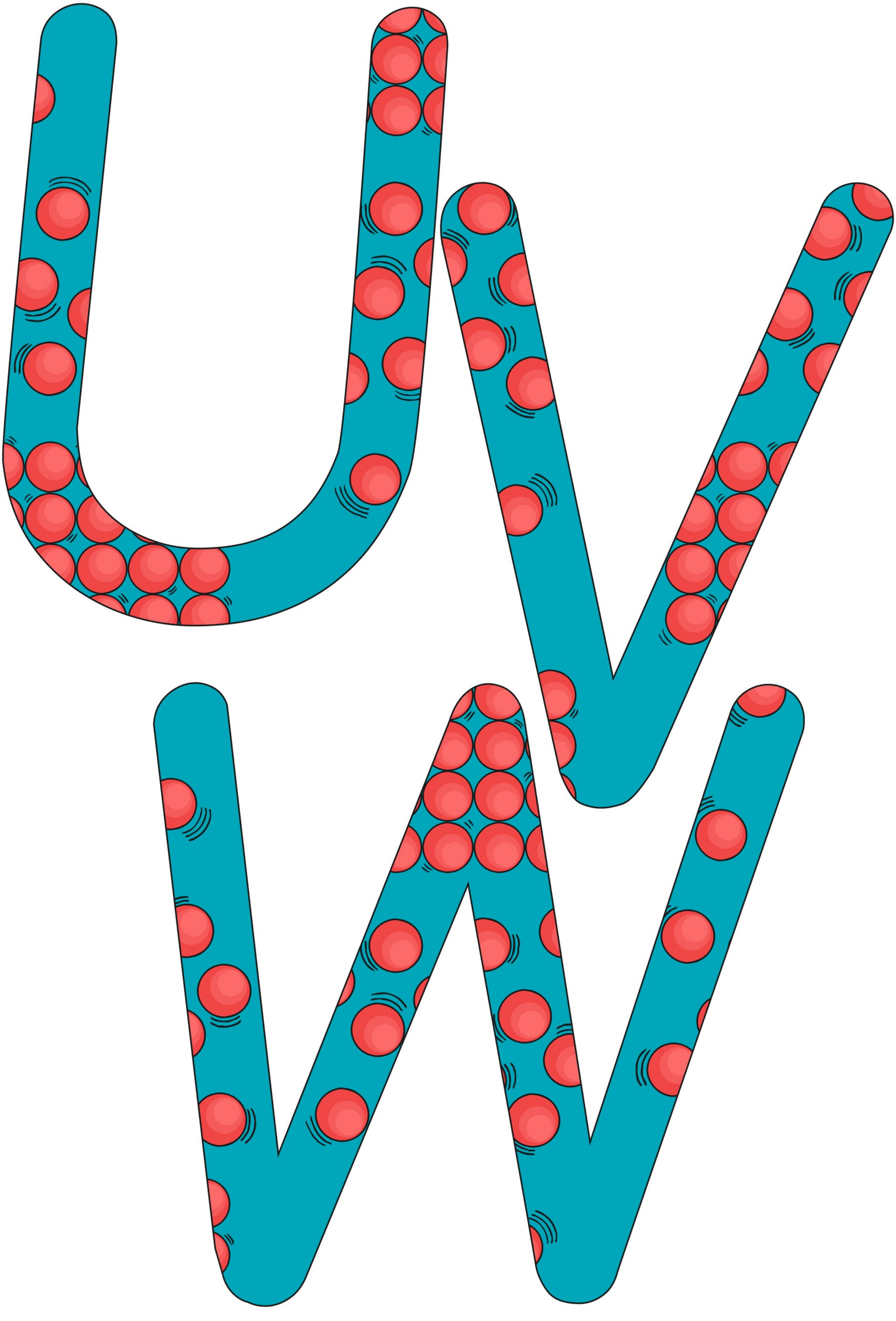
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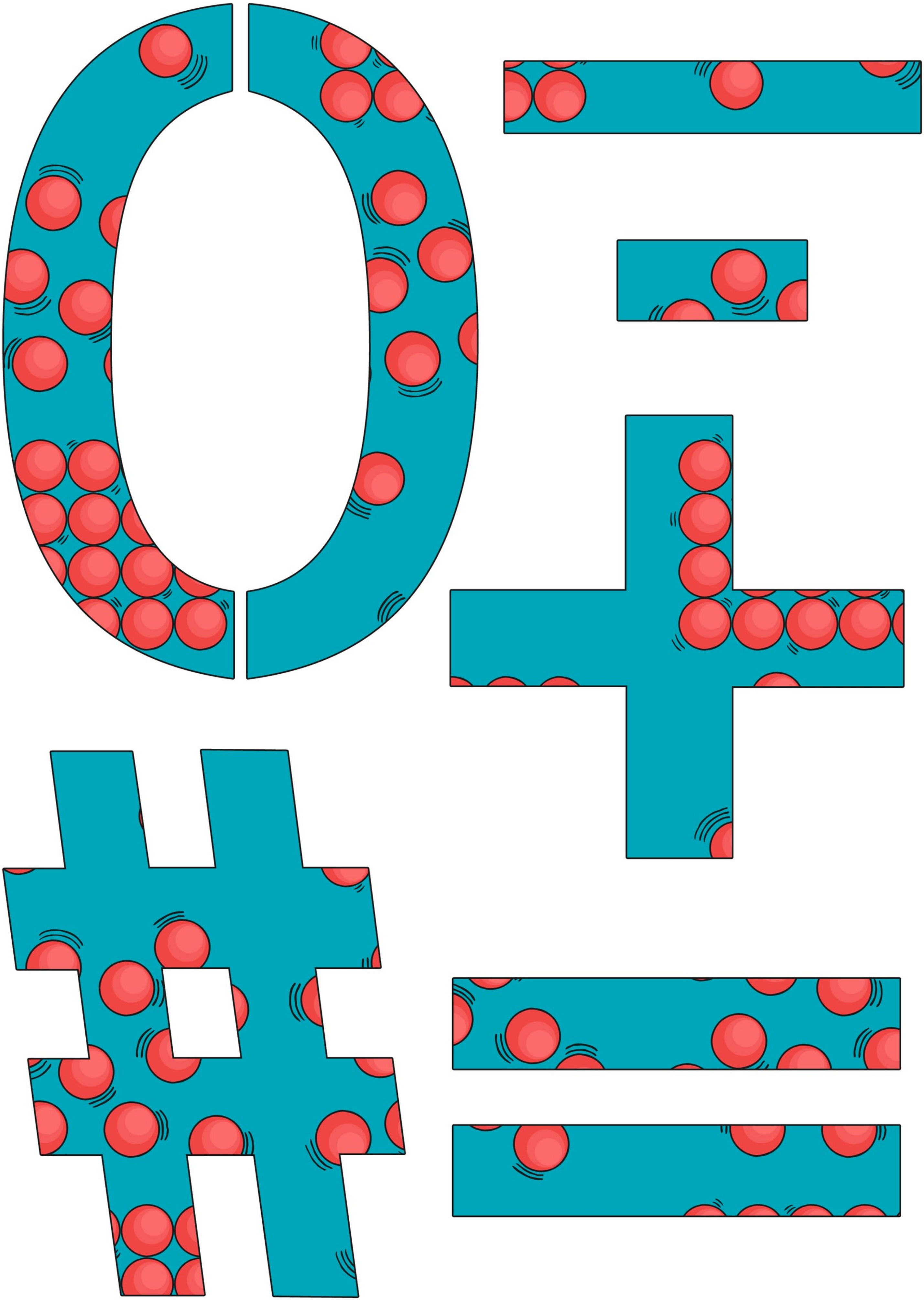

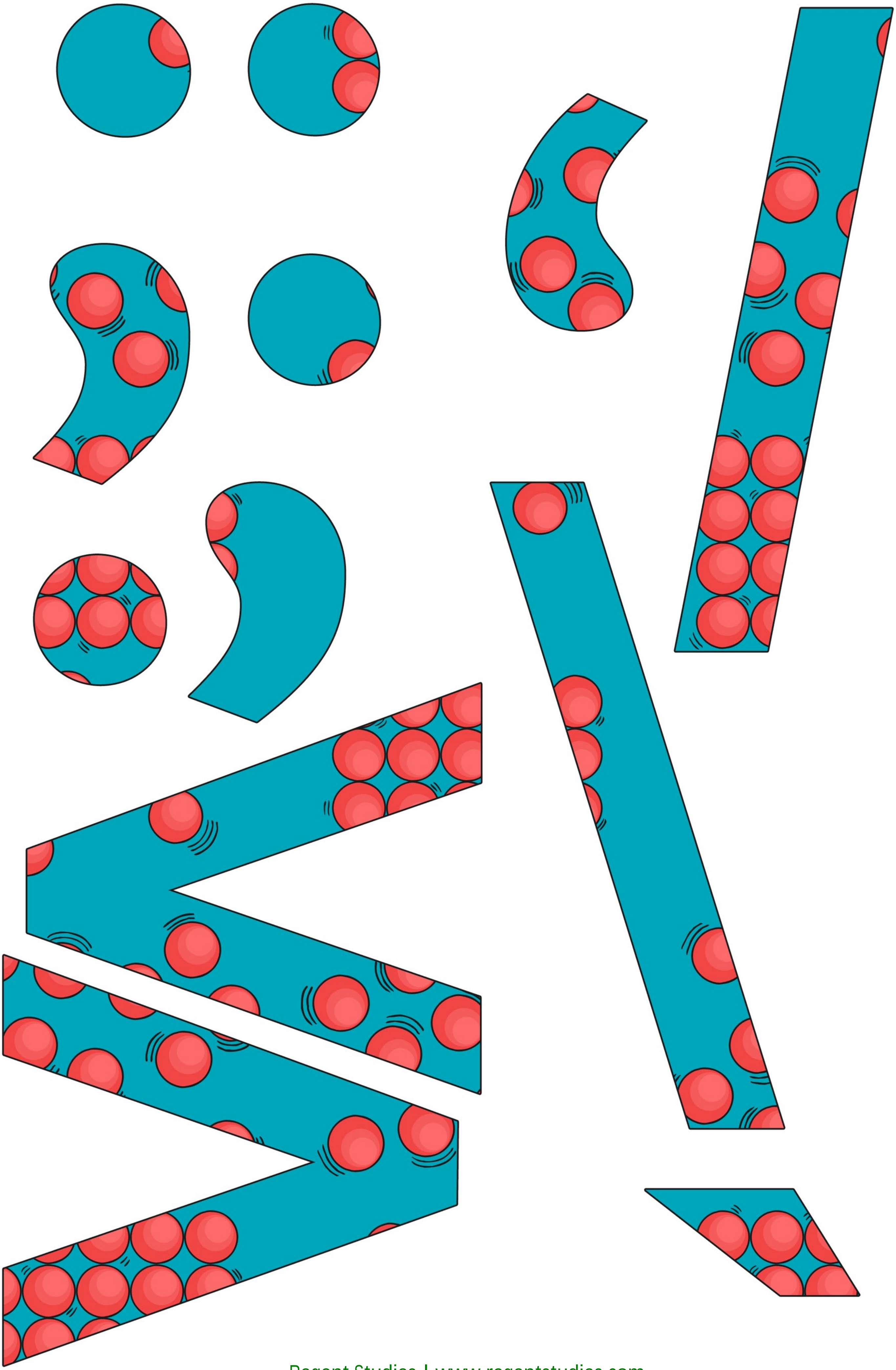

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clouds


dry


evaporation

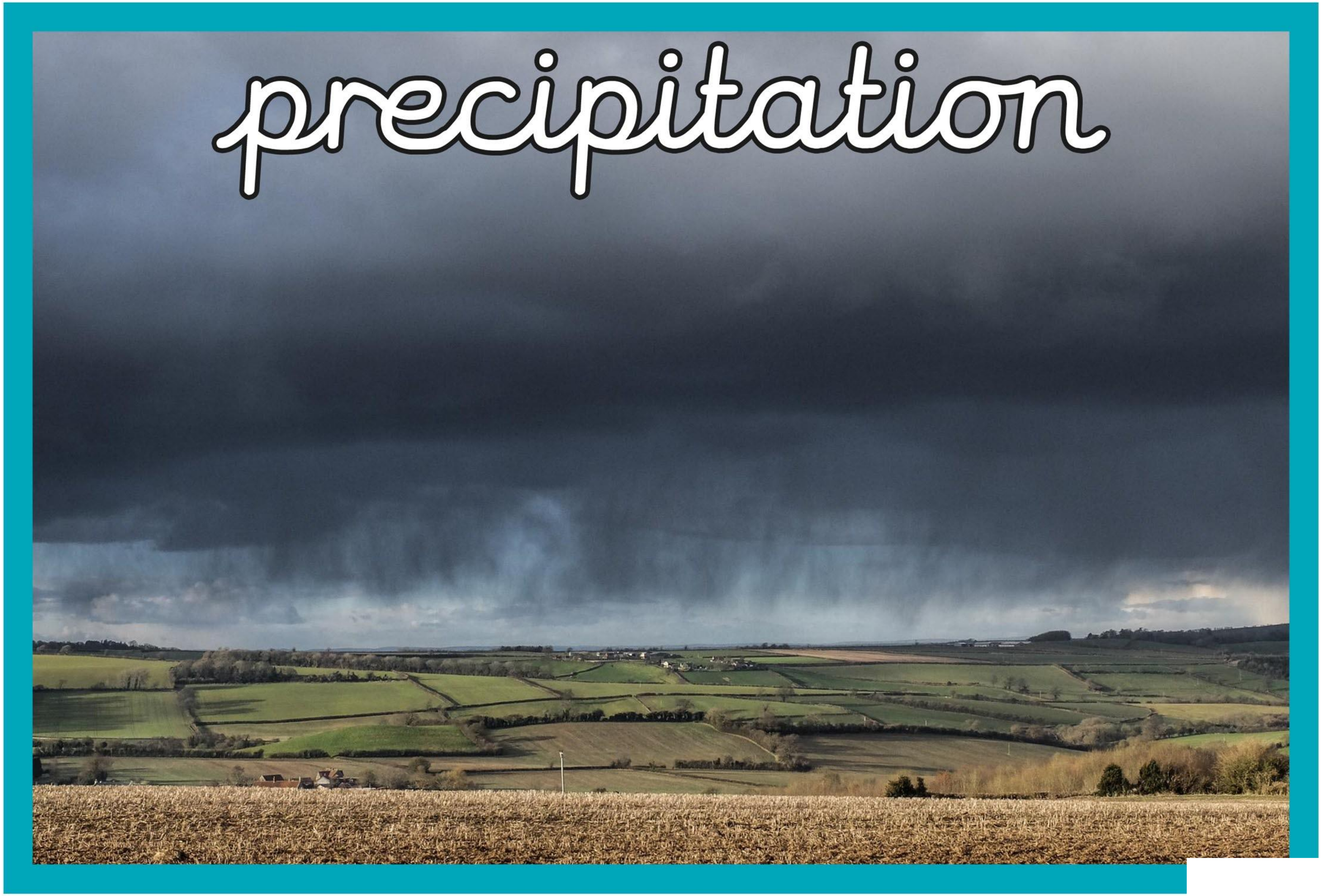

freeze


hail


heat


ice

materials


precipitation

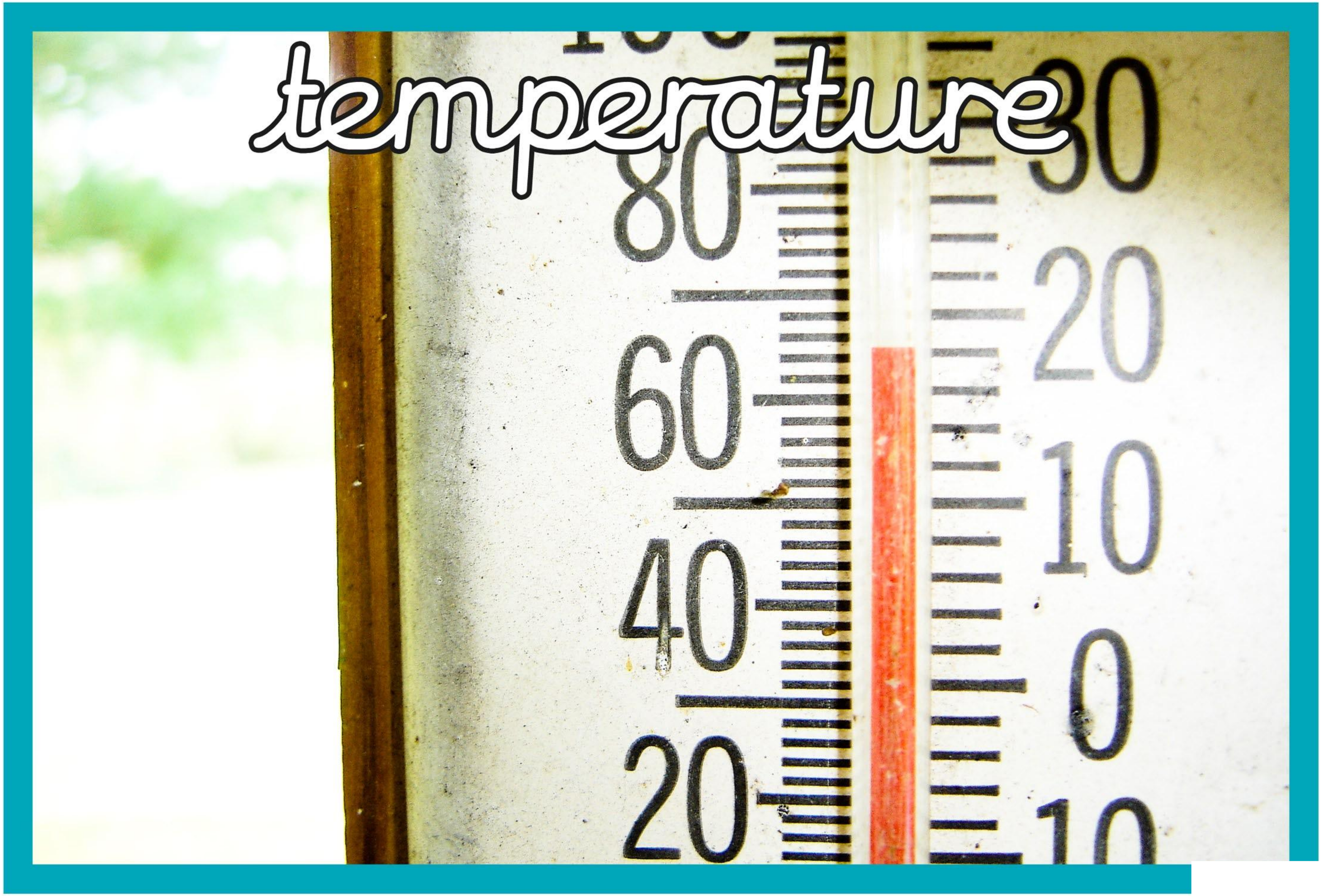

process


sleet

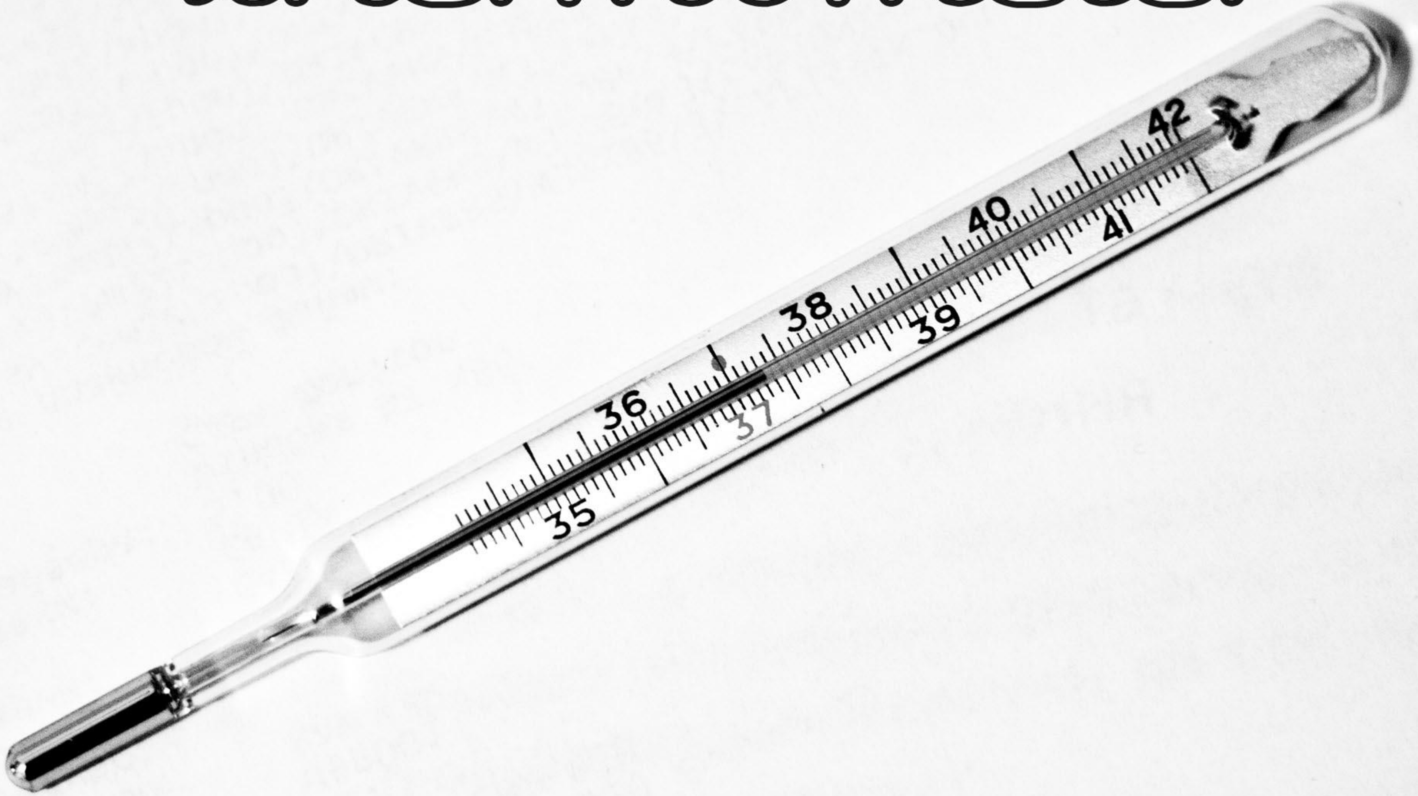

solid


state
TOASTESS

temperature



thermometer




water vapour


water

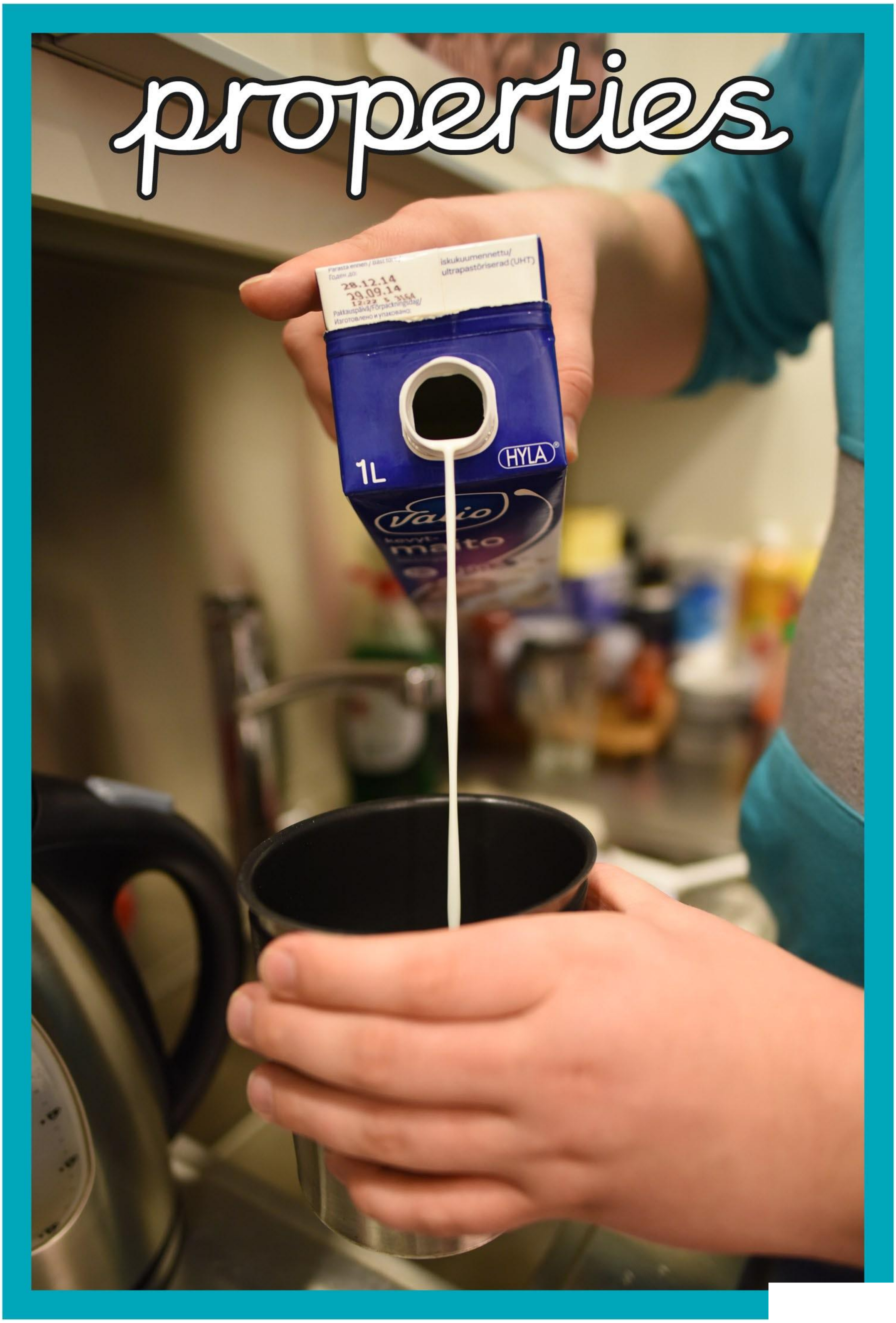

weigh


condensation

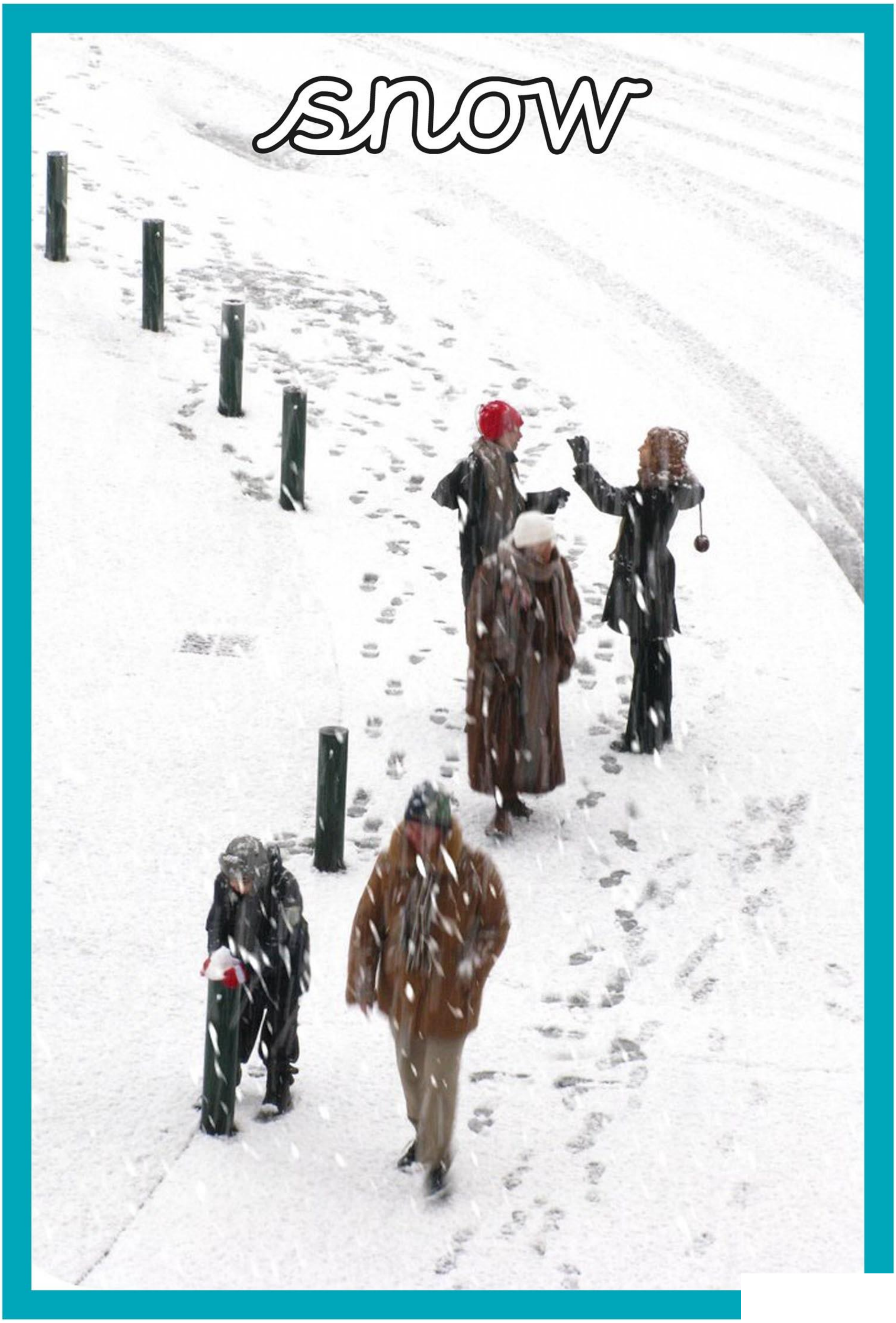

gas


liquid

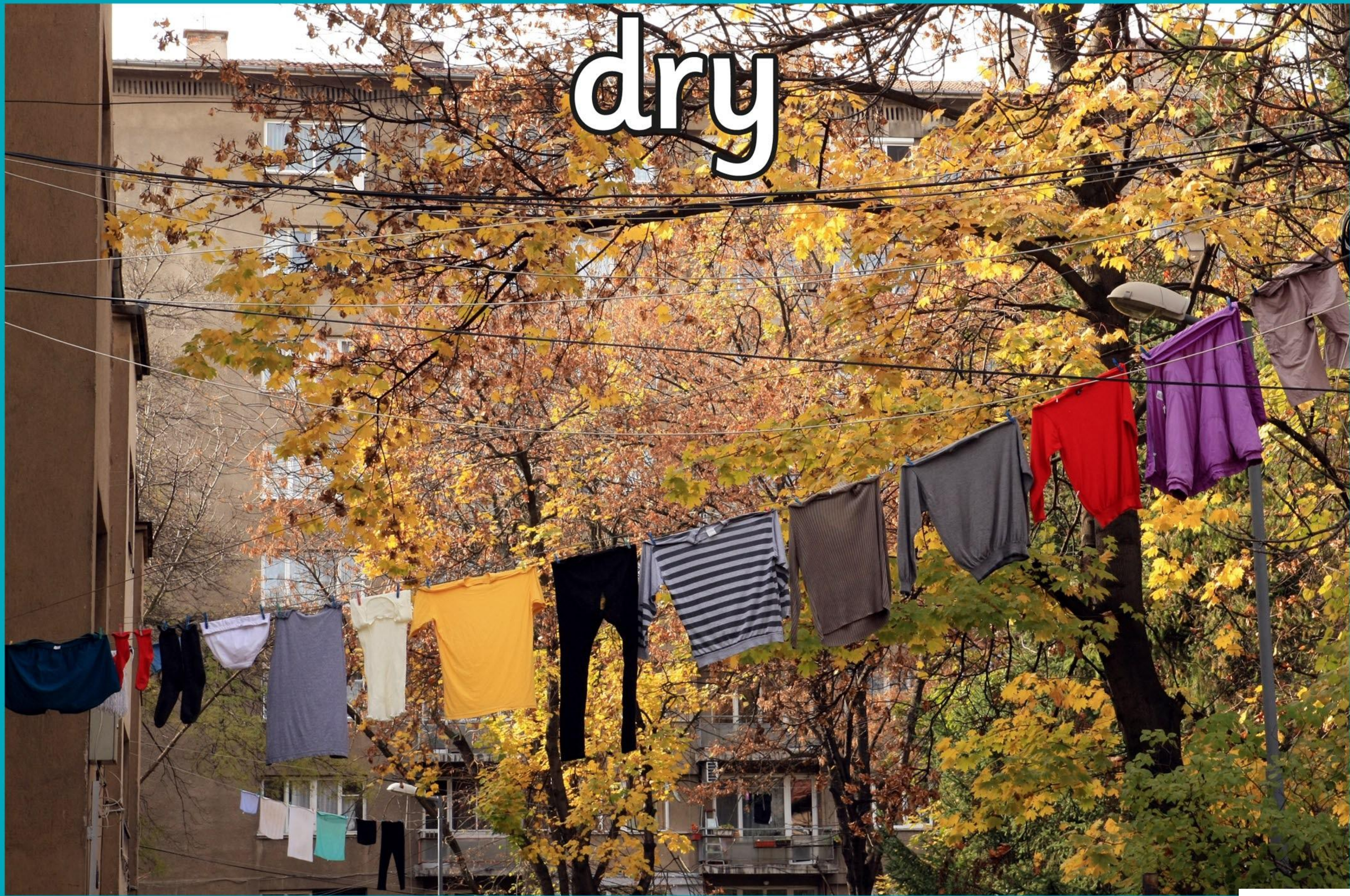

melt


properties
1L
HYLA


rain


snow


clouds


dry


evaporation

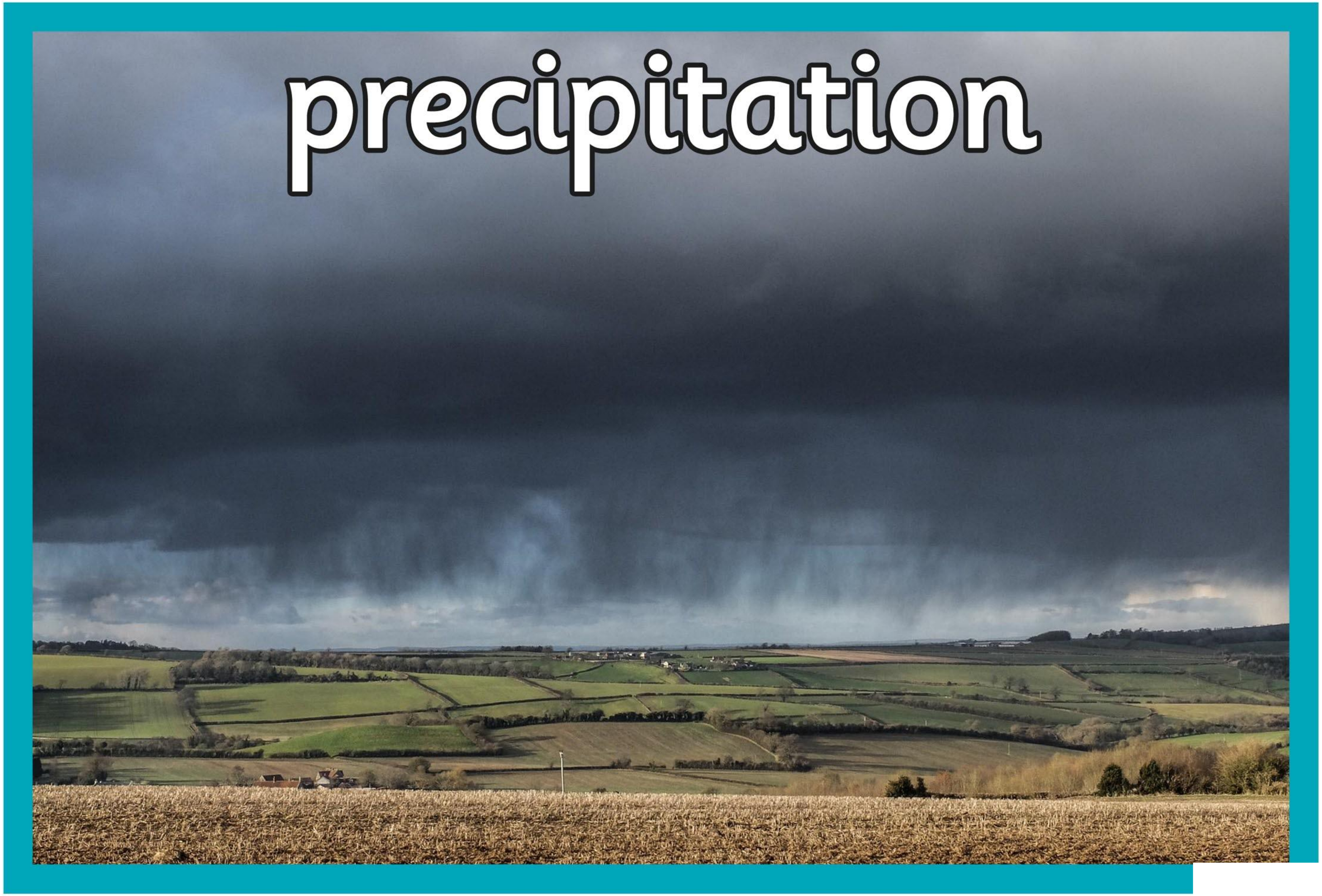

freeze


hail


heat


ice

materials

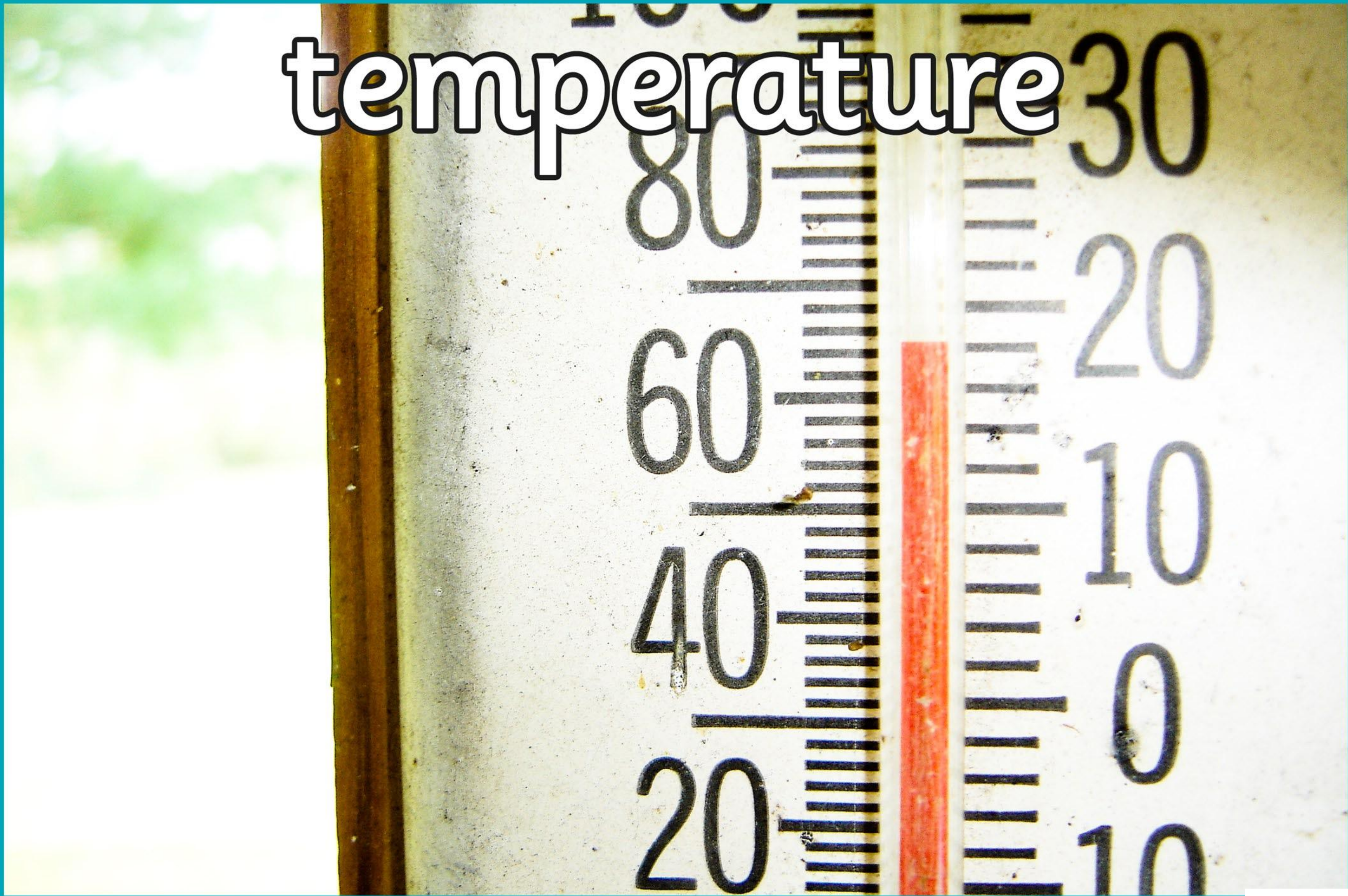

precipitation


process


sleet

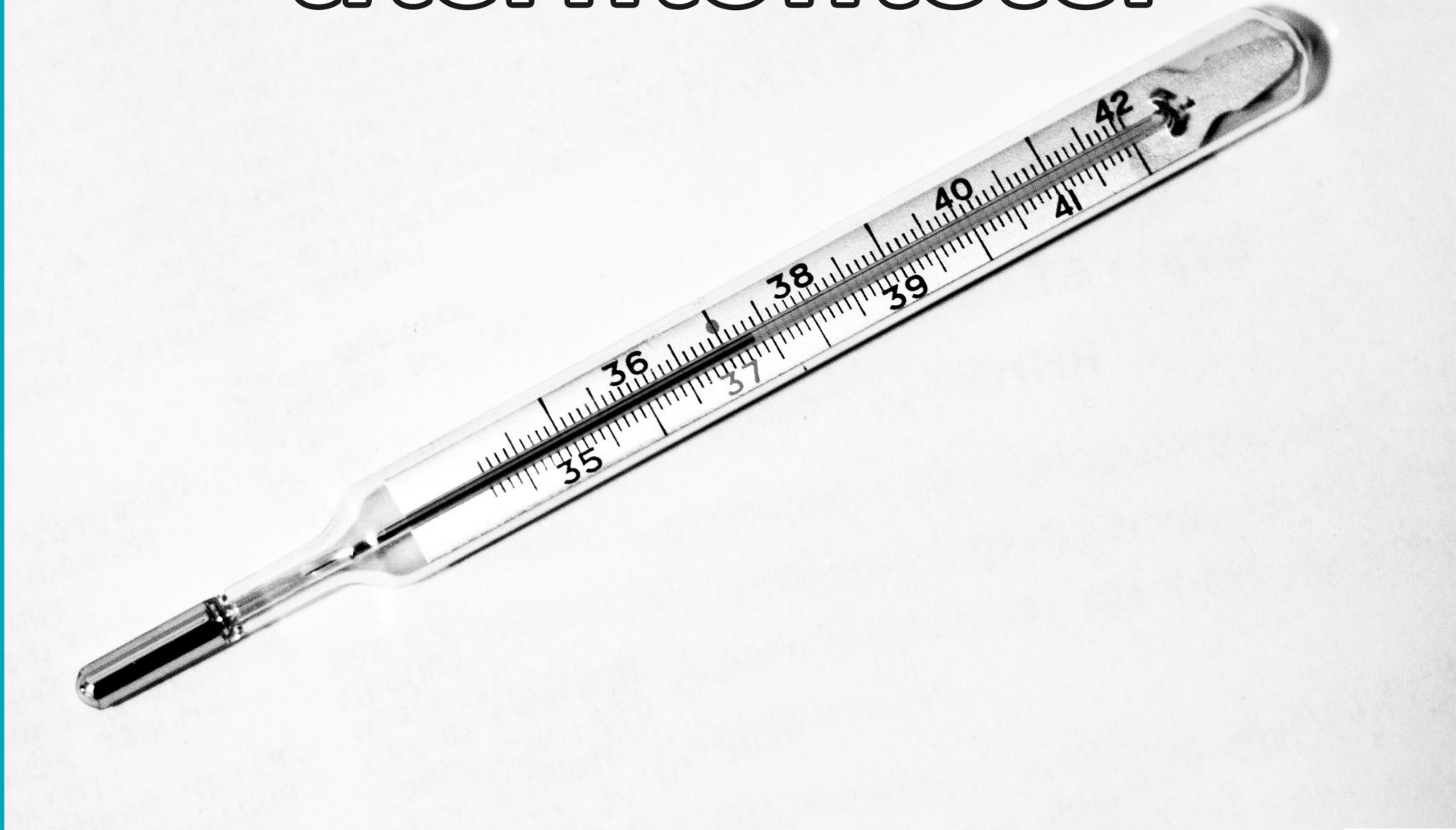

solid


state
TOASTESS



temperature

thermometer



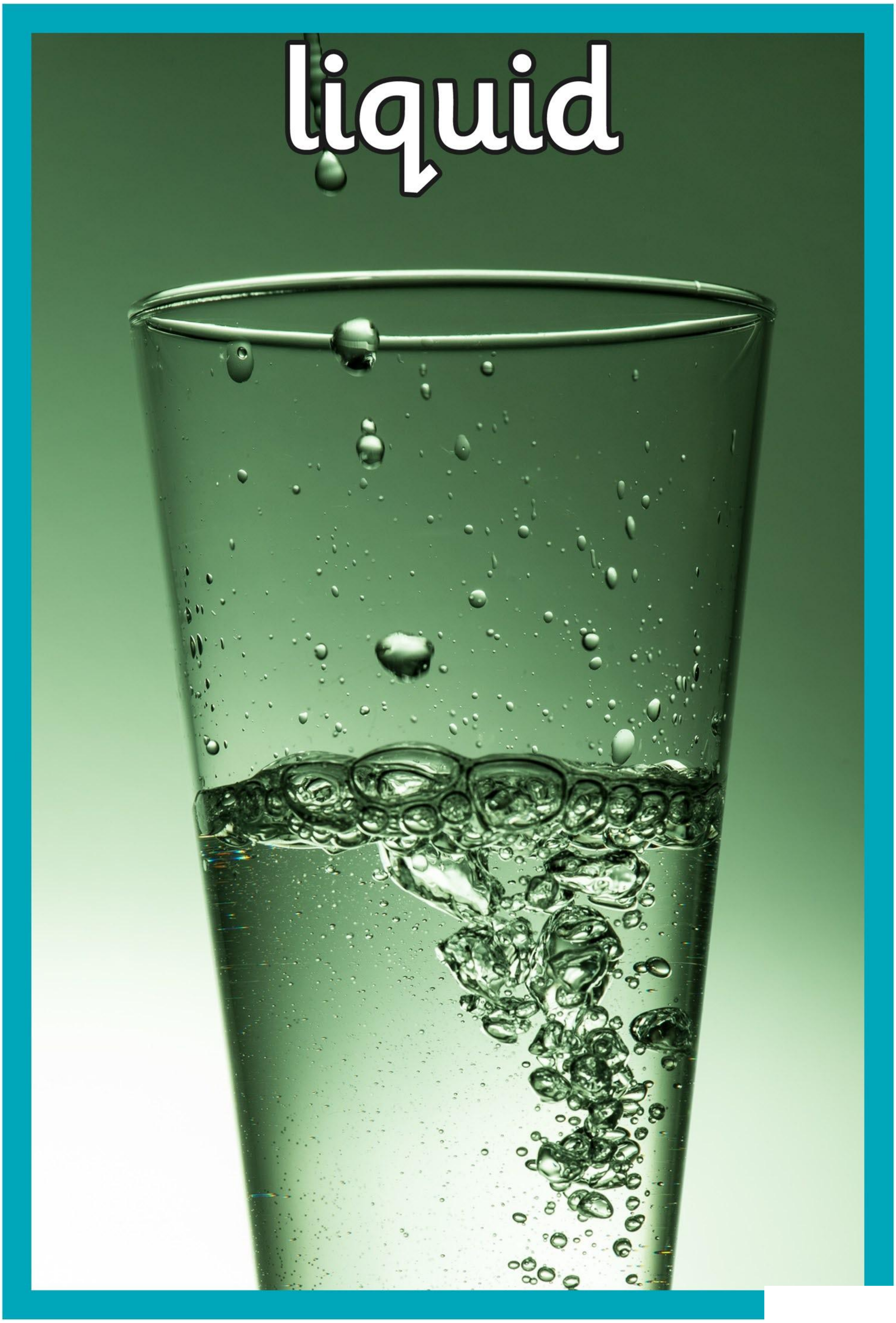

water vapour


water

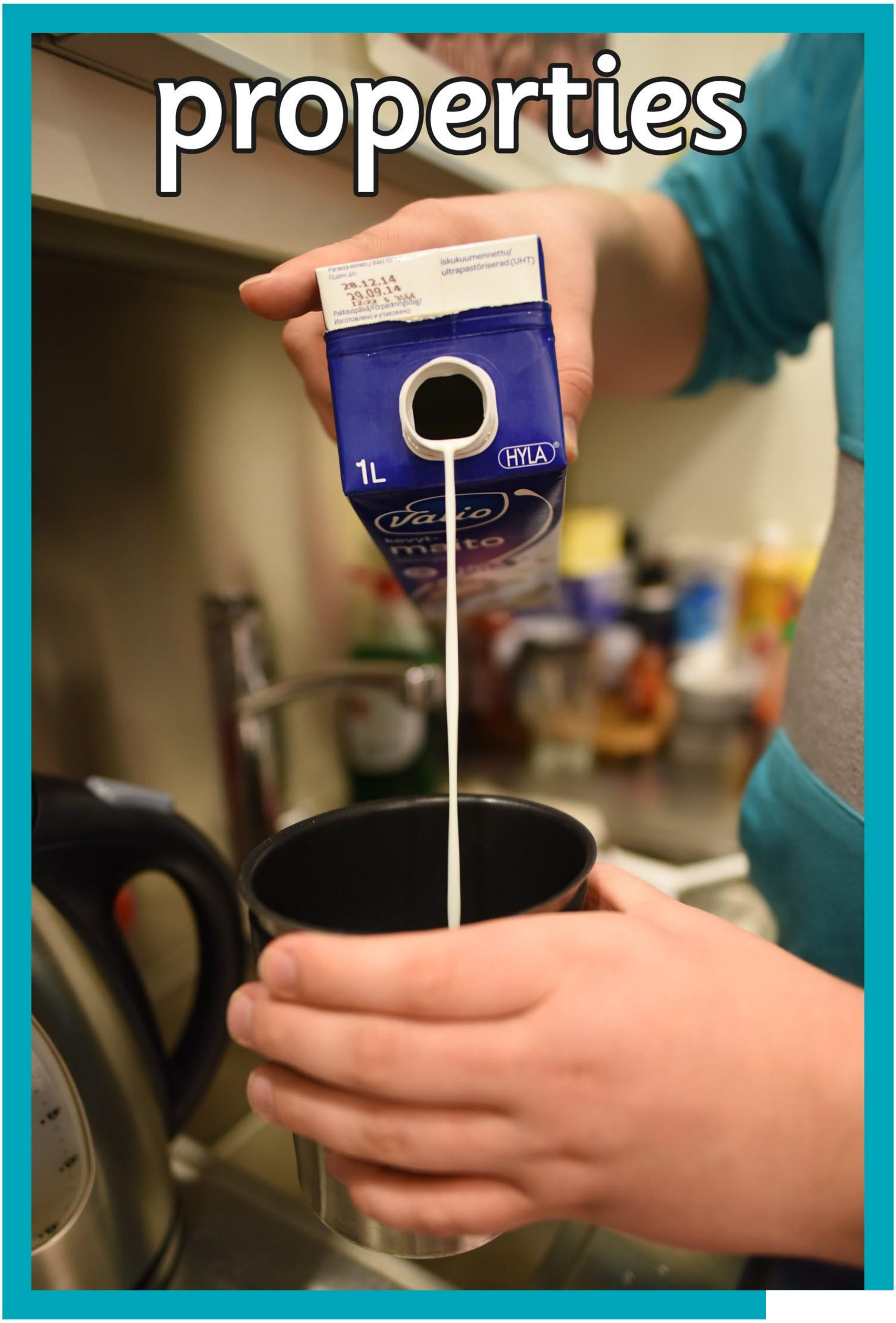
weigh


condensation


gas


liquid


melt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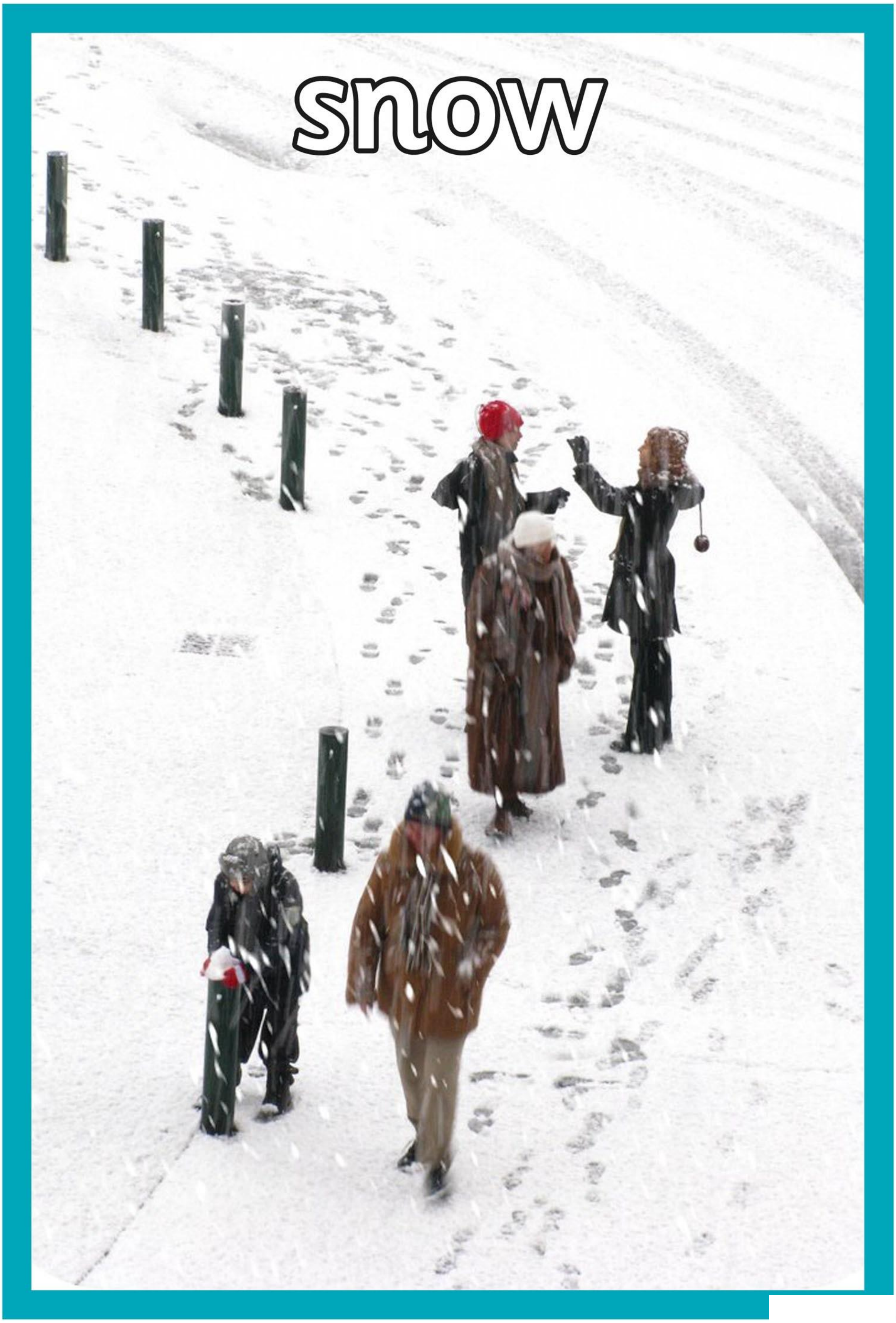
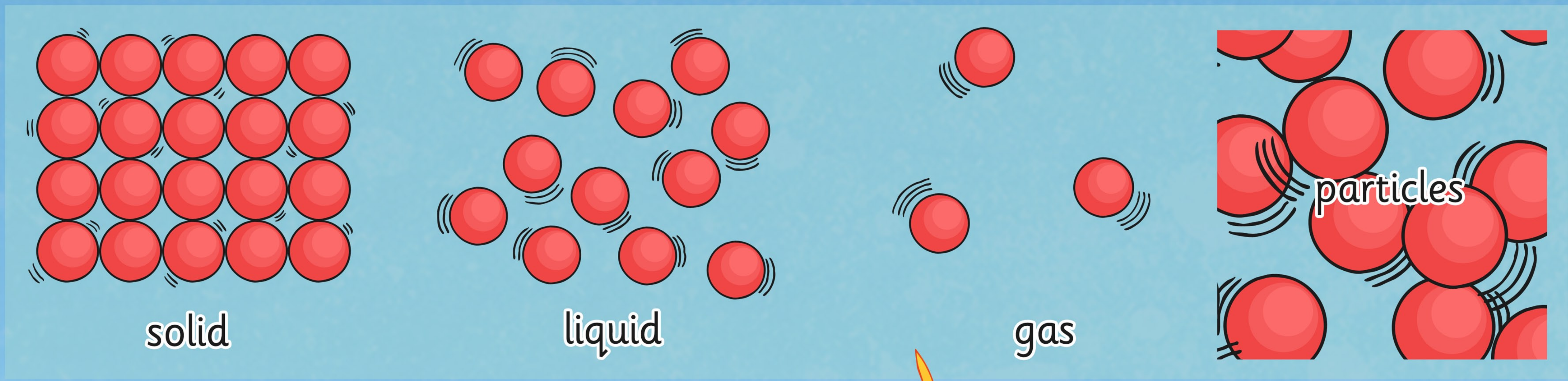
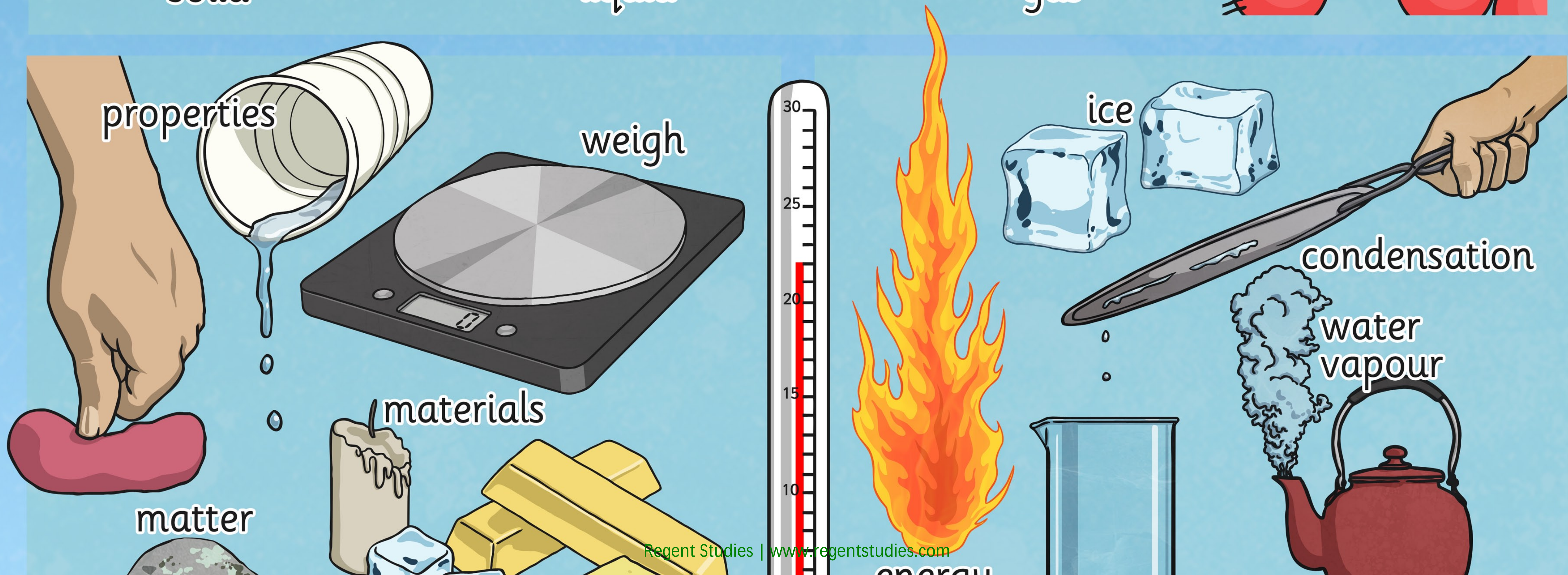
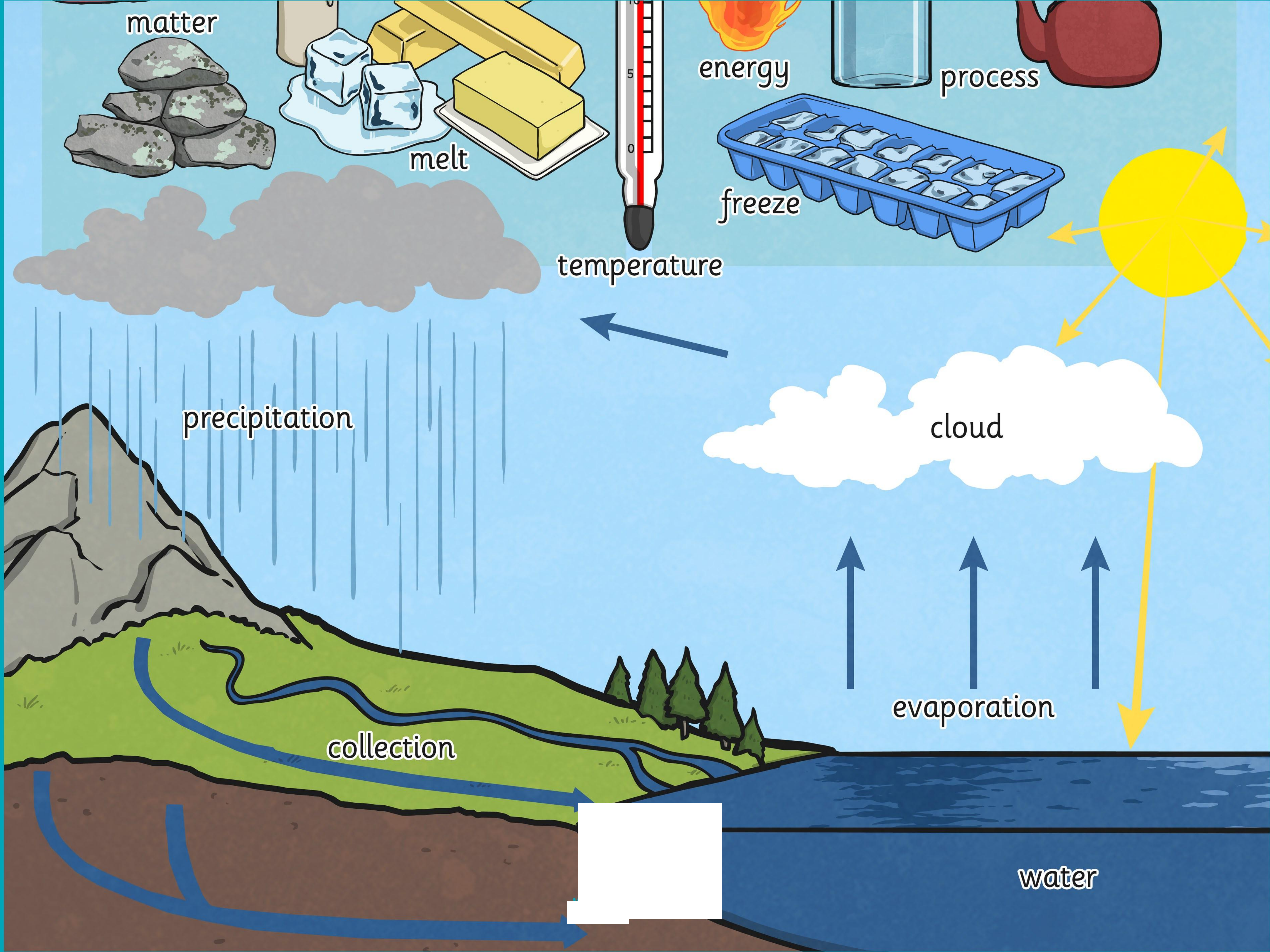
rain


snow

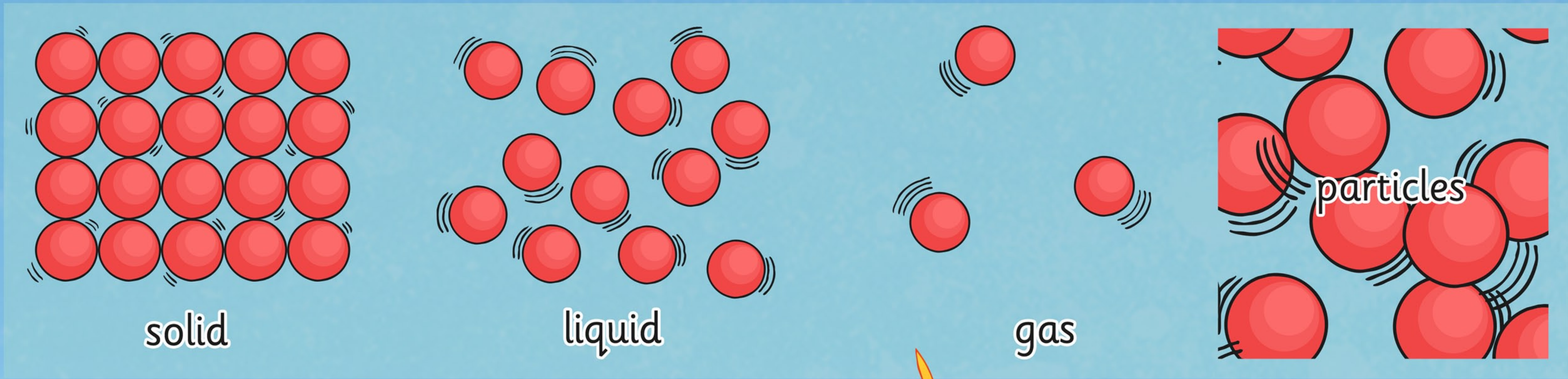
States of Matter

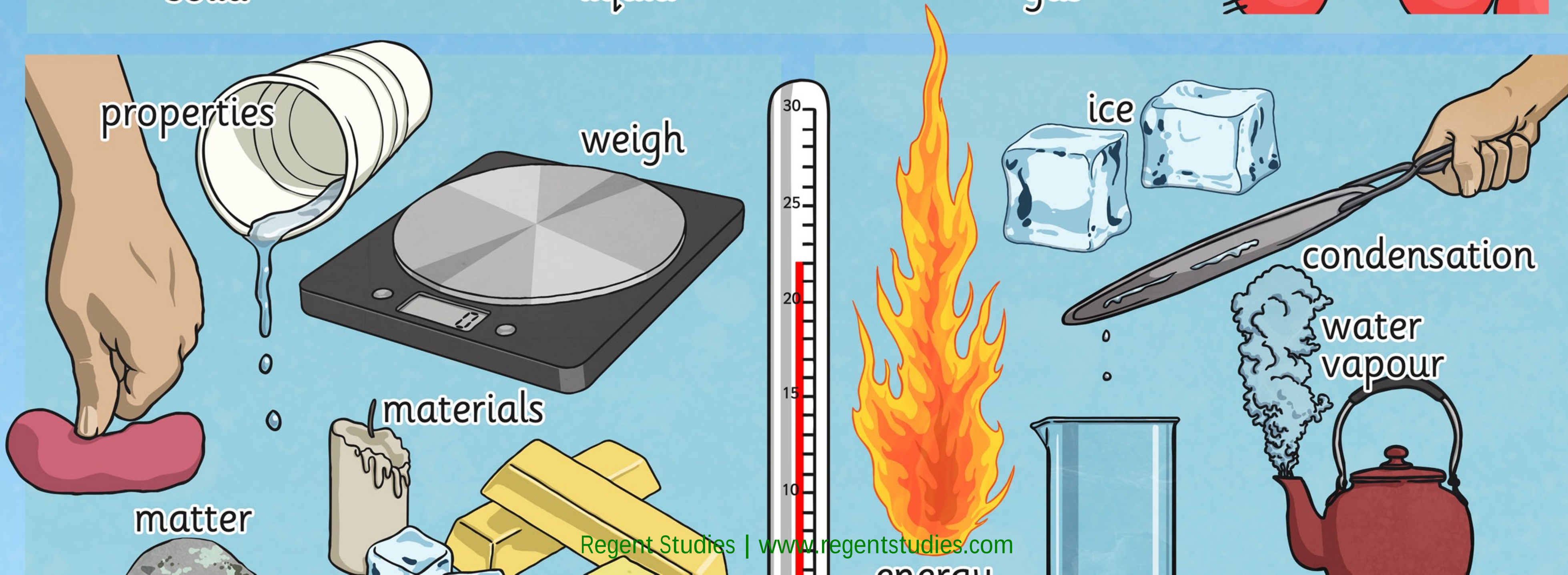


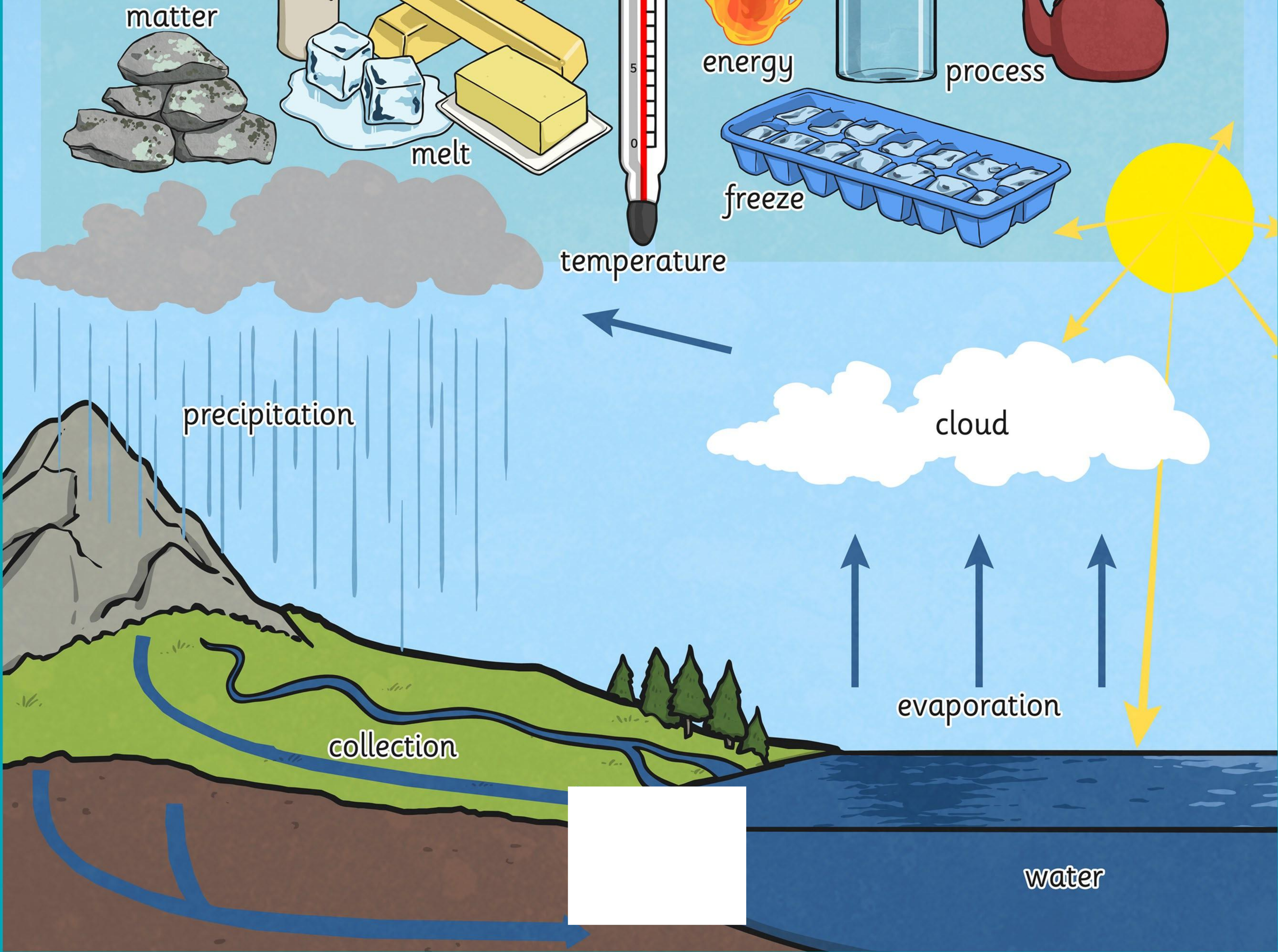



matter
melt
energy
process
freeze
temperature
precipitation
cloud
evaporation
collection
water

States of Matter






matter
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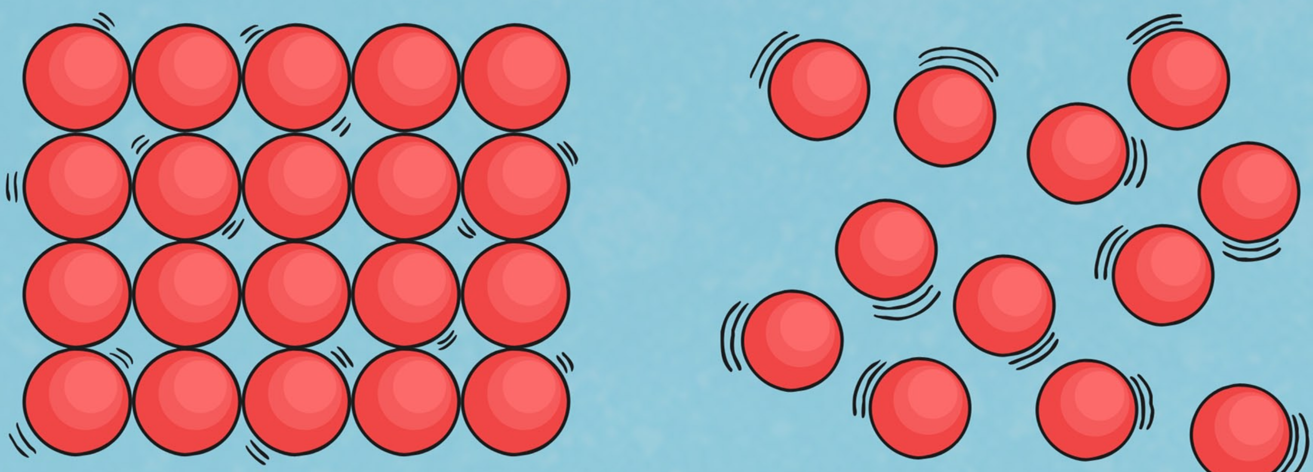
States of



solid
liquid

properties
weigh
materials
matter
30
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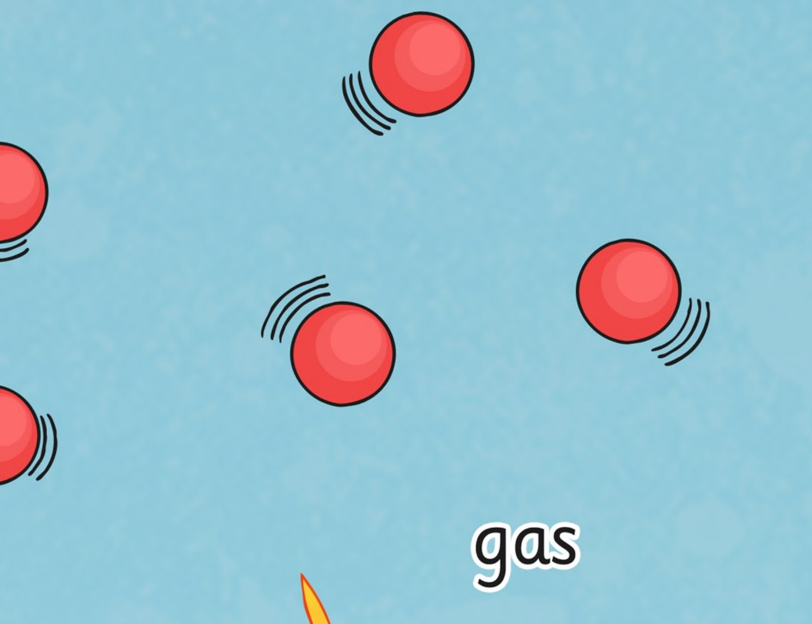
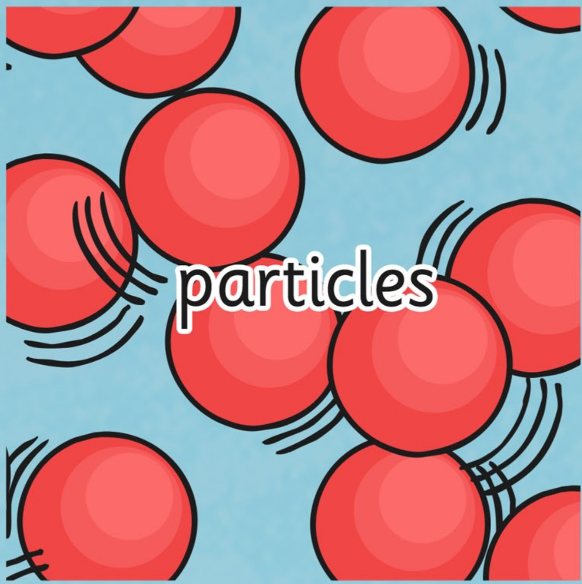
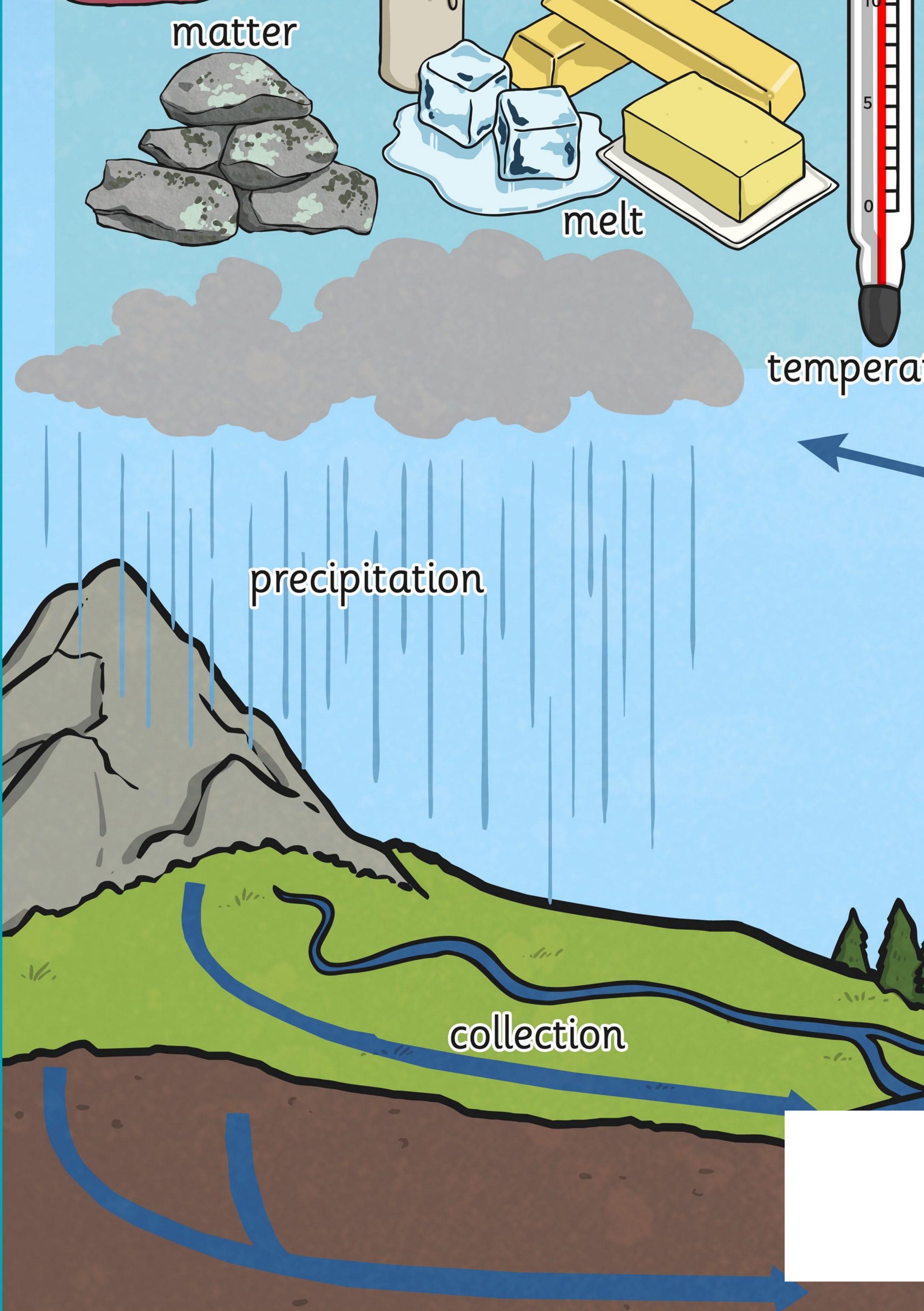
# of Matter



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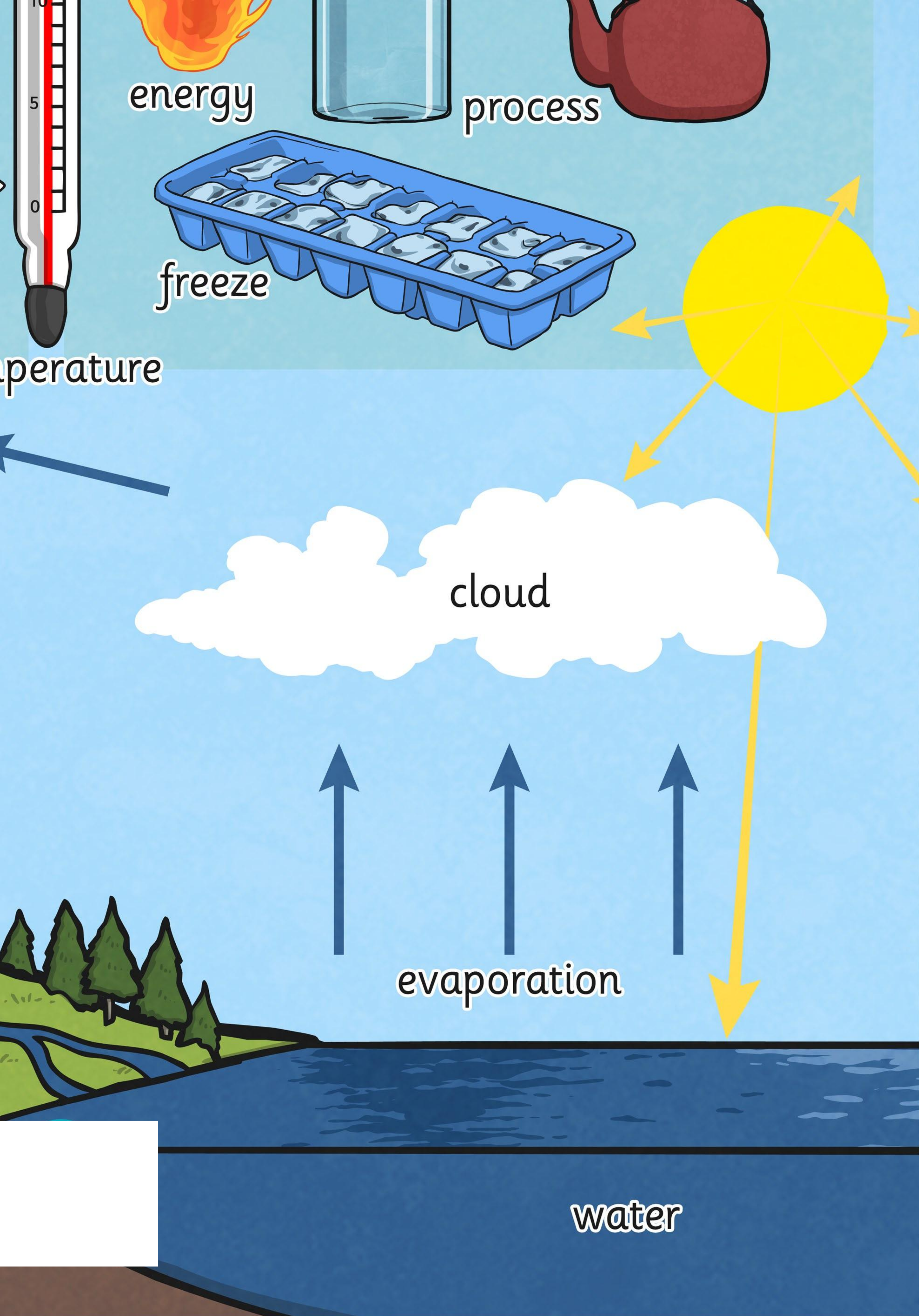
energy
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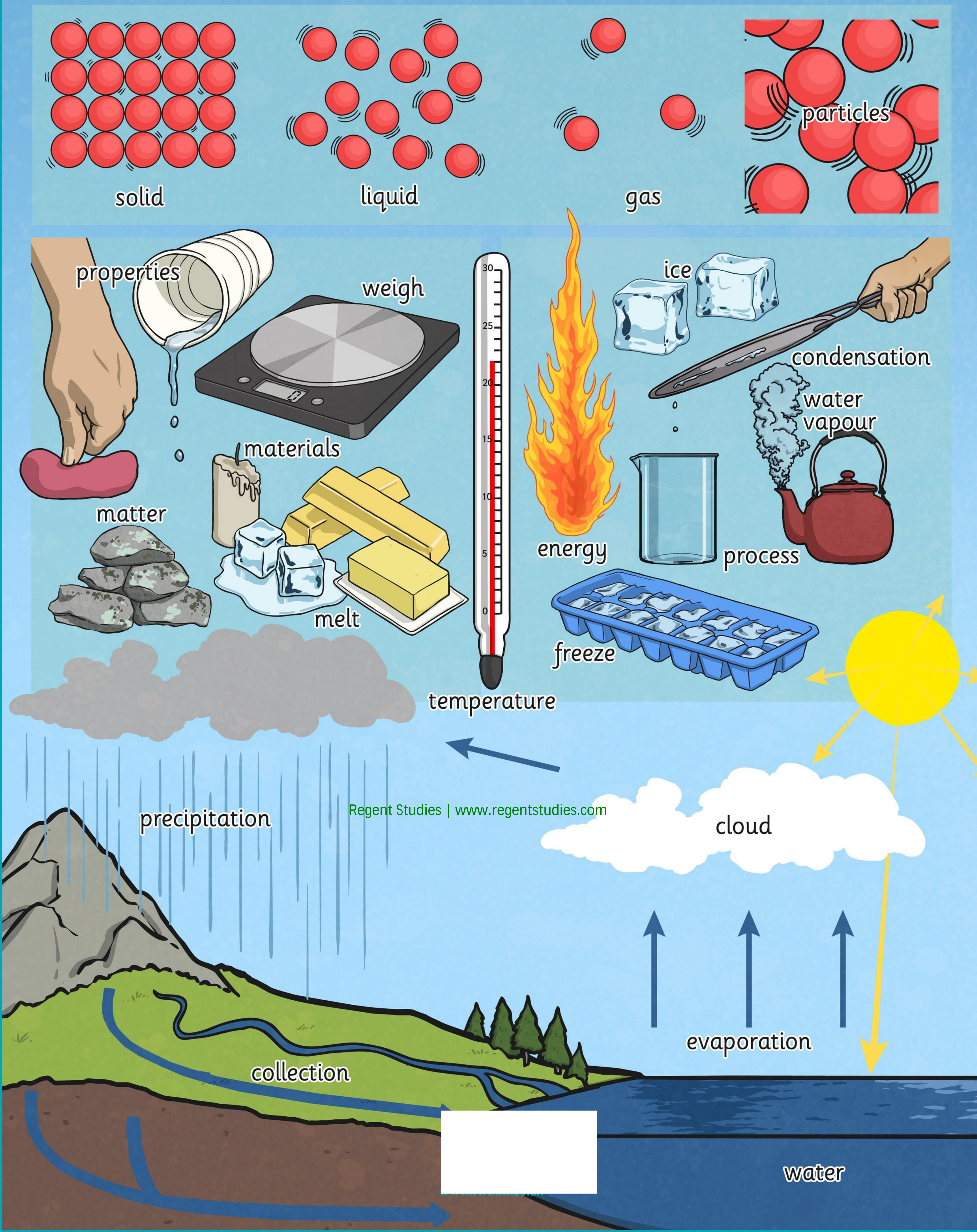
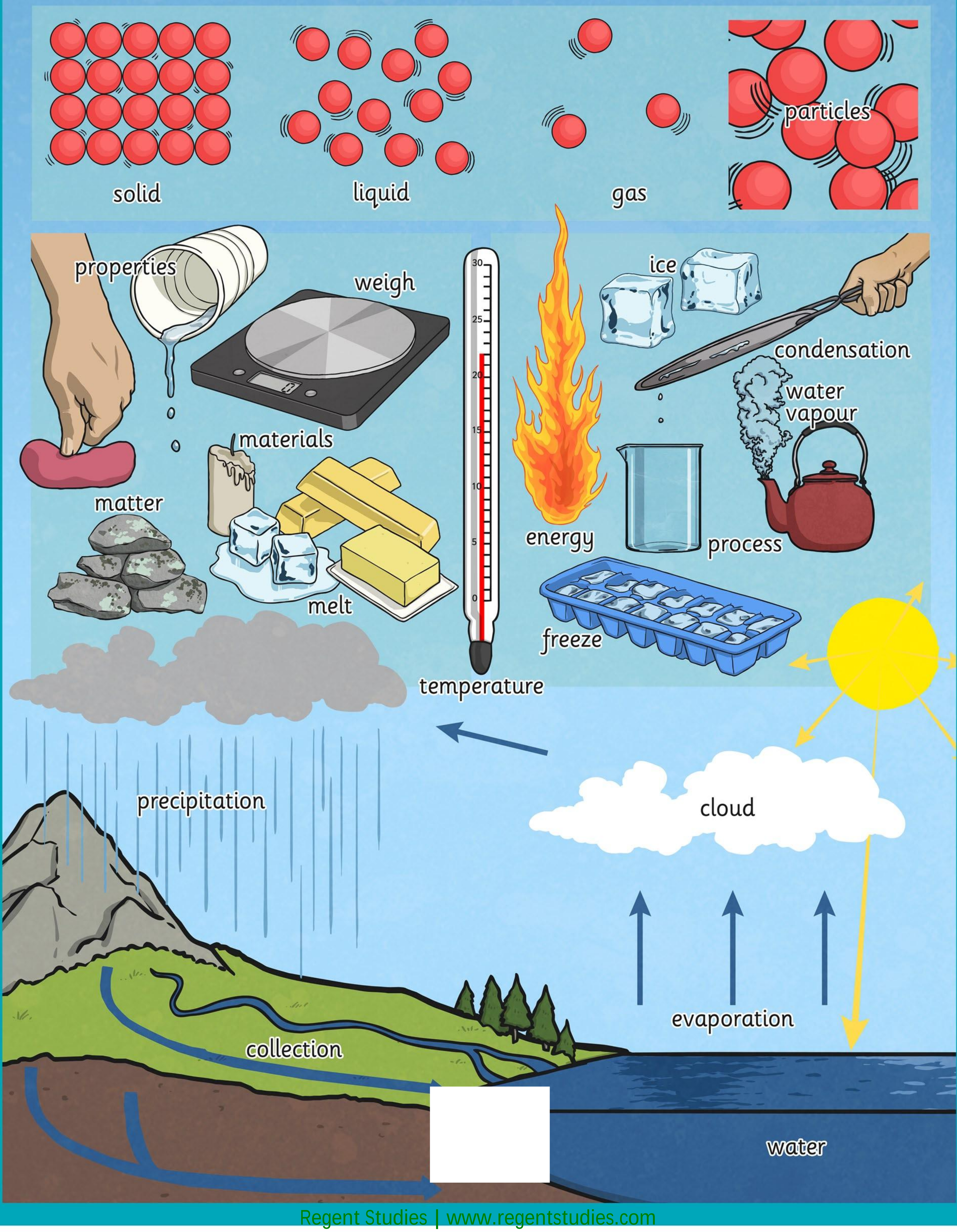
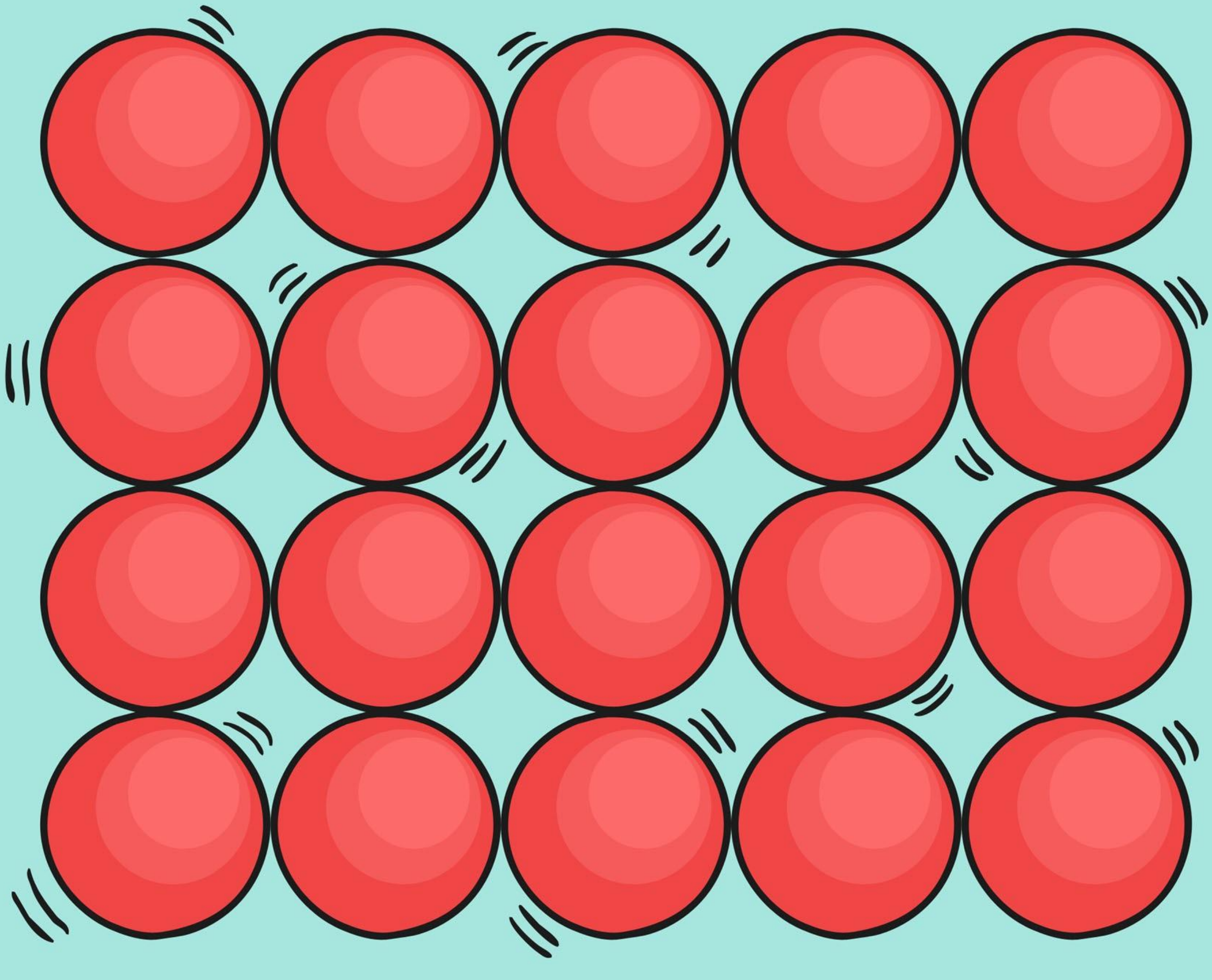
States of Matter



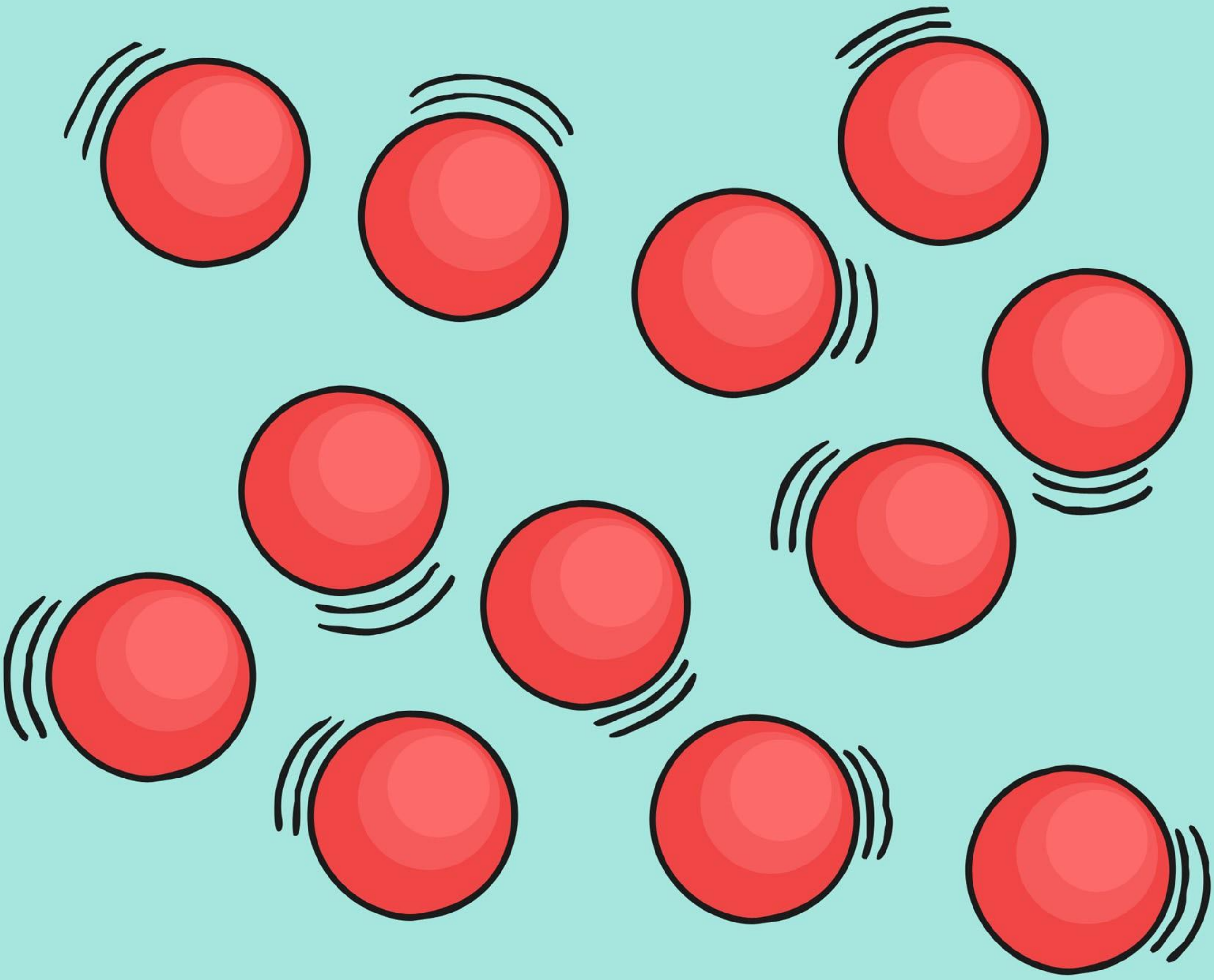
States of Matter



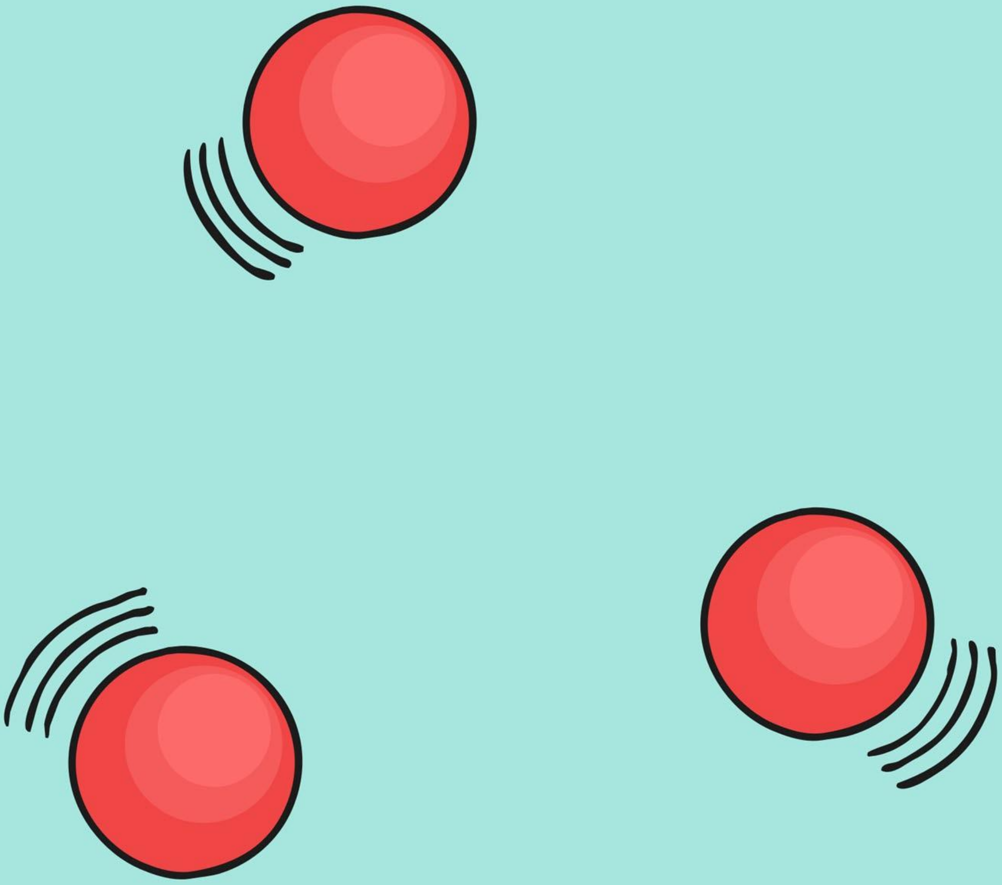
solid



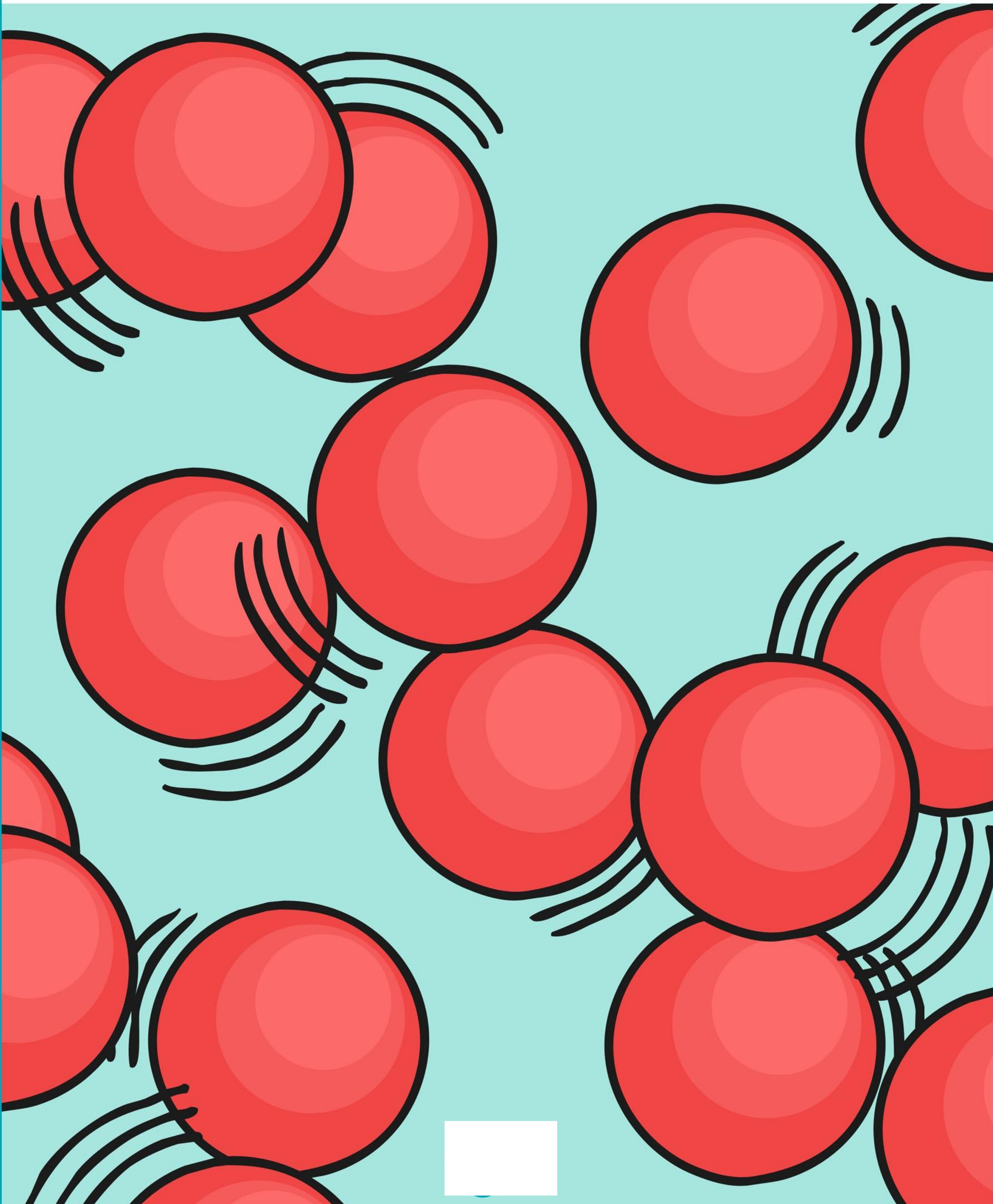
liquid



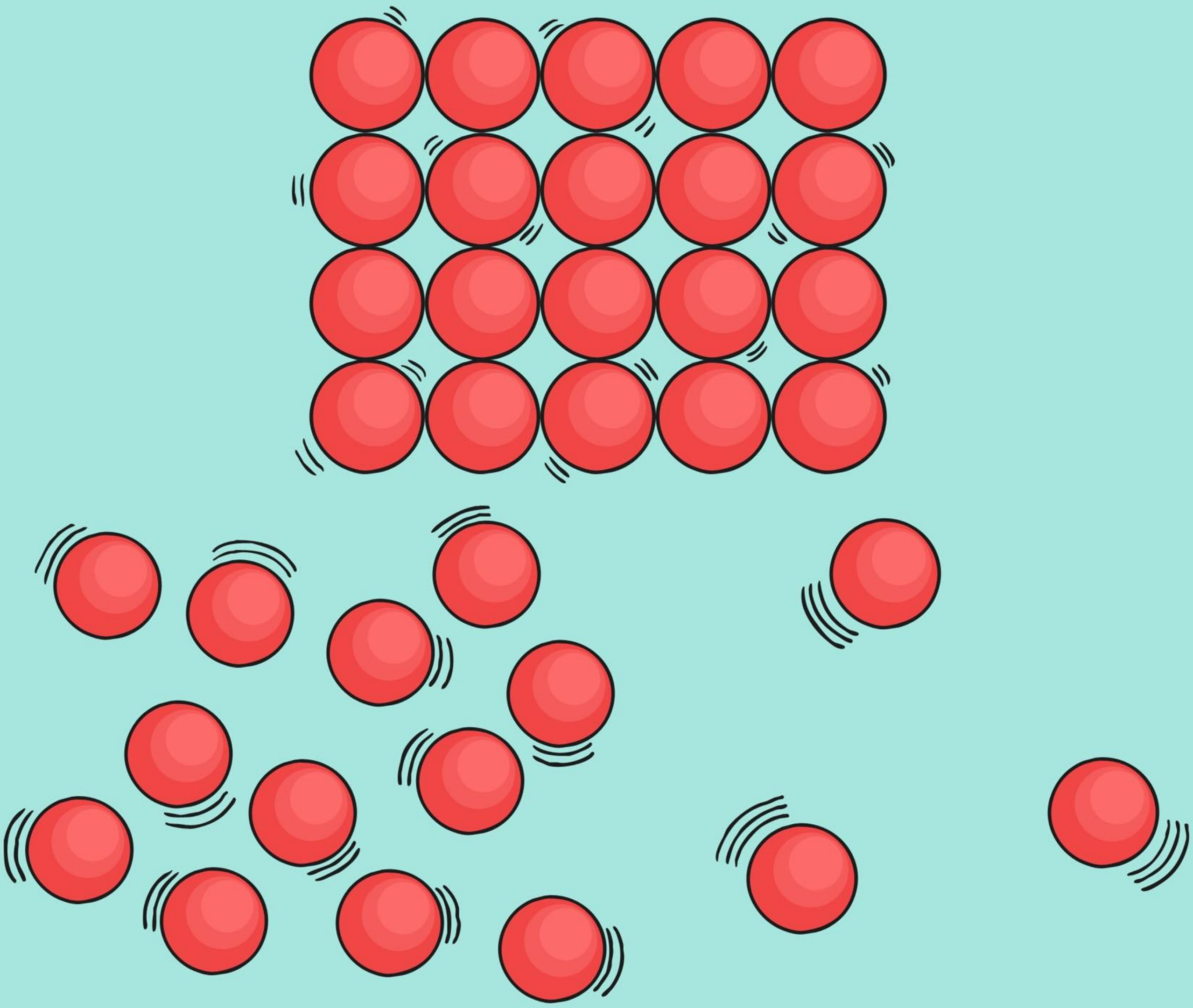
gas



particles



state



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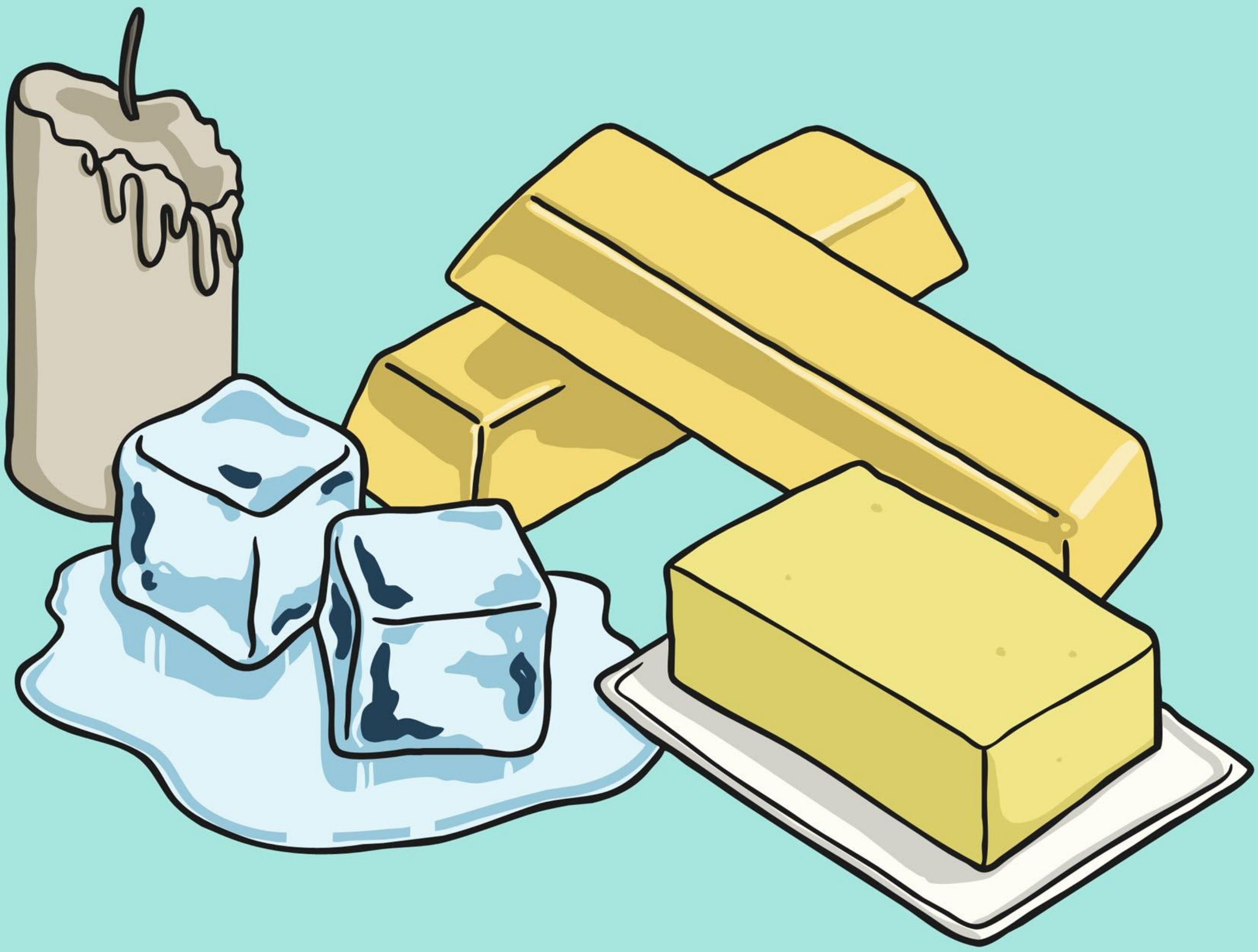
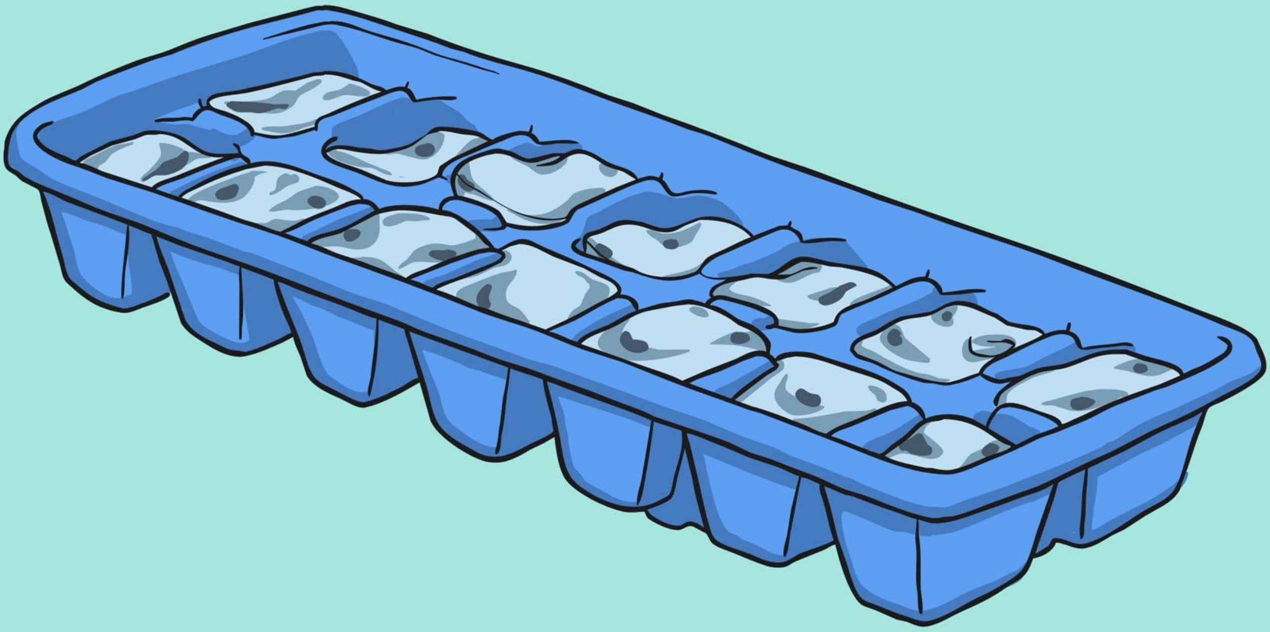


properties

matter

melt

freeze



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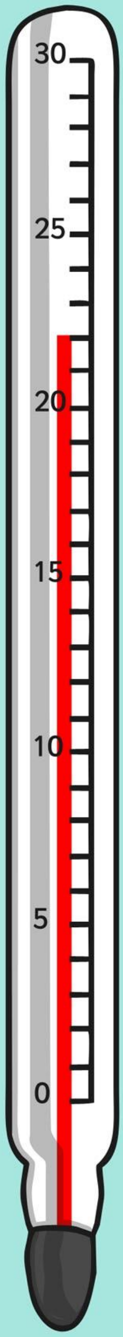
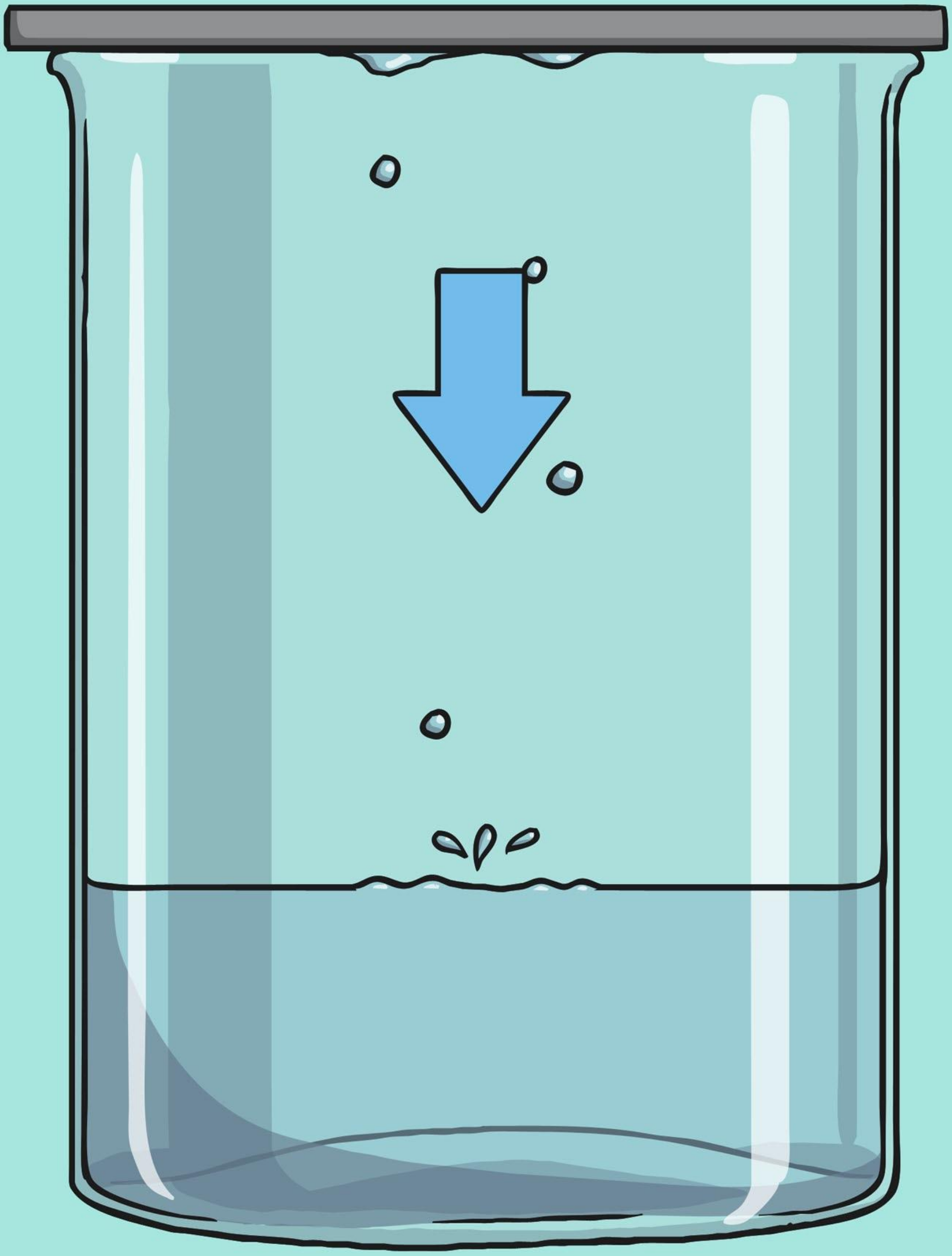


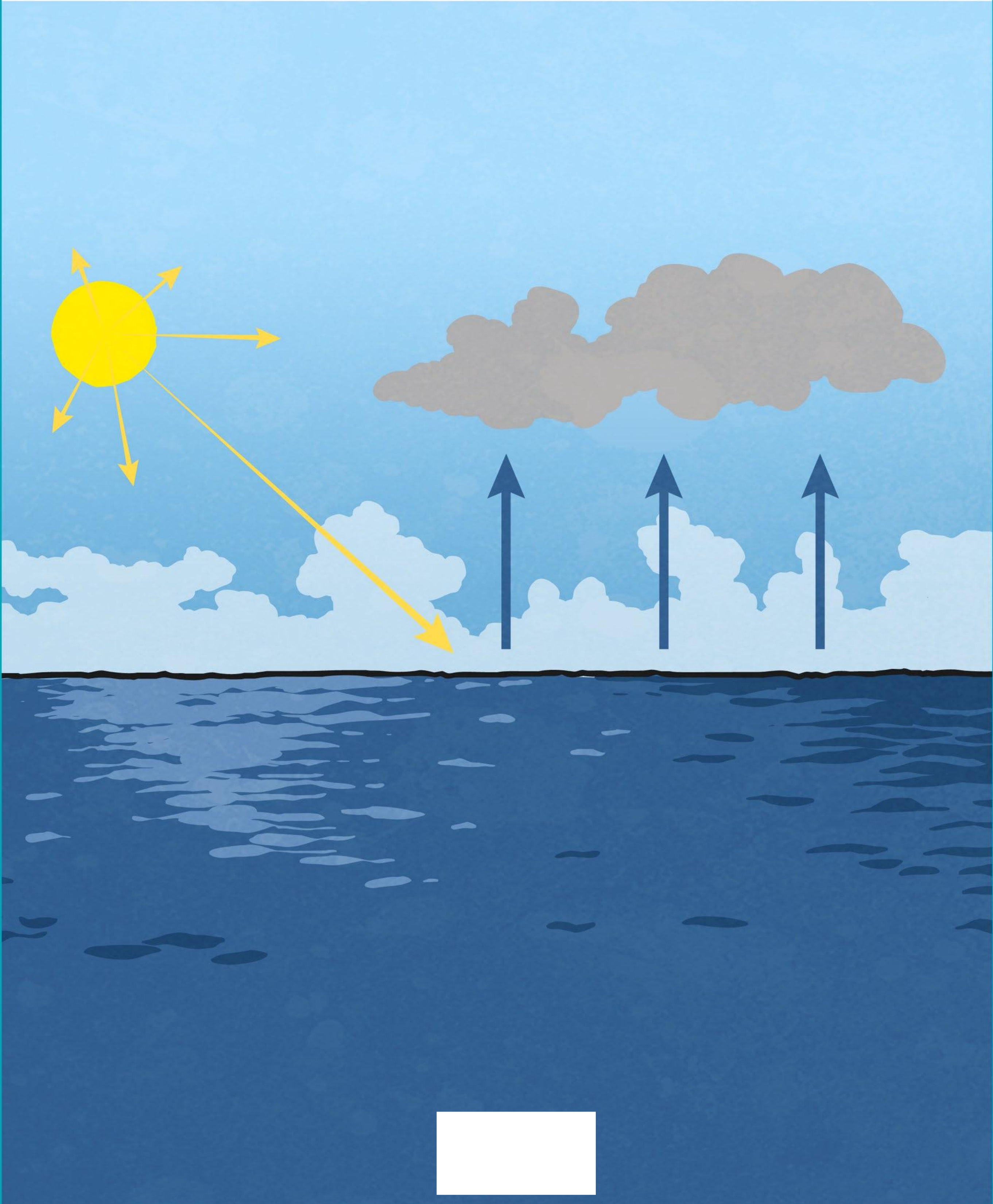
condensation



process

water

evaporation



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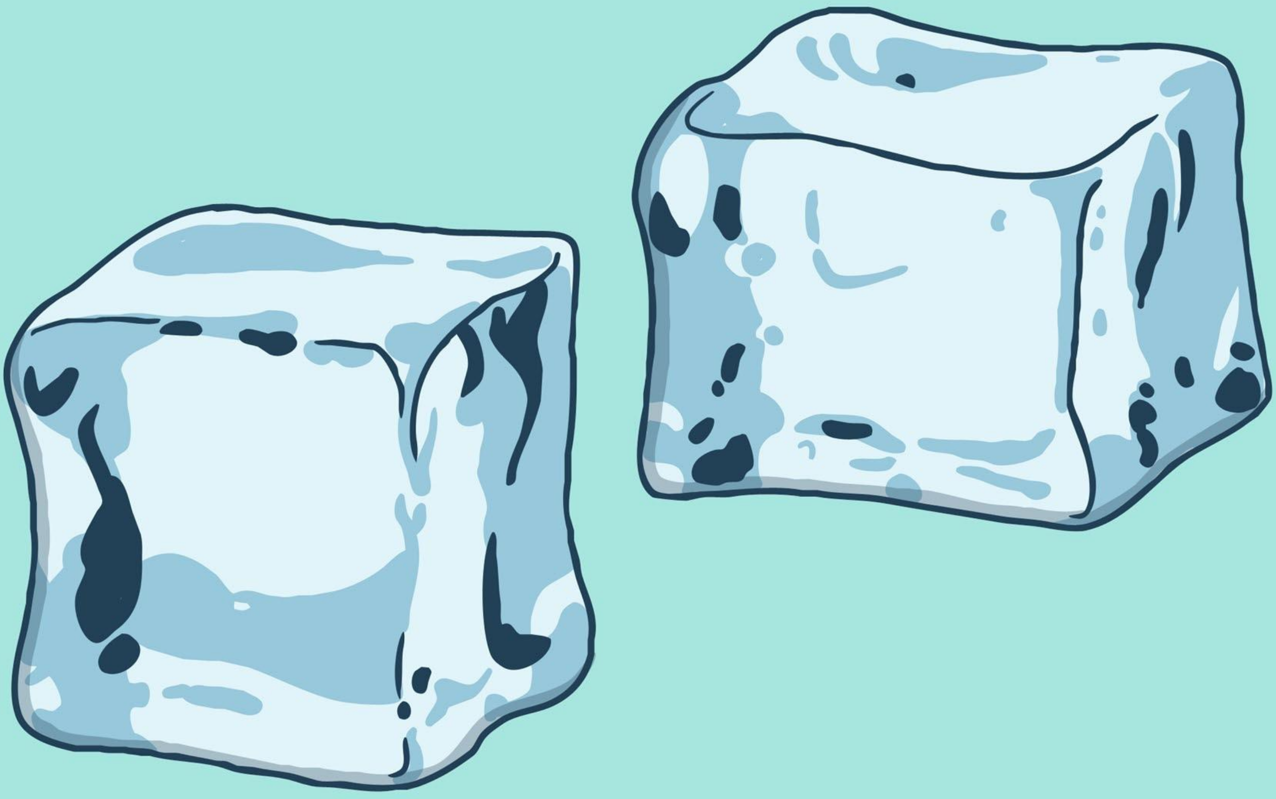
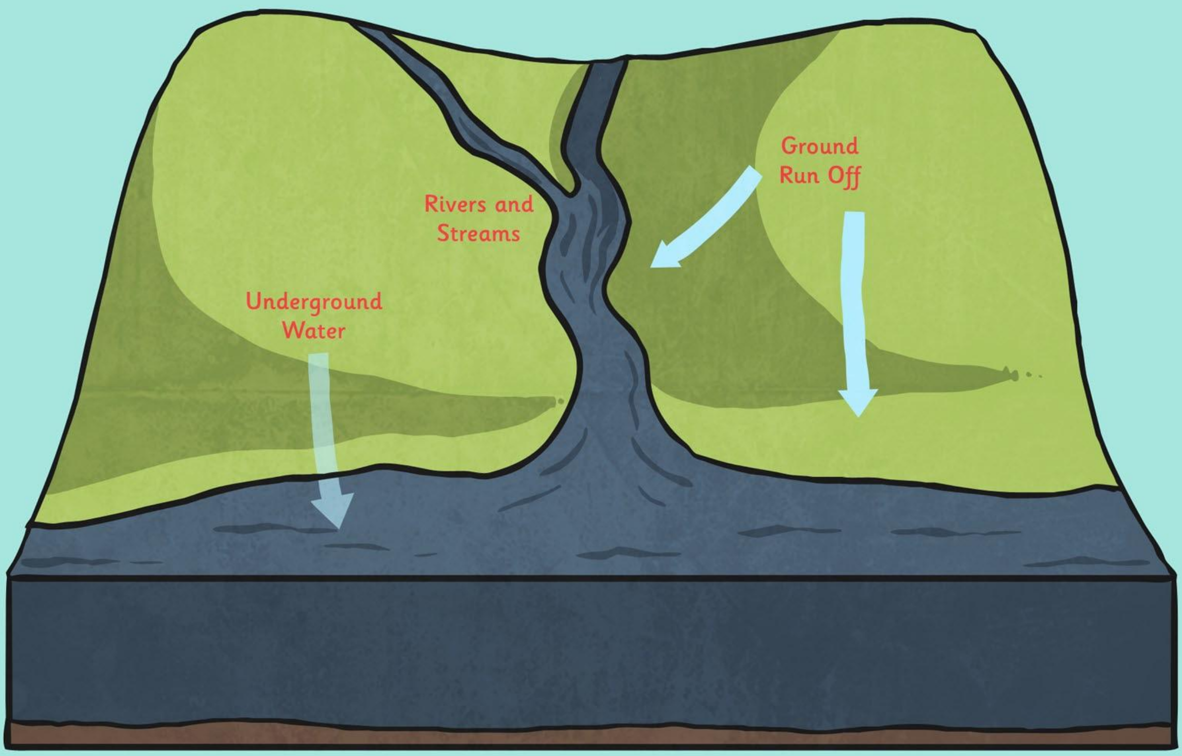


water vapour

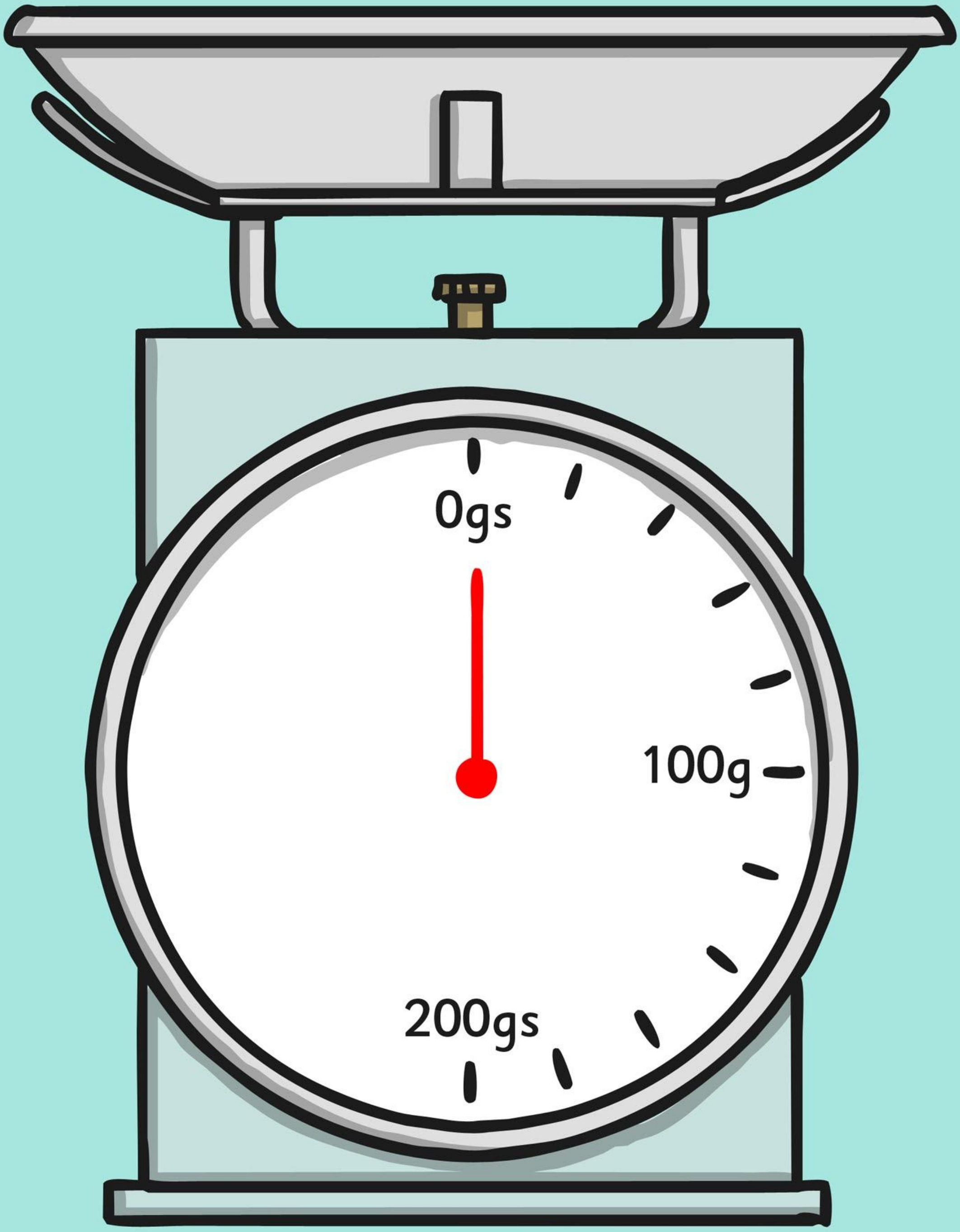
energy

precipitation

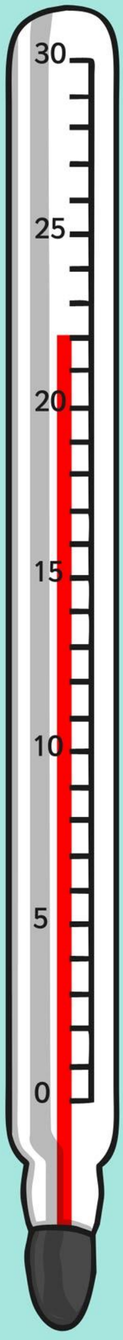
collection



weigh

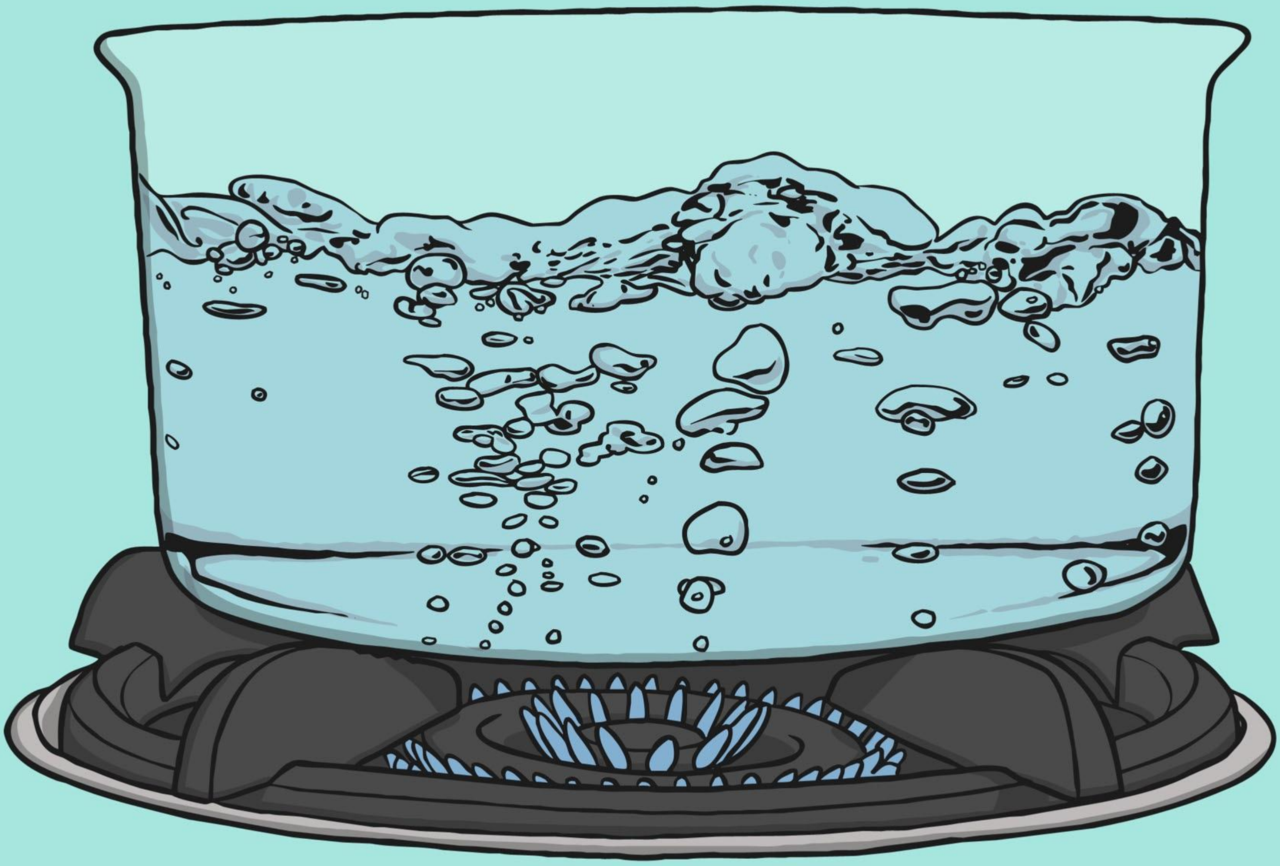


thermometer

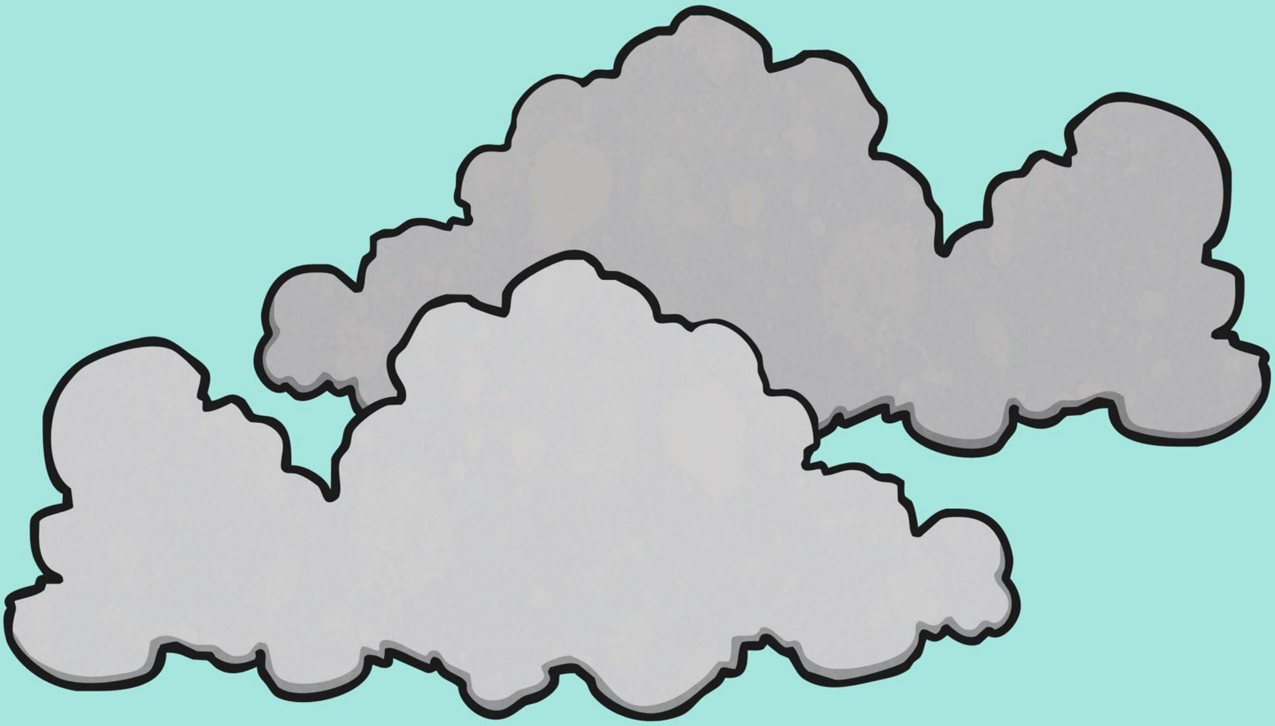


dry

heat



clouds



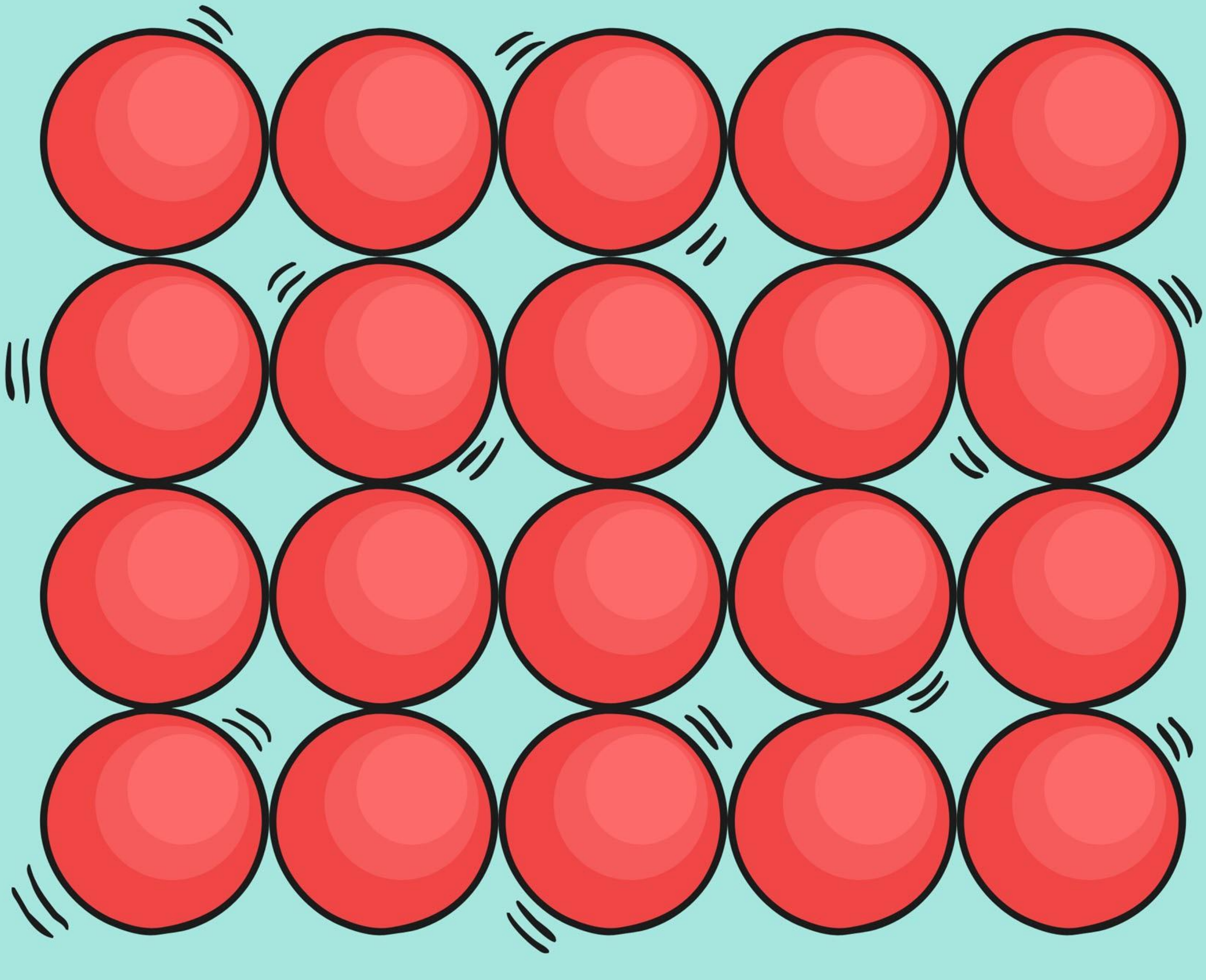
rain

sleet

hail

snow

solid



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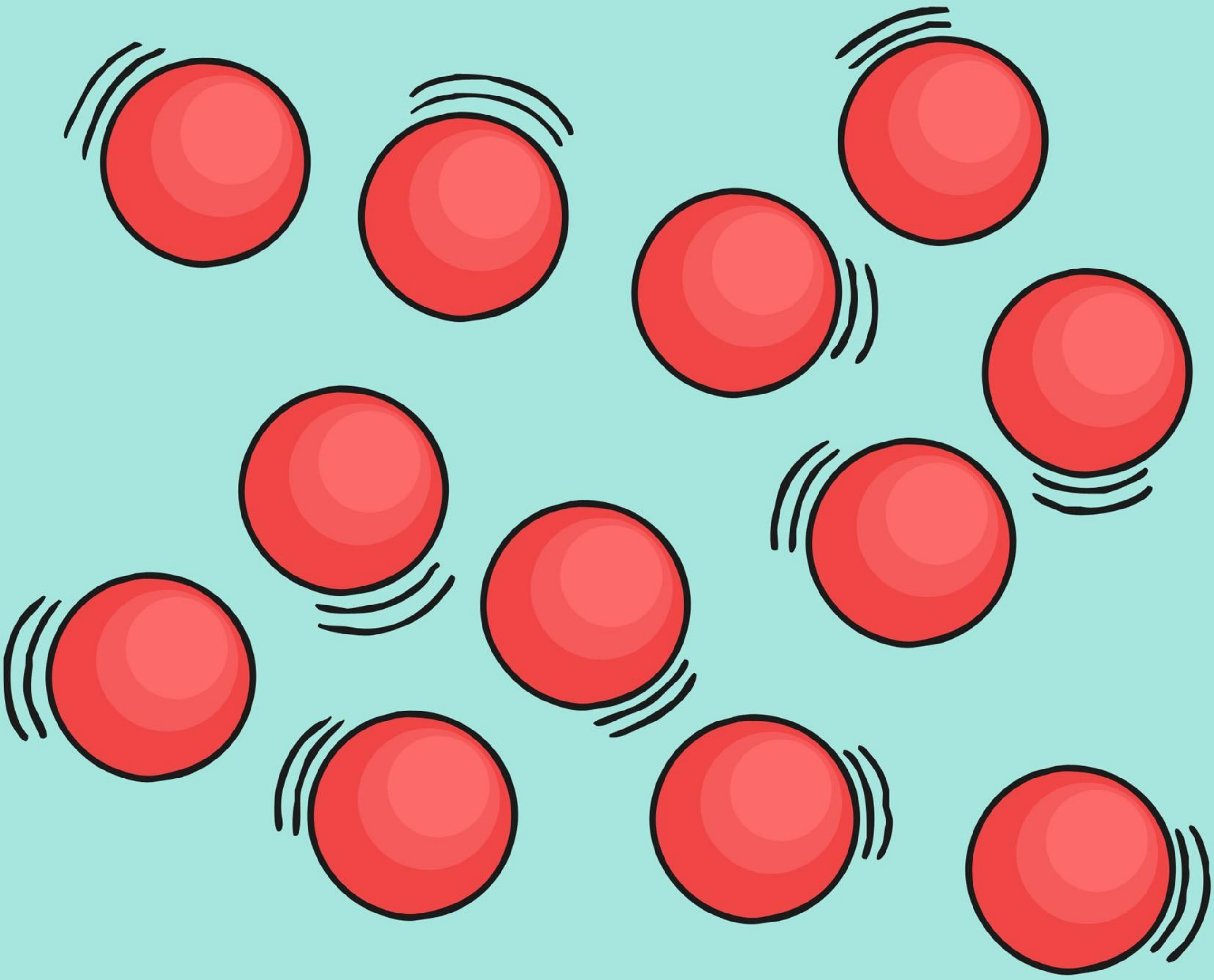
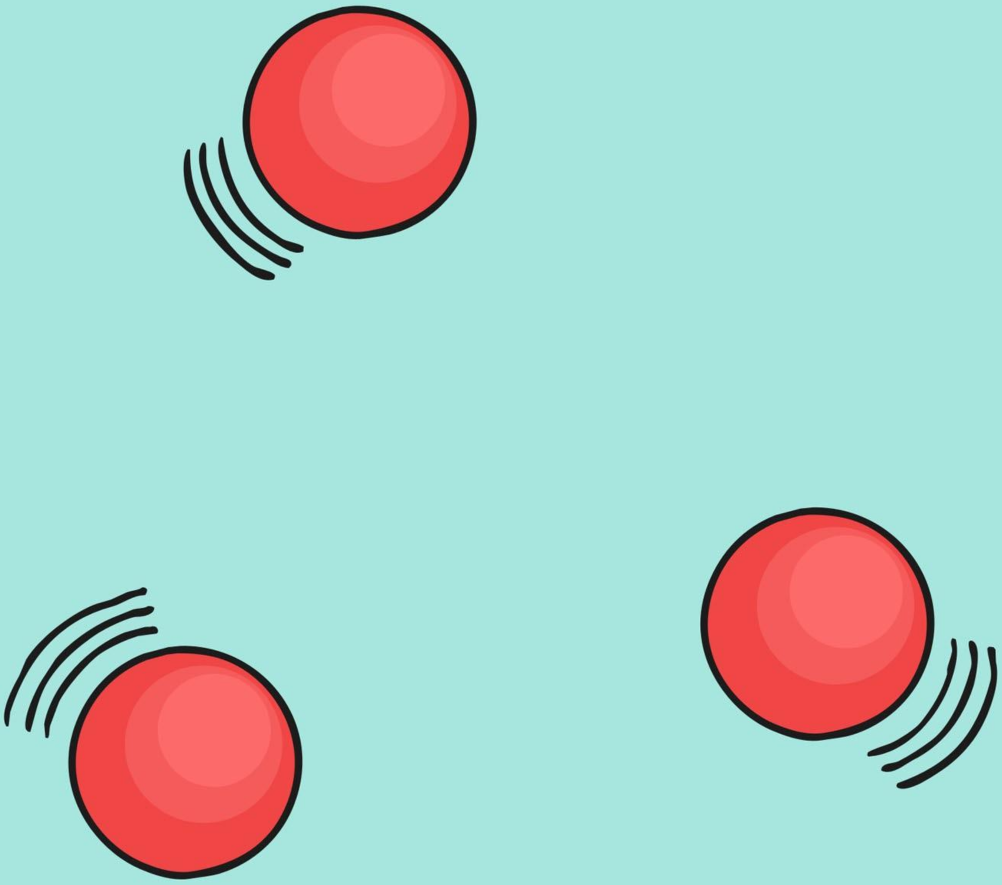


gas



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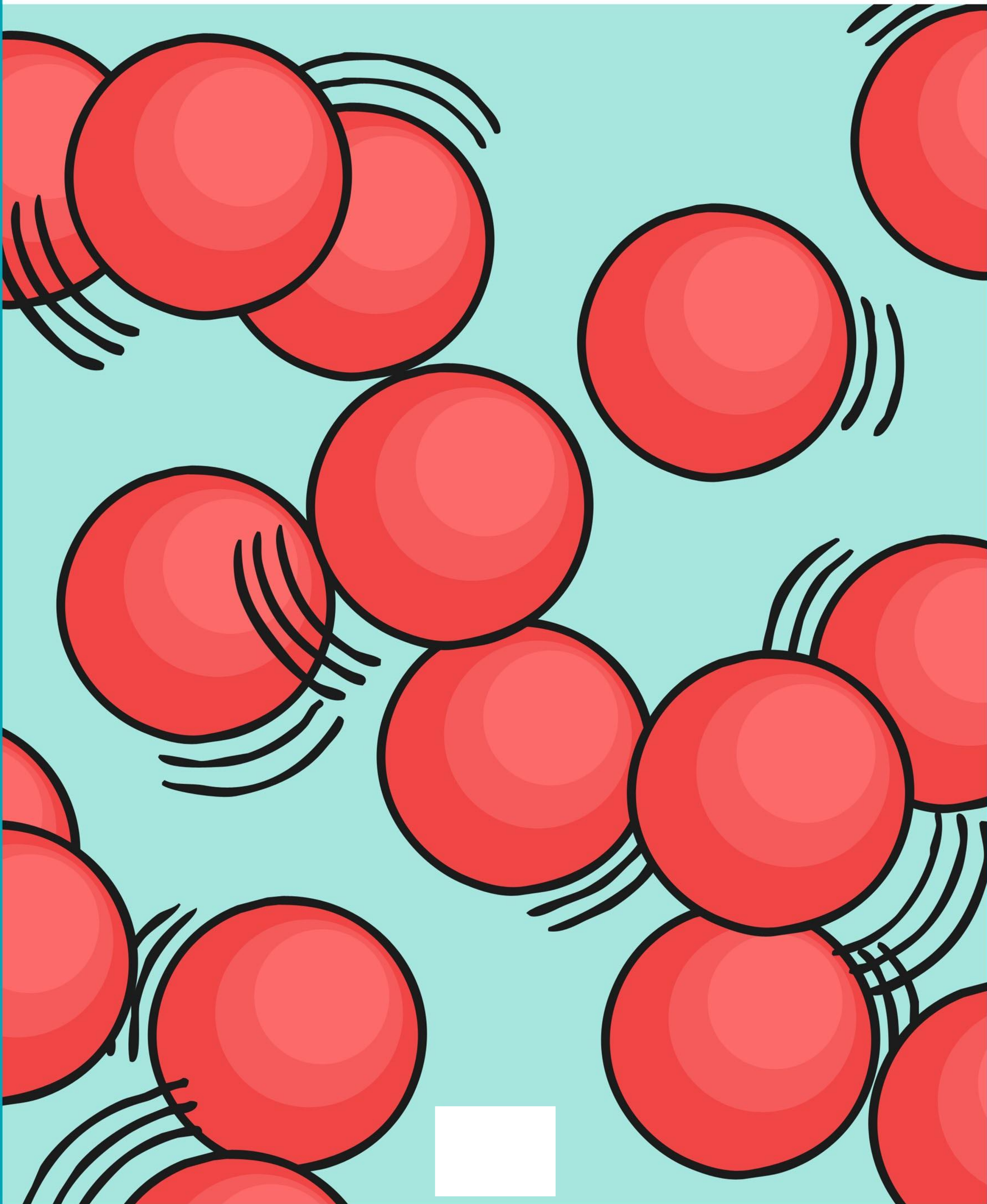
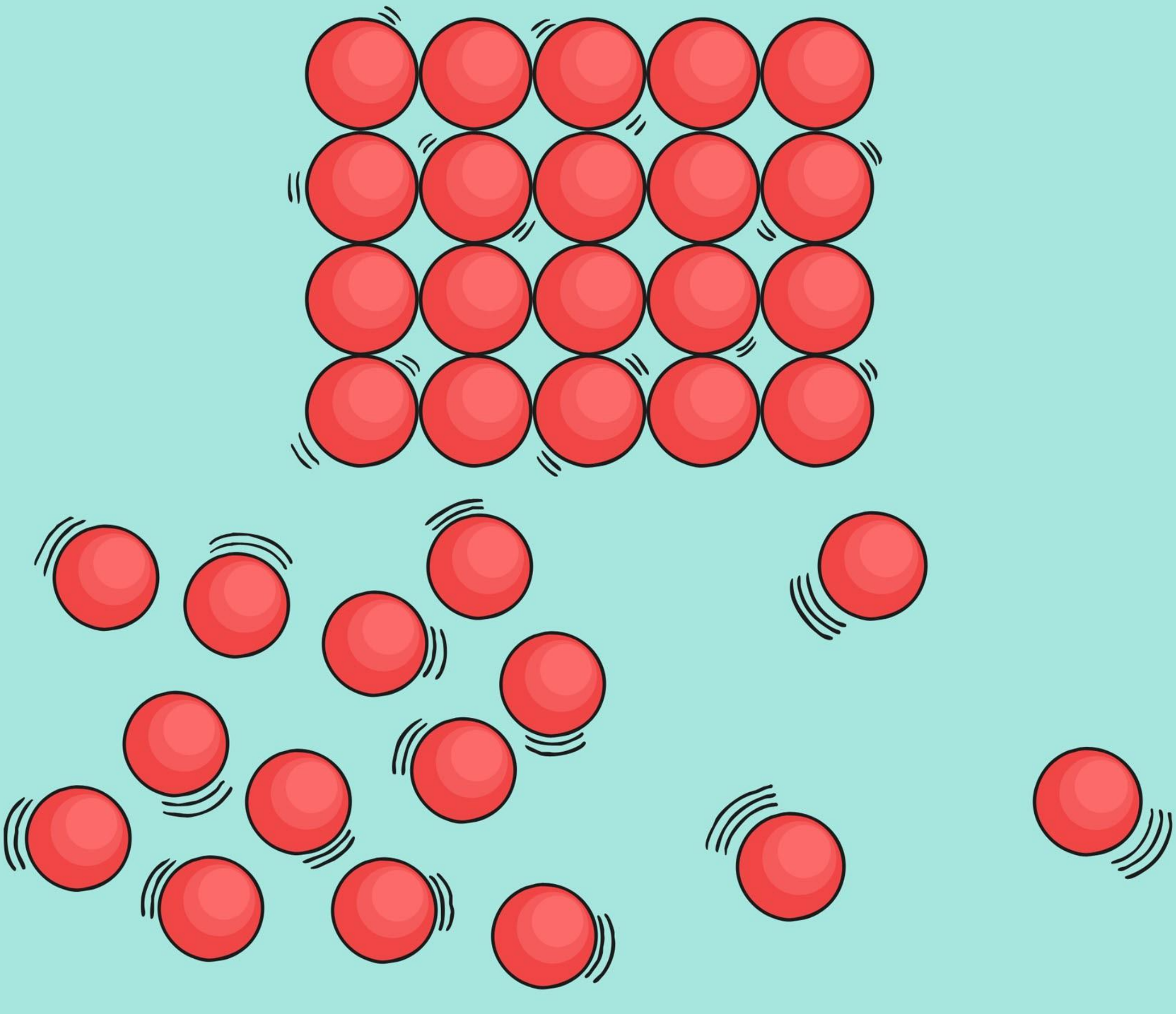


state



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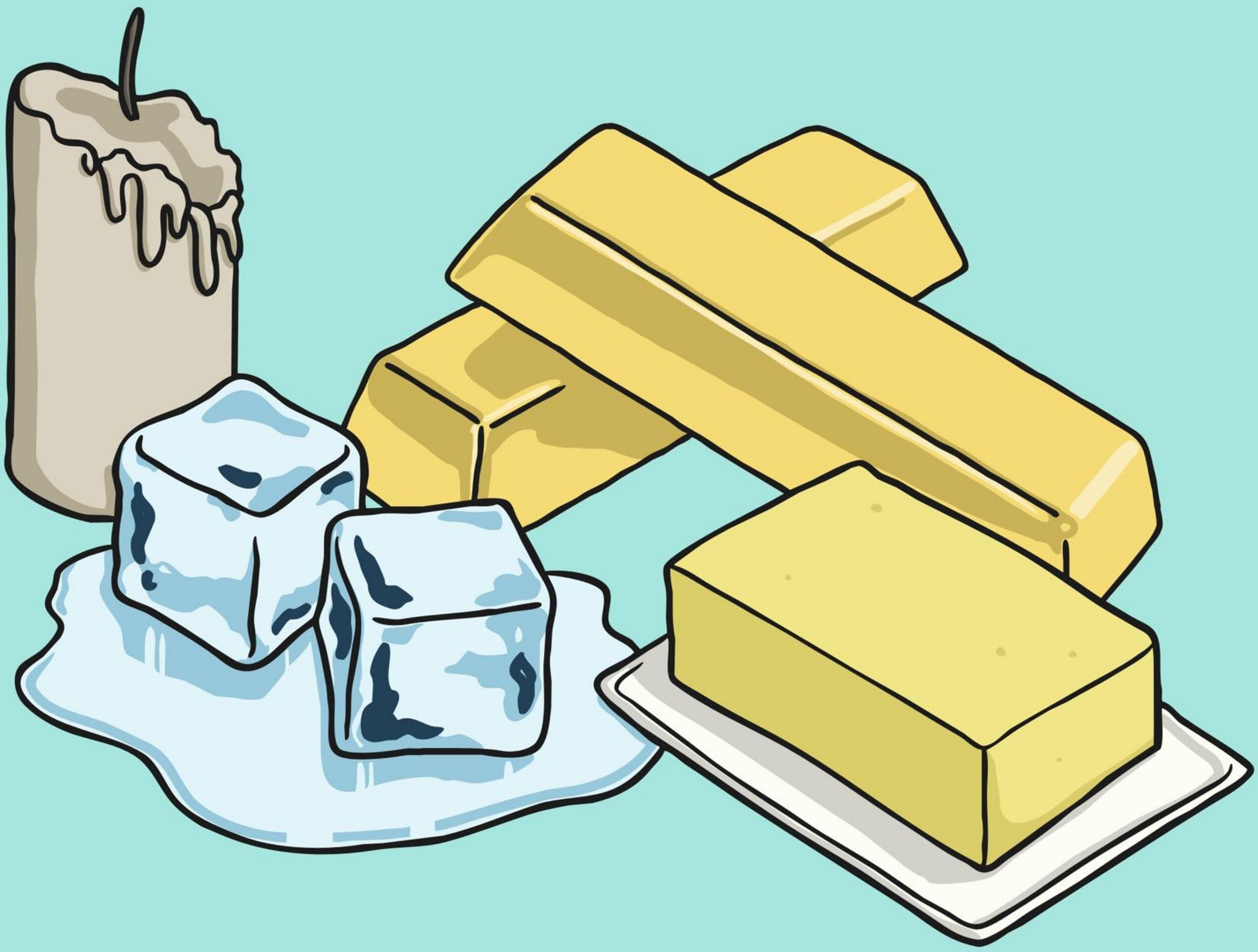

properties

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melt

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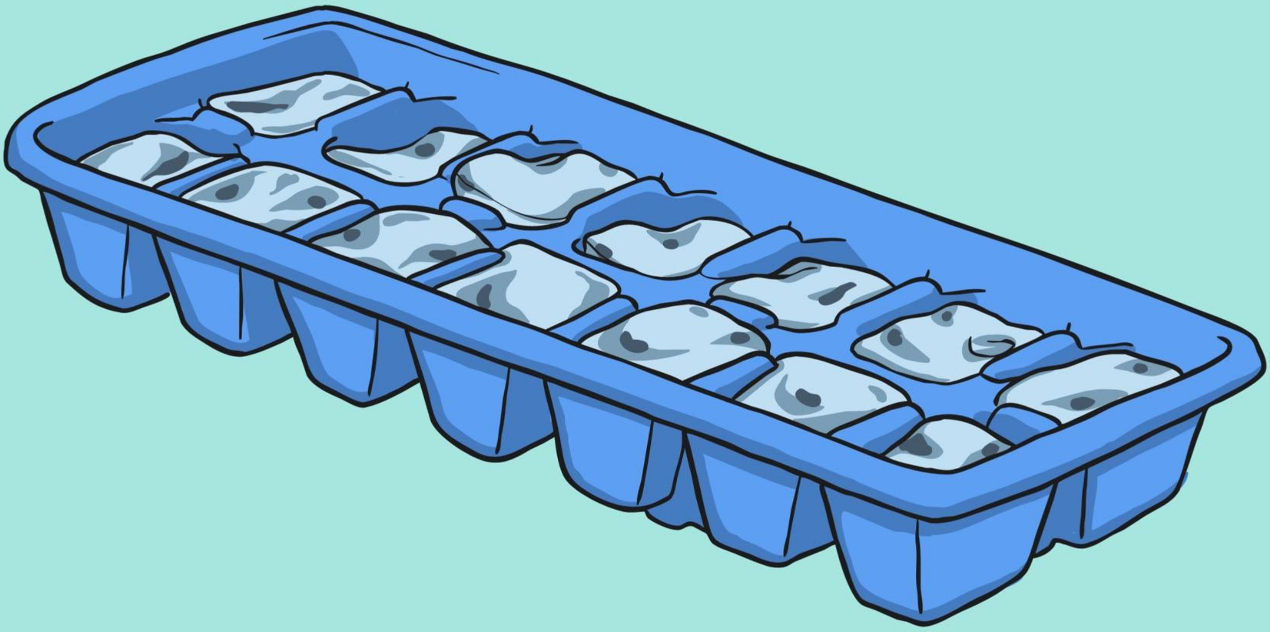
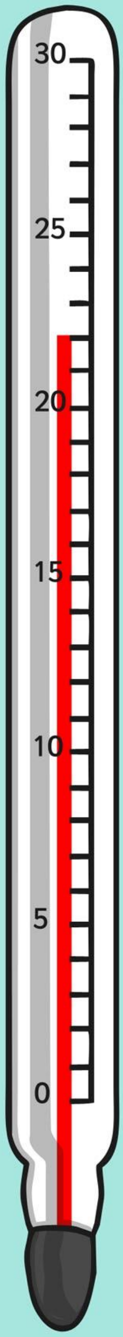
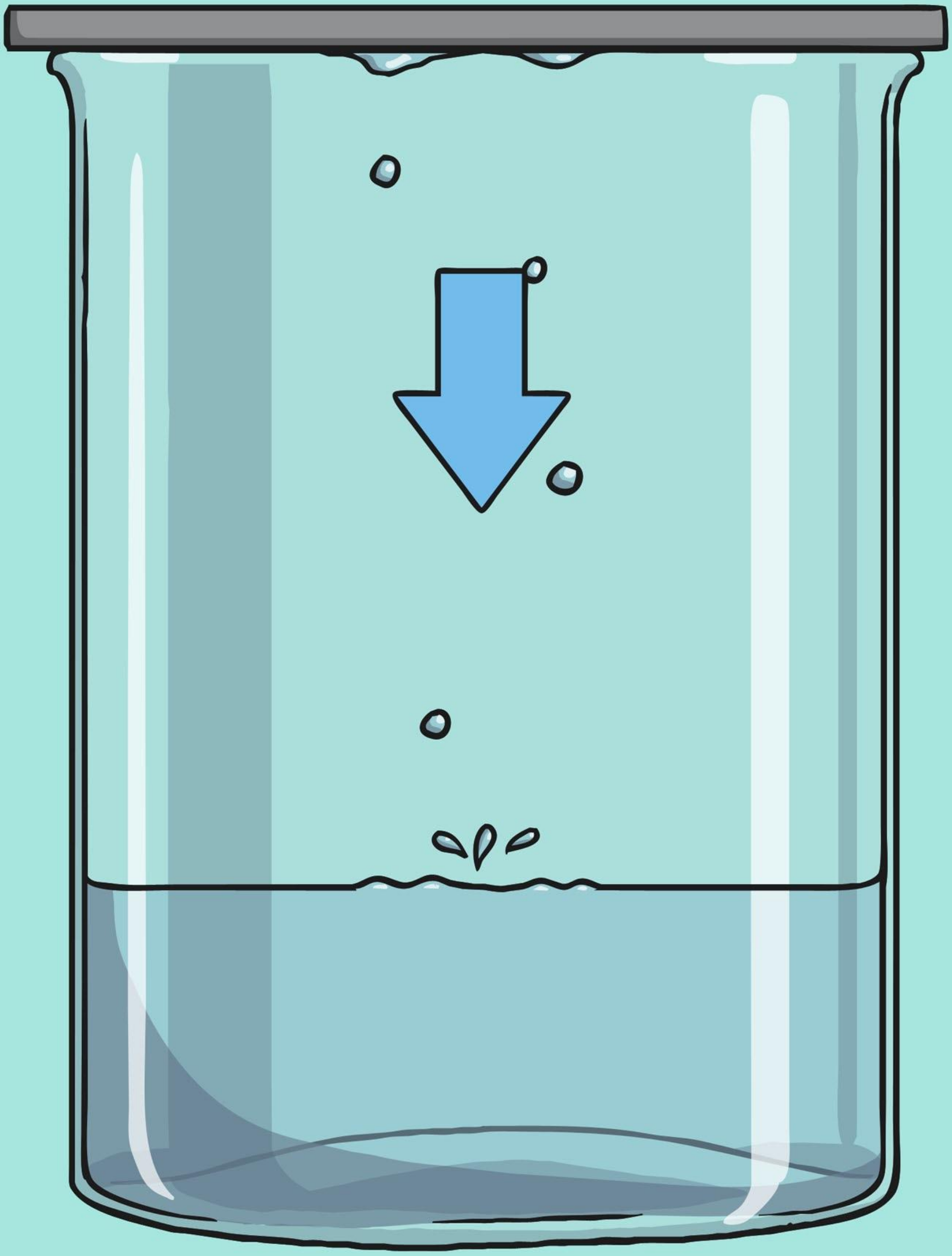


temperature

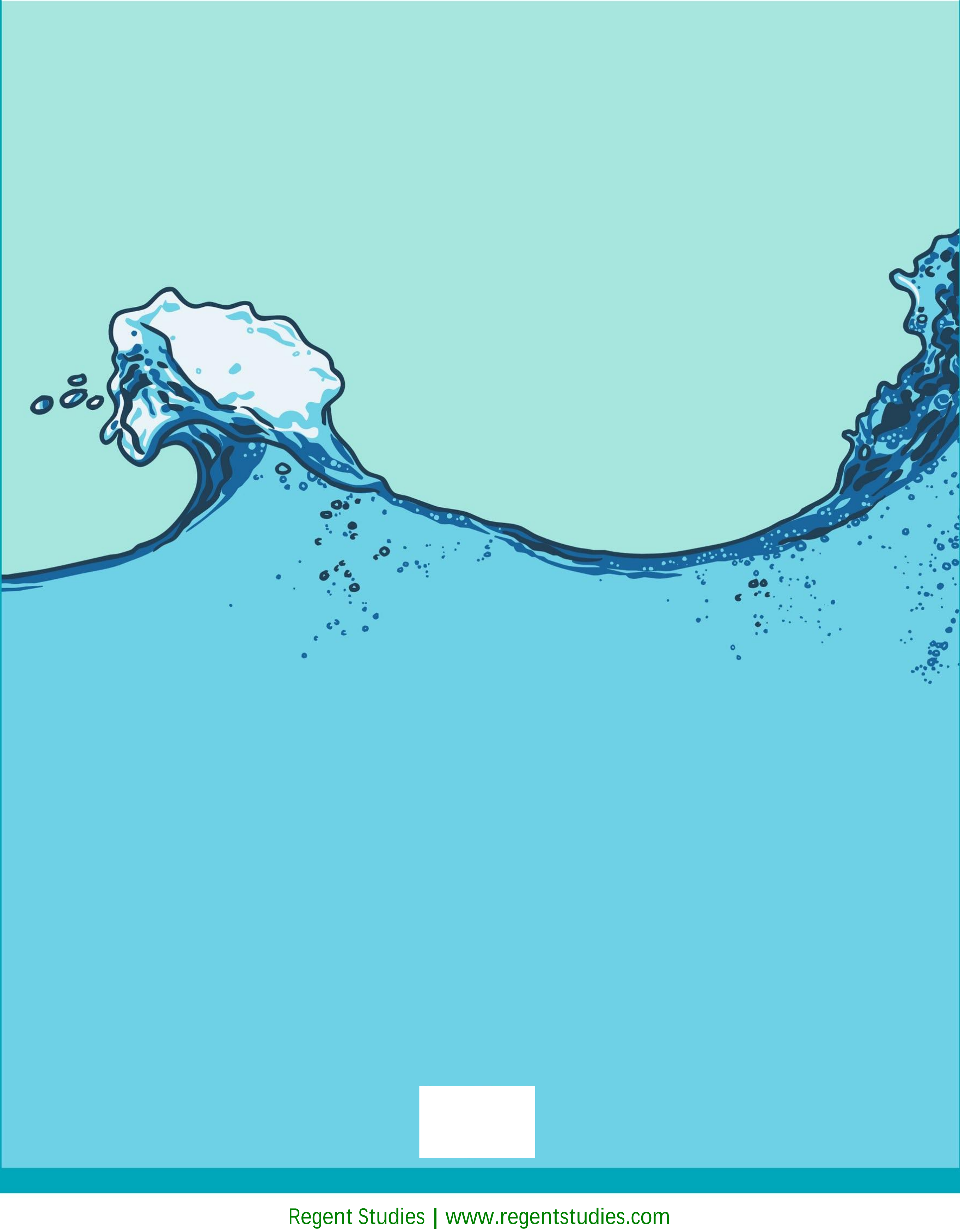


condensation

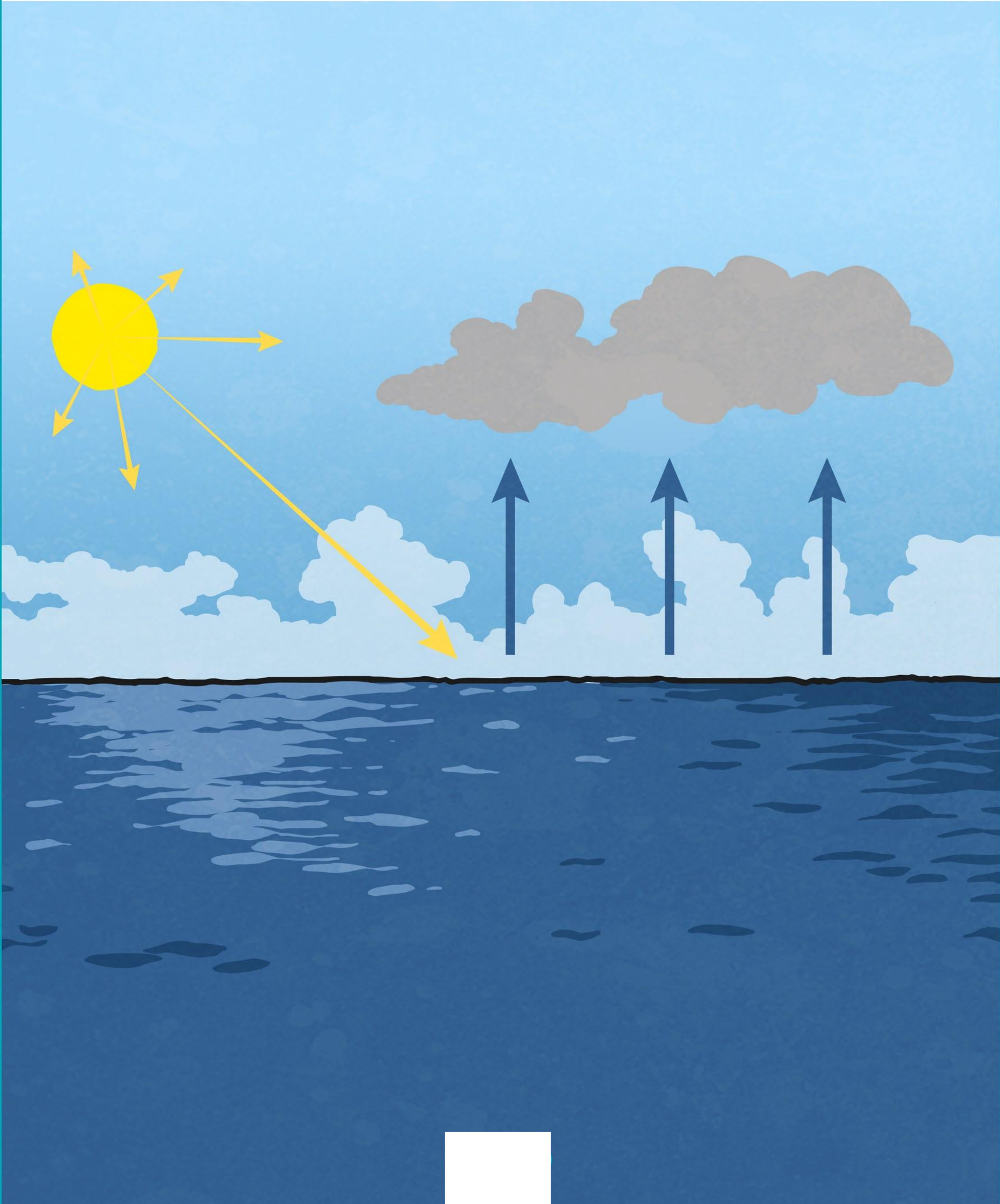


process

water



evaporation



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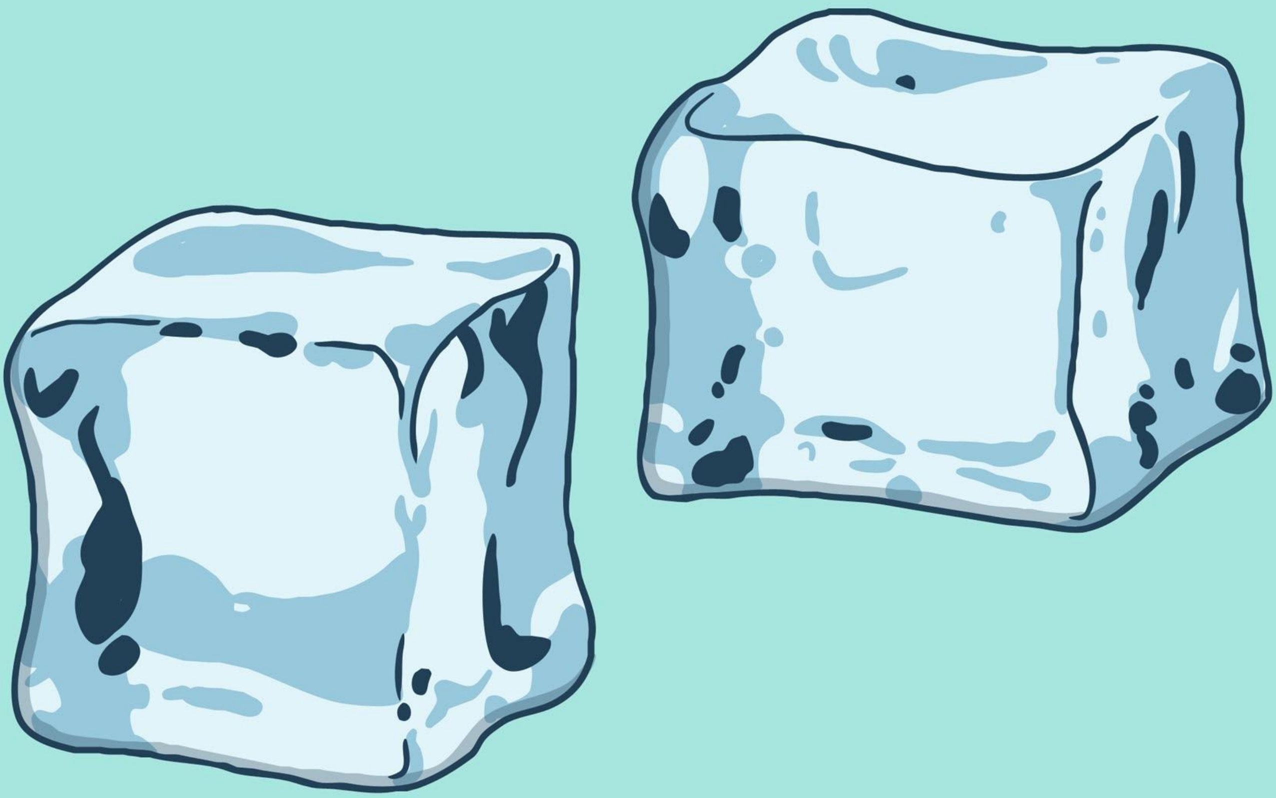

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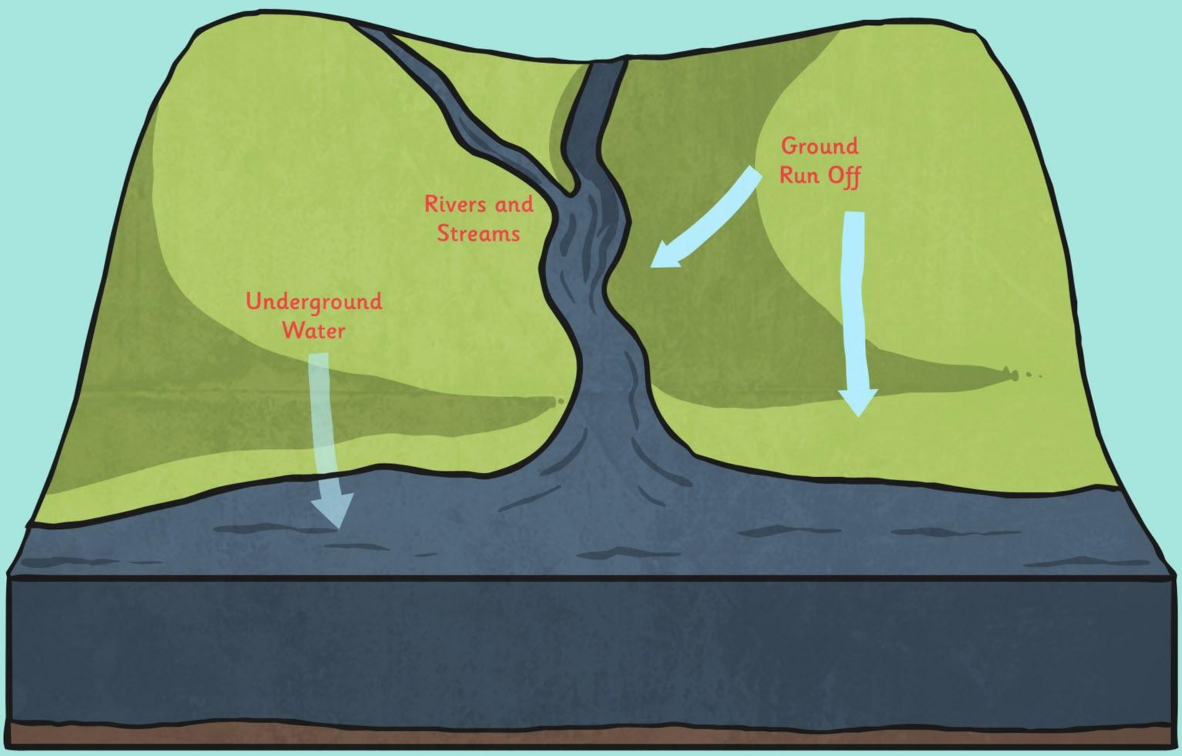

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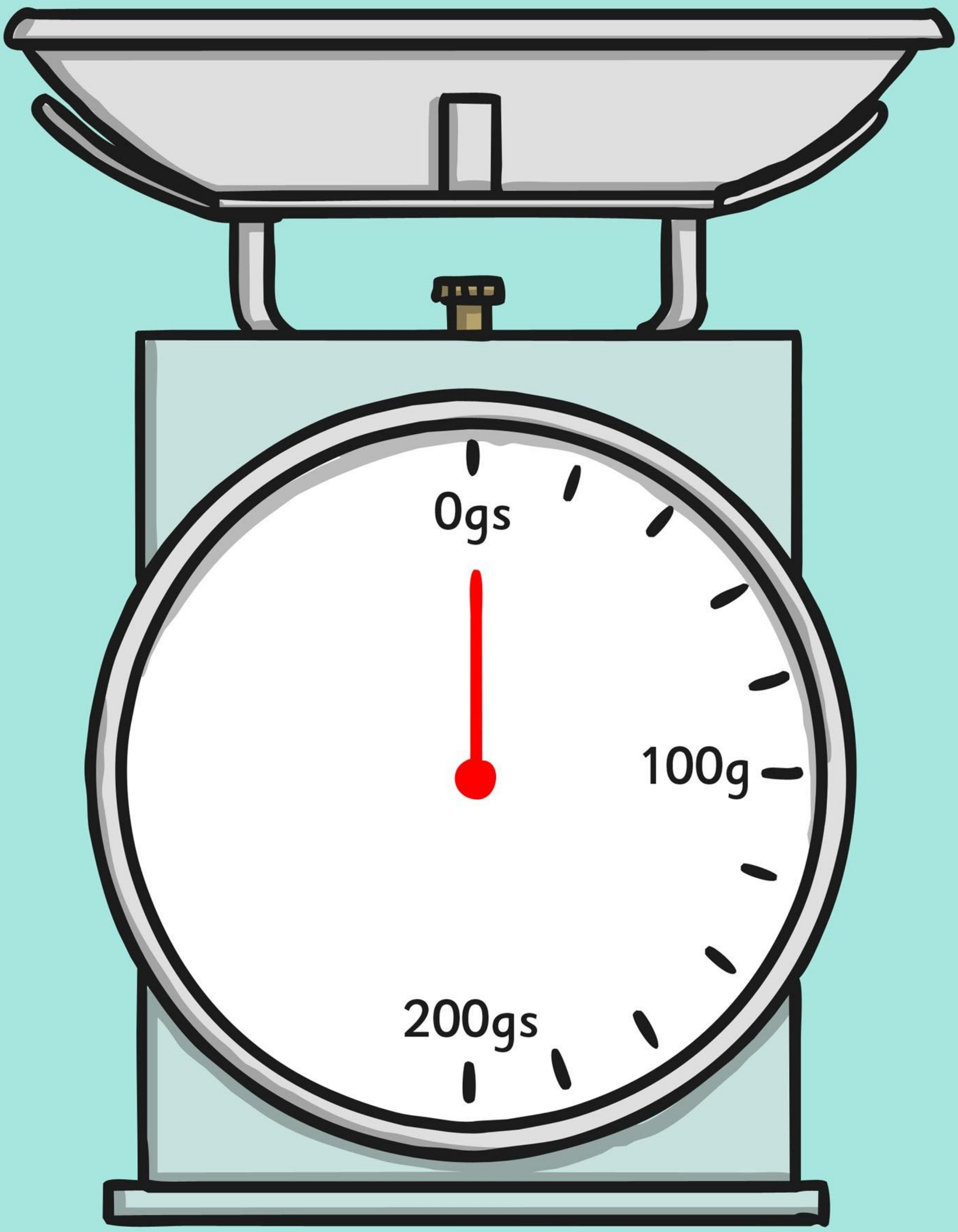

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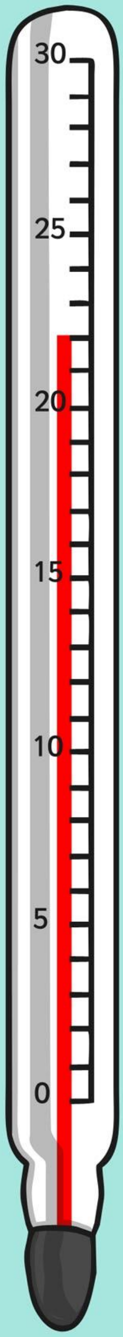

dry

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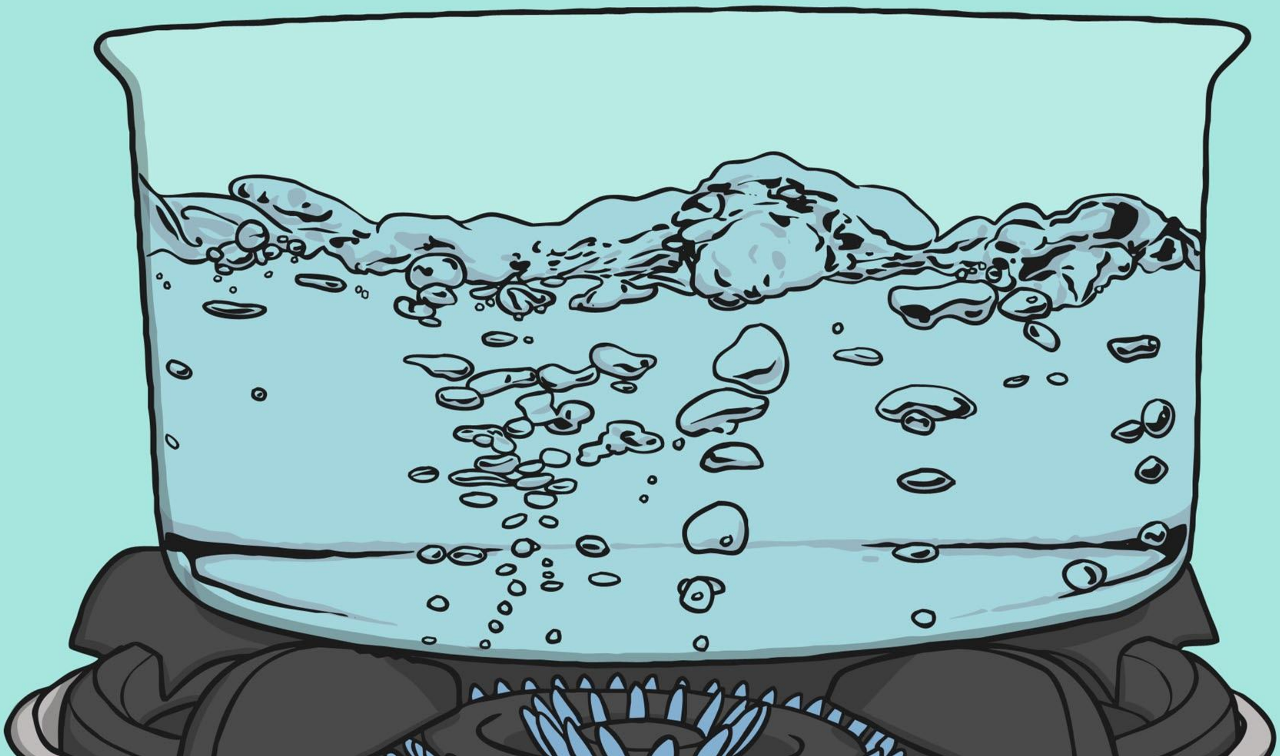
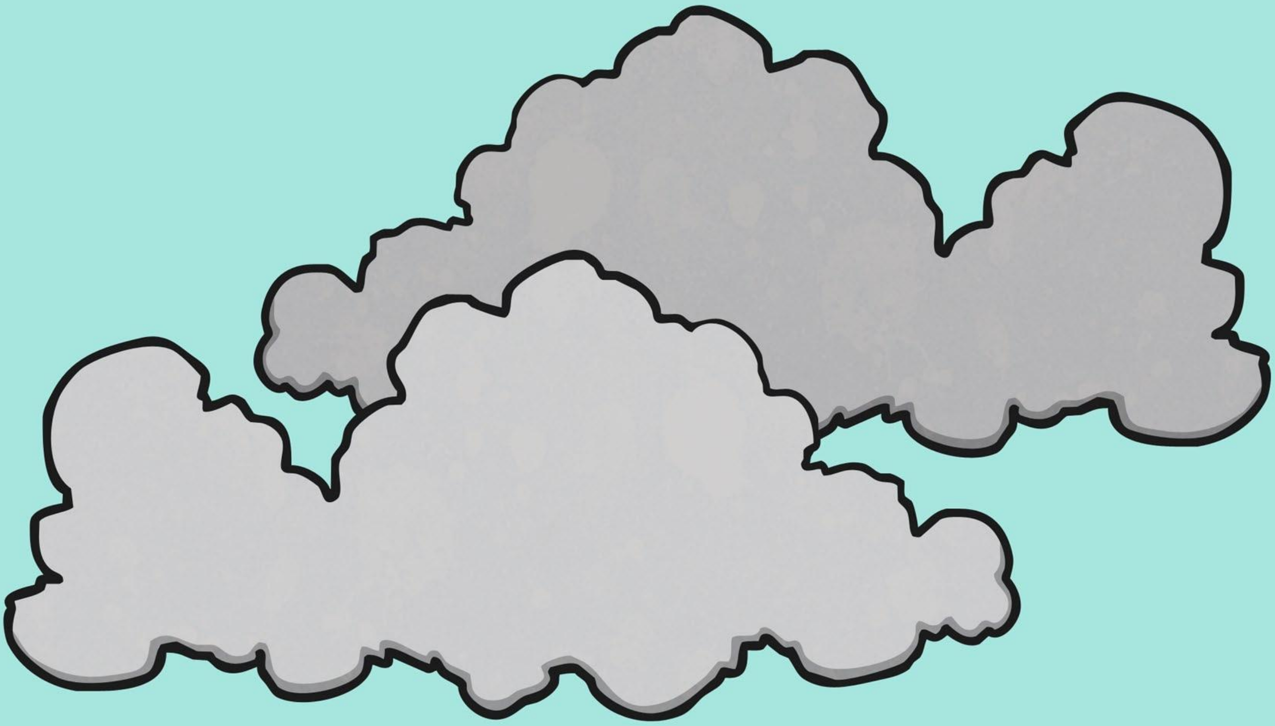


clouds



rain

sleet

hail

snow

States of Matter

Fact Cards

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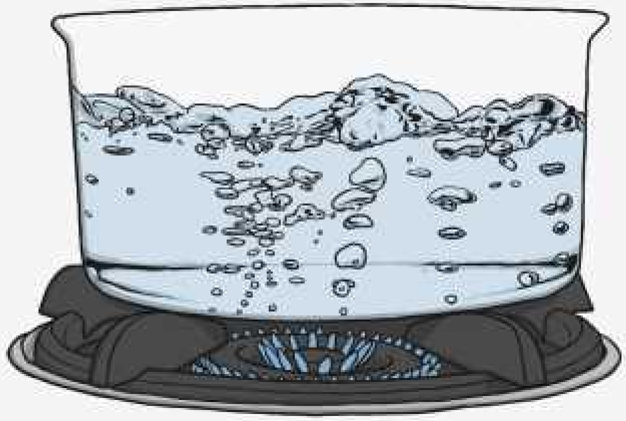
Sublimation is when snow or ice changes state from a solid to a gas without ever becoming a liquid in between. Good conditions for sublimation are when it is very cold, sunny and windy.

Several places around the world claim to have the largest annual rainfall, but Cherrapunji in India holds the all-time record for the most rainfall in a calendar month and in a year. It received 9,300 mm in July 1861 and 26,461 mm between 1 August 1860 and 31 July 1861.

Glaciers are very slow moving masses of ice. The Lambert Glacier in the East Antarctic holds the Guinness world record for the world's largest glacier. It is about 60 miles wide, over 250 miles long and around 2,500m deep!

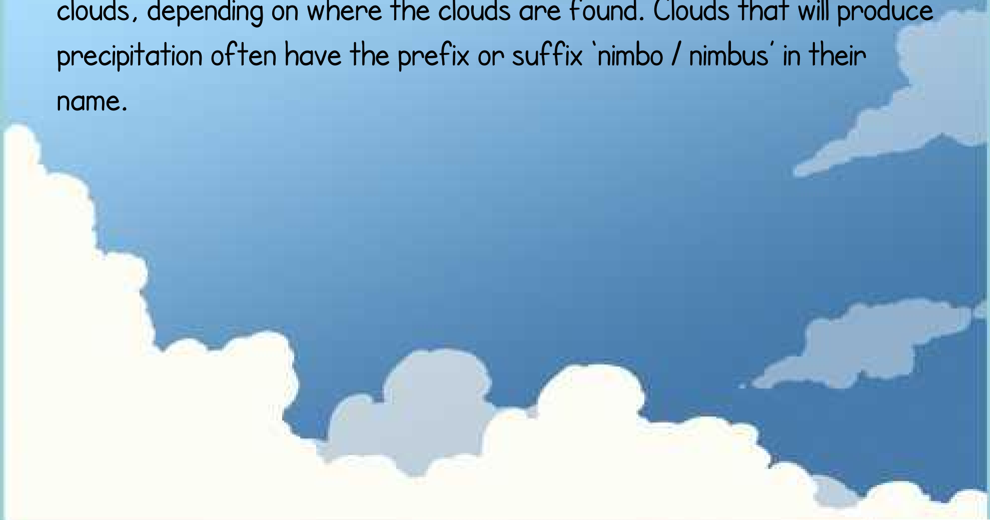
The boiling point of water is lower at higher altitudes. At sea level, water boils at 100ºC . But at 10,000 feet above sea level, water actually boils at around 90ºC!



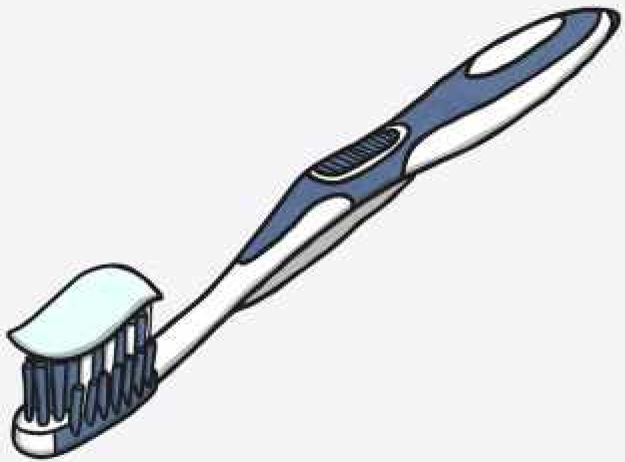
Oxygen is one of the gases in air. But did you know that it can be condensed into a liquid? If oxygen gas is cooled to around -182ºC it will condense, changing state to become liquid oxygen. This liquid is pale blue in colour.

Air is made up of different gases. It is about 78% nitrogen, 21% oxygen, 0.9% argon and about 0.04% carbon dioxide. Air also contains water vapour. The amount of water vapour in the air differs depending on the weather conditions.

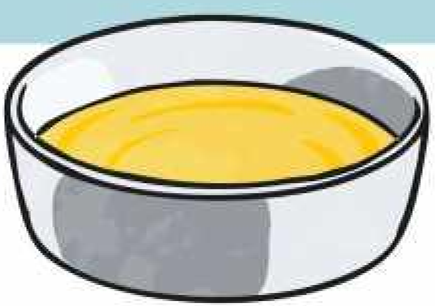
There are lots of different types of clouds, but there are ten main named groups of clouds. These are divided into low, medium or high clouds, depending on where the clouds are found. Clouds that will produce precipitation often have the prefix or suffix 'nimbo / nimbus' in their name.

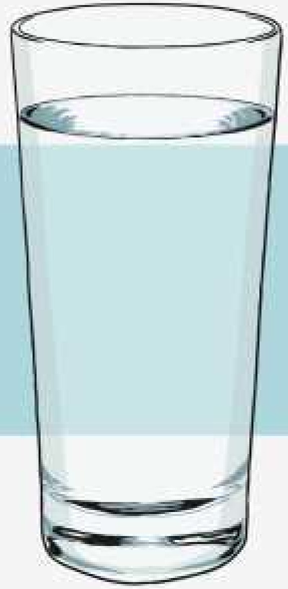


Toothpaste is a tricky material to classify! It is a type of colloid called a sol. A sol is a substance in which tiny solid particles are suspended in a liquid.



Custard is a non-Newtonian liquid. When it is resting, it is a liquid, but when force is applied to it, such as by stirring it or pushing on it, it acts like a solid.





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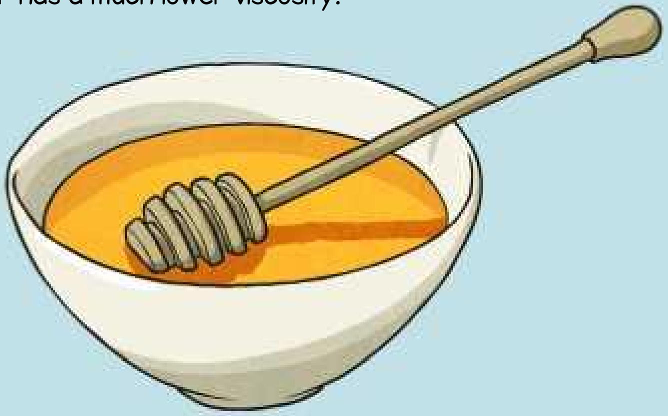

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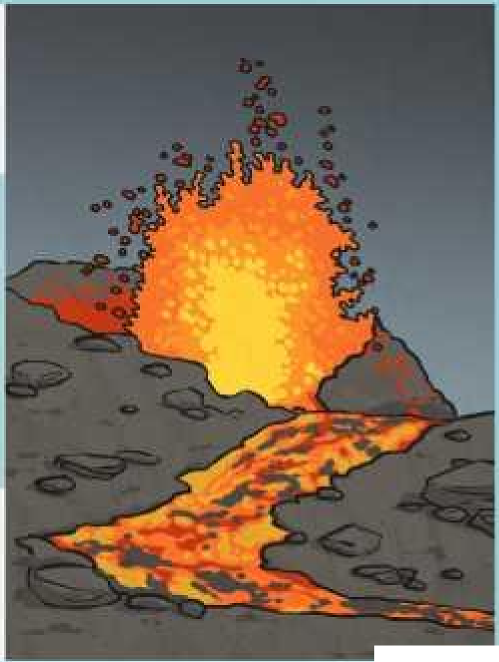

States of Matter
Fact Cards

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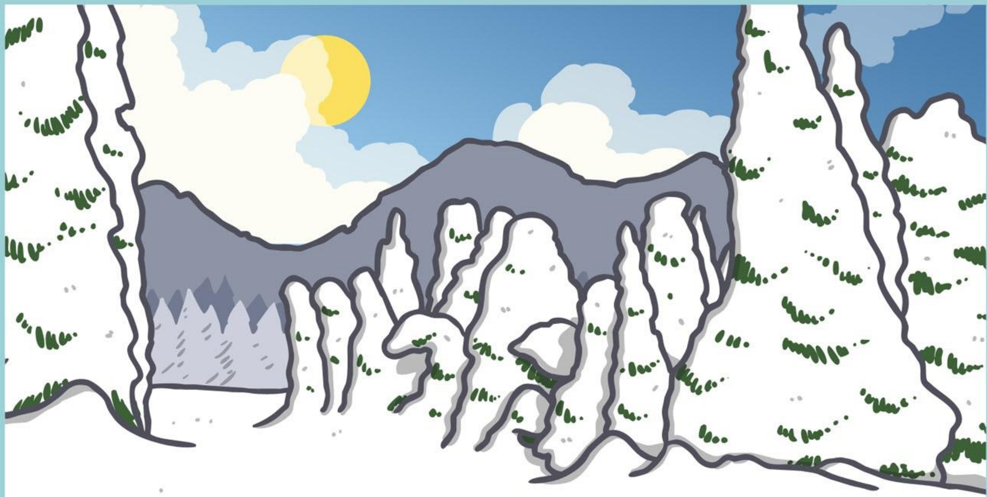

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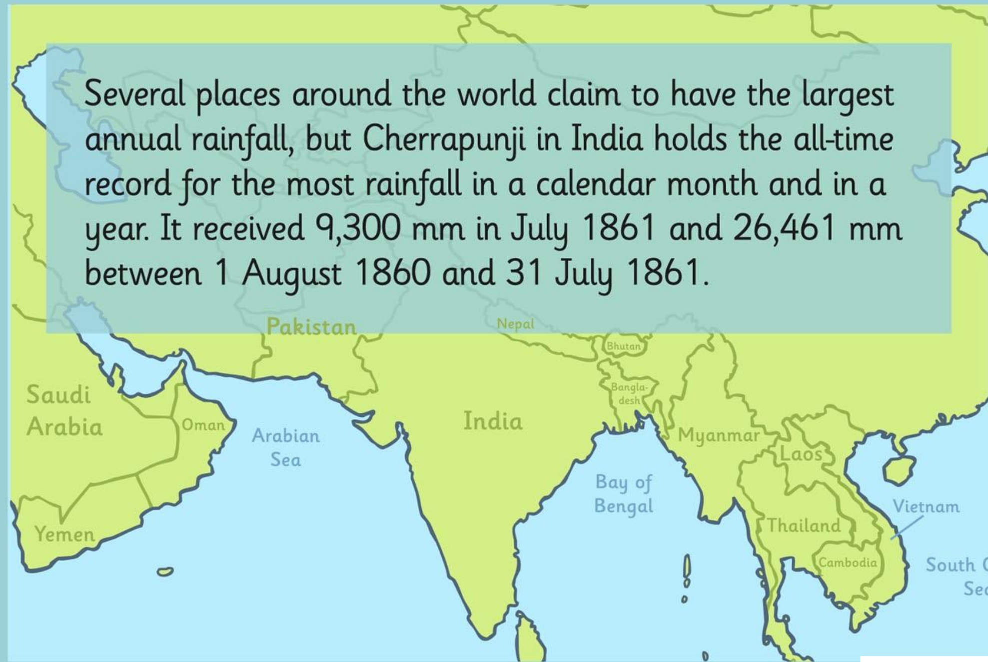

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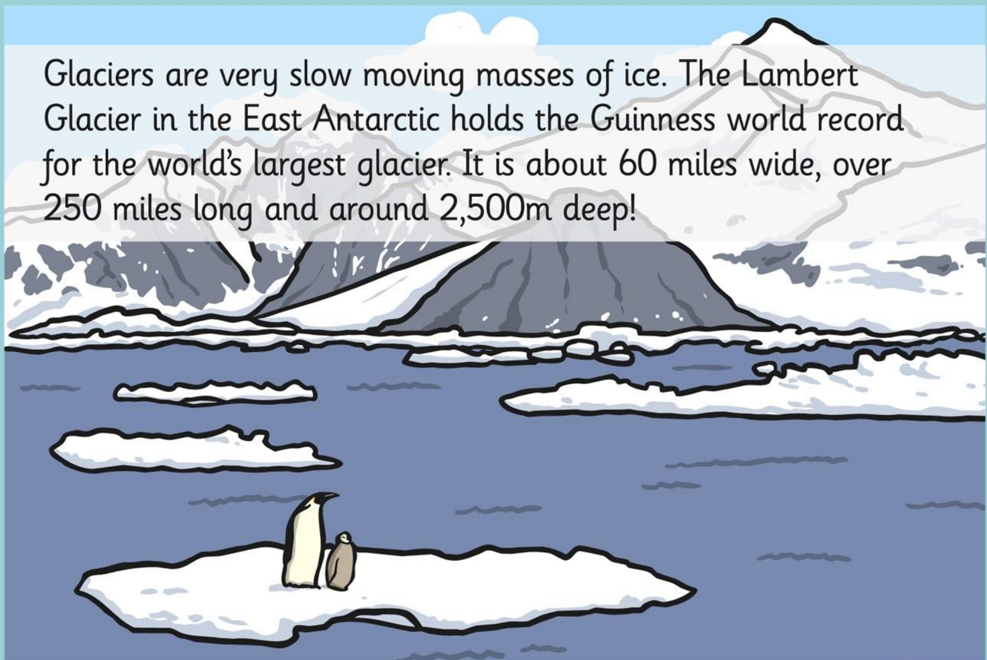

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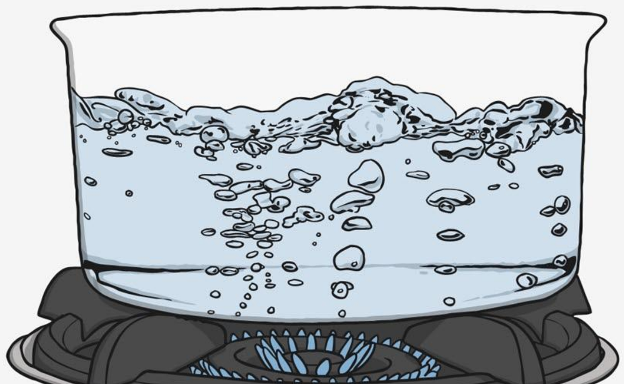

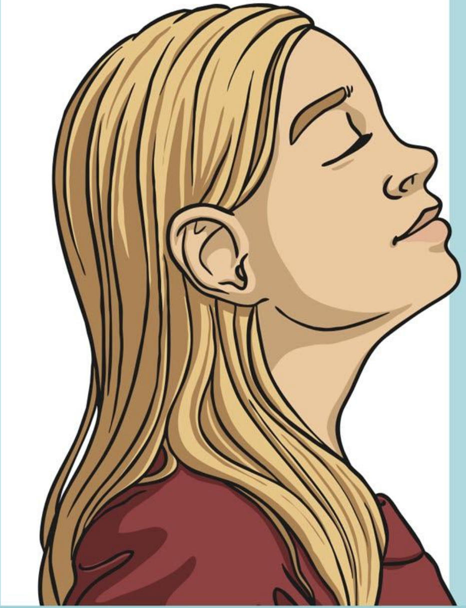

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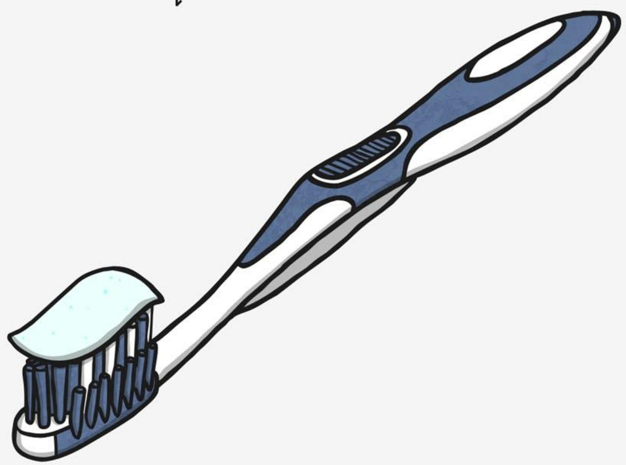

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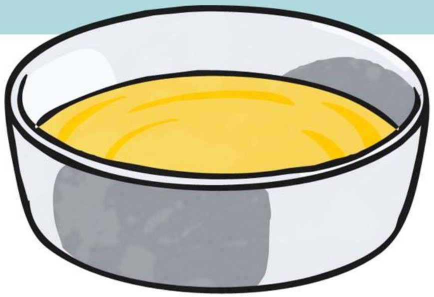

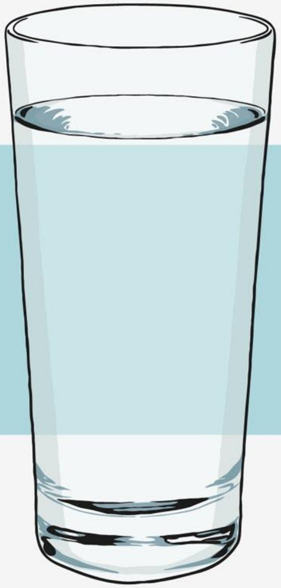

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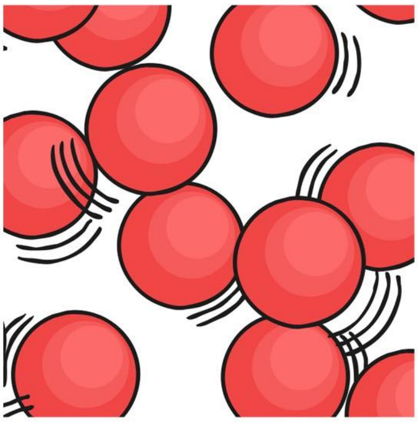
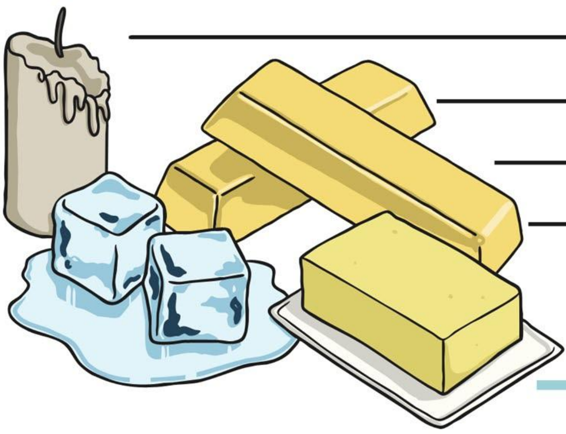
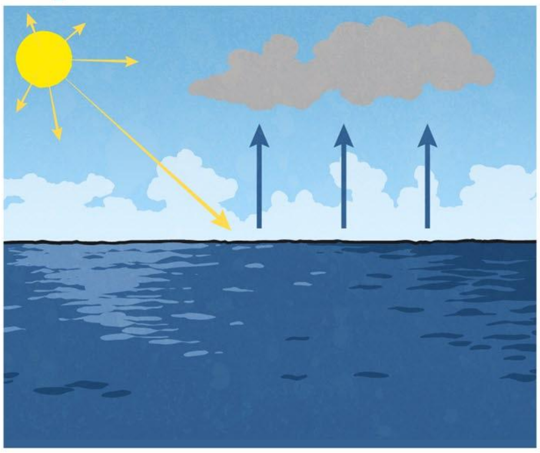
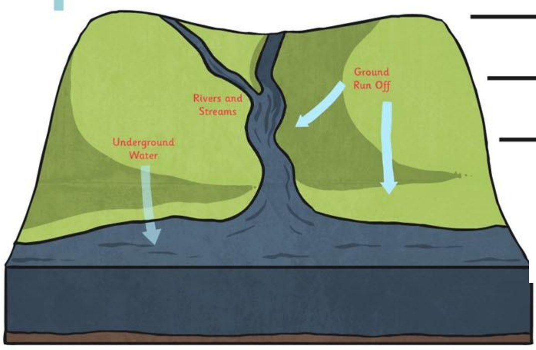
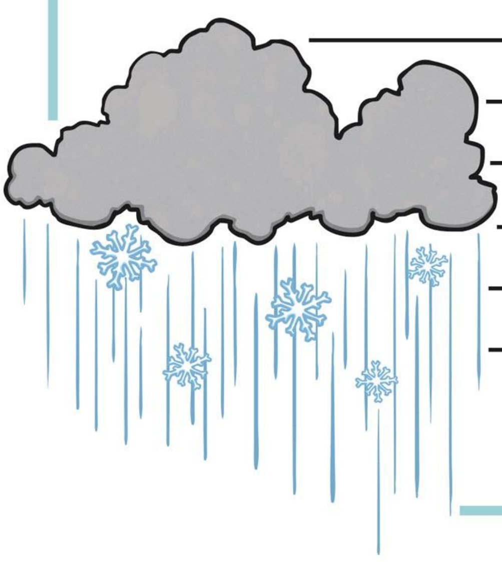
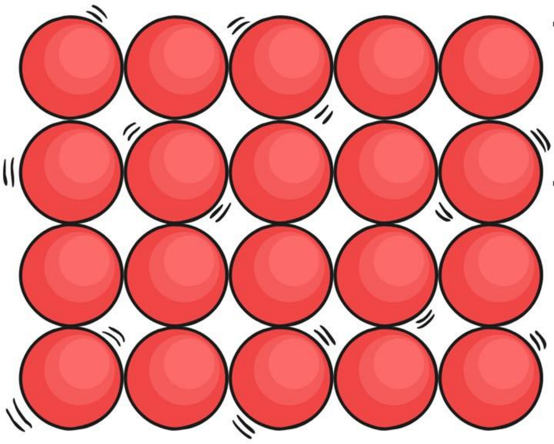


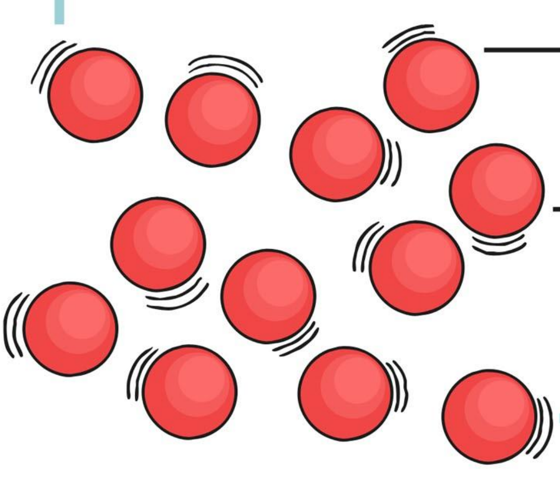


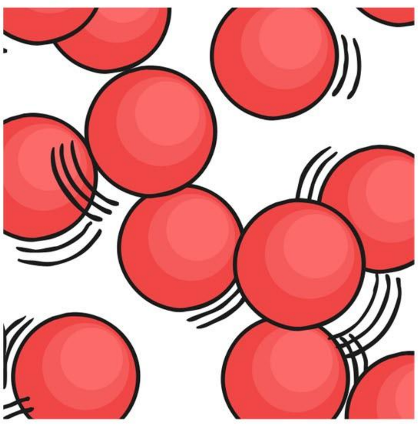


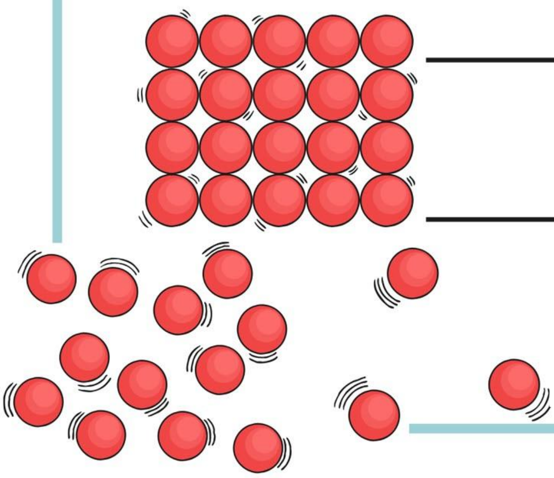

Rivers and Streams
Ground Run Off
Underground Water

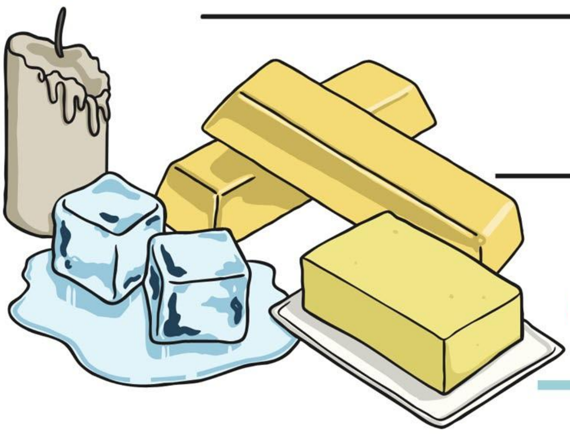


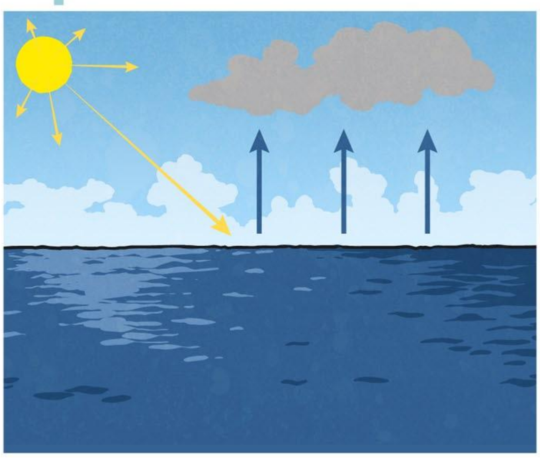


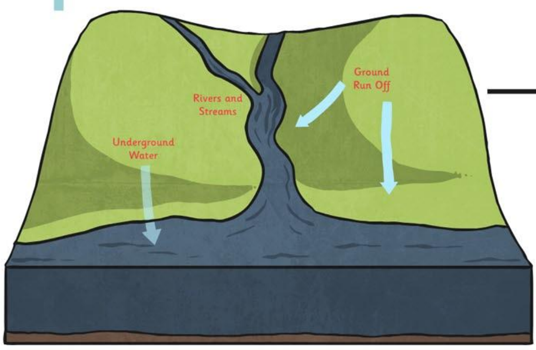








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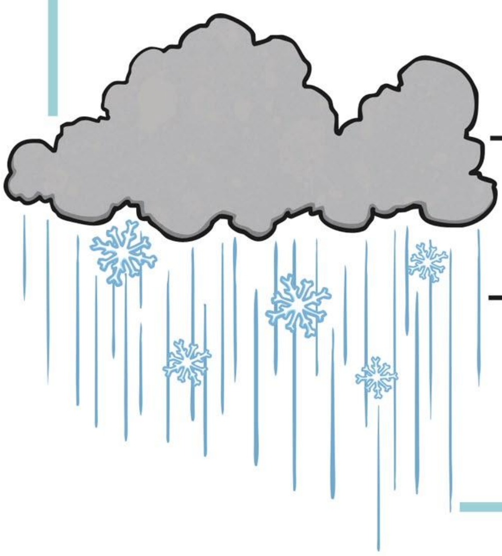
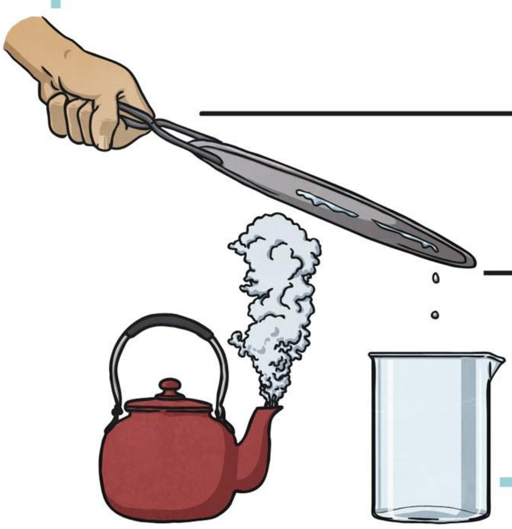
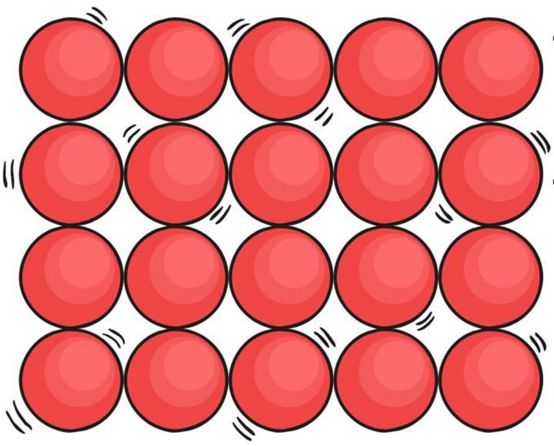
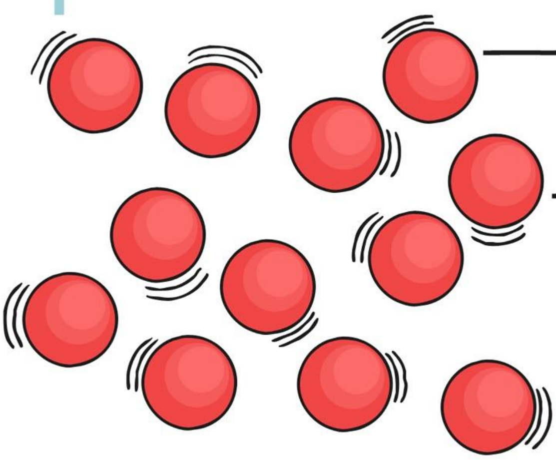
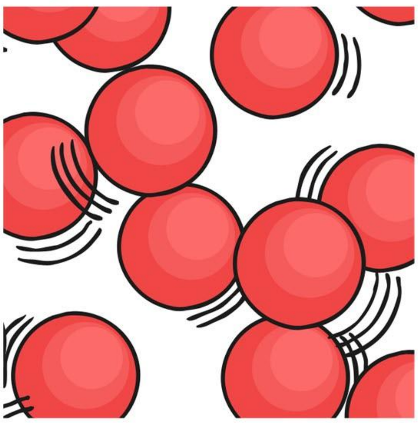
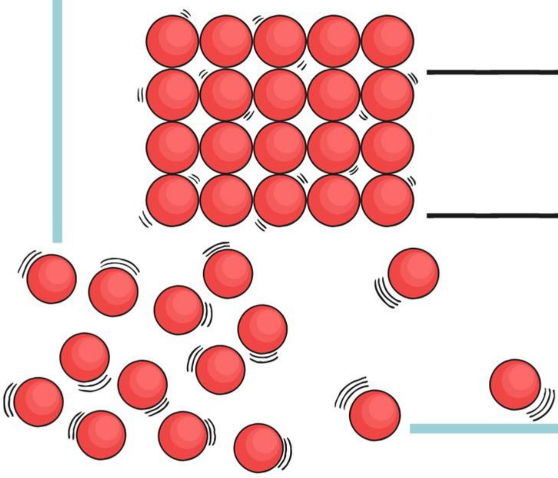


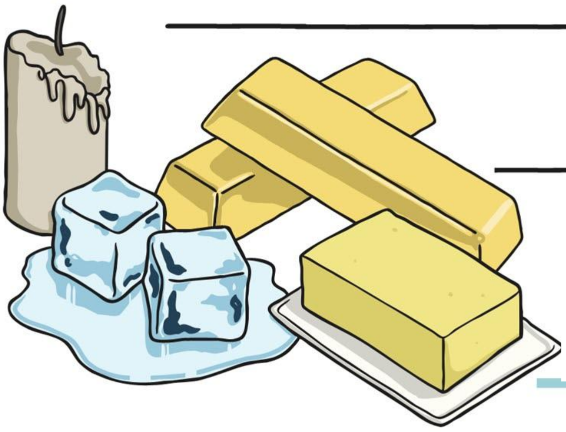


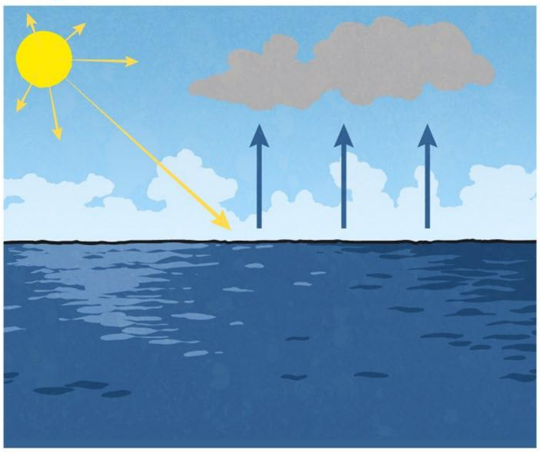


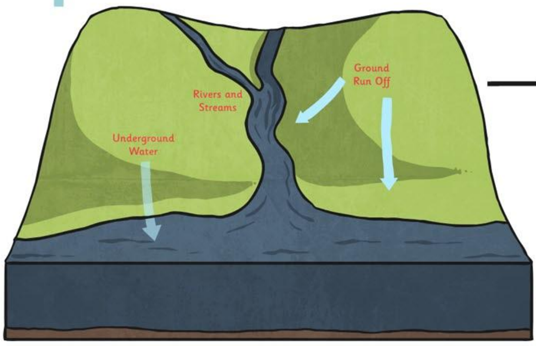


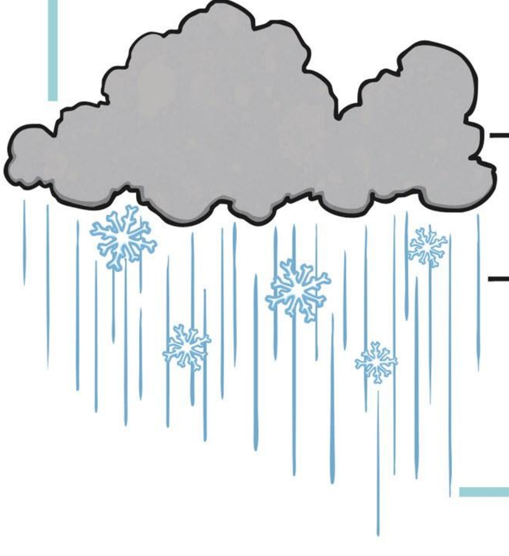


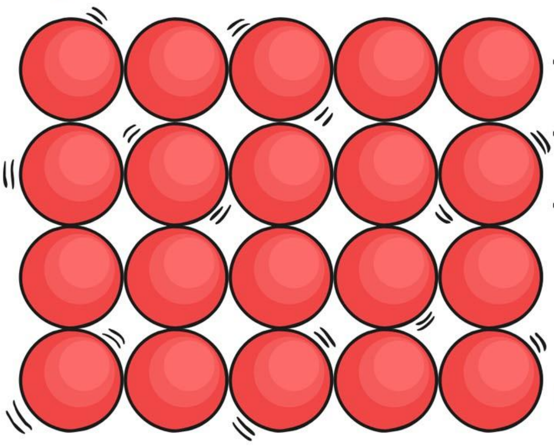


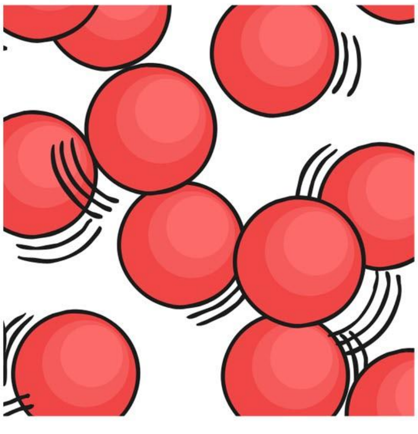


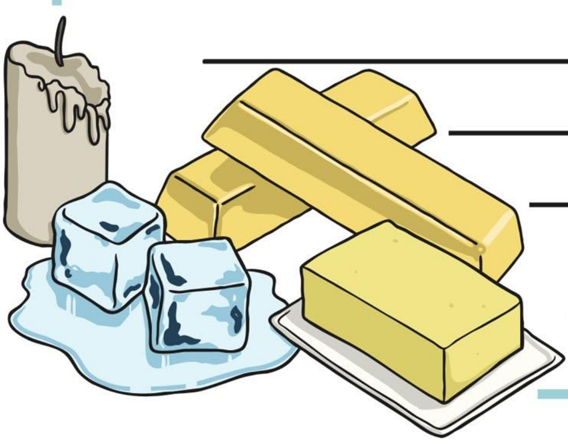


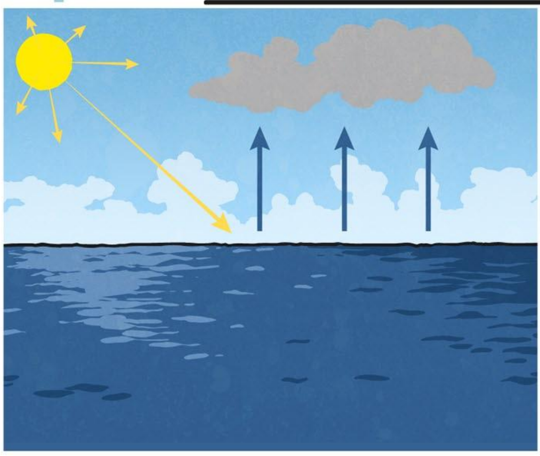

Ground
Run Off
Rivers and
Streams
Underground
Water

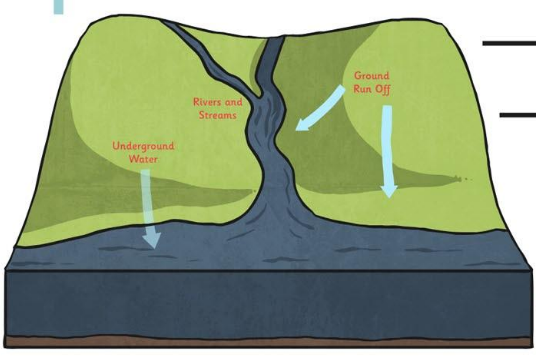


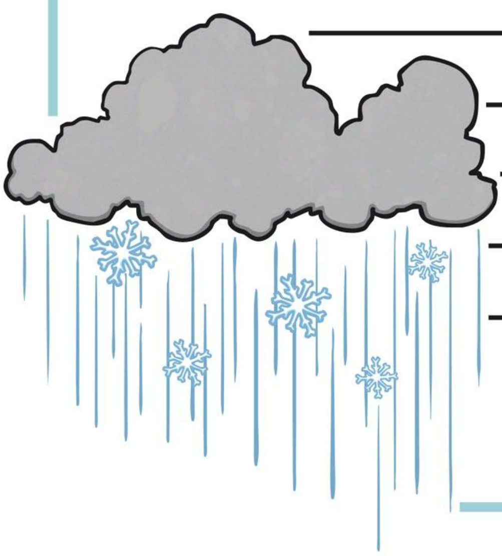


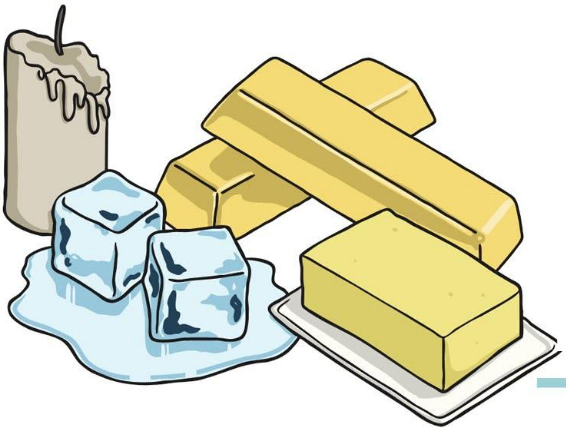


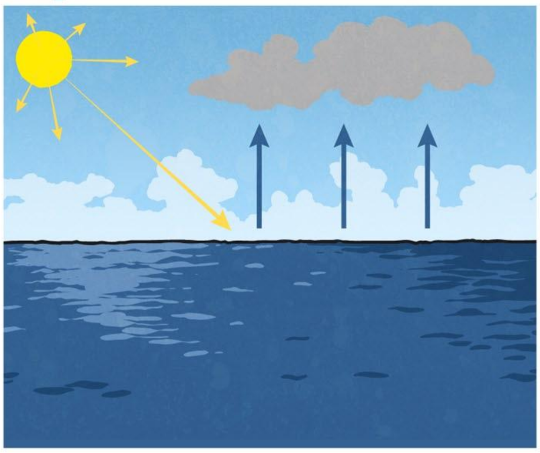


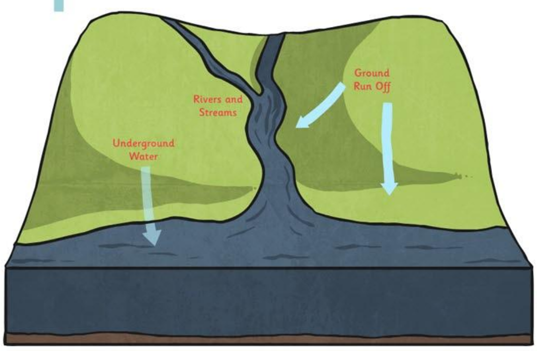



Rivers and Streams
Ground Run Off
Underground Water








Ground
Run Off
Rivers and
Streams
Underground
Water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iskukuumennettu/
ultrapastöriserad (UHT)
28.12.14
29.09.14
1L
HYLA
Valio
maito


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Photo courtesy of Digitalnative, ecstaticist and robbplusjessie (@flickr.com) - granted under creative commons licence - attribution

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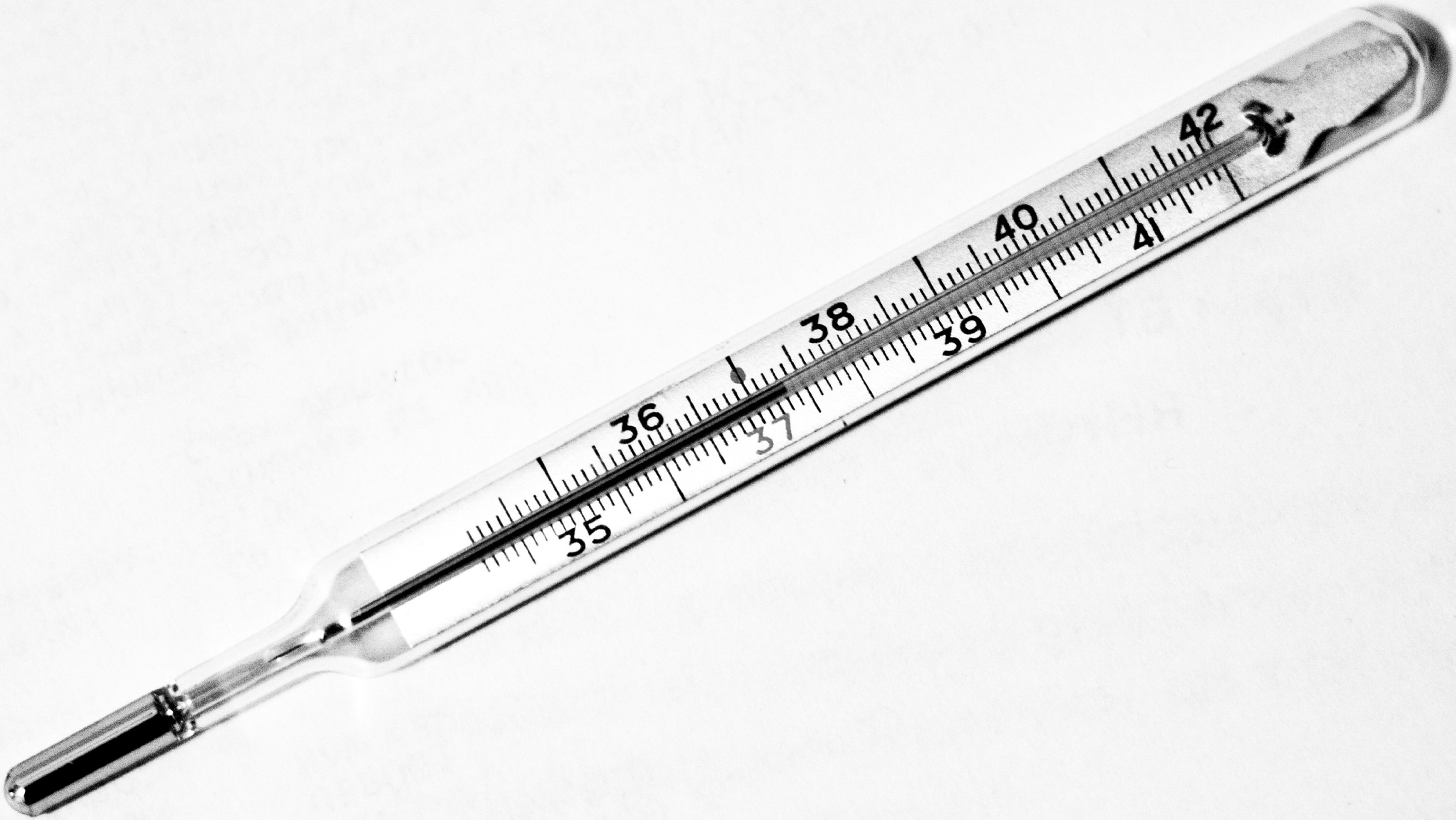
36
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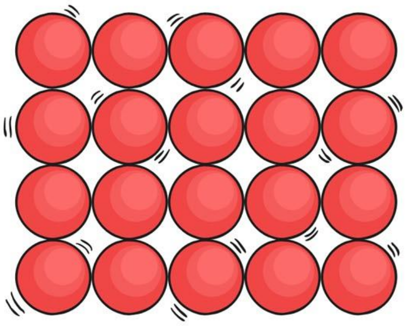
40
41
42
35


WayRite

solid



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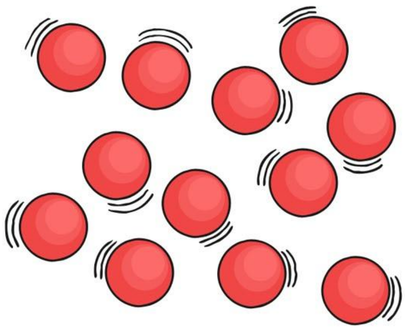

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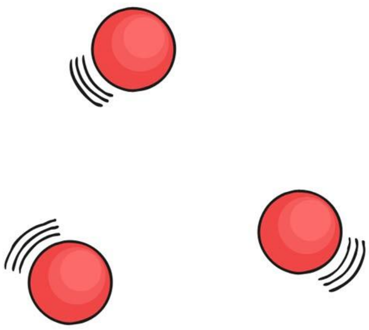

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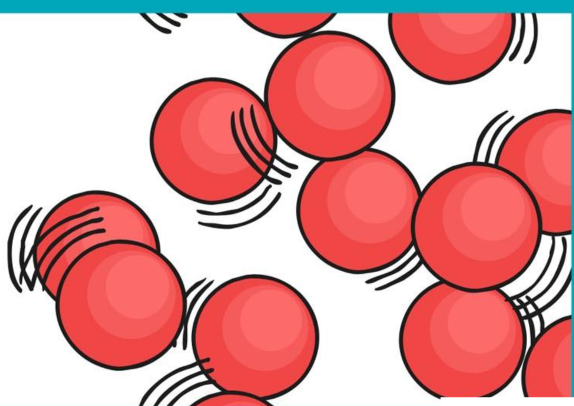
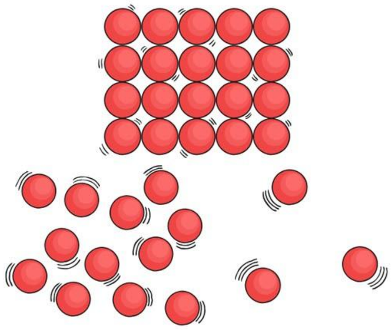


state



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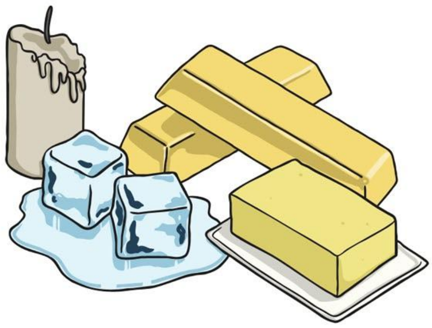
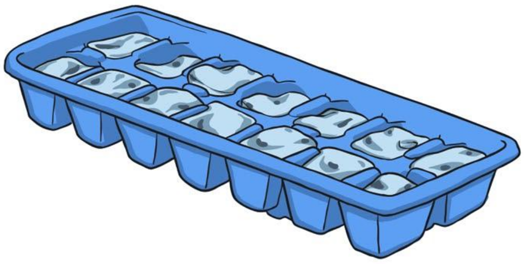


properties

matter

melt

freeze



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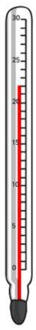

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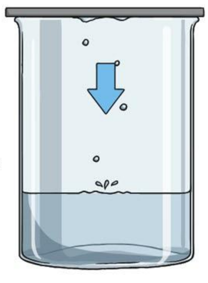

process

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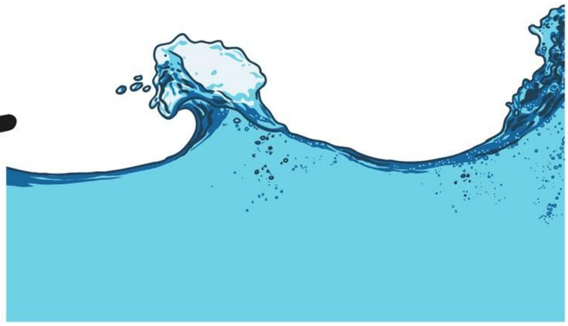
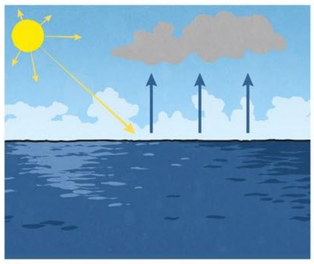


evaporation



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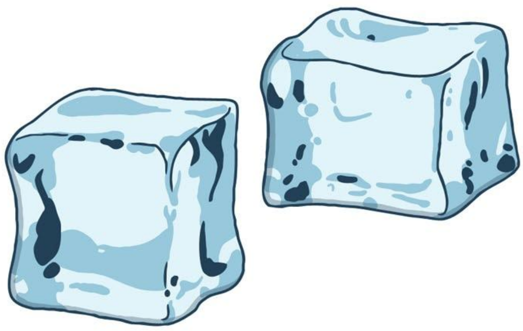

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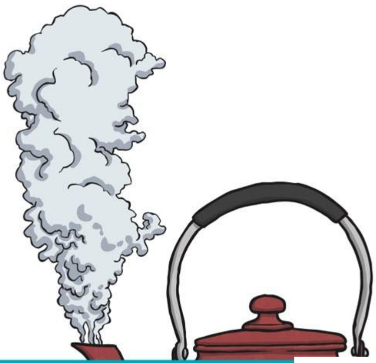
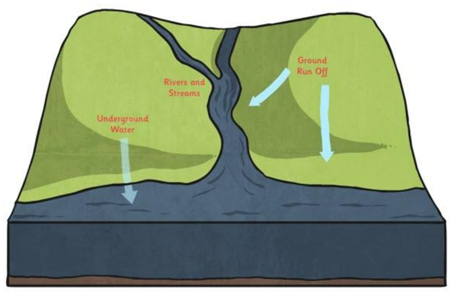


energy

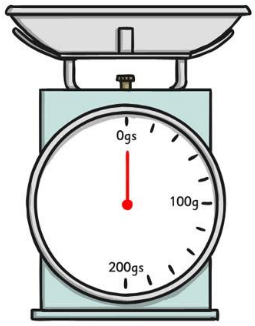
precipitation

collection



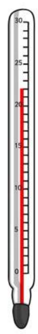
carbon dioxide

weigh



mass

thermometer



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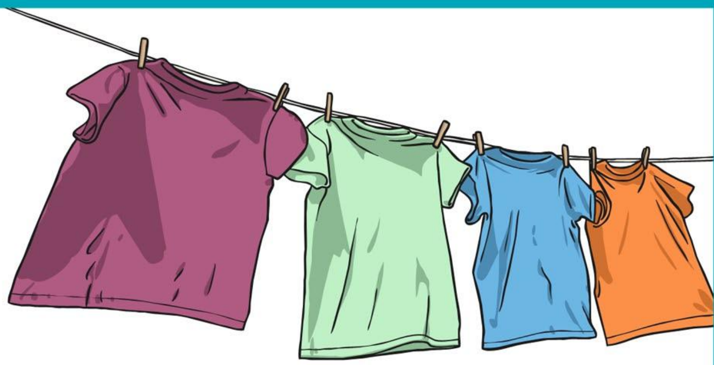

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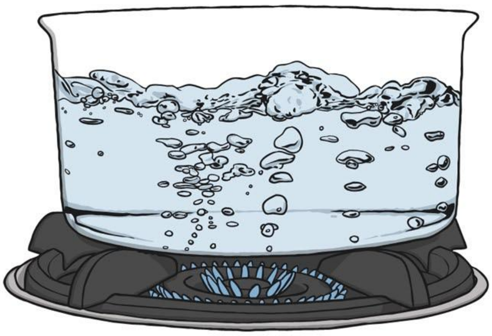

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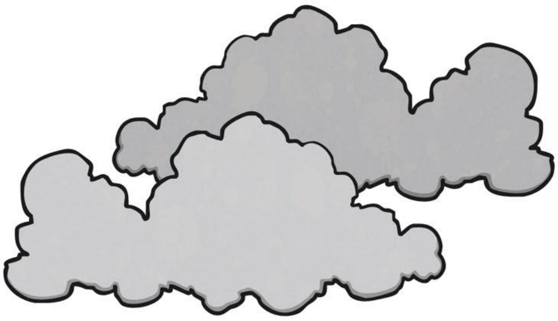
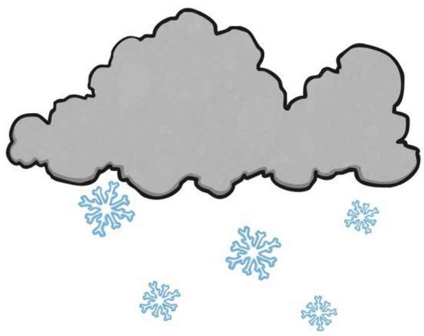


rain

sleet

hail

snow



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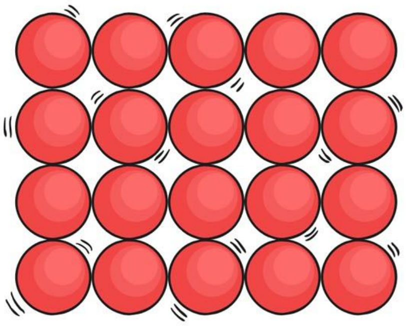

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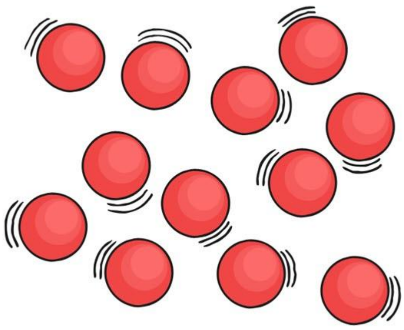

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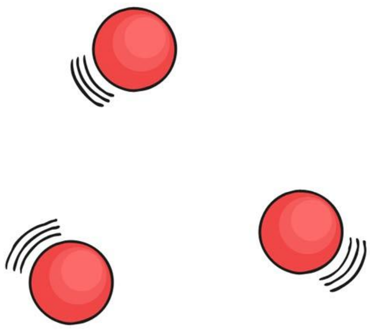

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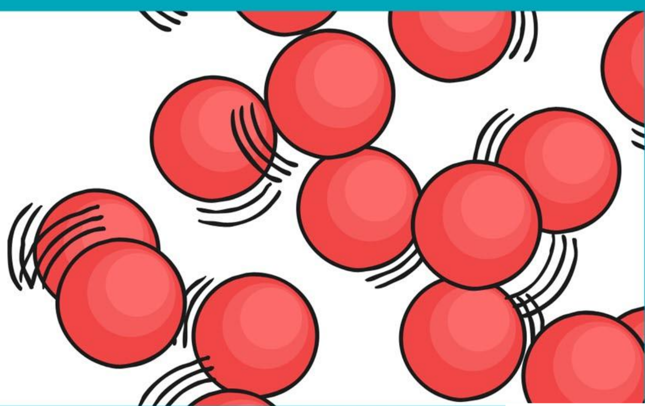

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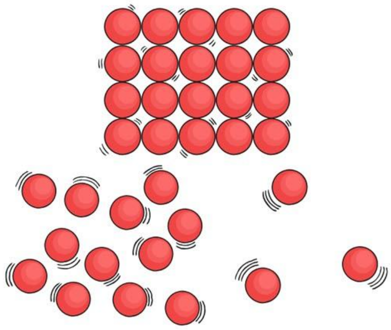

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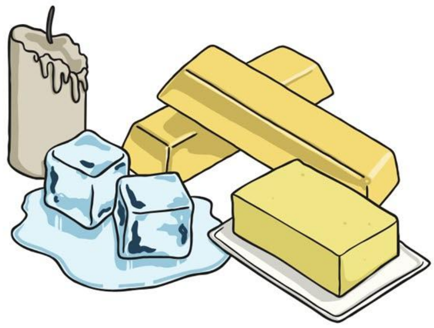

properties

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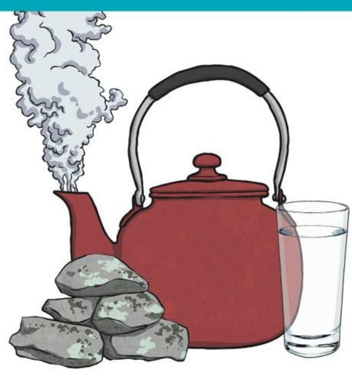
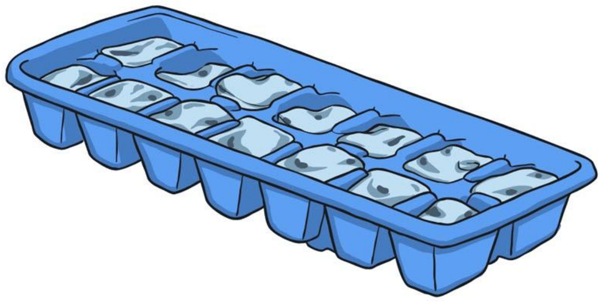


melt

freeze



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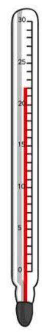

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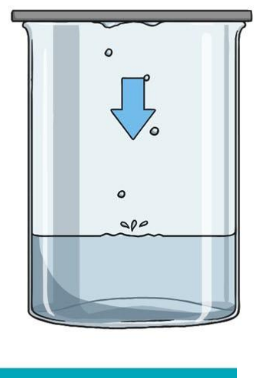

process

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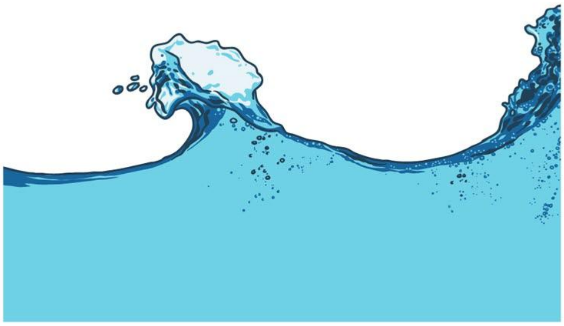

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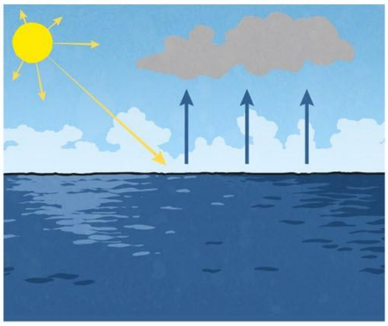

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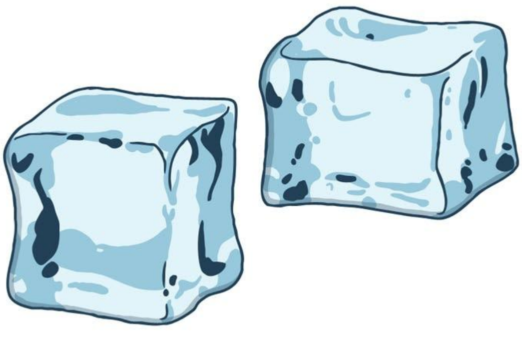

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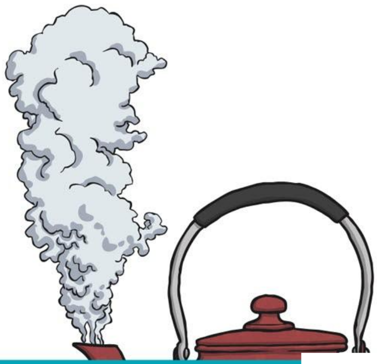
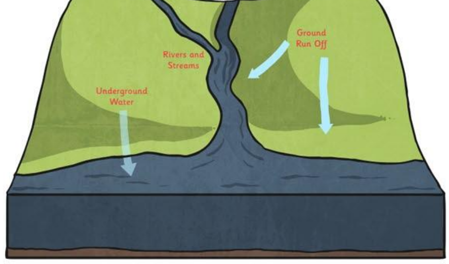


energy

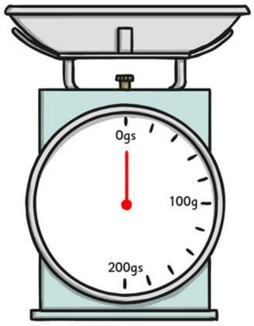
precipitation

collection



carbon dioxide

weigh



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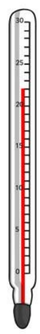

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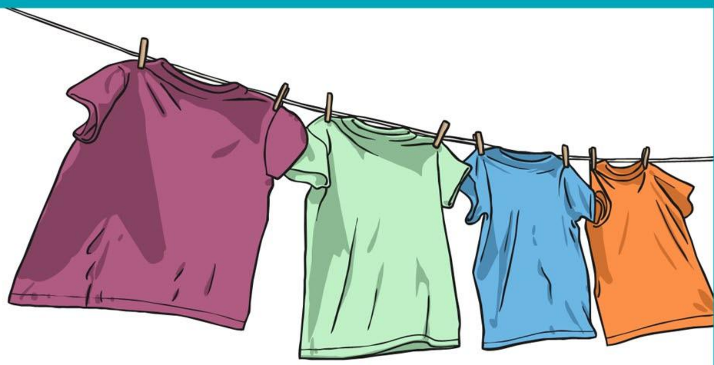

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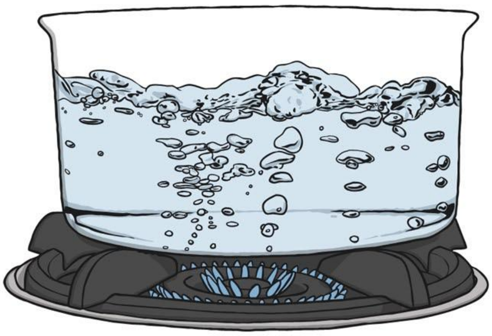

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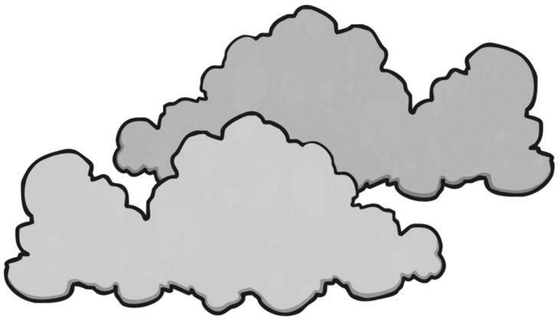
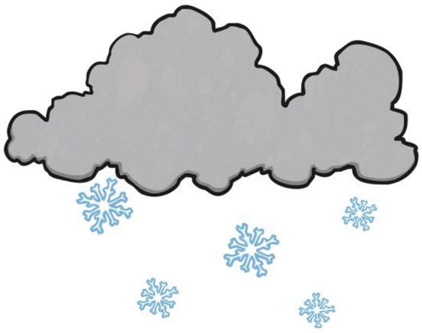


rain

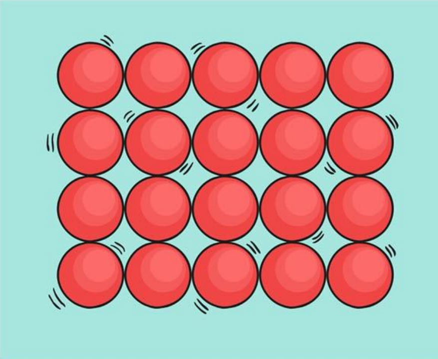
sleet

hail

snow



States of Matter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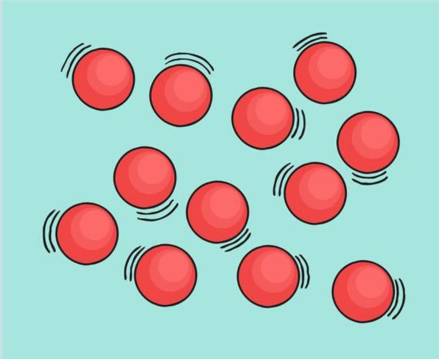
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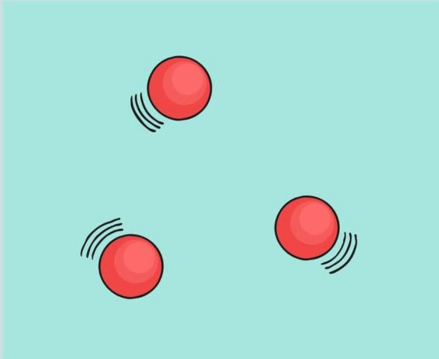
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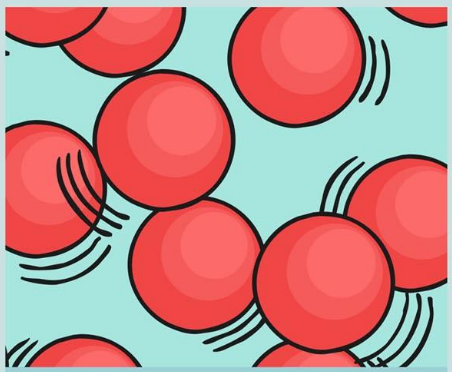
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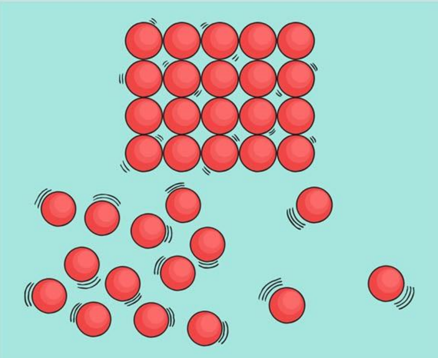
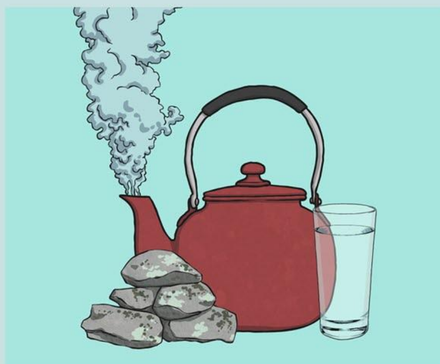

state


materials


properties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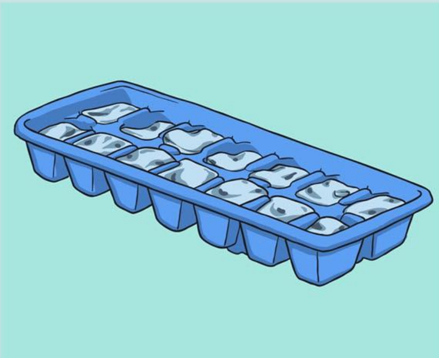
melt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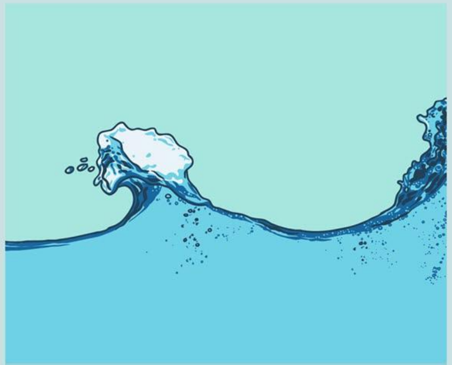
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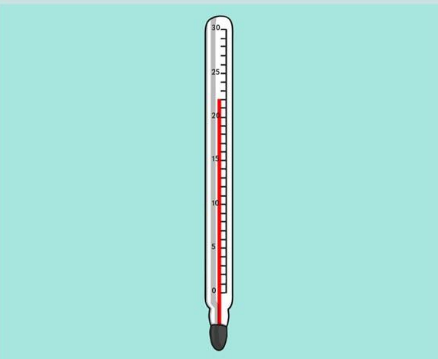
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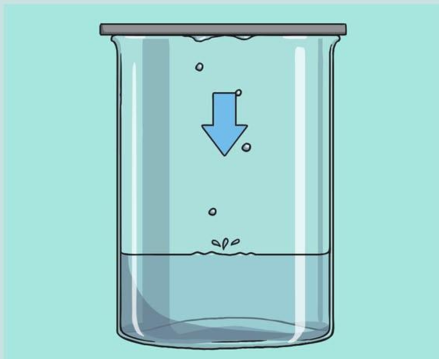
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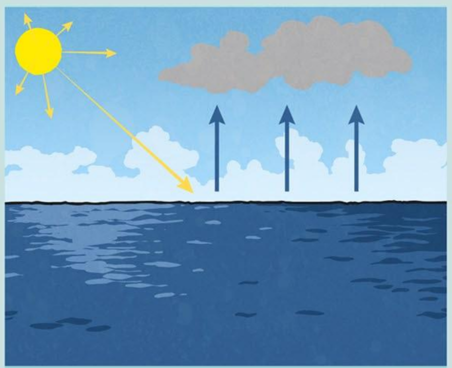
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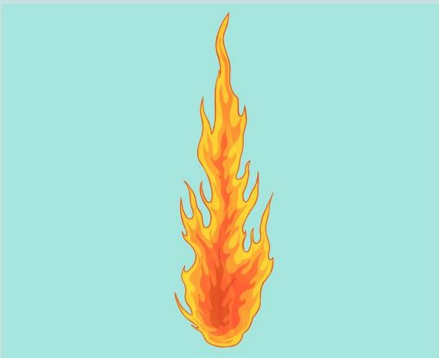
water vapour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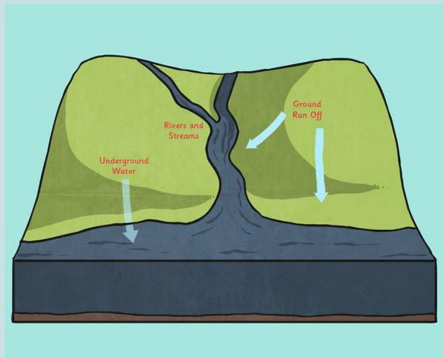
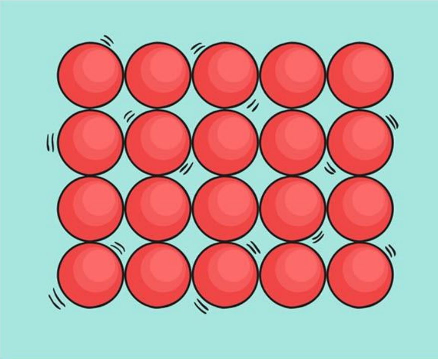
precipitation


collection

States of Matter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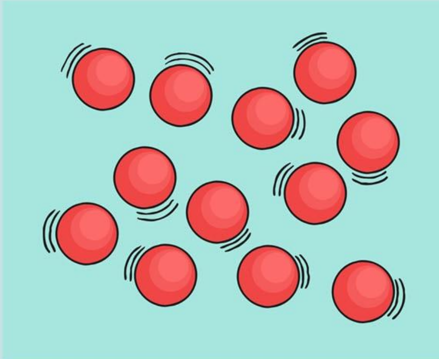
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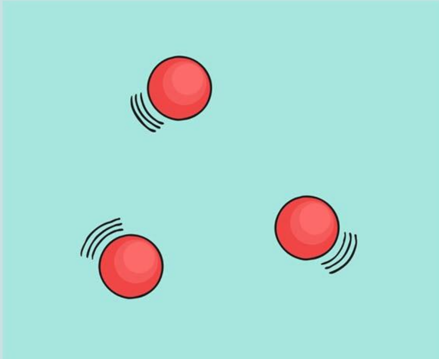
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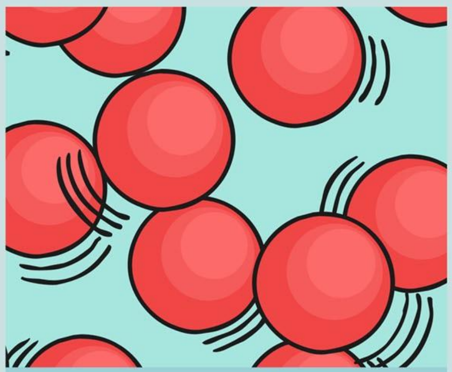
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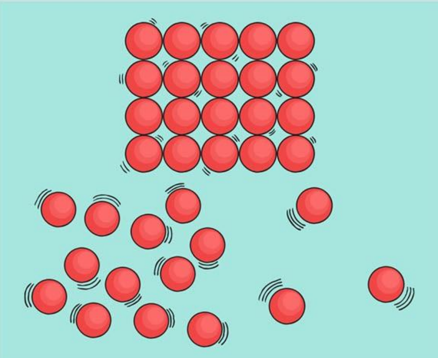
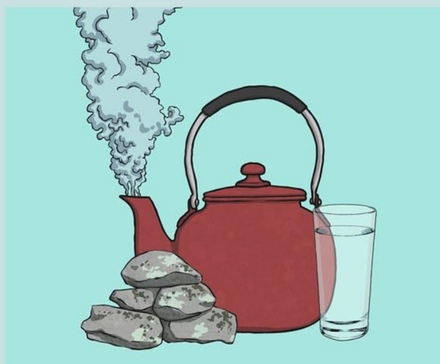
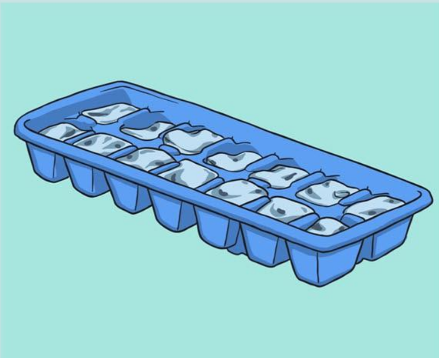

state


materials


properties


matter


melt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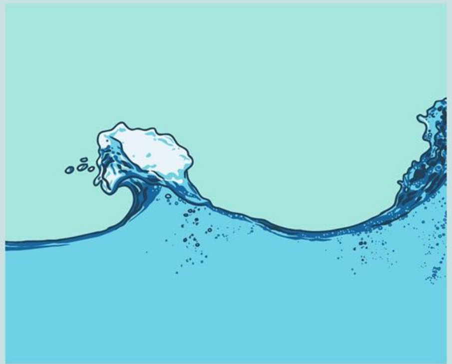
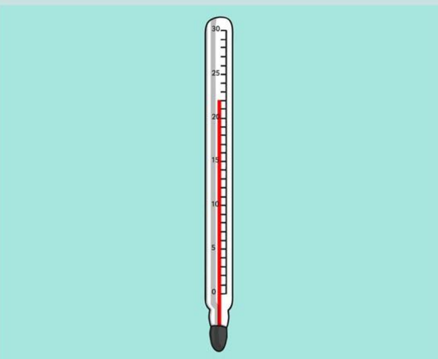
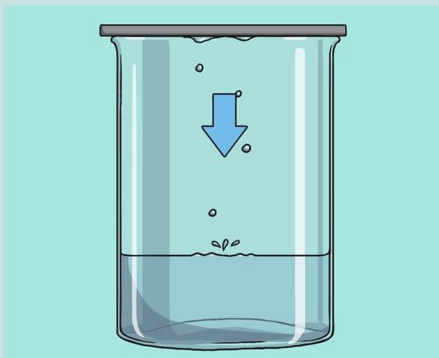

water


ice


temperature


process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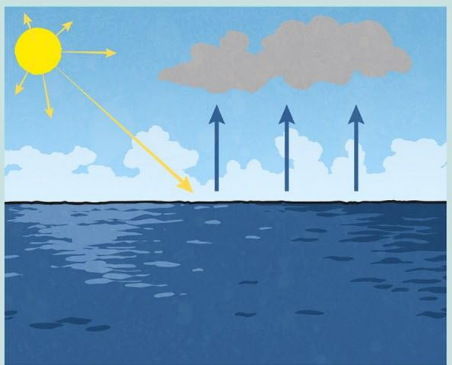
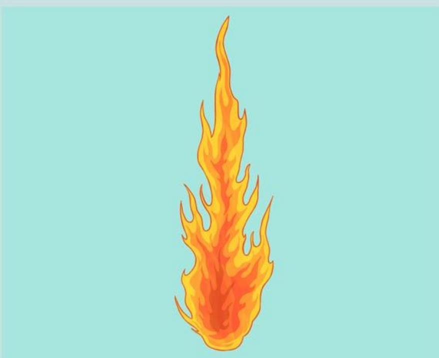

evaporation


water vapour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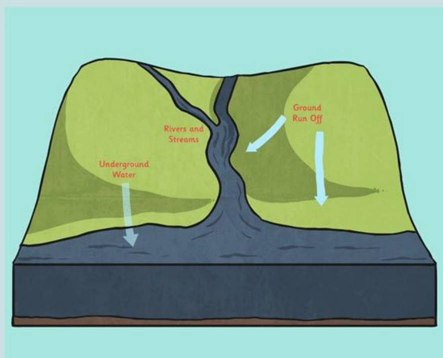
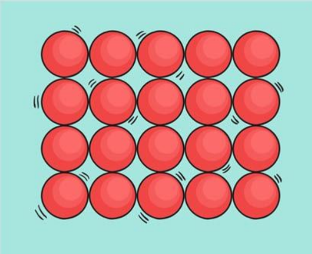
precipitation


collection

States of Matter

States of Matter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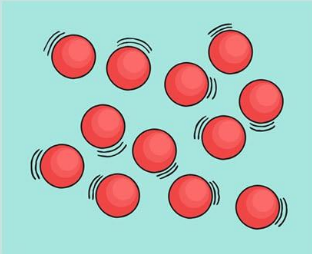
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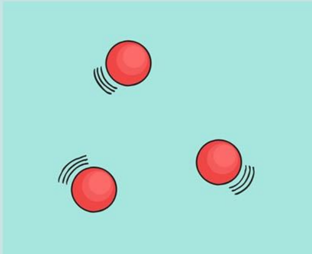
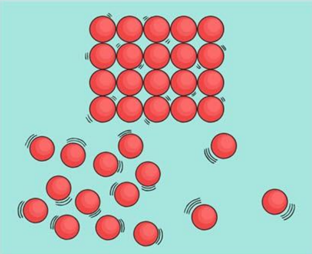

gas


particles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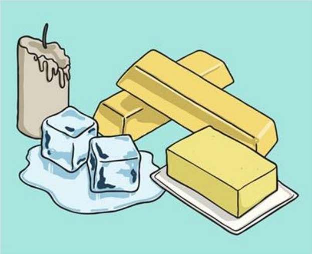
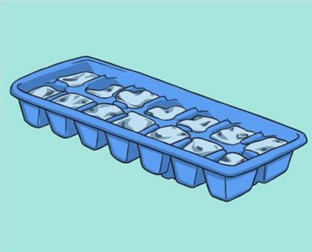
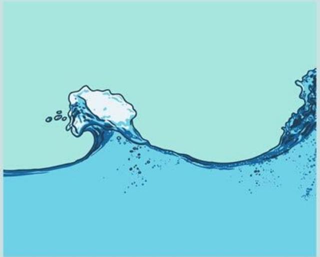

materials


properties

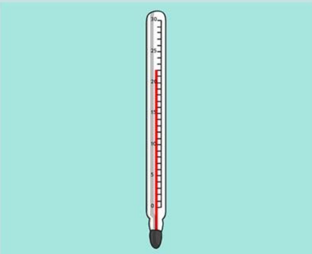

matter


melt

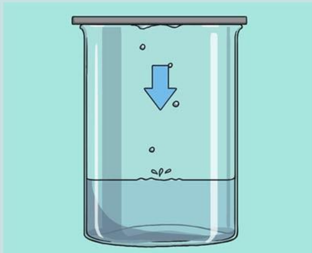

freeze

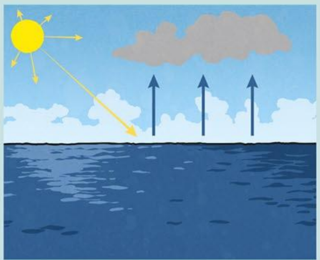

water


ice

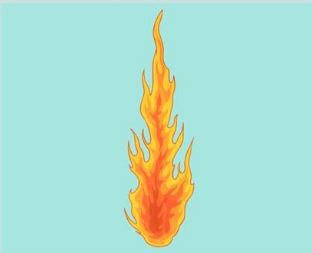

temperature


process


condensation


evaporation


water vapour


energy


precipitation


collection

States of Matter

f	g	a	s	p	f	y	r	u	r	j	d
e	s	m	a	t	t	e	r	p	u	q	u
l	p	r	o	p	e	r	t	i	e	s	u
w	d	i	c	c	q	u	y	m	k	l	u
x	x	w	p	h	b	n	j	q	d	i	u
s	f	a	z	s	t	a	t	e	b	q	v
w	s	t	r	m	m	e	l	t	i	u	a
y	n	e	v	s	s	o	l	i	d	i	p
p	a	r	t	i	c	l	e	s	n	d	o
k	r	l	n	h	n	r	a	b	z	z	u
z	m	a	t	e	r	i	a	l	s	e	r
i	u	i	c	e	j	b	r	e	r	i	g

solid	properties
liquid	matter
gas	melt
particles	ice
state	water
materials	vapour

States of Matter

f	g	a	s	p	f	y	r	u	r	j	d
e	s	m	a	t	t	e	r	p	u	q	u
l	p	r	o	p	e	r	t	i	e	s	u
w	d	i	c	c	q	u	y	m	k	l	u
x	x	w	p	h	b	n	j	q	d	i	u
s	f	a	z	s	t	a	t	e	b	q	v
w	s	t	r	m	m	e	l	t	i	u	a
y	n	e	v	s	s	o	l	i	d	i	p
p	a	r	t	i	c	l	e	s	n	d	o
k	r	l	n	h	n	r	a	b	z	z	u
z	m	a	t	e	r	i	a	l	s	e	r
i	u	i	c	e	j	b	r	e	r	i	g

solid
liquid
gas
particles
state
materials

properties
matter
melt
ice
water
vapour

States of Matter

s	l	a	i	r	e	t	a	m	h	v	u
u	s	h	p	a	r	t	i	c	l	e	s
n	o	i	t	a	r	o	p	a	v	e	m
h	d	n	h	a	y	g	r	e	n	e	e
s	s	e	c	o	r	p	w	k	a	p	l
d	i	l	o	s	z	i	u	b	a	g	t
q	g	a	s	c	c	p	s	t	a	t	e
c	o	n	d	e	n	s	a	t	i	o	n
n	v	d	c	g	v	a	p	o	u	r	a
d	m	a	t	t	e	r	e	t	a	w	k
p	p	r	o	p	e	r	t	i	e	s	x
x	l	i	q	u	i	d	x	m	o	r	c

solid	melt
liquid	ice
gas	water
particles	vapour
state	process
materials	evaporation
properties	condensation
matter	energy

States of Matter

s	l	a	i	r	e	t	a	m	h	v	u
u	s	h	p	a	r	t	i	c	l	e	s
n	o	i	t	a	r	o	p	a	v	e	m
h	d	n	h	a	y	g	r	e	n	e	e
s	s	e	c	o	r	p	w	k	a	p	l
d	i	l	o	s	z	i	u	b	a	g	t
q	g	a	s	c	e	p	s	t	a	t	e
c	o	n	d	e	n	s	a	t	i	o	n
n	v	d	c	g	v	a	p	o	u	r	a
d	m	a	t	t	e	r	r	e	t	a	w
p	p	r	o	p	e	r	t	i	e	s	x
x	l	i	q	u	i	d	x	m	o	r	c

solid	melt
liquid	ice
gas	water
particles	vapour
state	process
materials	evaporation
properties	condensation
matter	energy

States of Matter

f	g	a	s	p	f	y	r	u	r	j	d
e	s	m	a	t	t	e	r	p	u	q	u
l	p	r	o	p	e	r	t	i	e	s	u
w	d	i	c	c	q	u	y	m	k	l	u
x	x	w	p	h	b	n	j	q	d	i	u
s	f	a	z	s	t	a	t	e	b	q	v
w	s	t	r	m	m	e	l	t	i	u	a
y	n	e	v	s	s	o	l	i	d	i	p
p	a	r	t	i	c	l	e	s	n	d	o
k	r	l	n	h	n	r	a	b	z	z	u
z	m	a	t	e	r	i	a	l	s	e	r
i	u	i	c	e	j	b	r	e	r	i	g

solid
liquid
gas
particles
state
materials

properties
matter
melt
ice
water
vapour

States of Matter

f	g	a	s	p	f	y	r	u	r	j	d
e	s	m	a	t	t	e	r	p	u	q	u
l	p	r	o	p	e	r	t	i	e	s	u
w	d	i	c	c	q	u	y	m	k	l	u
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p	a	r	t	i	c	l	e	s	n	d	o
k	r	l	n	h	n	r	a	b	z	z	u
z	m	a	t	e	r	i	a	l	s	e	r
i	u	i	c	e	j	b	r	e	r	i	g

solid	properties
liquid	matter
gas	melt
particles	ice
state	water
materials	vapour

States of Matter

s	l	a	i	r	e	t	a	m	h	v	u
u	s	h	p	a	r	t	i	c	l	e	s
n	o	i	t	a	r	o	p	a	v	e	m
h	d	n	h	a	y	g	r	e	n	e	e
s	s	e	c	o	r	p	w	k	a	p	l
d	i	l	o	s	z	i	u	b	a	g	t
q	g	a	s	c	c	p	s	t	a	t	e
c	o	n	d	e	n	s	a	t	i	o	n
n	v	d	c	g	v	a	p	o	u	r	a
d	m	a	t	t	e	r	e	t	a	w	k
p	p	r	o	p	e	r	t	i	e	s	x
x	l	i	q	u	i	d	x	m	o	r	c

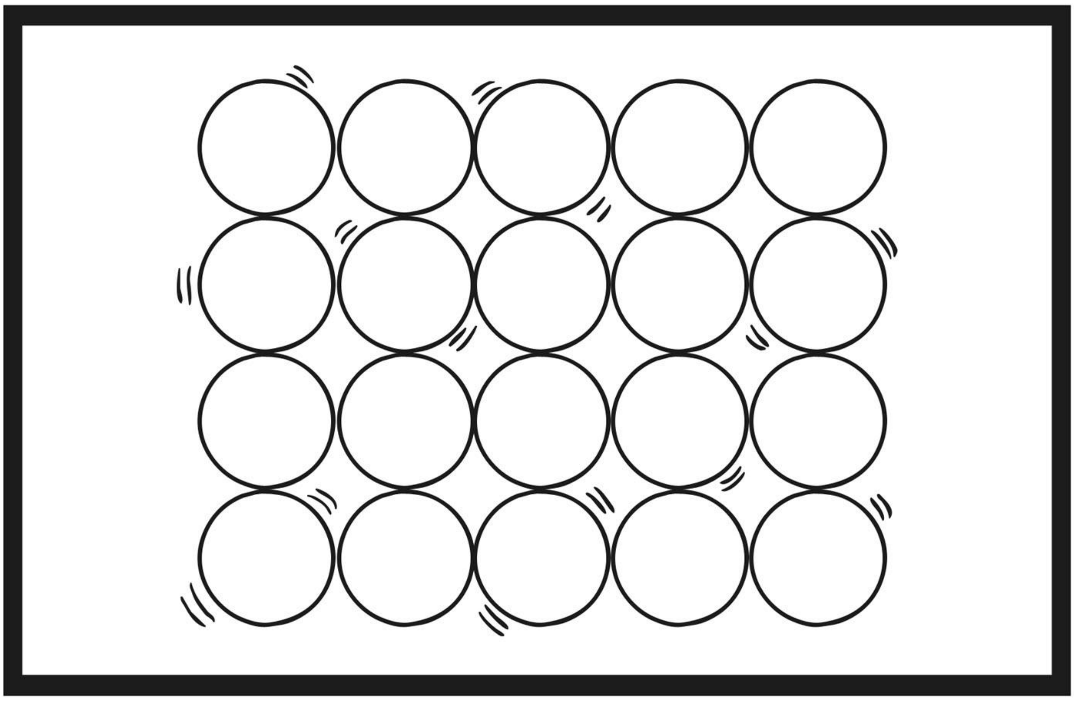
solid
liquid
gas
particles
state
materials
properties
matter

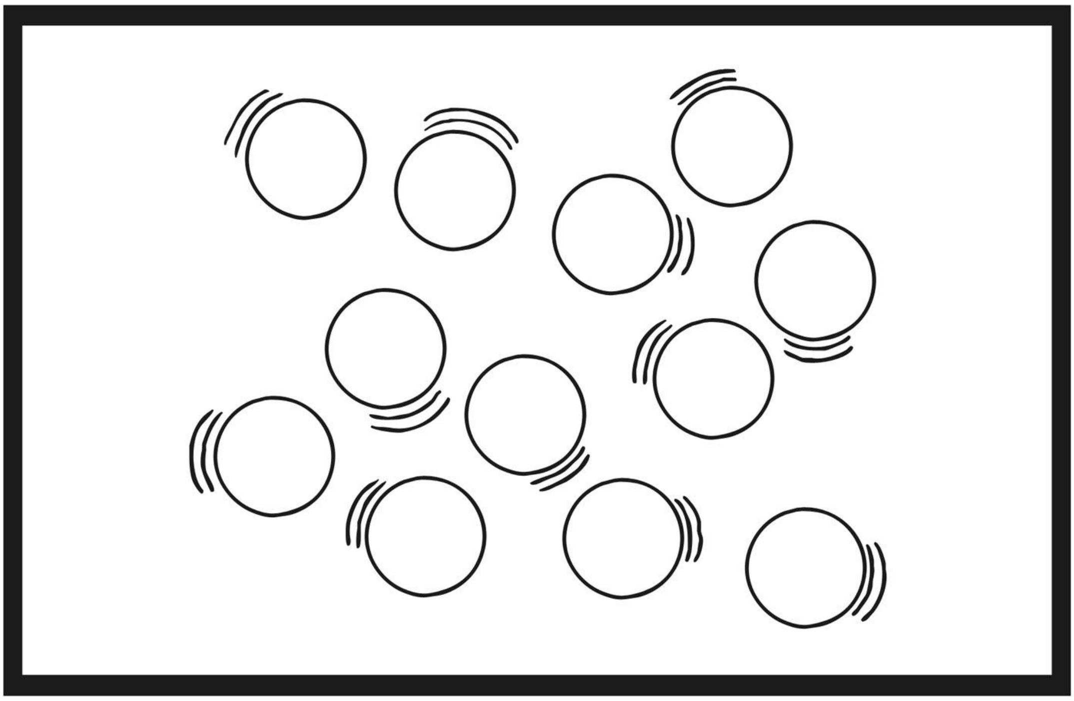
melt
ice
water
vapour
process
evaporation
condensation
energy

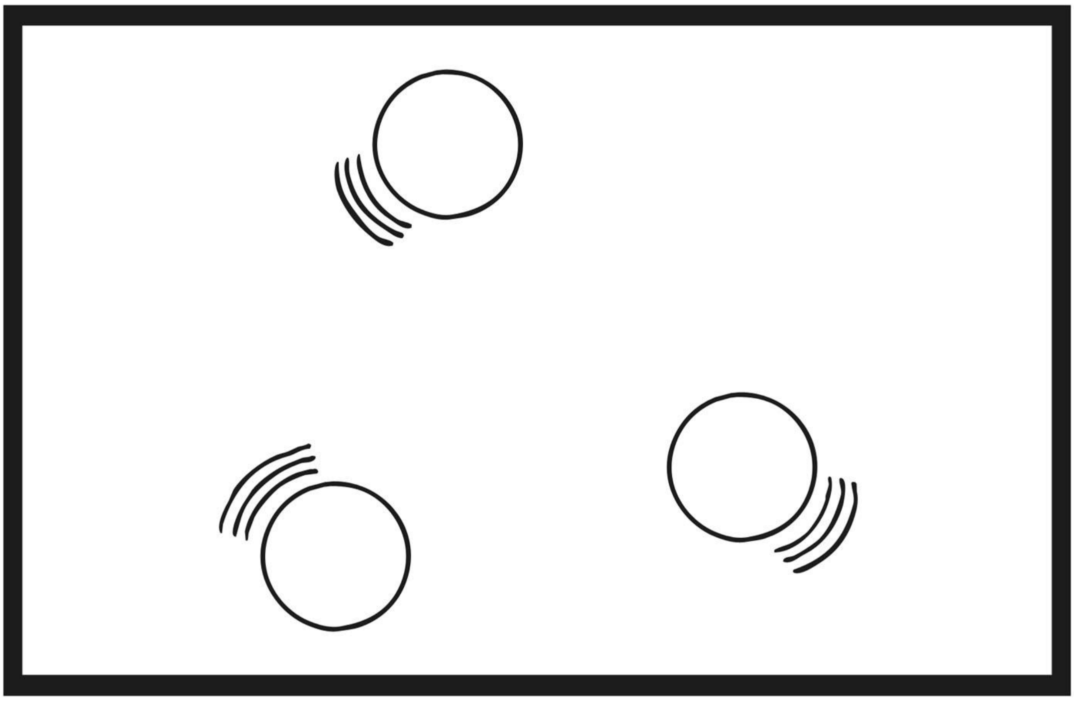
States of Matter

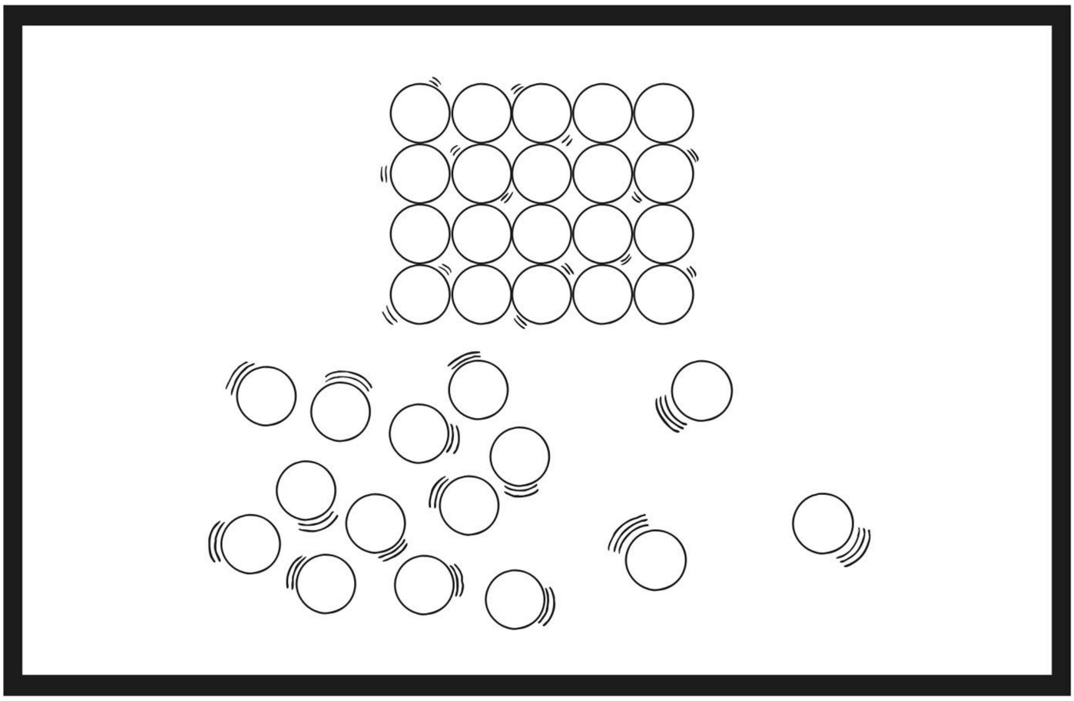
s	l	a	i	r	e	t	a	m	h	v	u
u	s	h	p	a	r	t	i	c	l	e	s
n	o	i	t	a	r	o	p	a	v	e	m
h	d	n	h	a	y	g	r	e	n	e	e
s	s	e	c	o	r	p	w	k	a	p	l
d	i	l	o	s	z	i	u	b	a	g	t
q	g	a	s	c	e	p	s	t	a	t	e
c	o	n	d	e	n	s	a	t	i	o	n
n	v	d	c	g	v	a	p	o	u	r	a
d	m	a	t	t	e	r	r	e	t	a	w
p	p	r	o	p	e	r	t	i	e	s	x
x	l	i	q	u	i	d	x	m	o	r	c

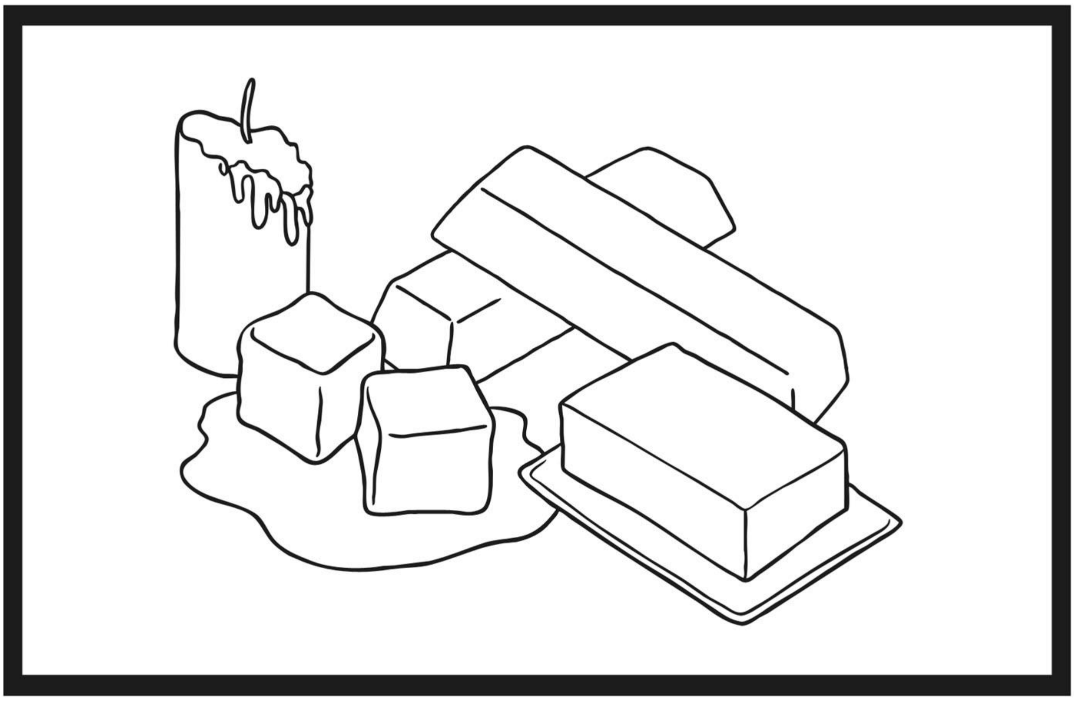
solid	melt
liquid	ice
gas	water
particles	vapour
state	process
materials	evaporation
properties	condensation
matter	energy

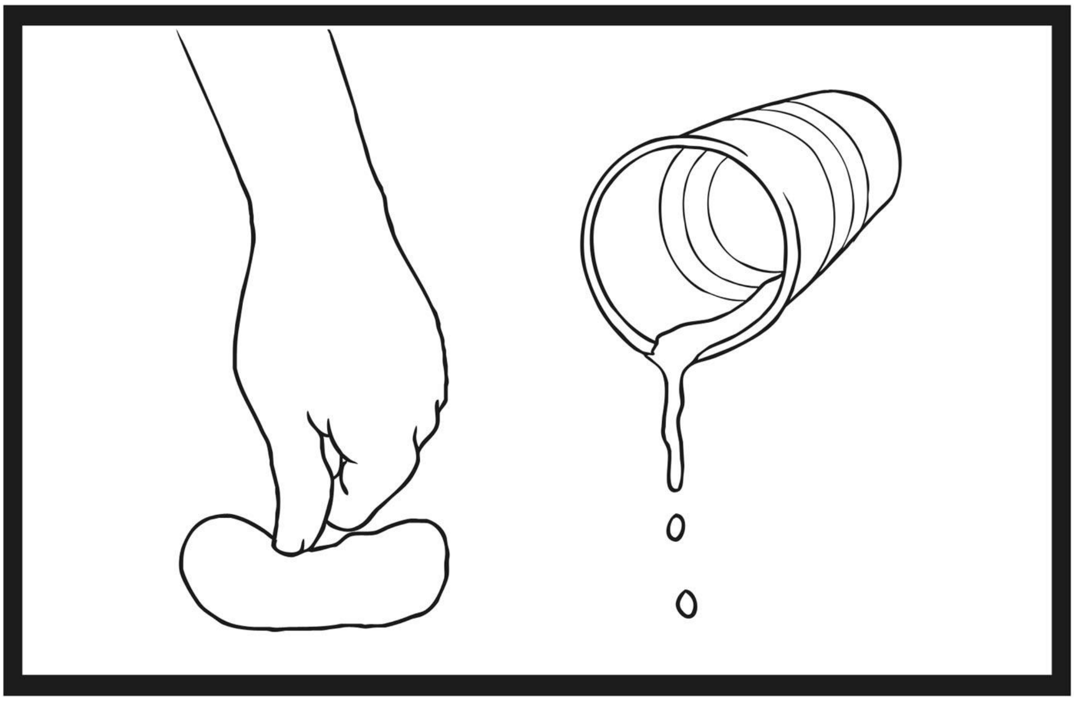


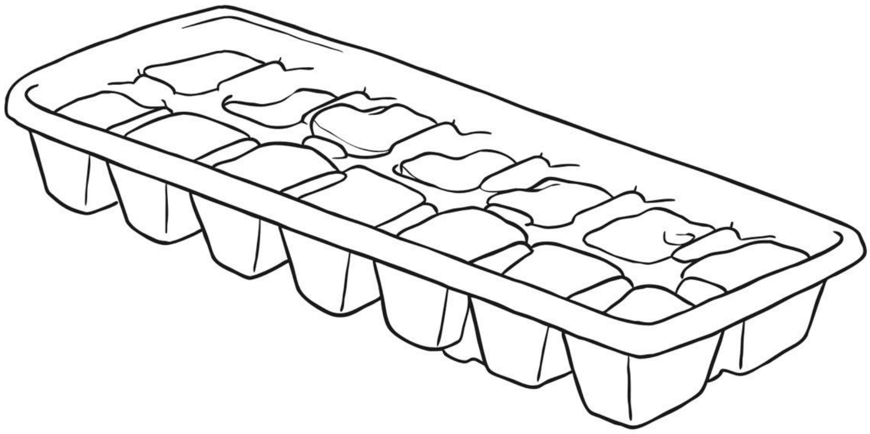


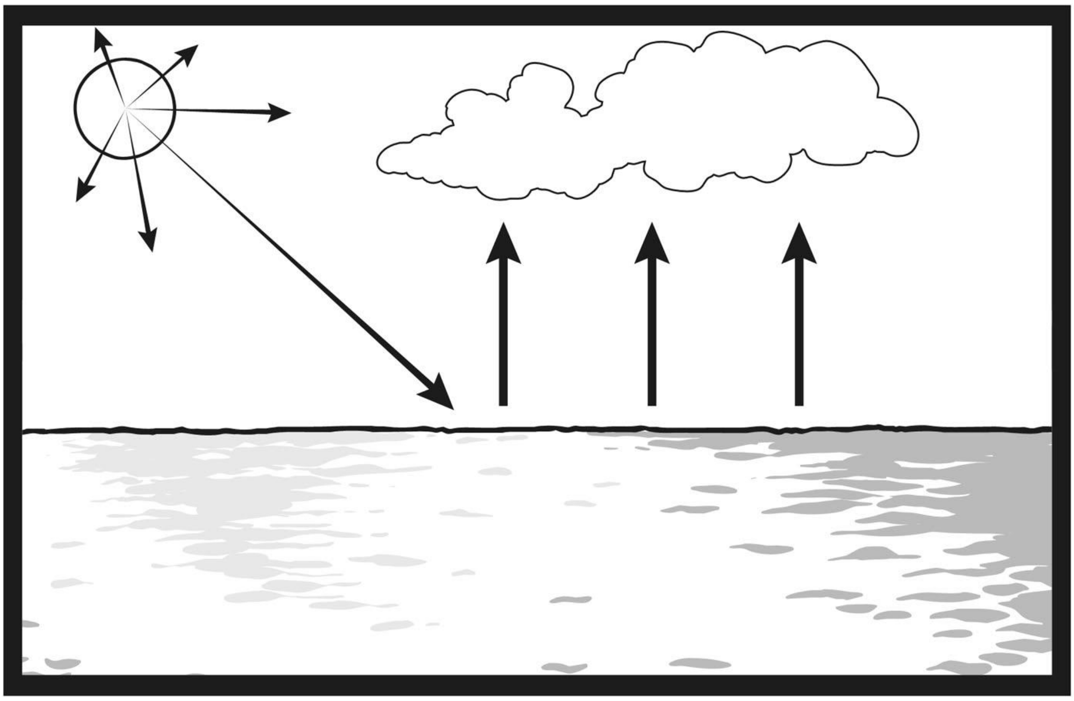


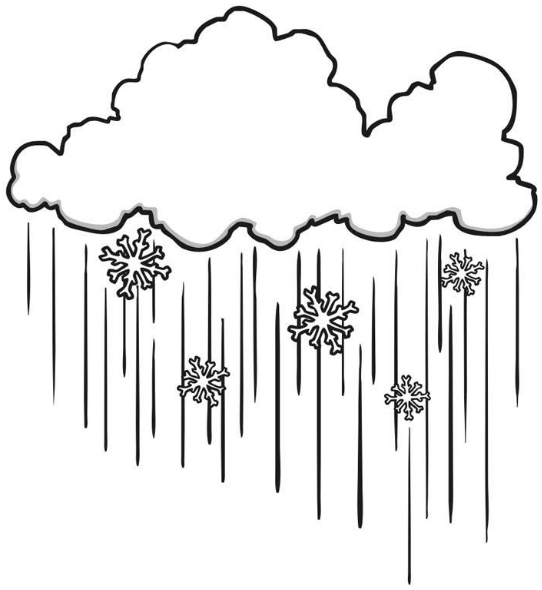


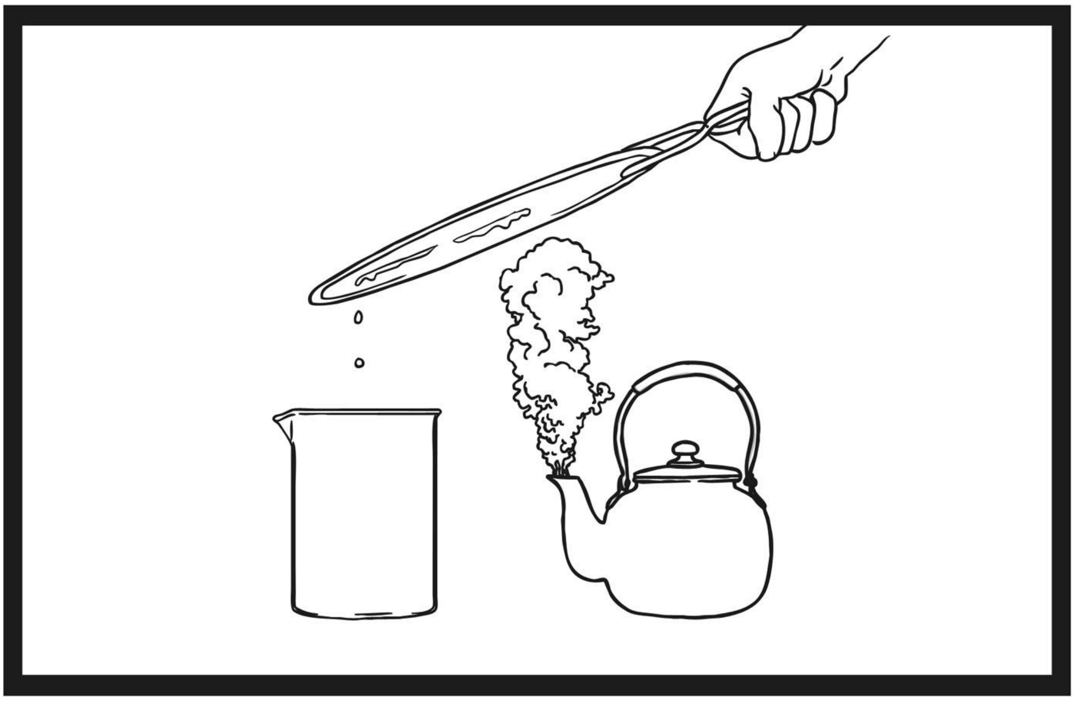


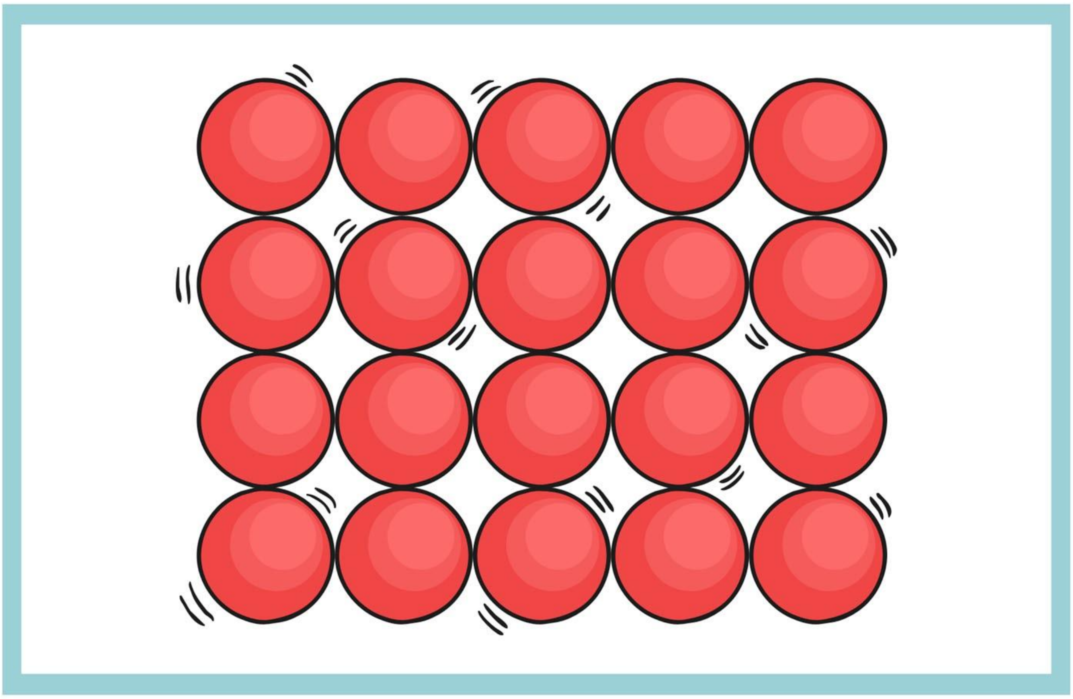


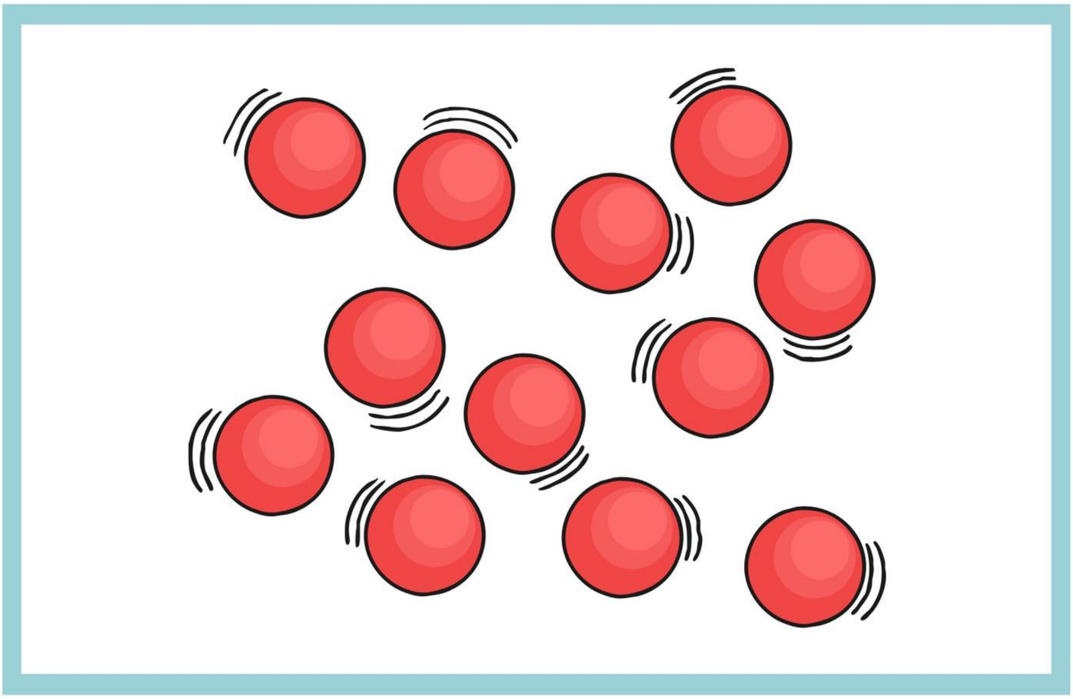


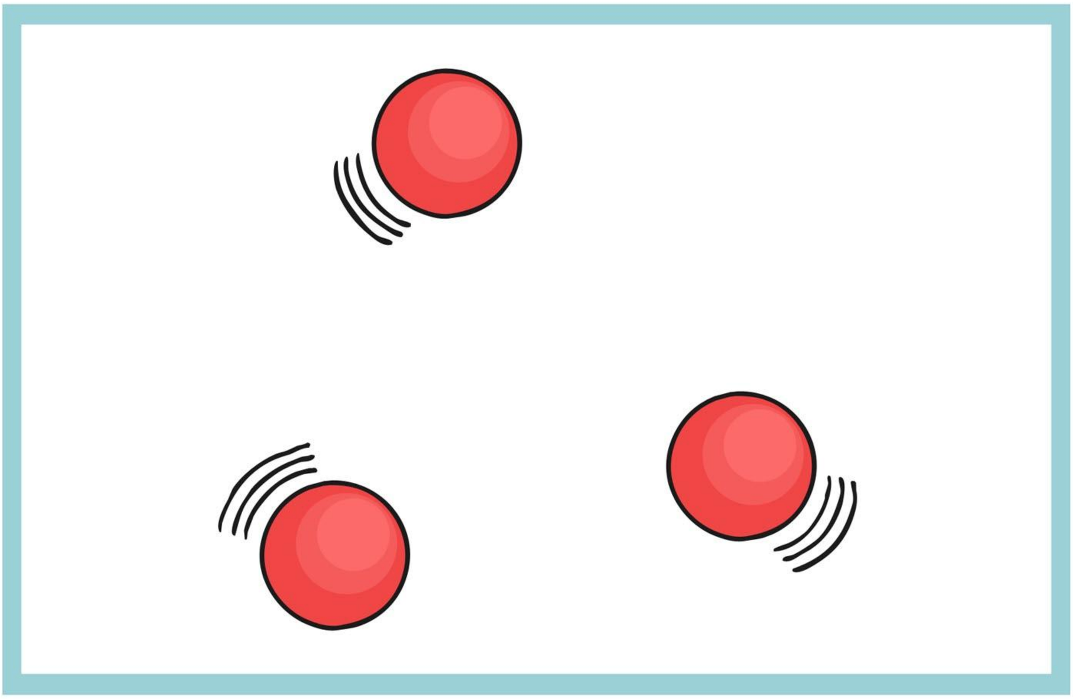


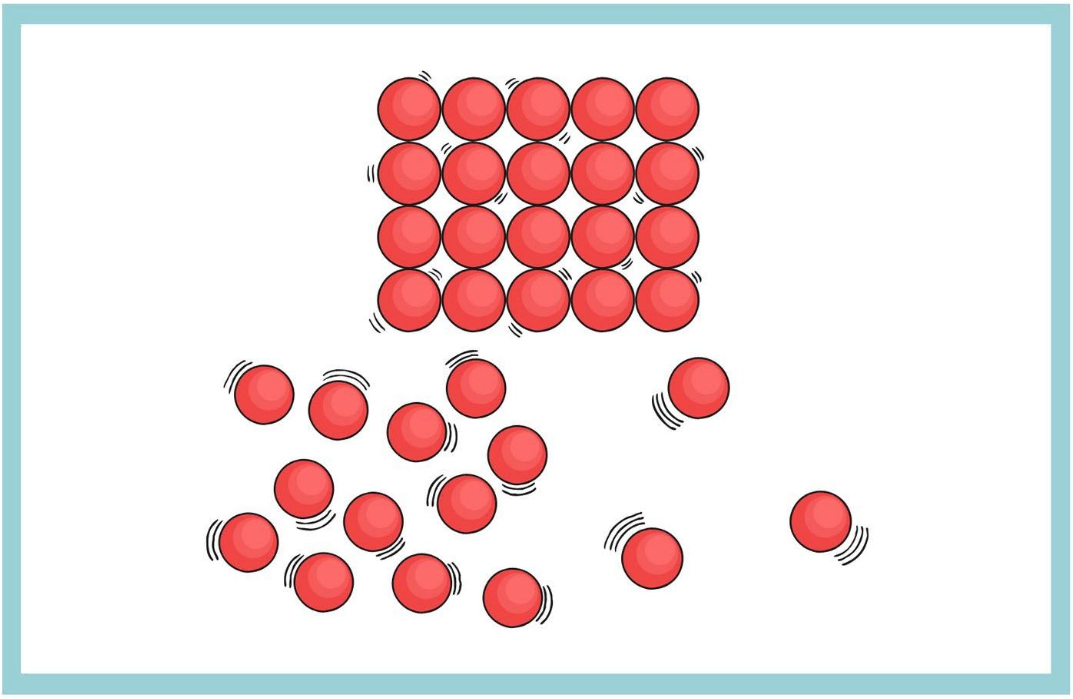


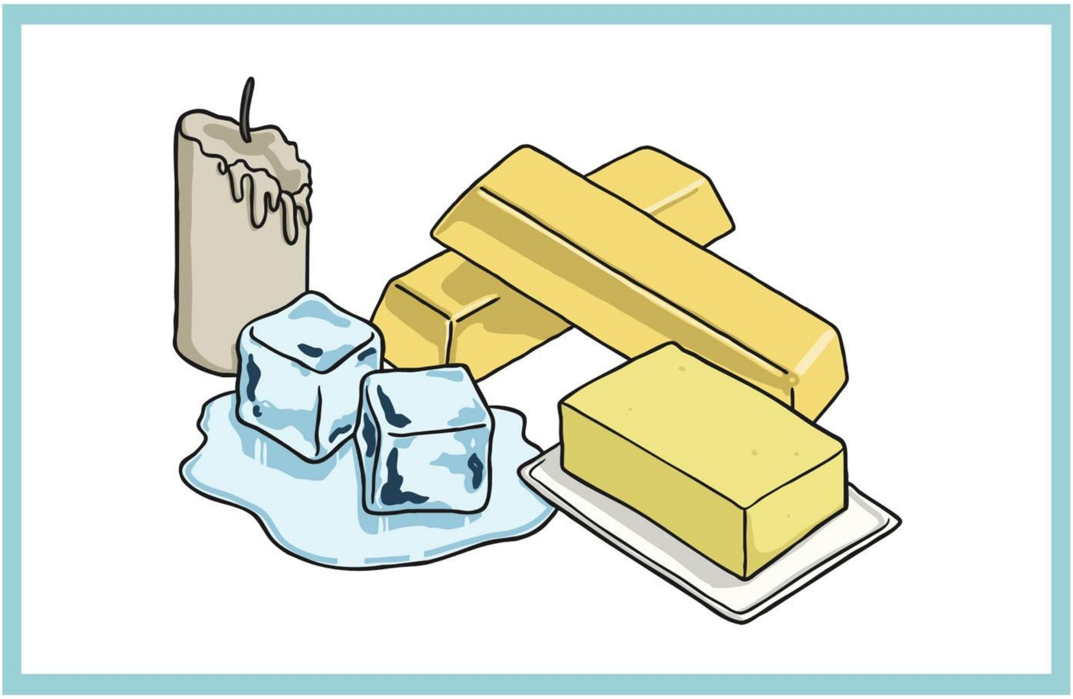


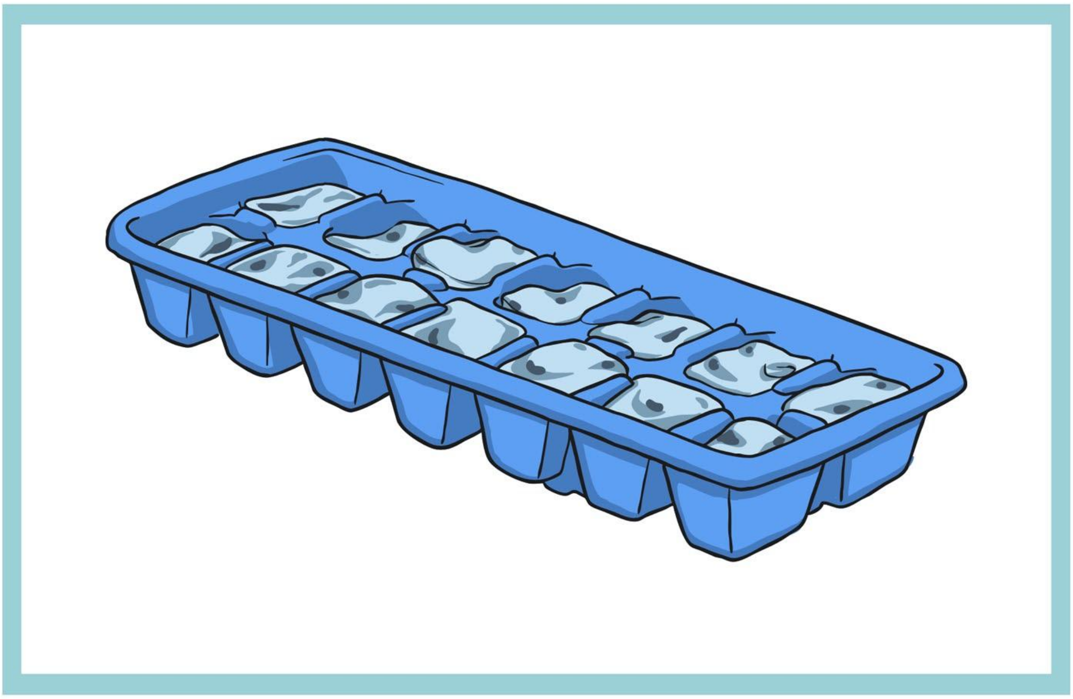


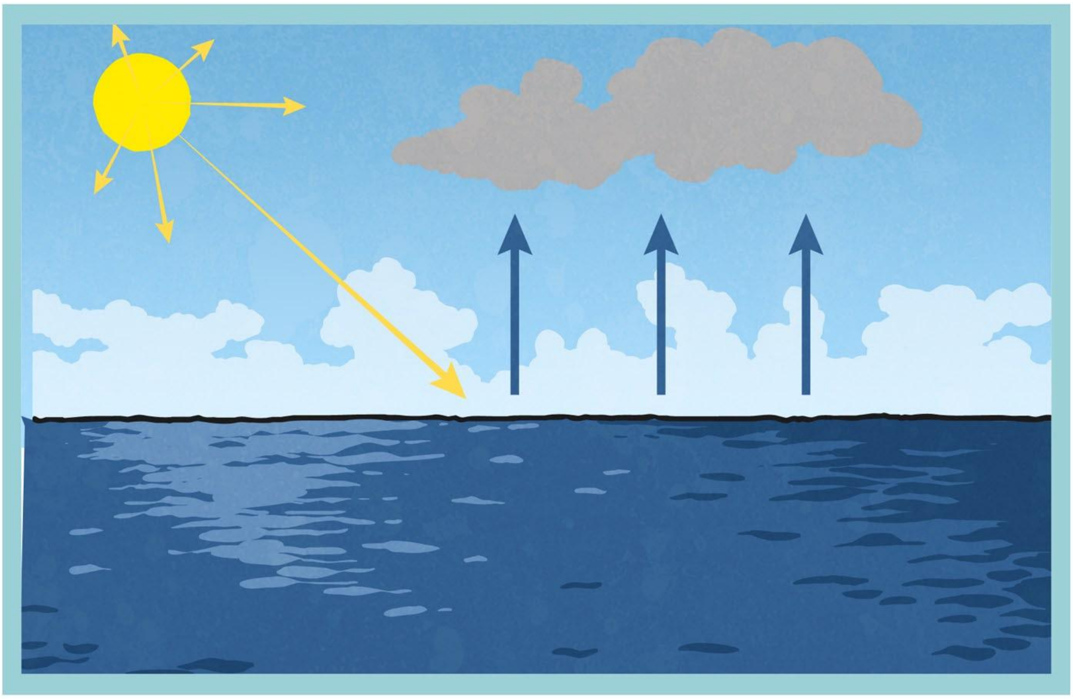












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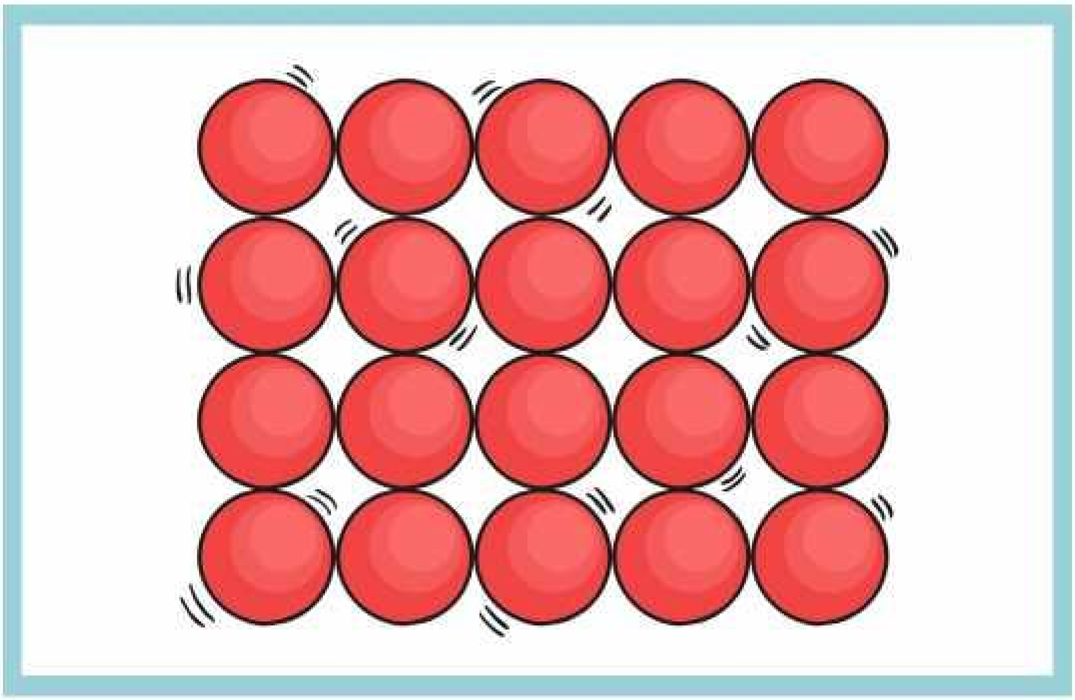

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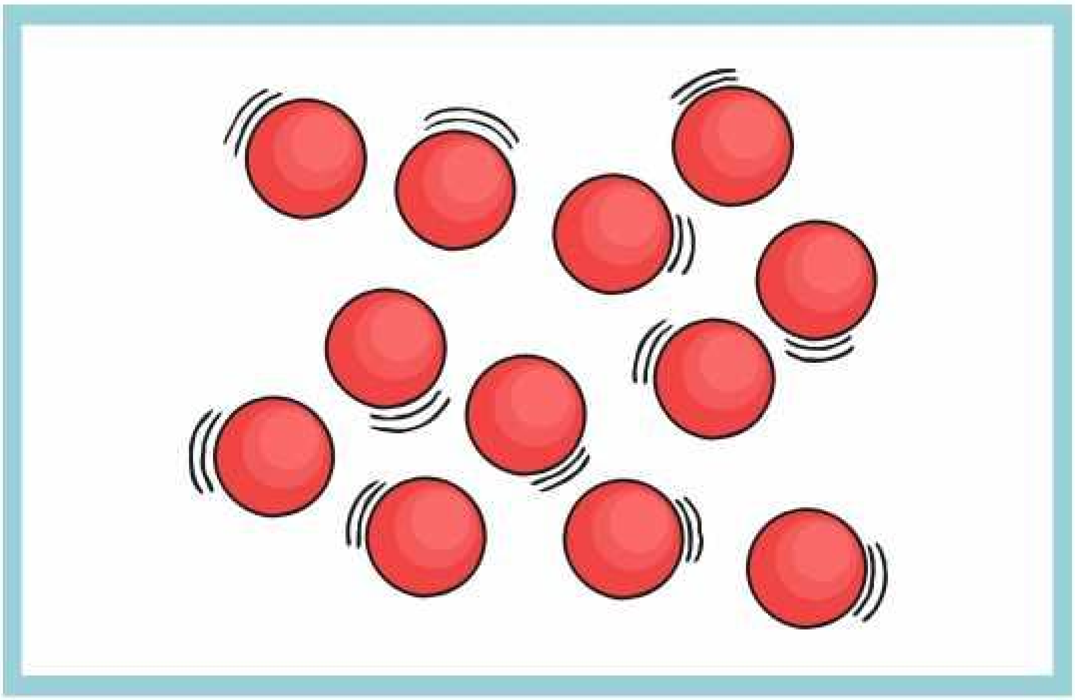

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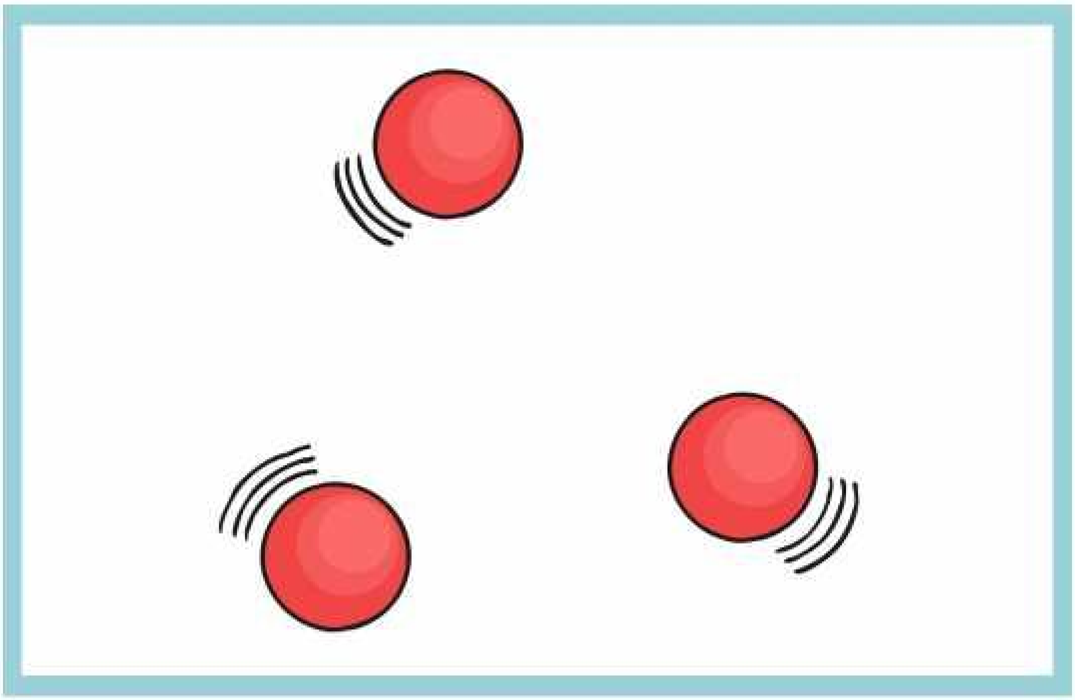

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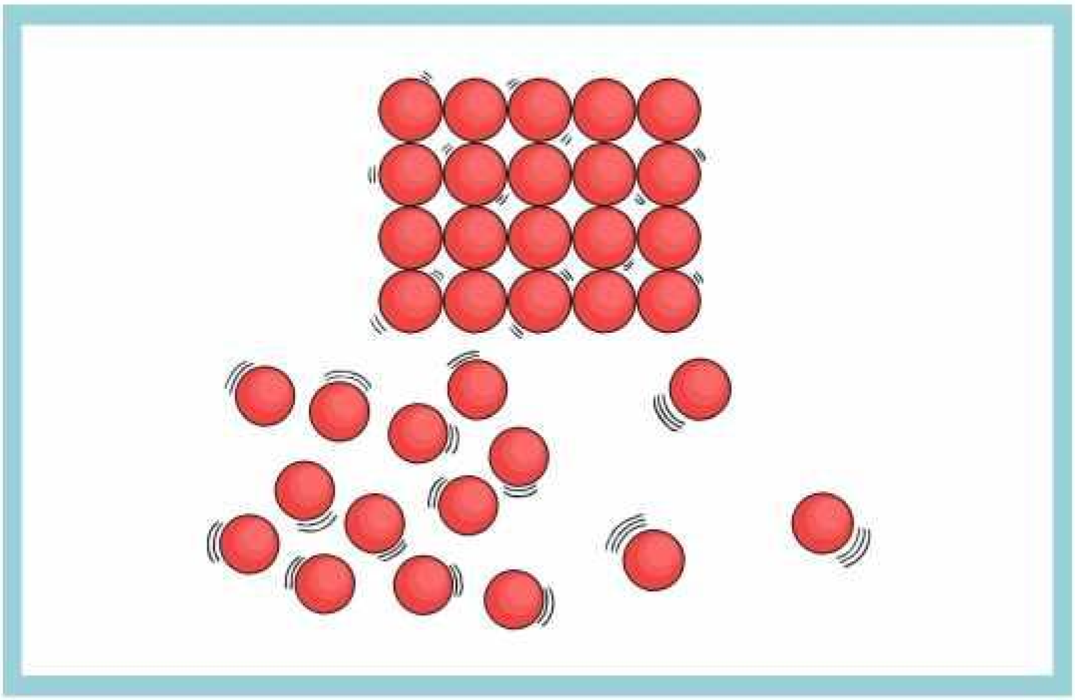

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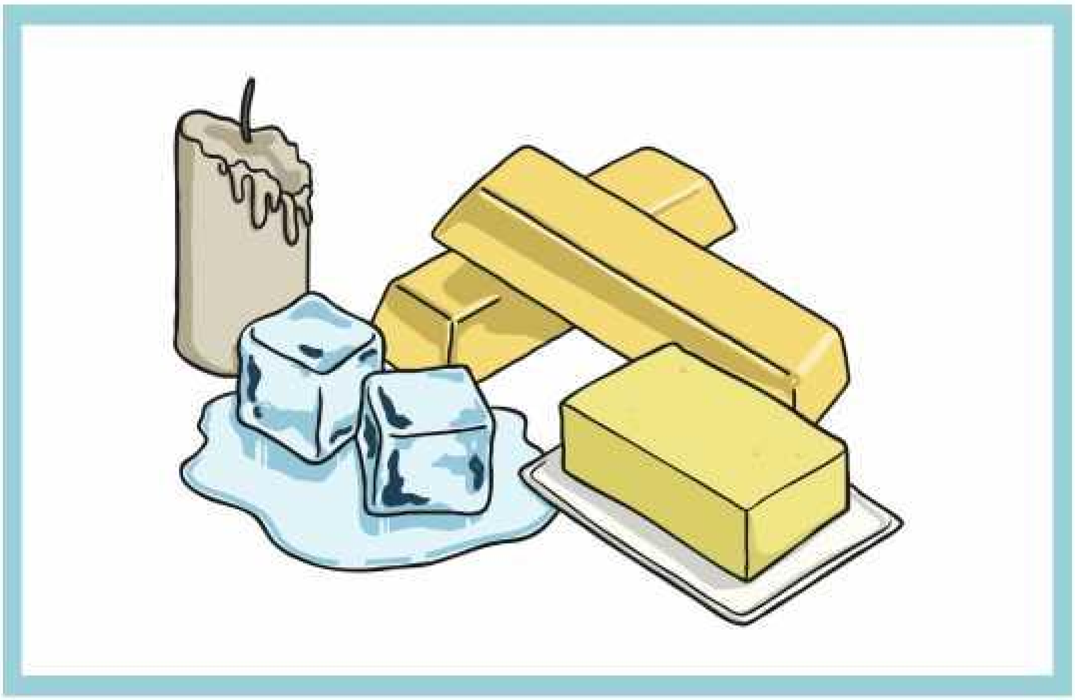

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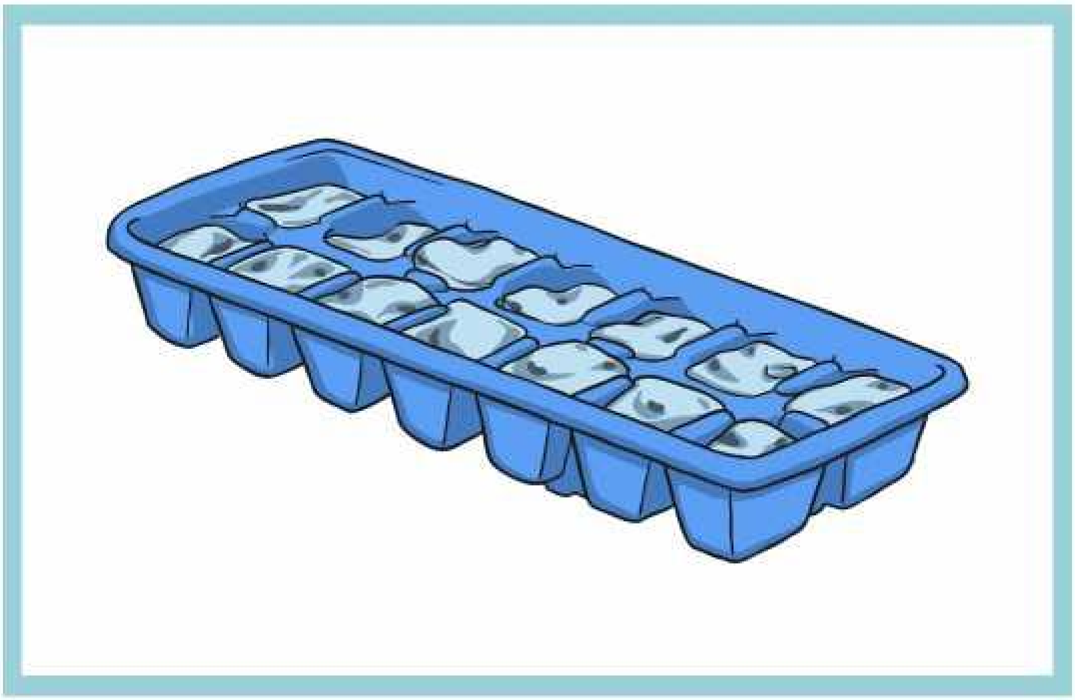

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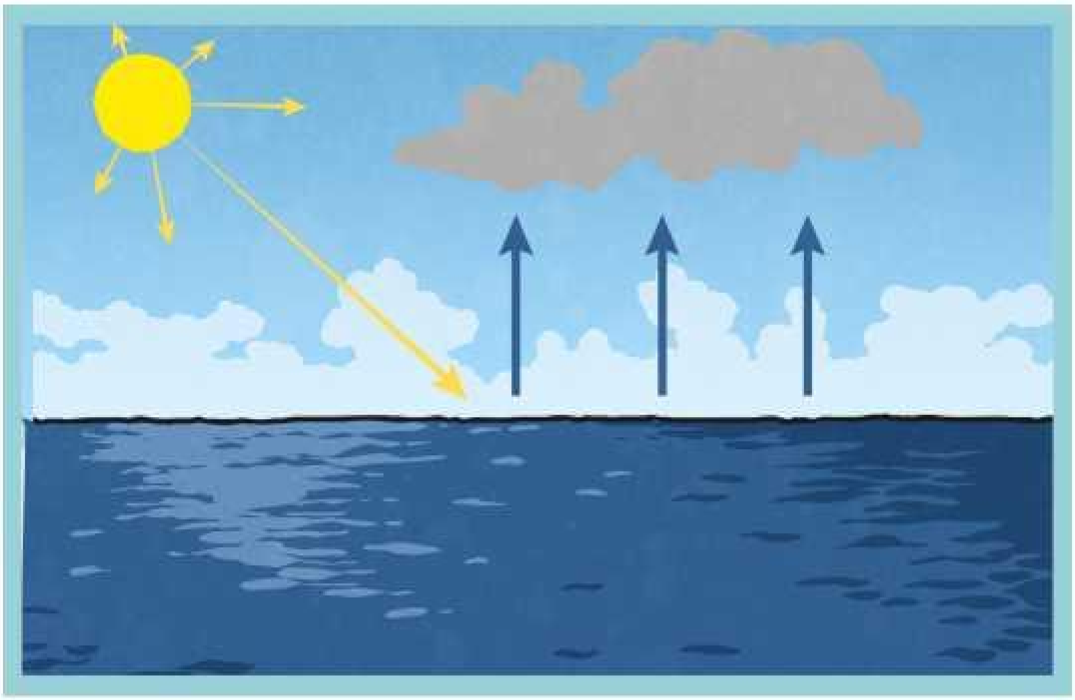

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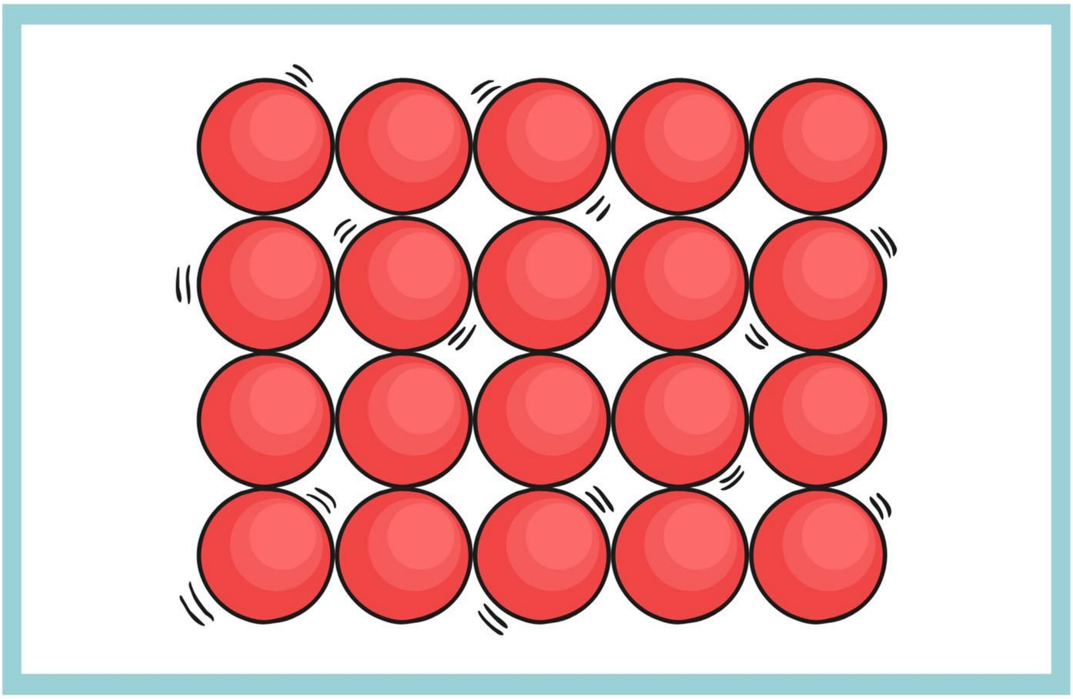

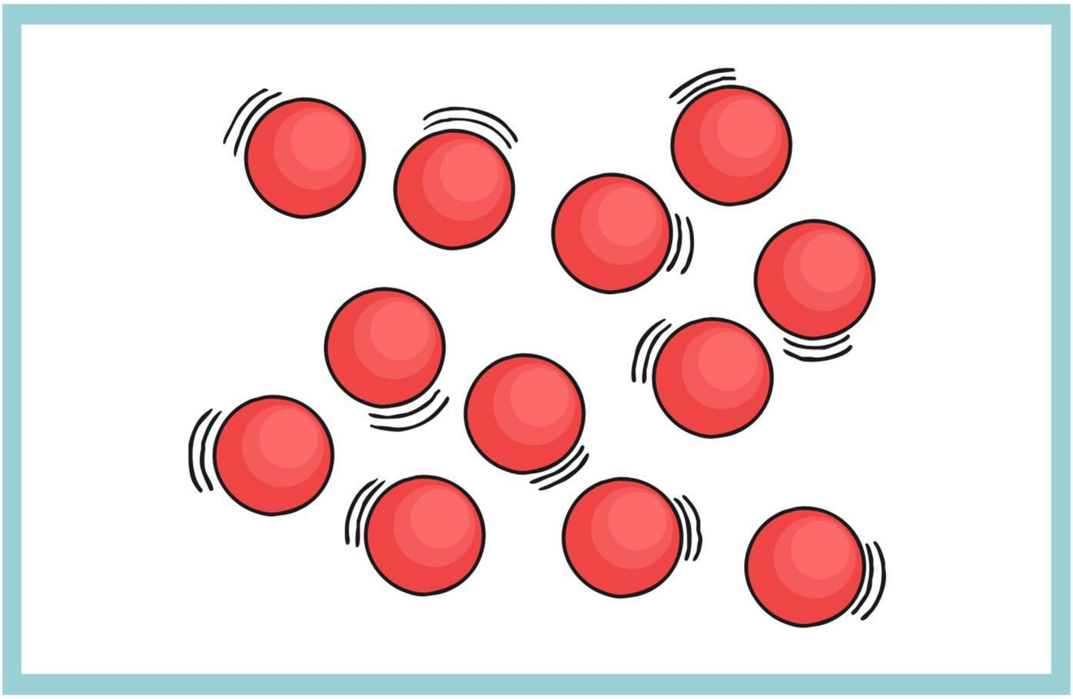

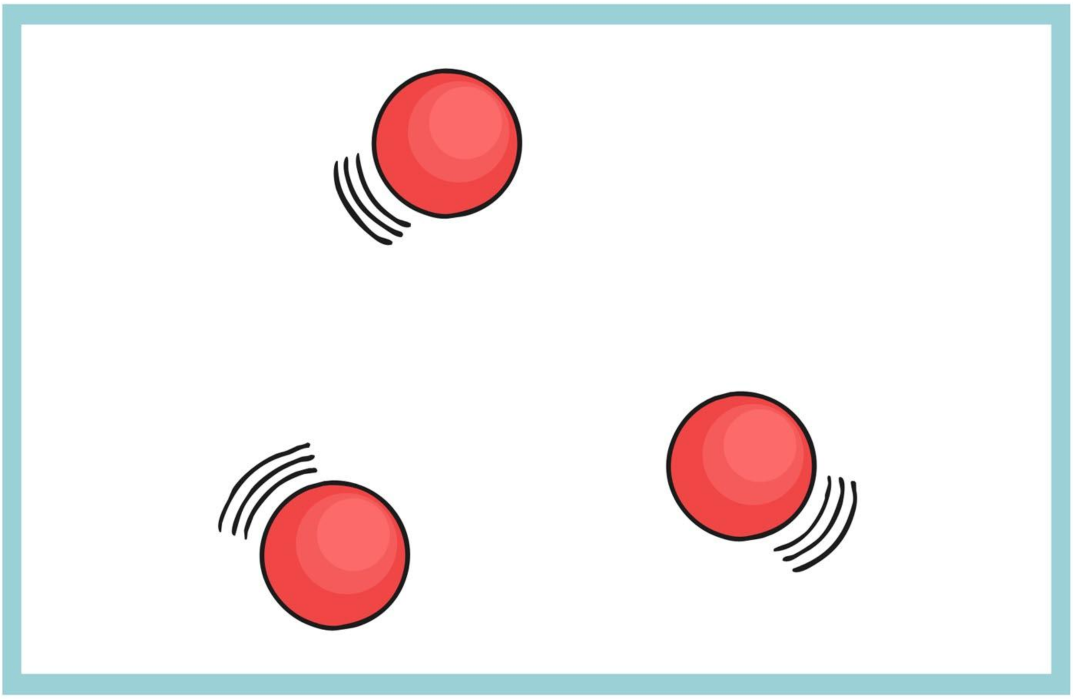

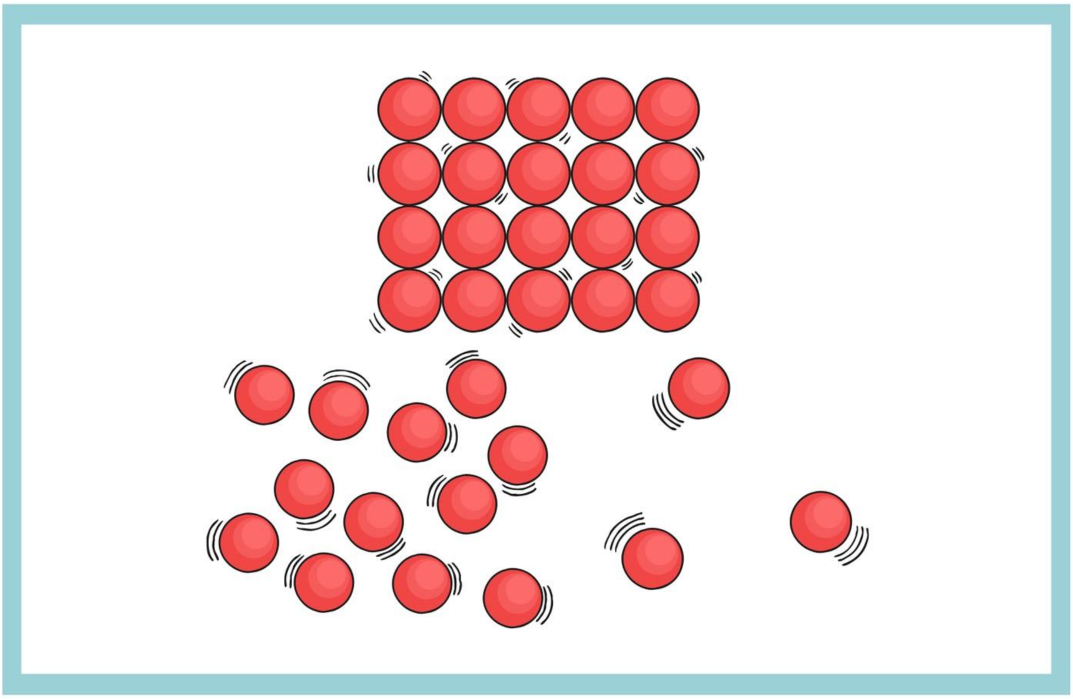

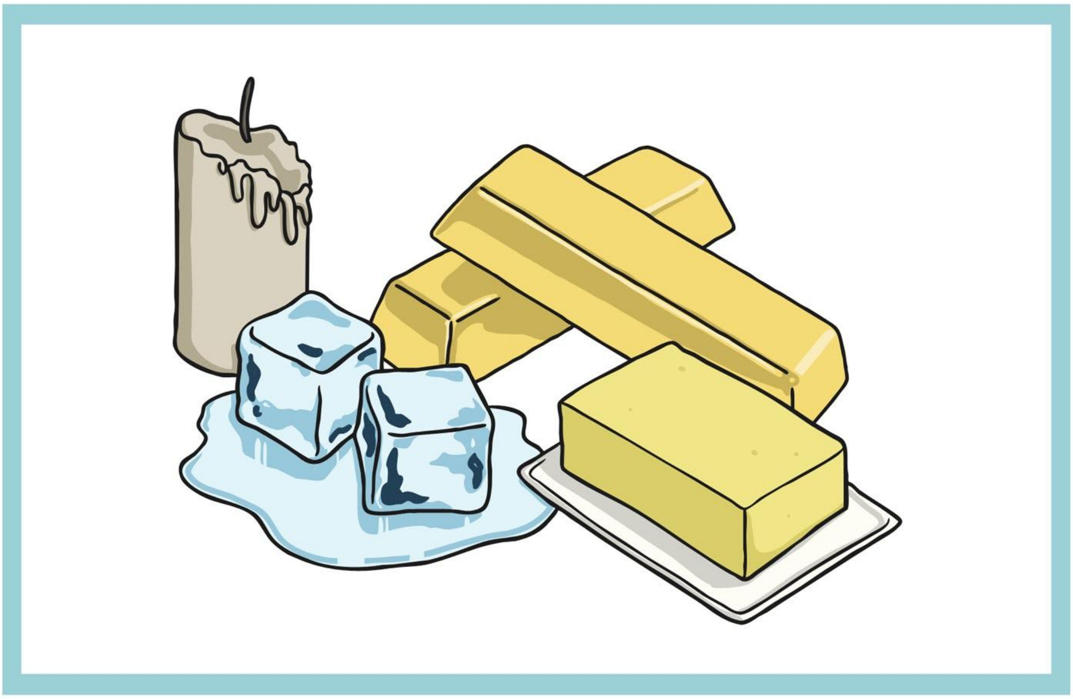

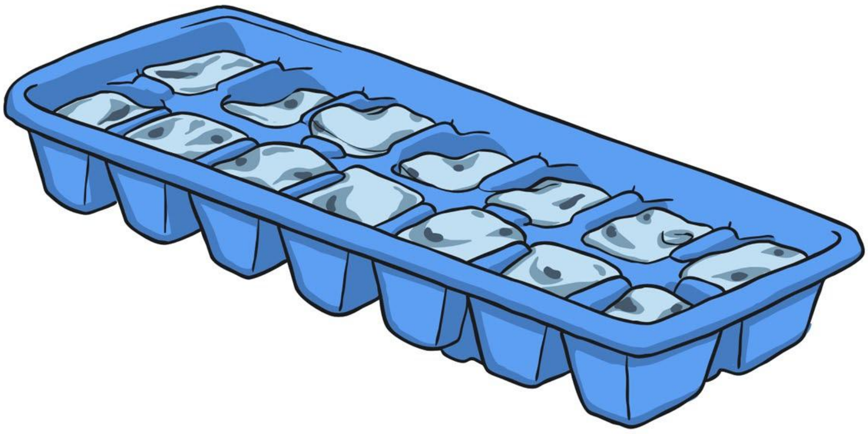

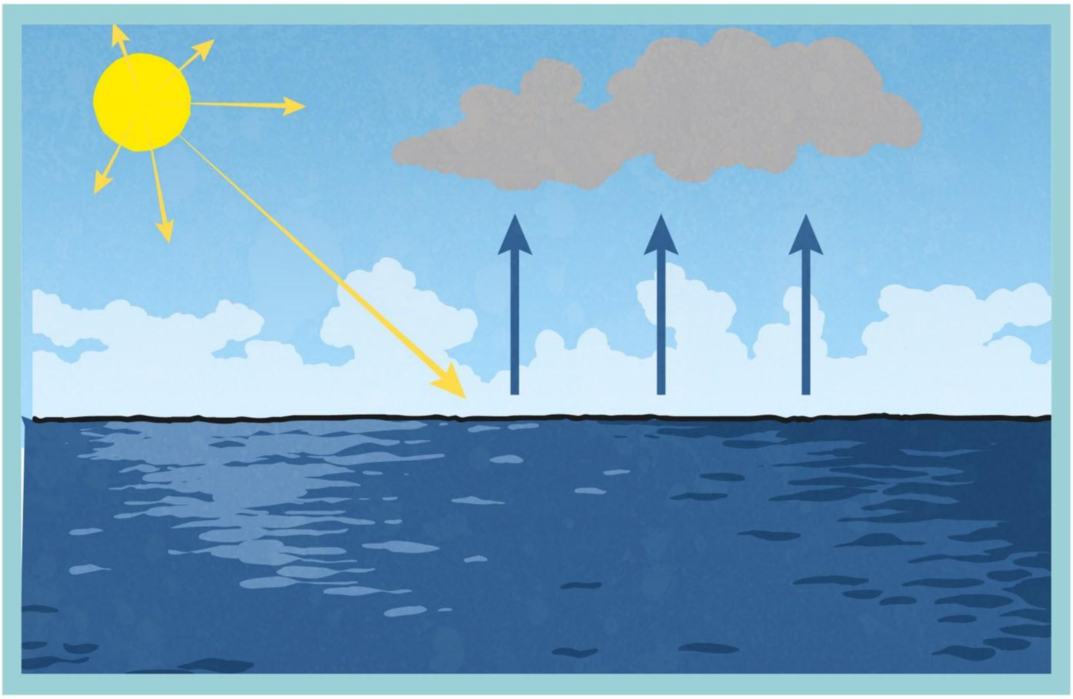

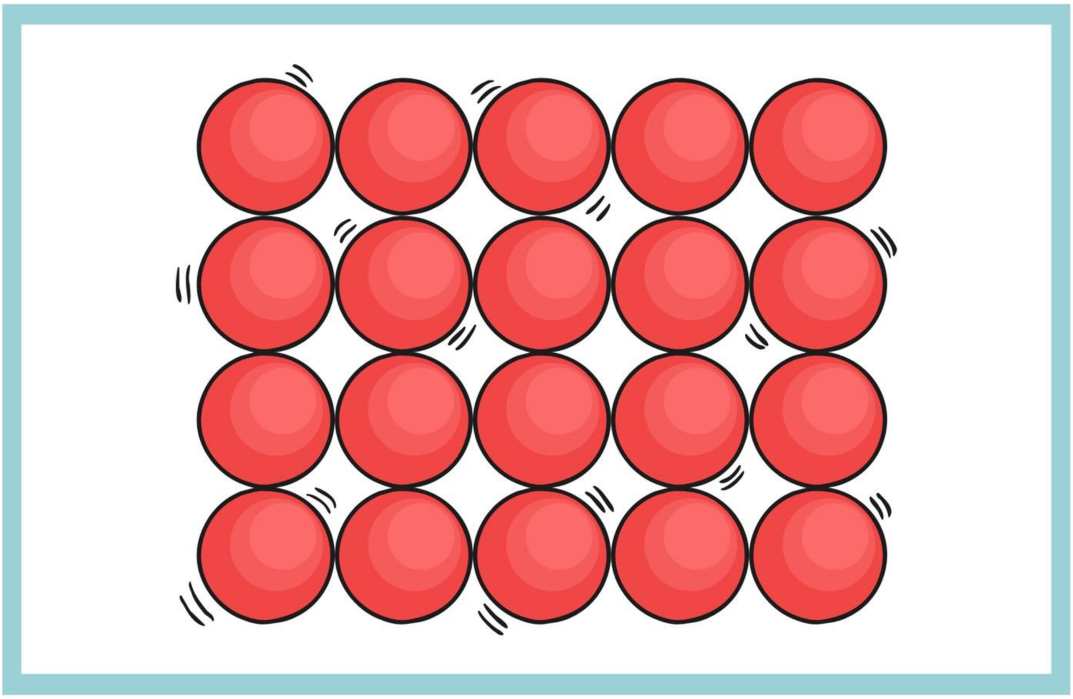

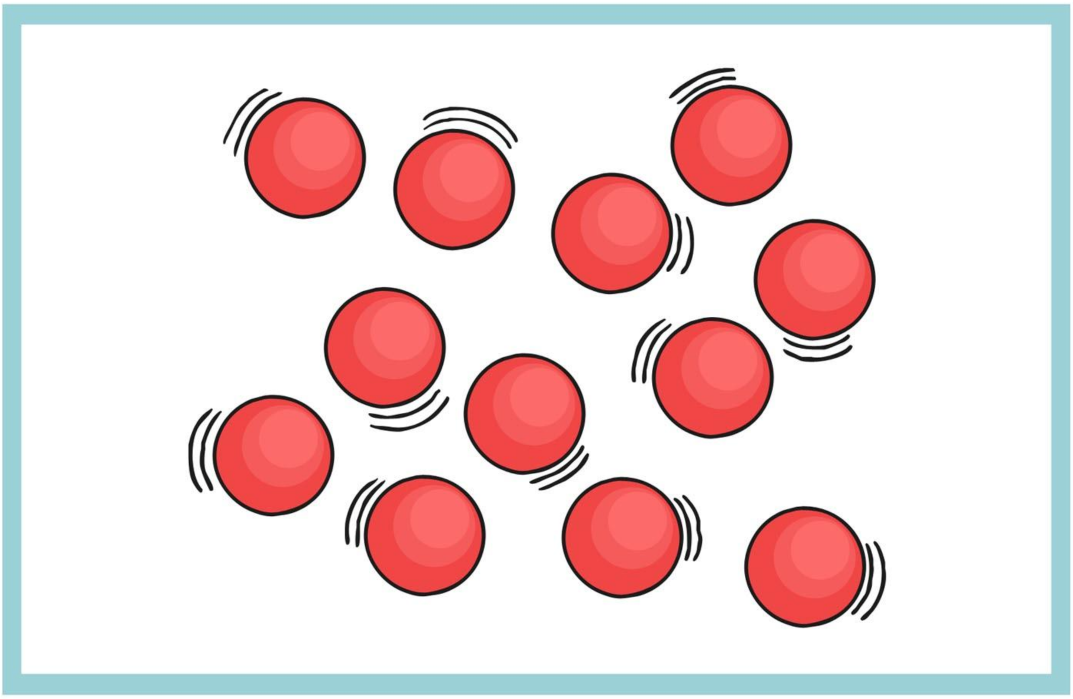

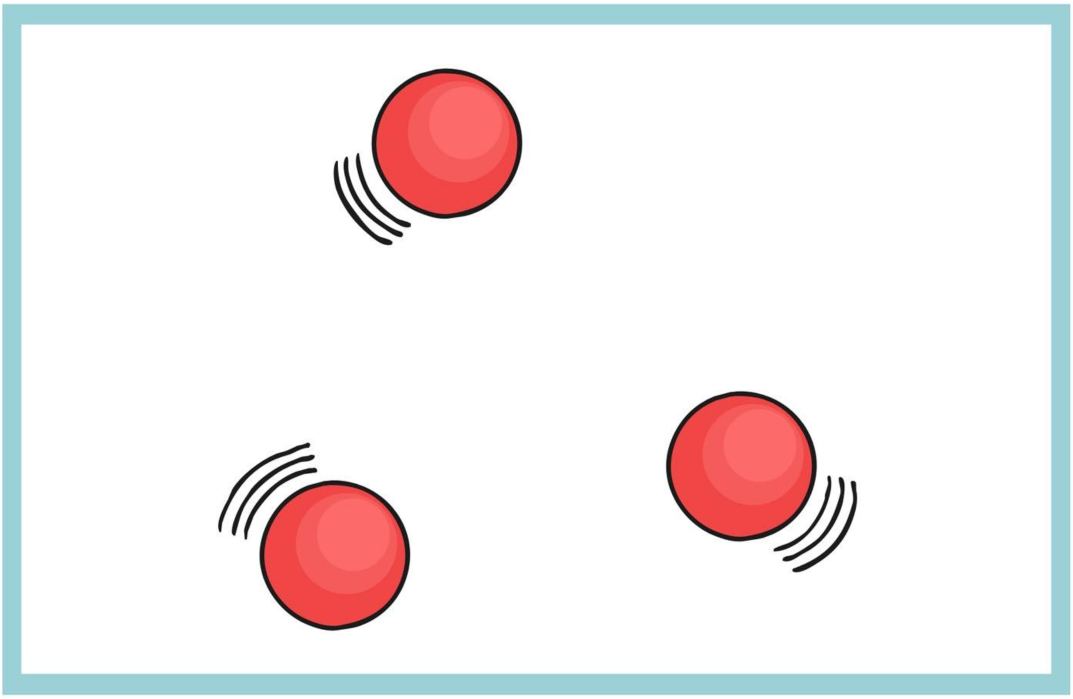

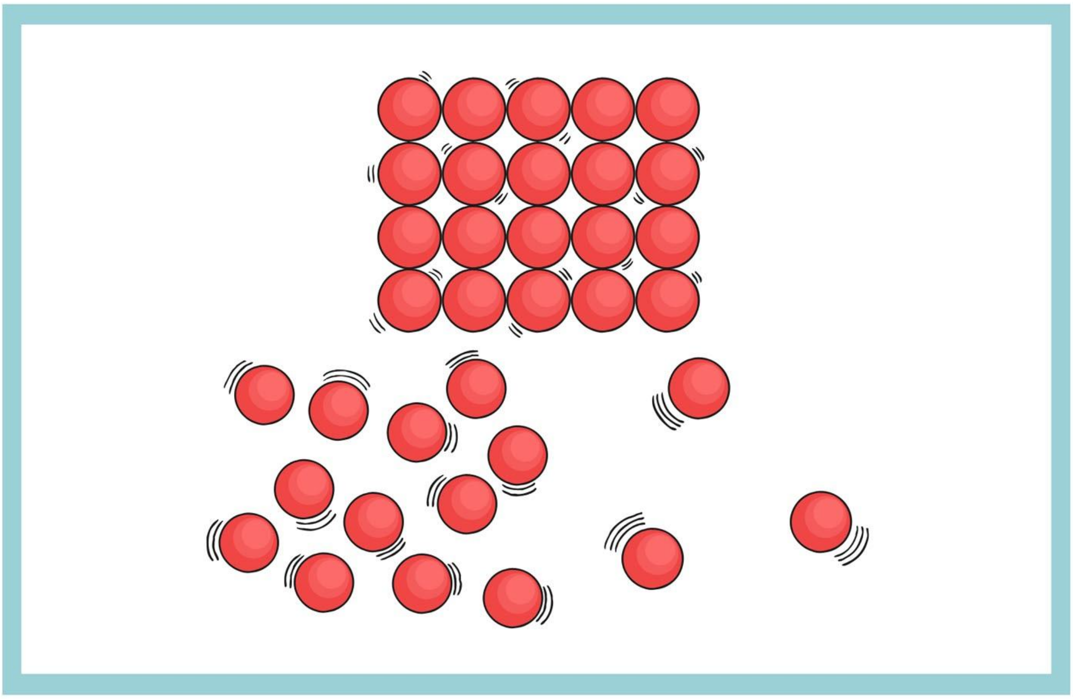

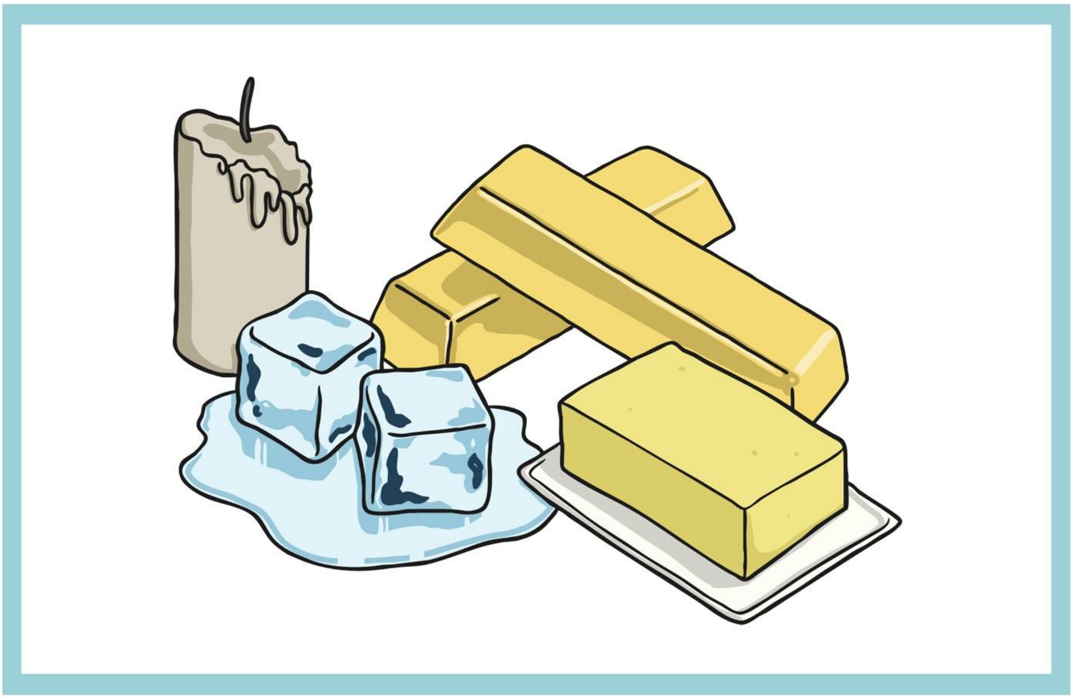

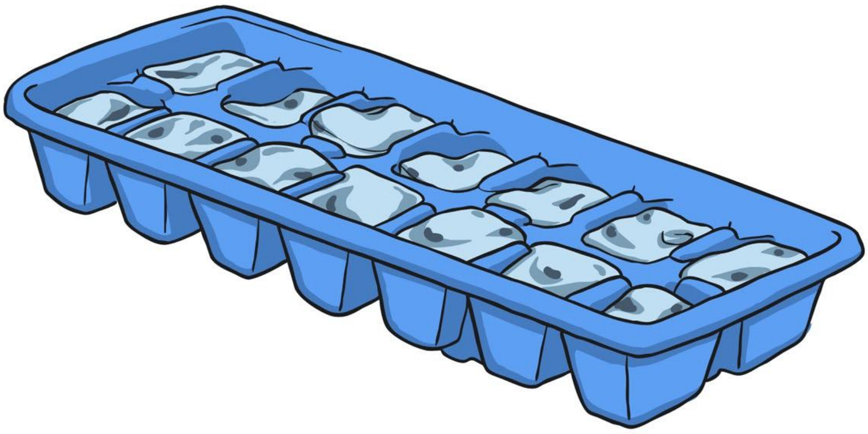

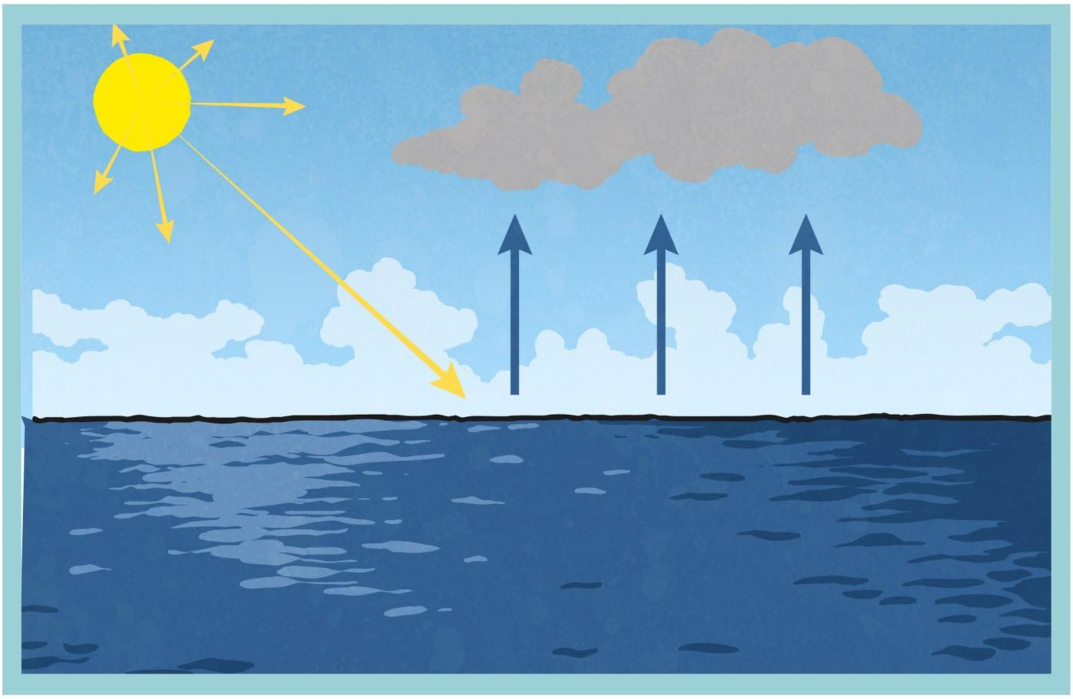

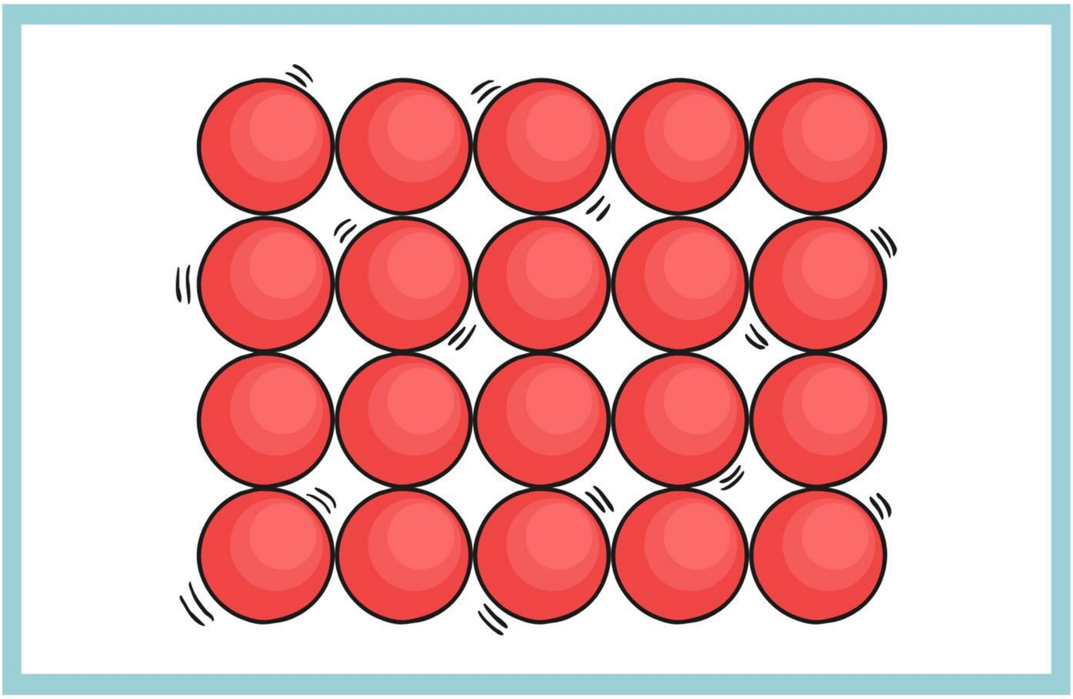

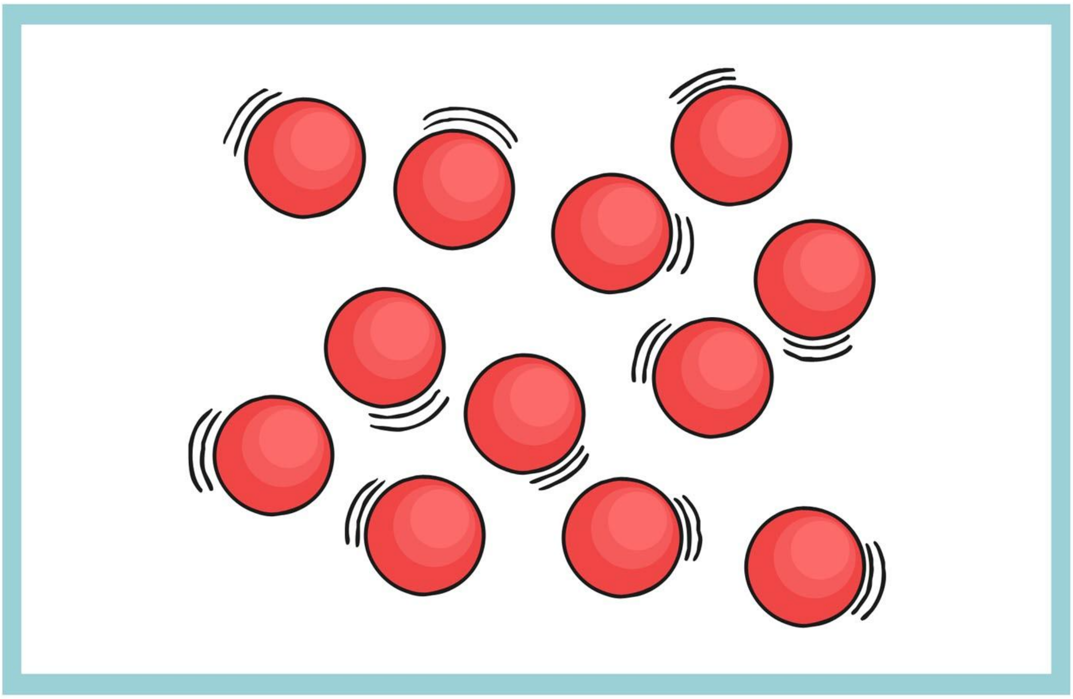

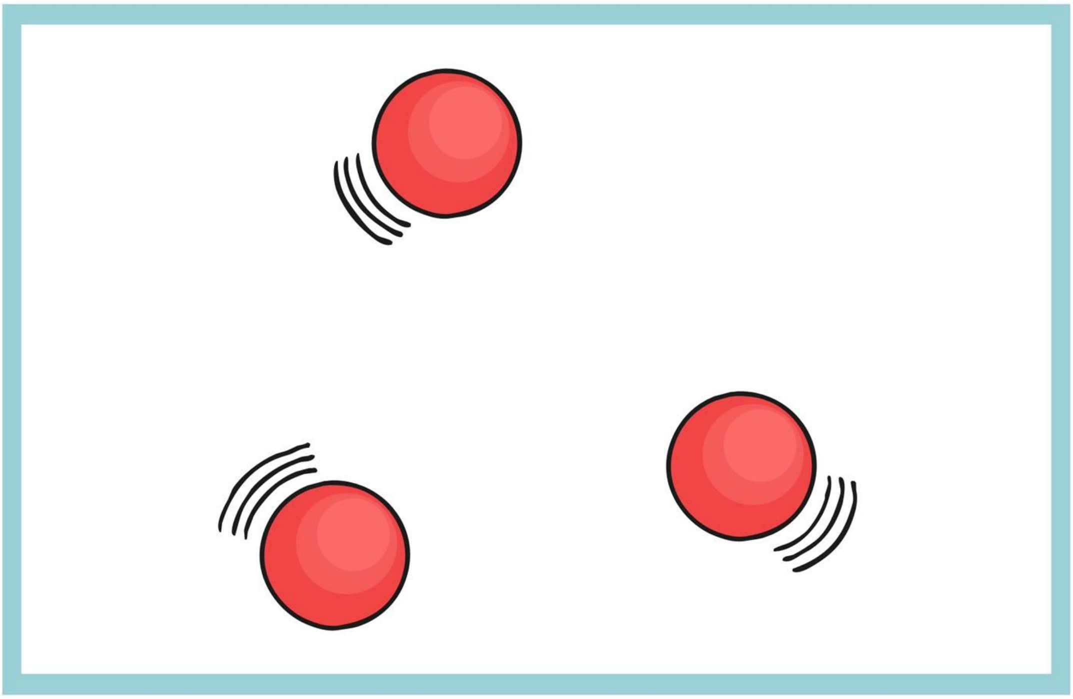

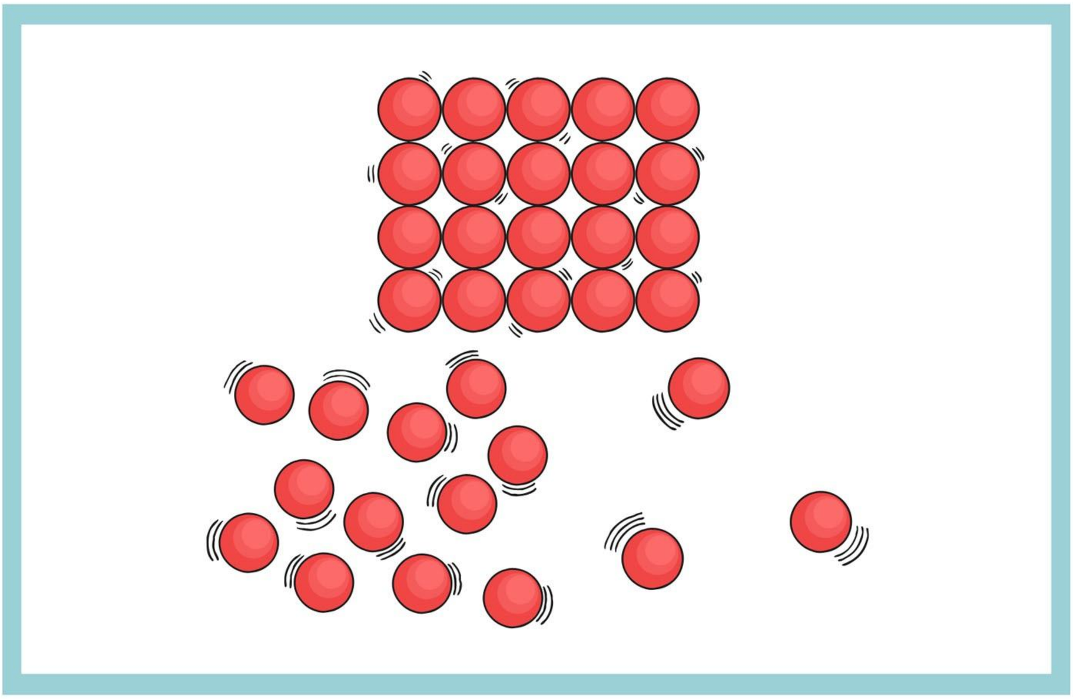

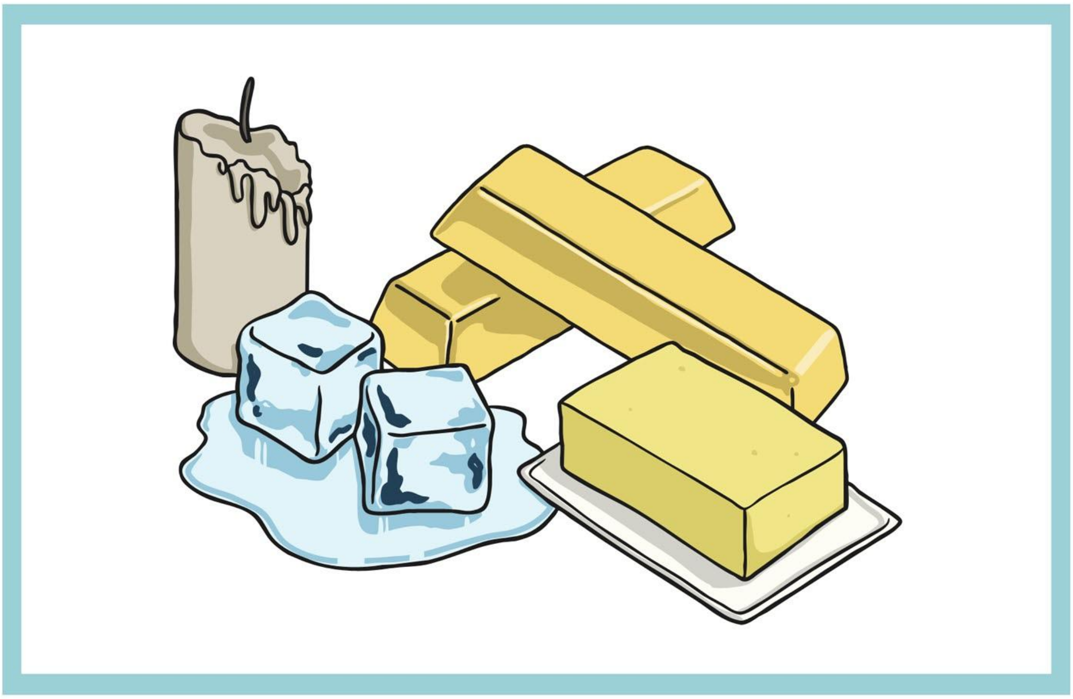

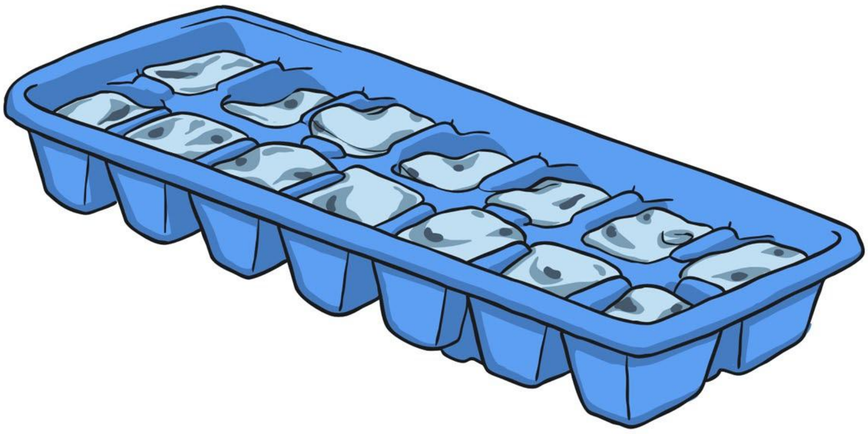

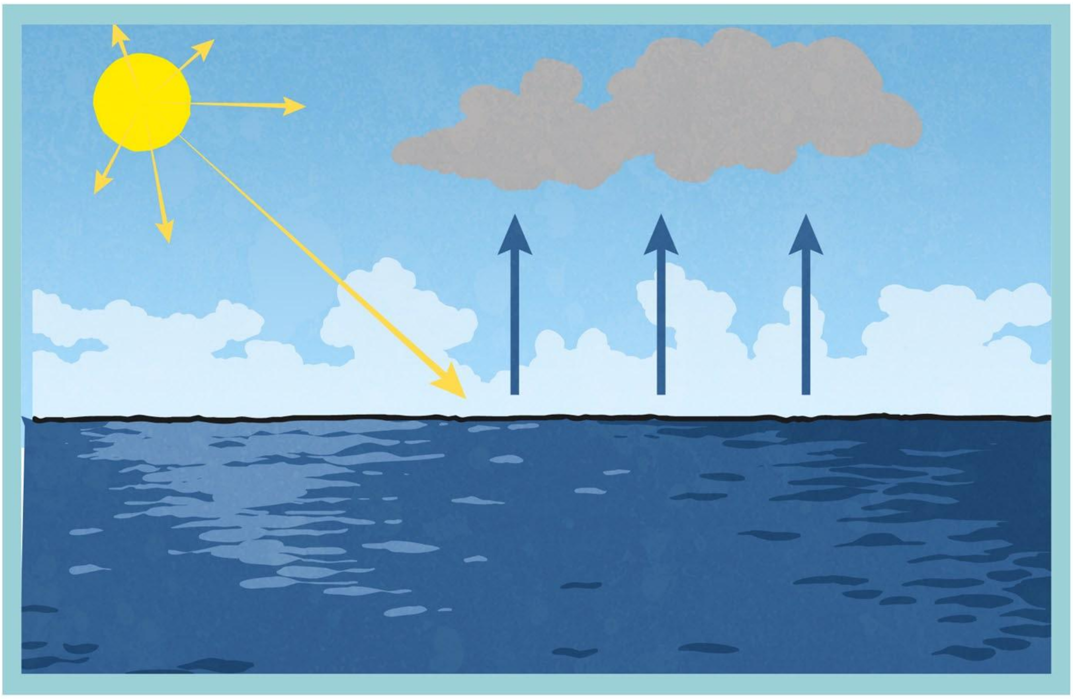

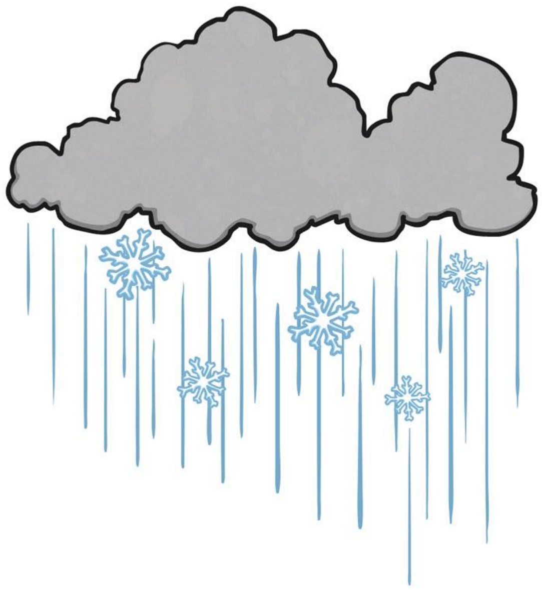

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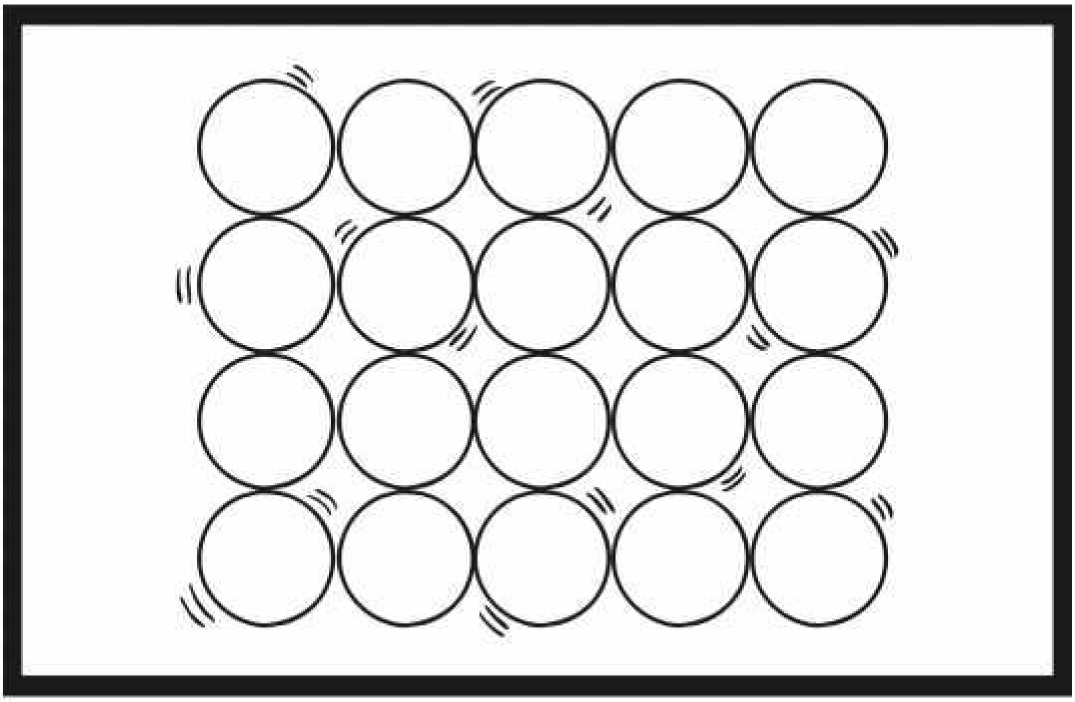

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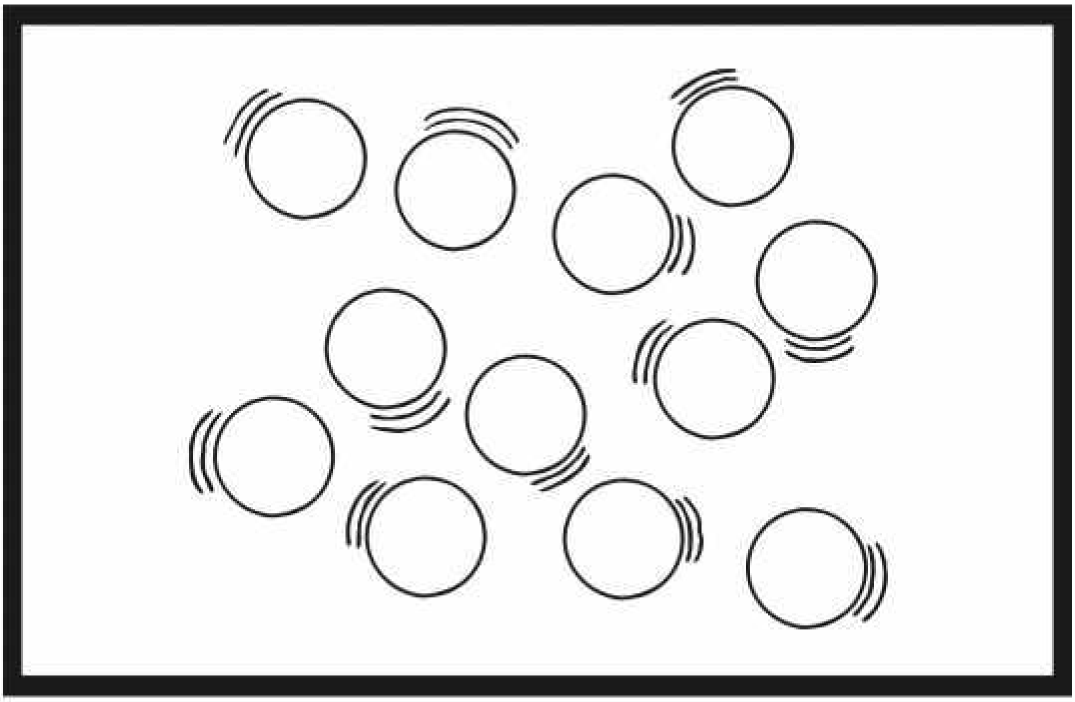

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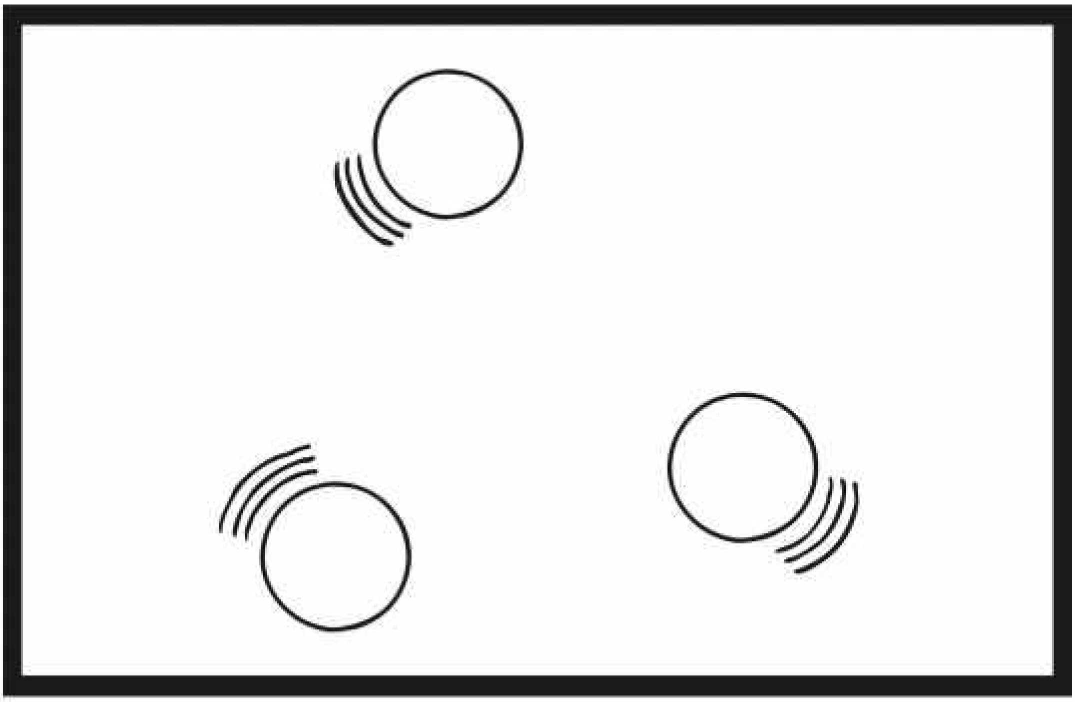

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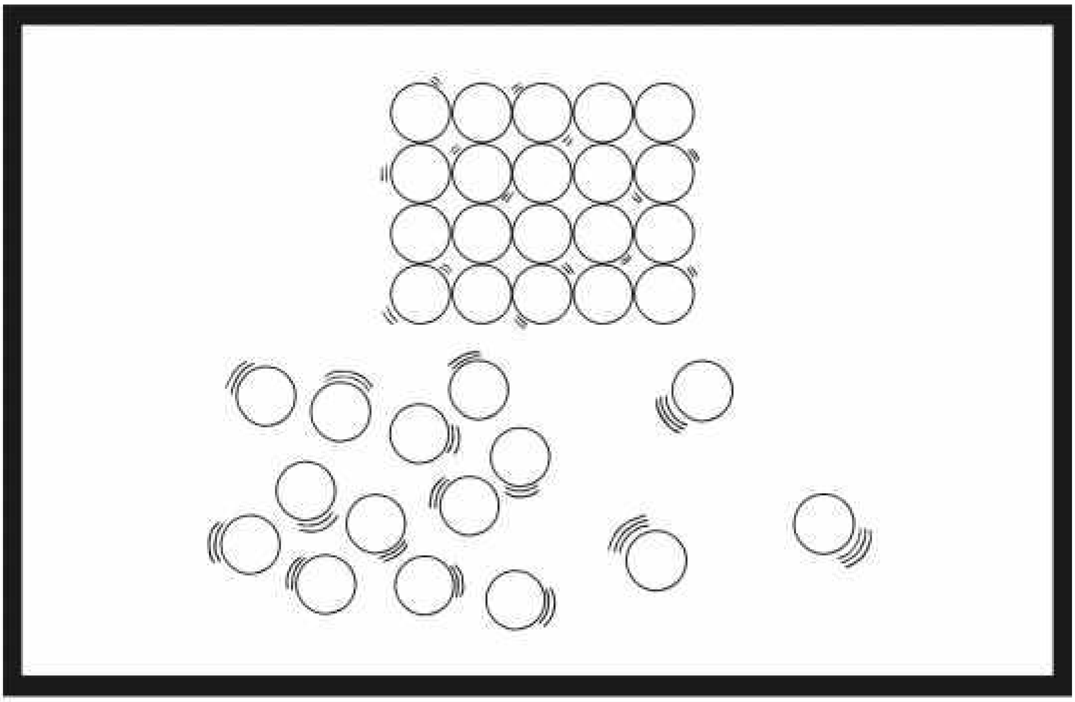

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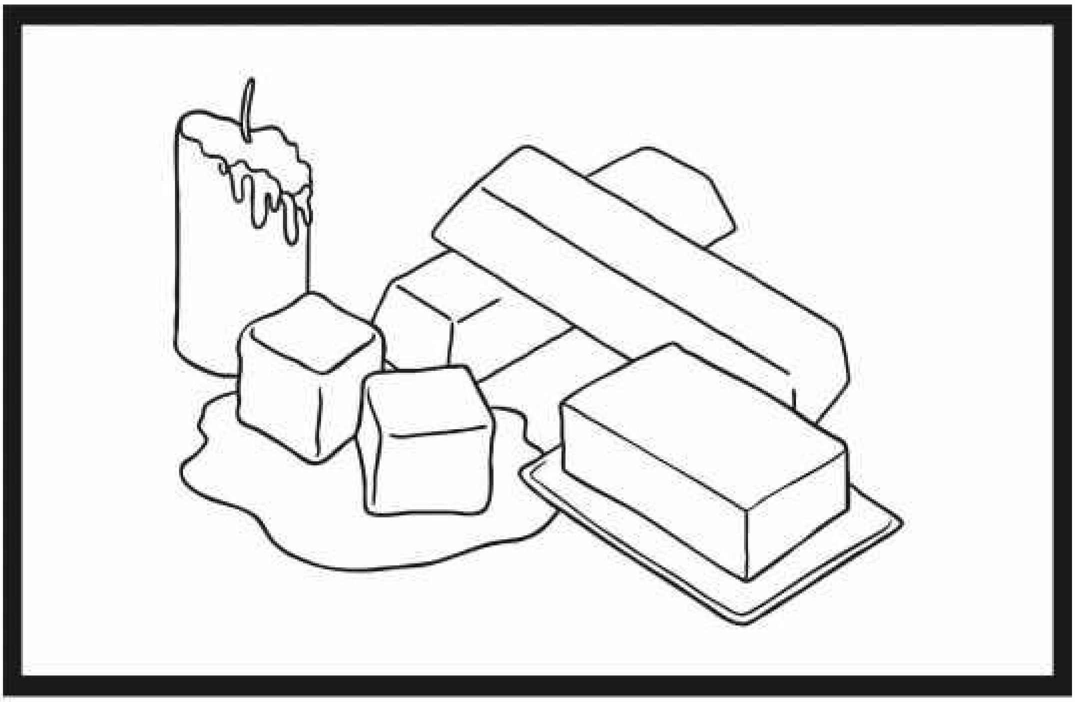

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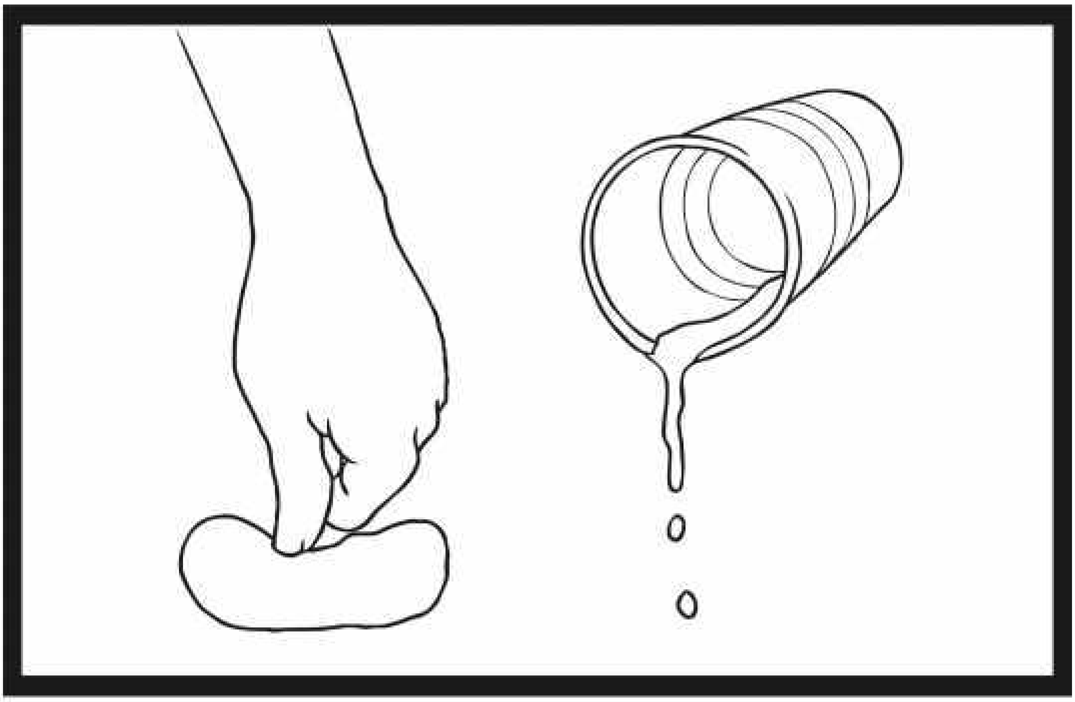

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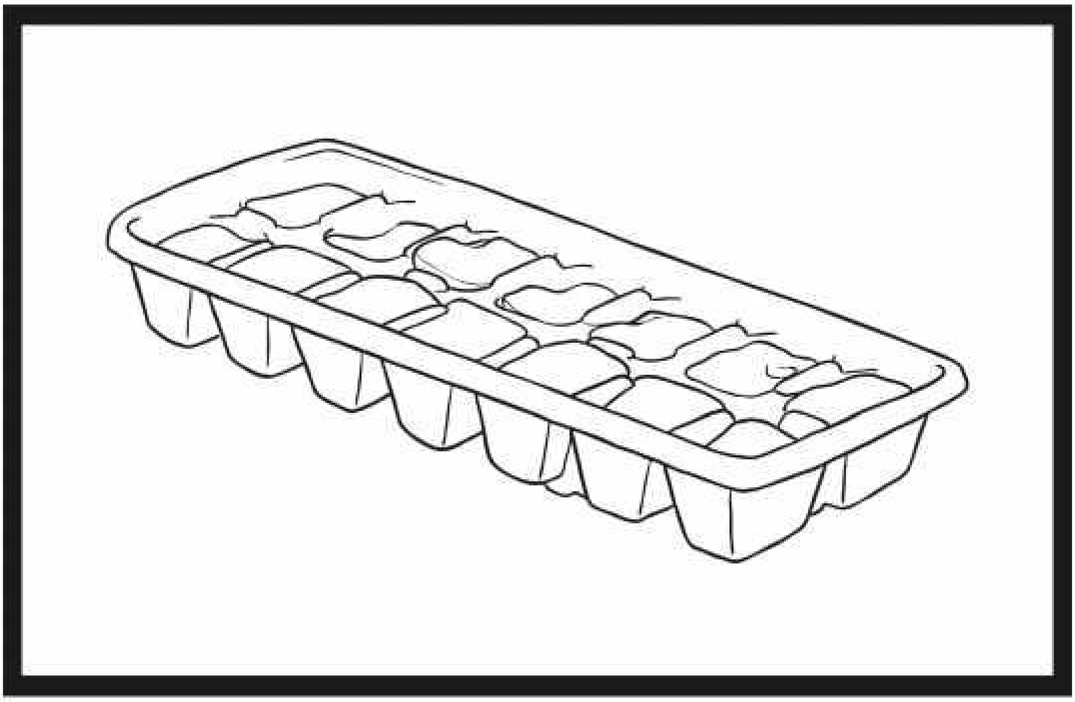

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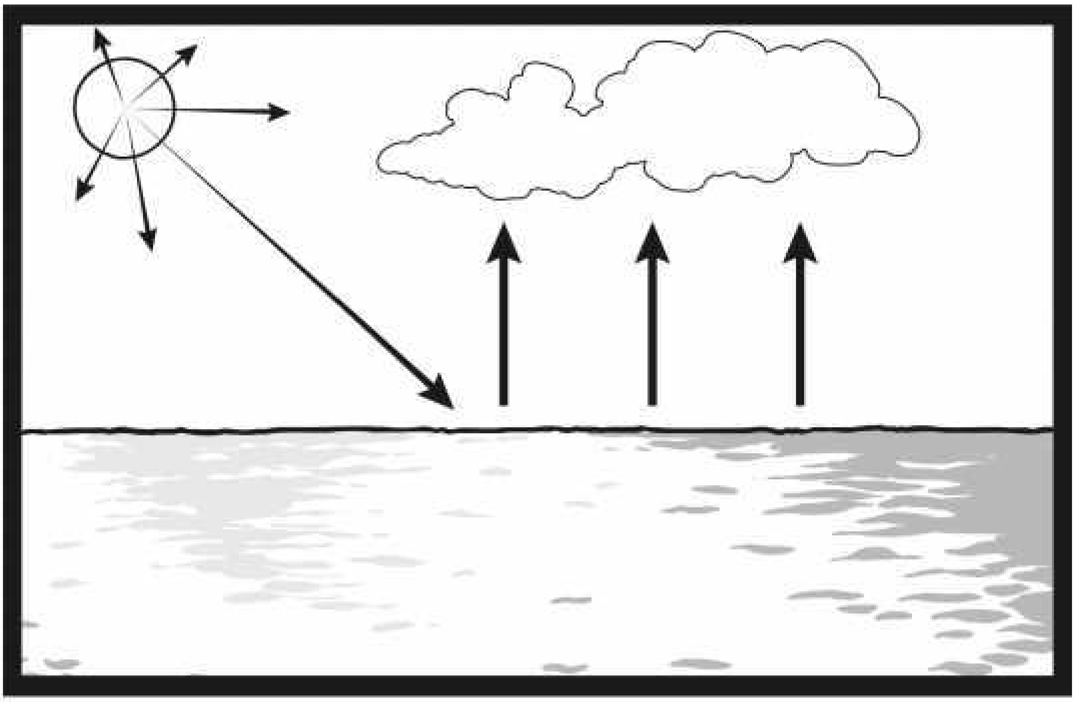

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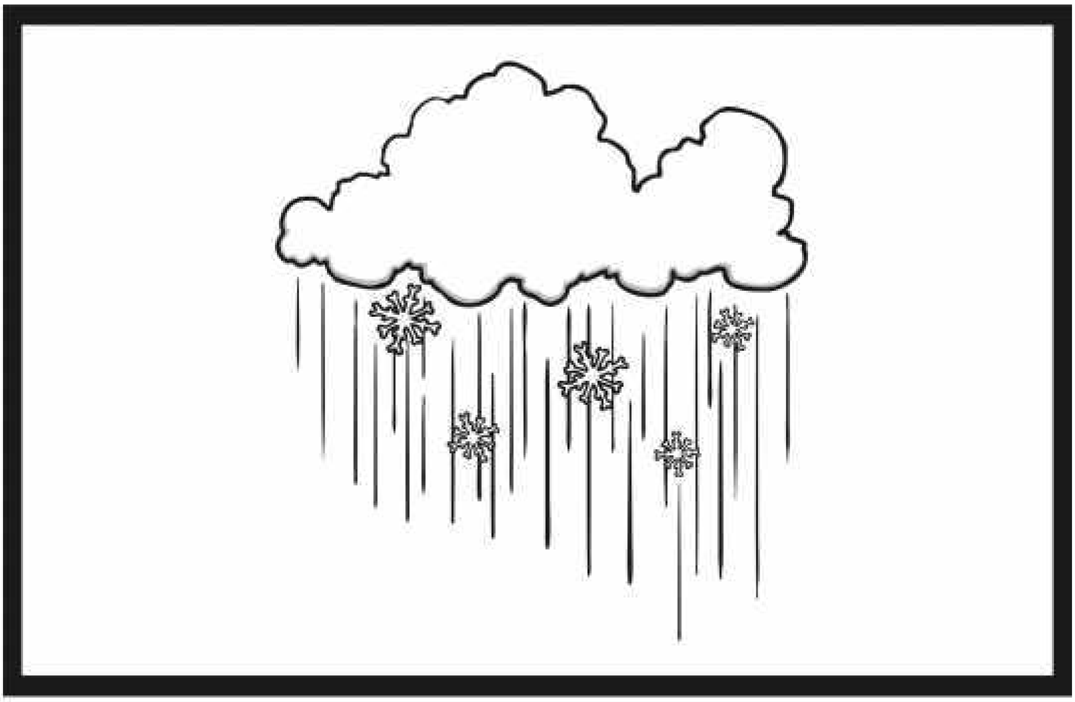

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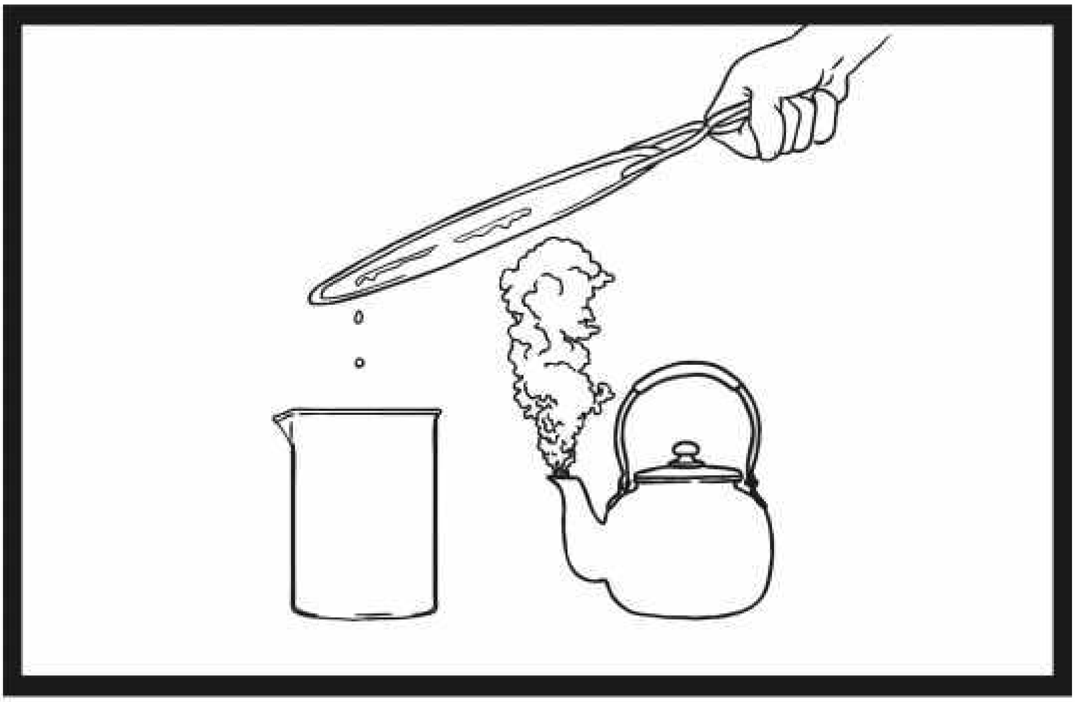
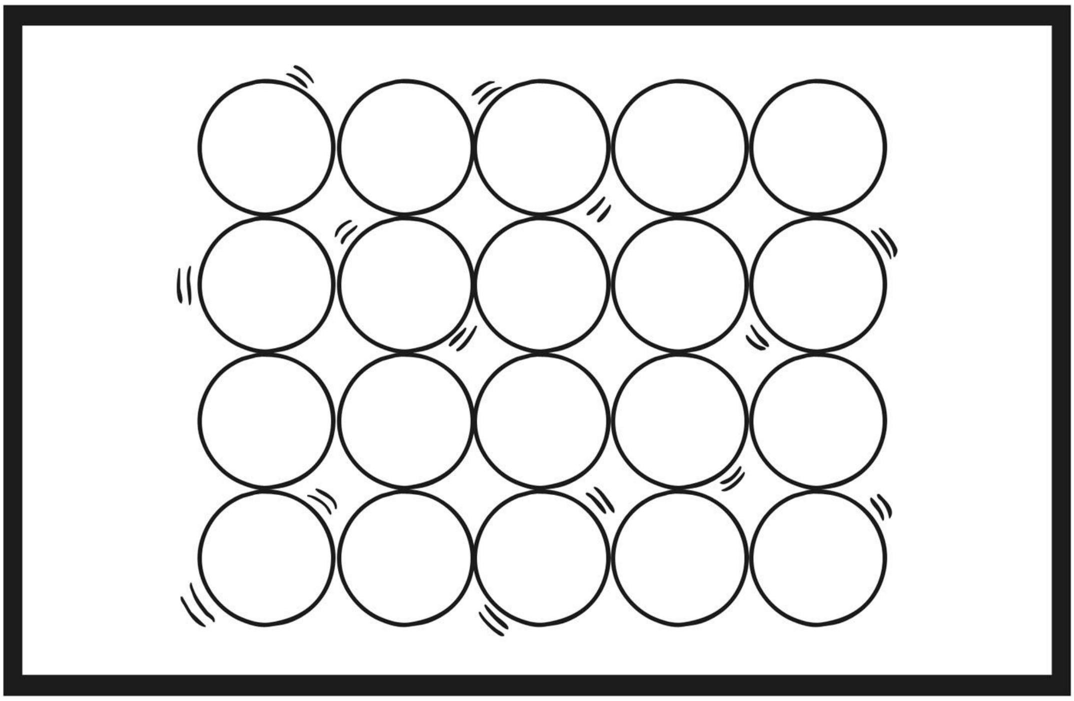
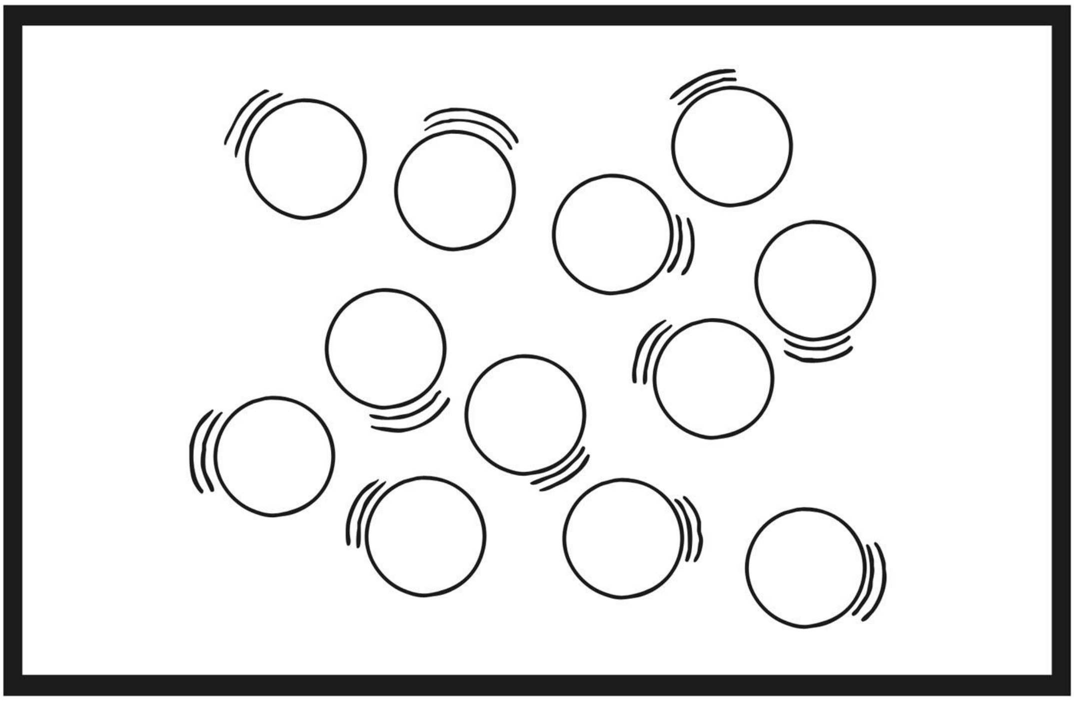
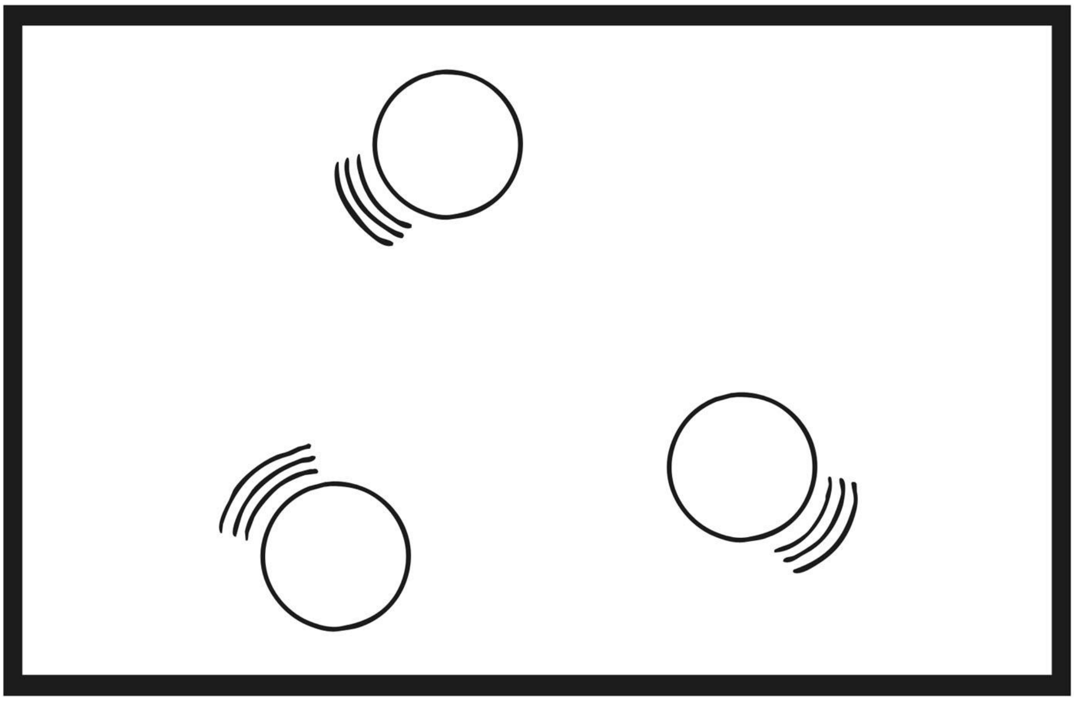
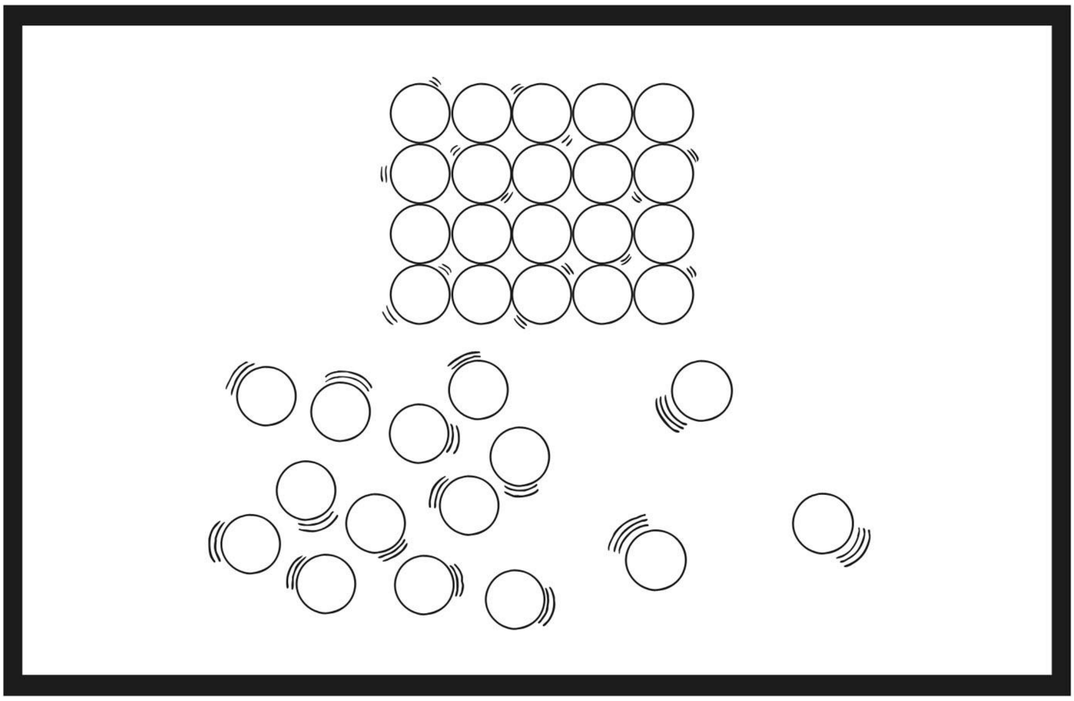
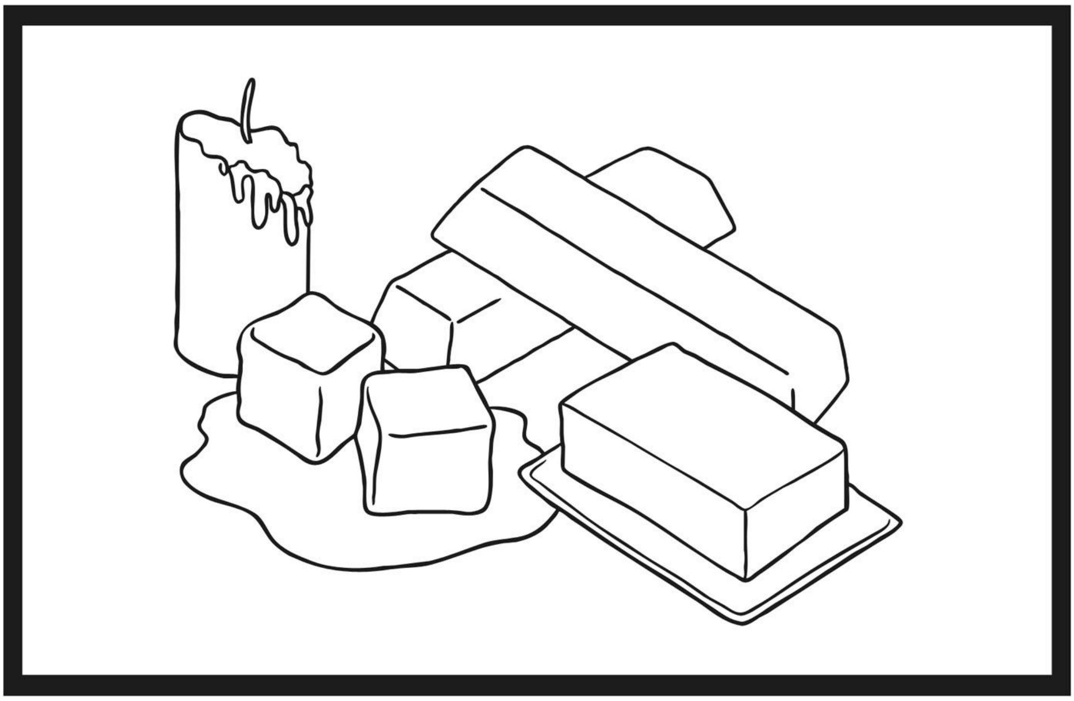


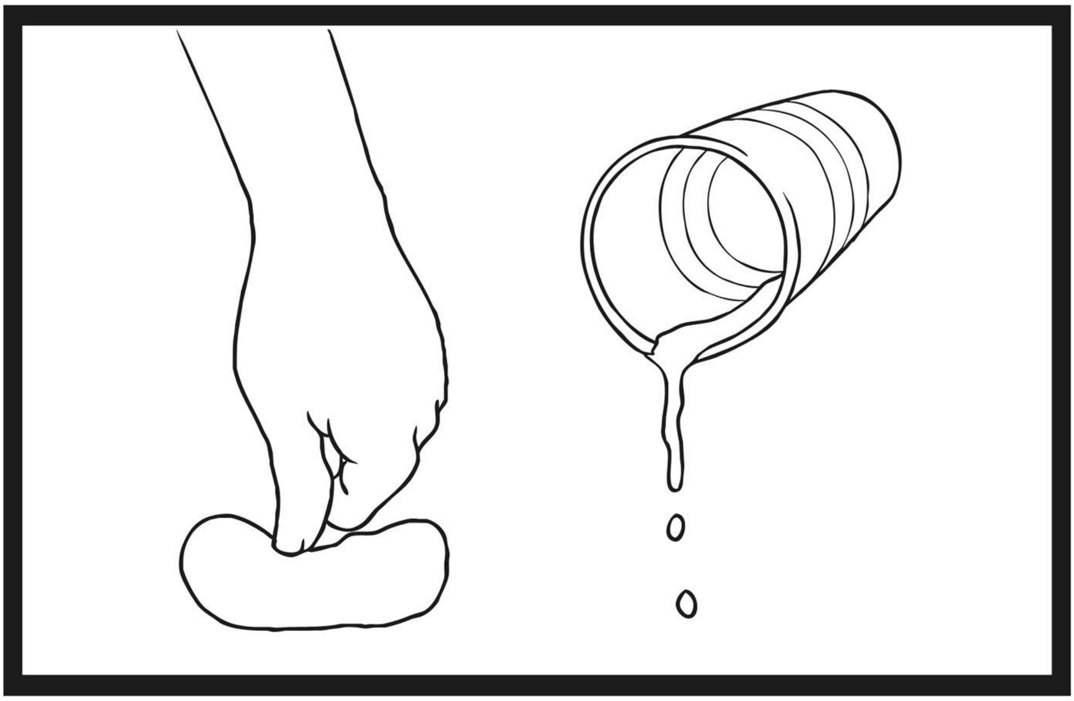


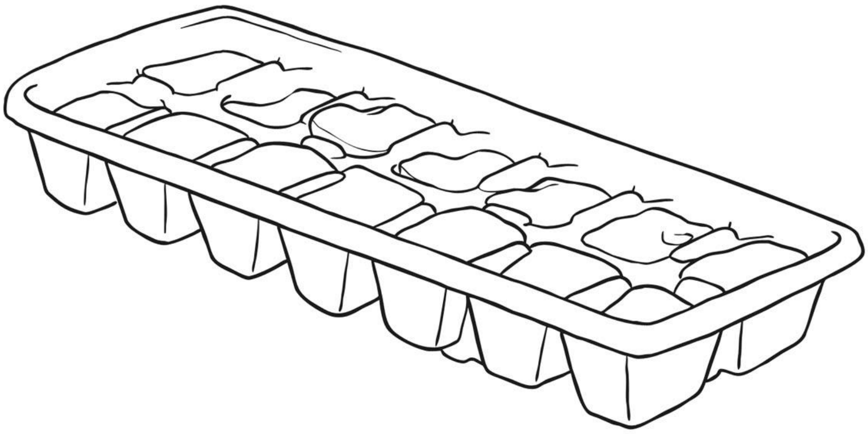


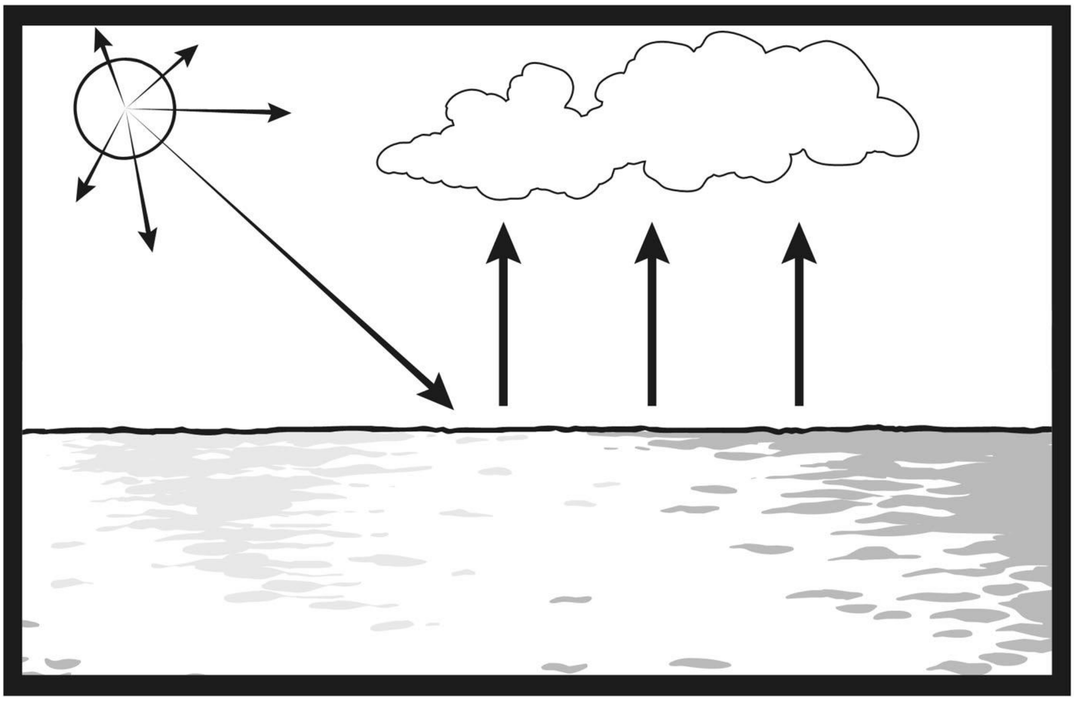


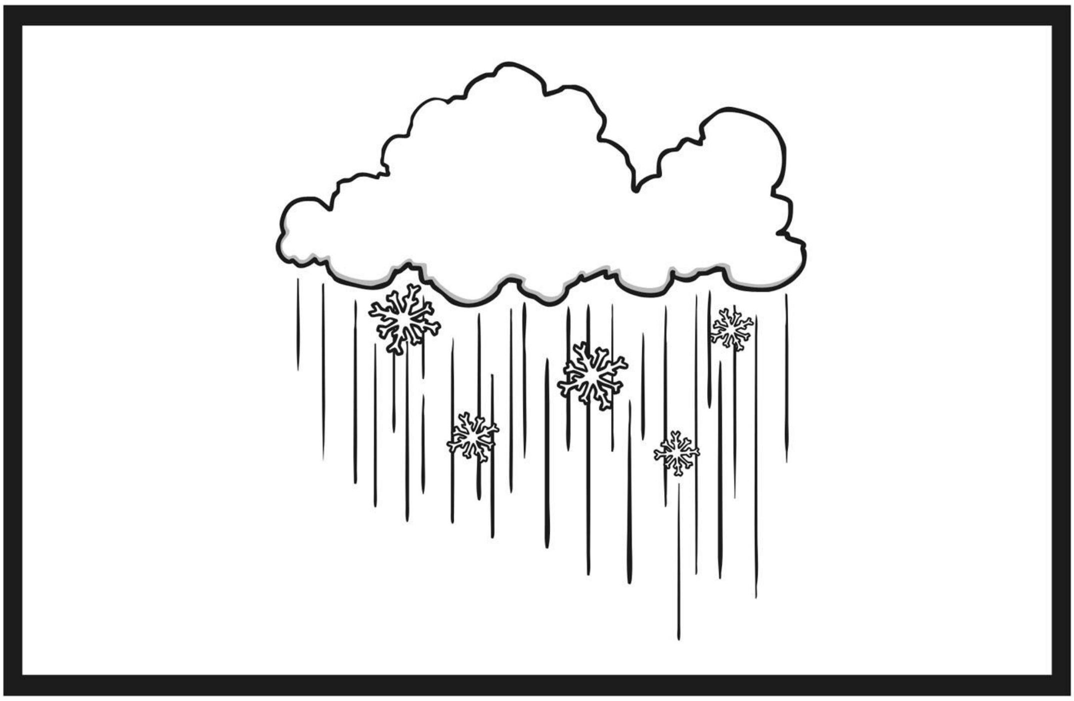


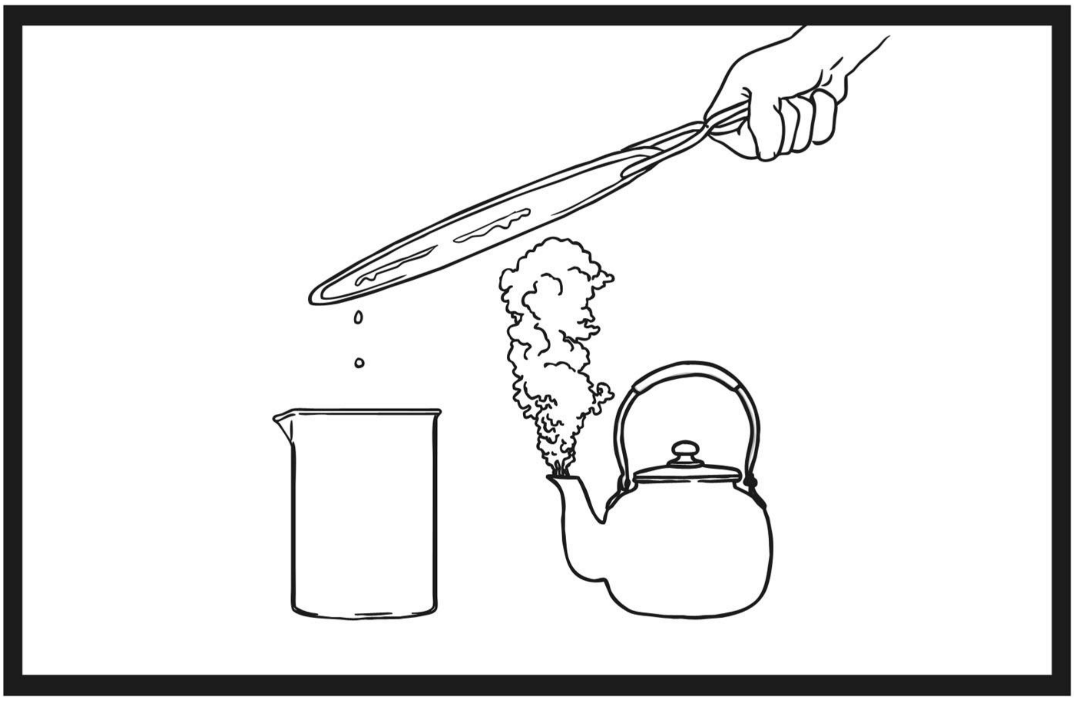


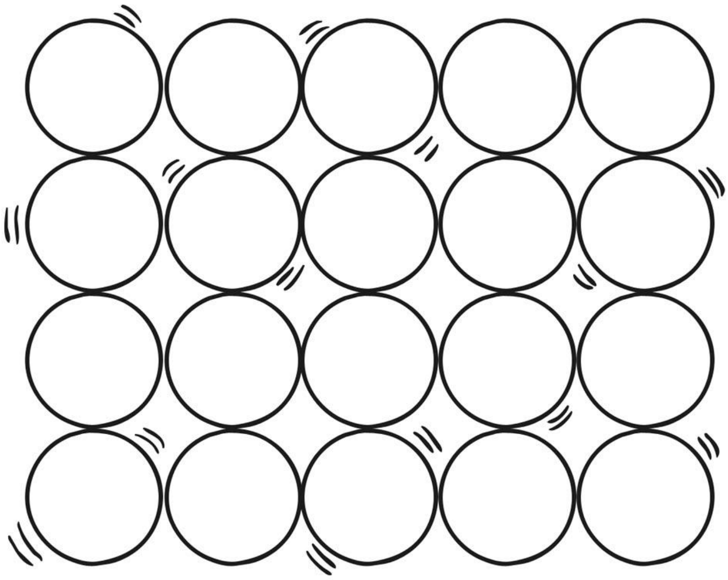


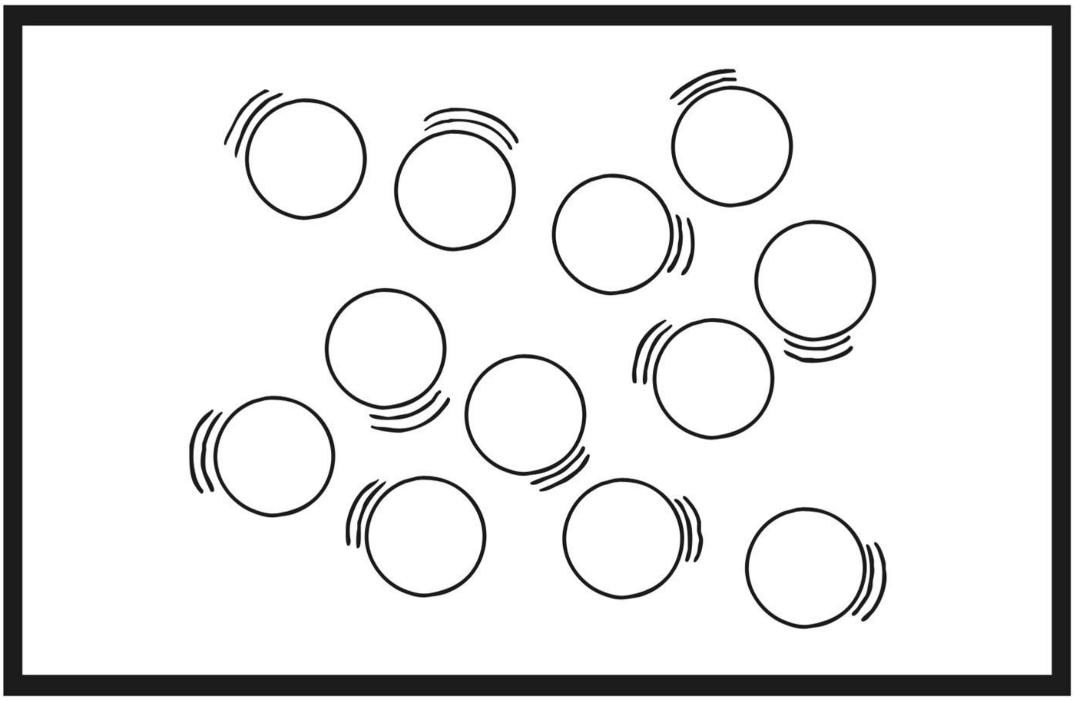


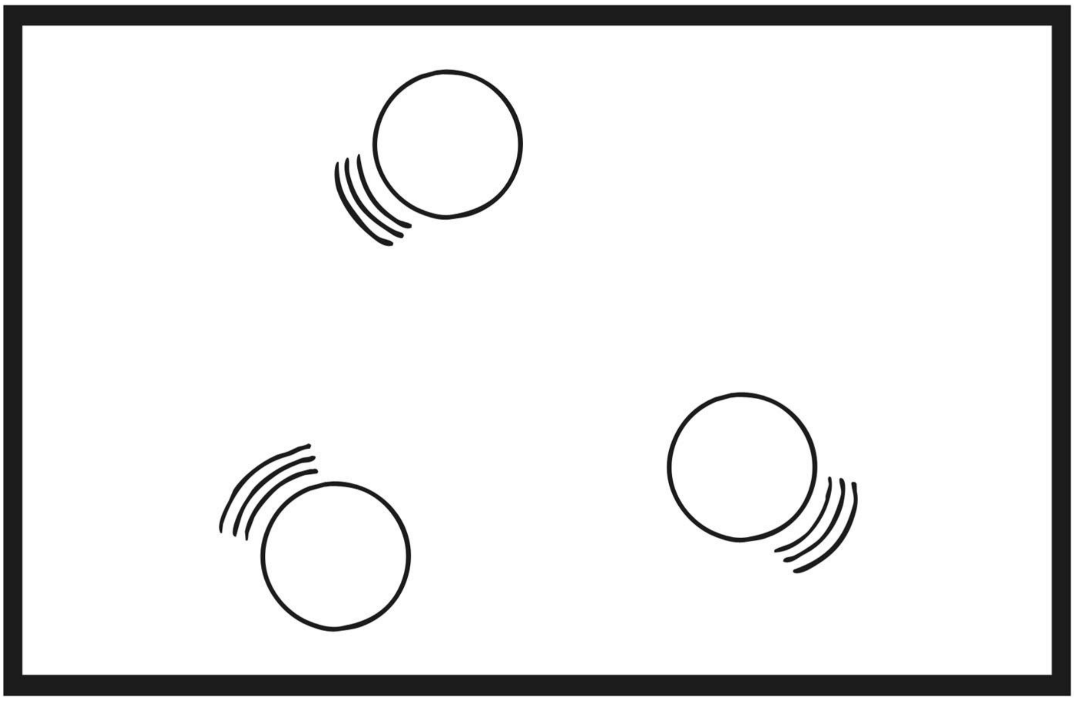


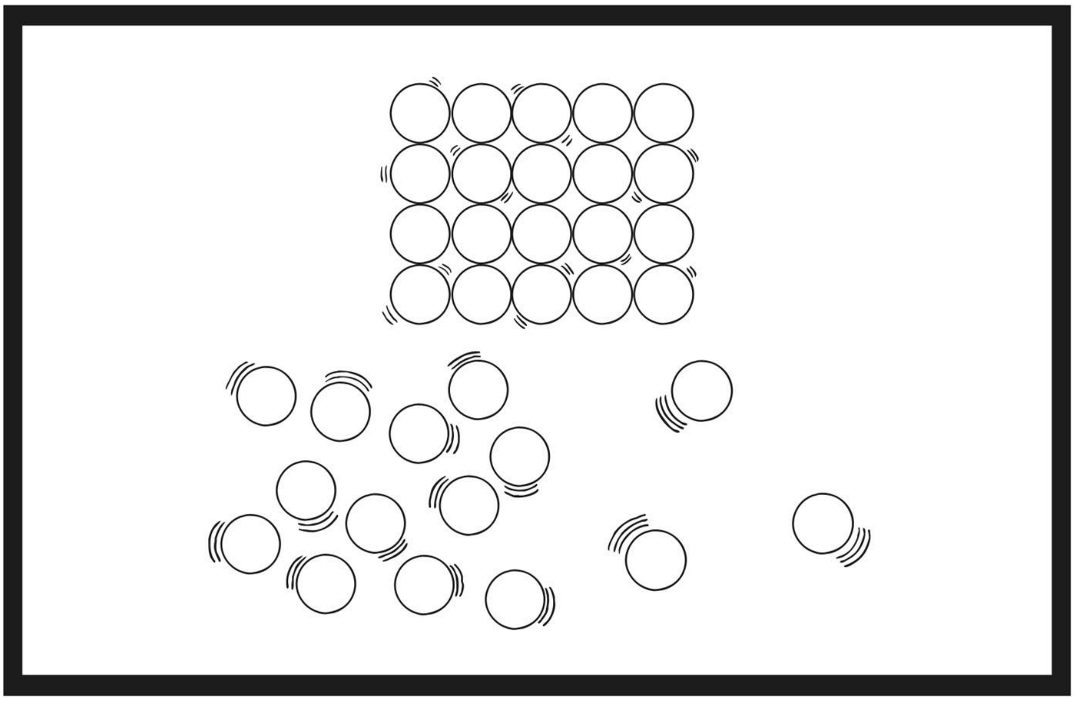


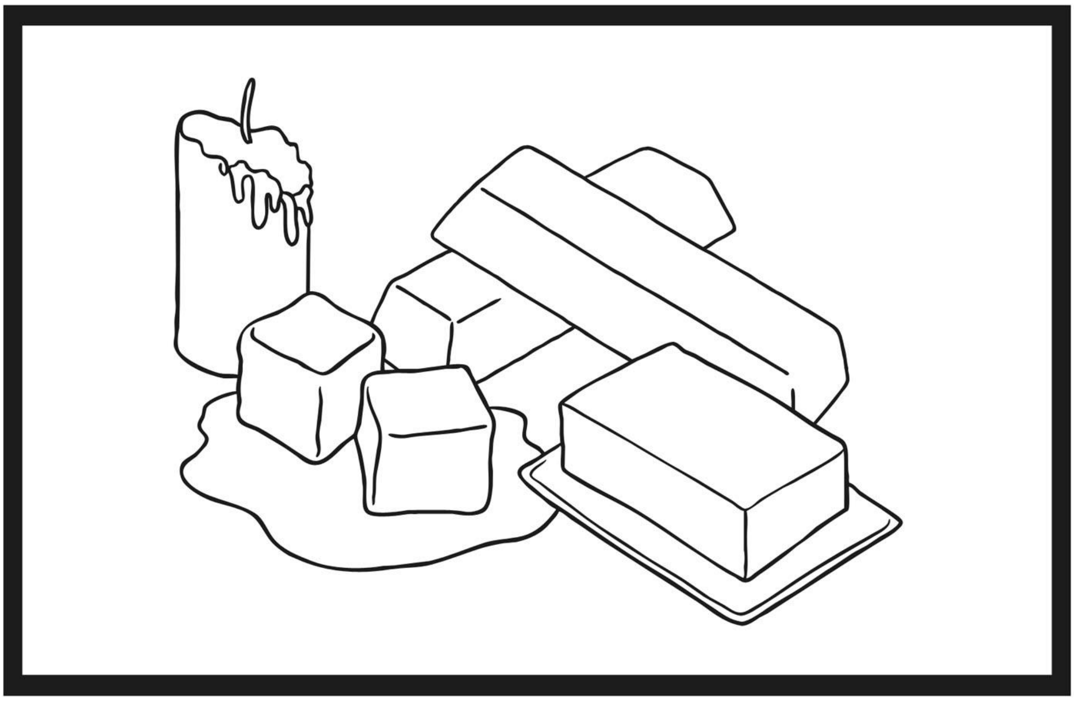


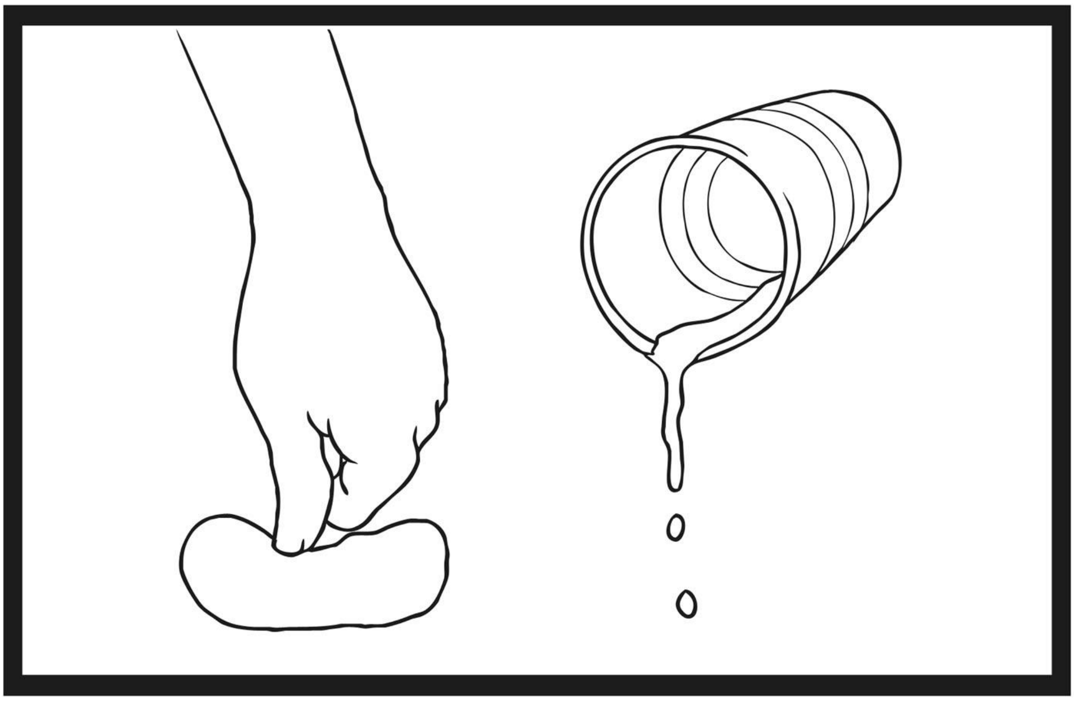


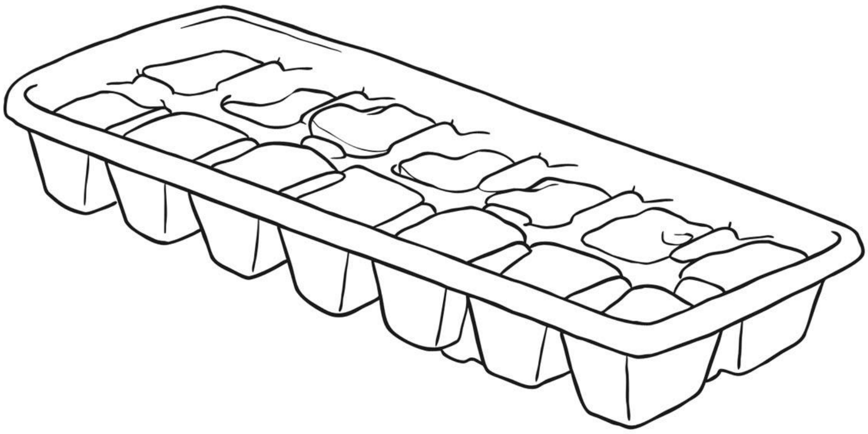


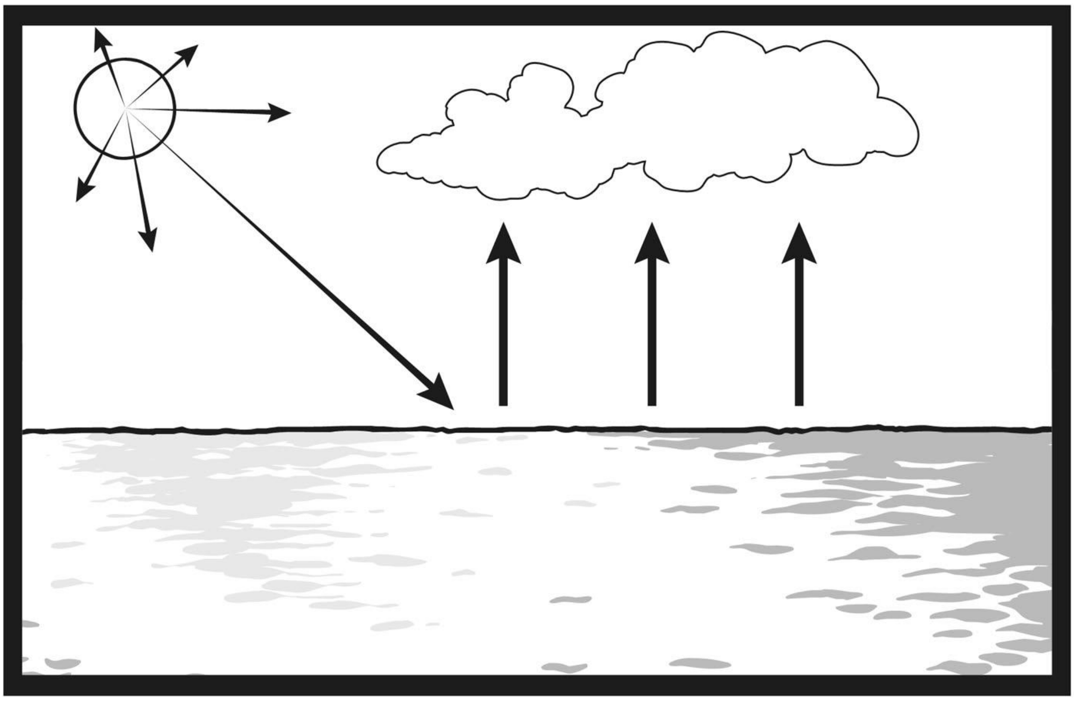


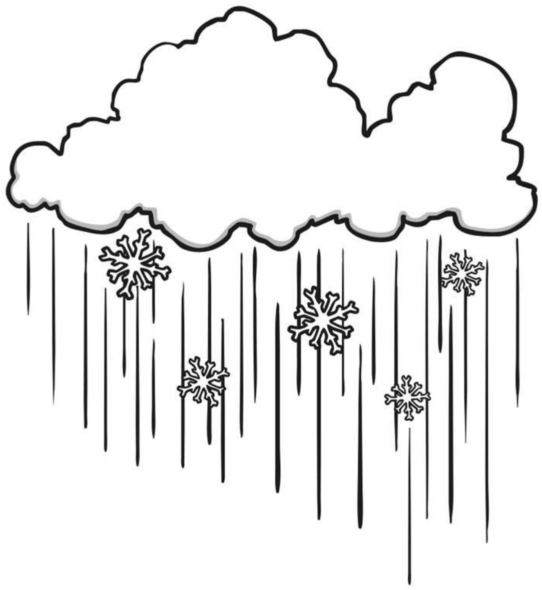


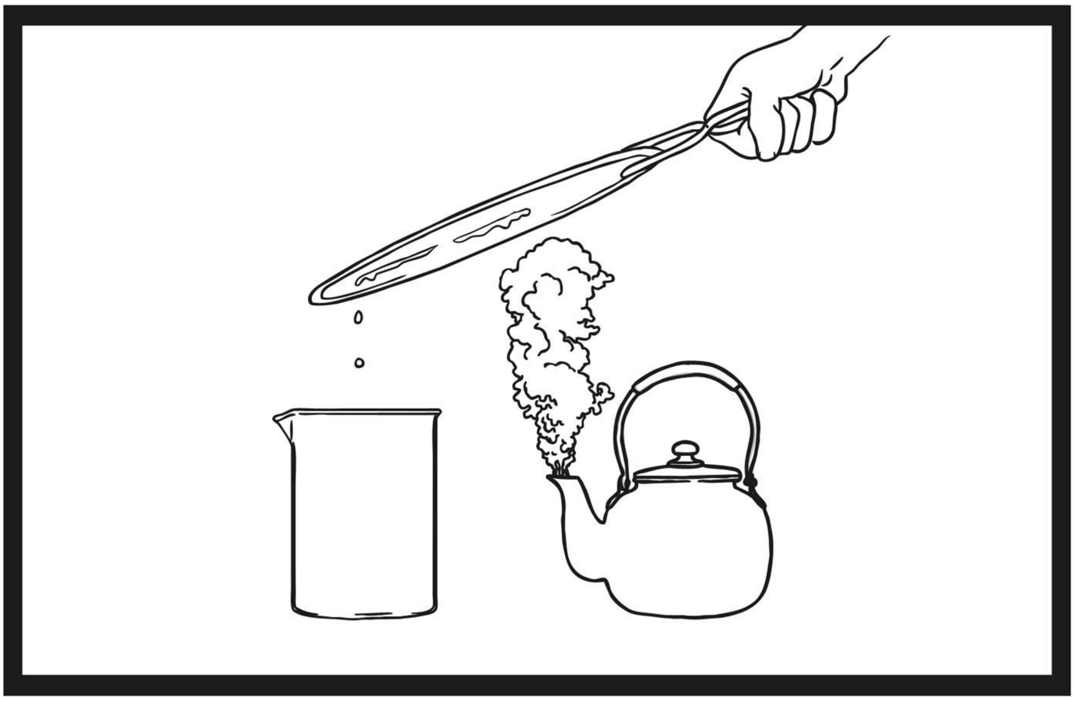


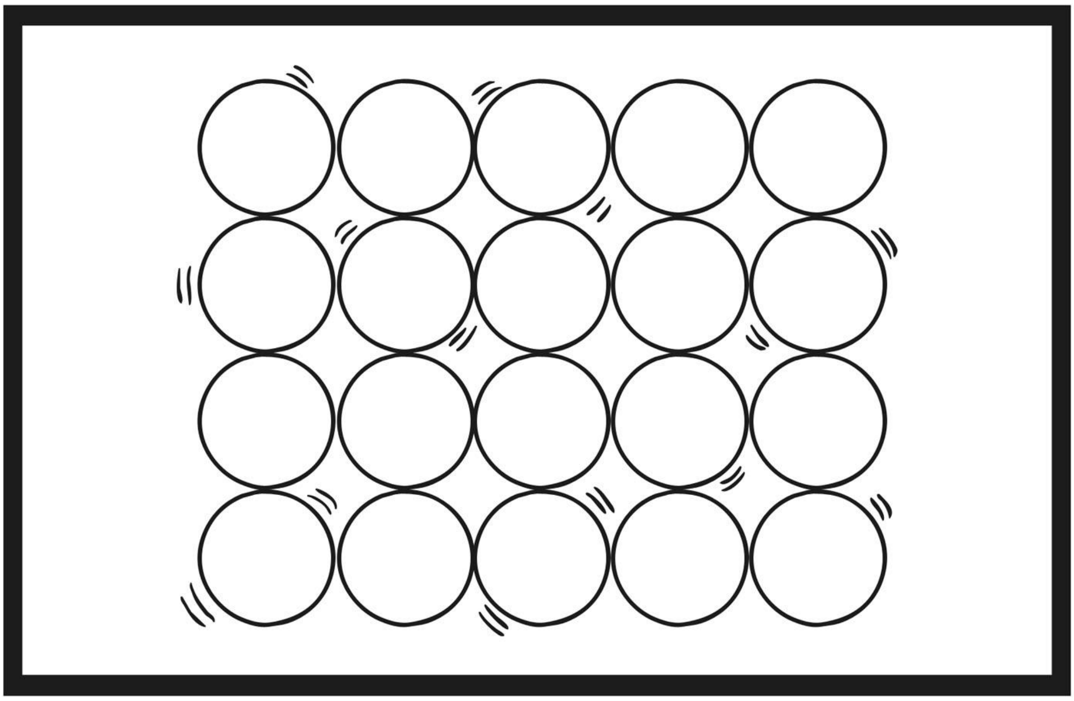


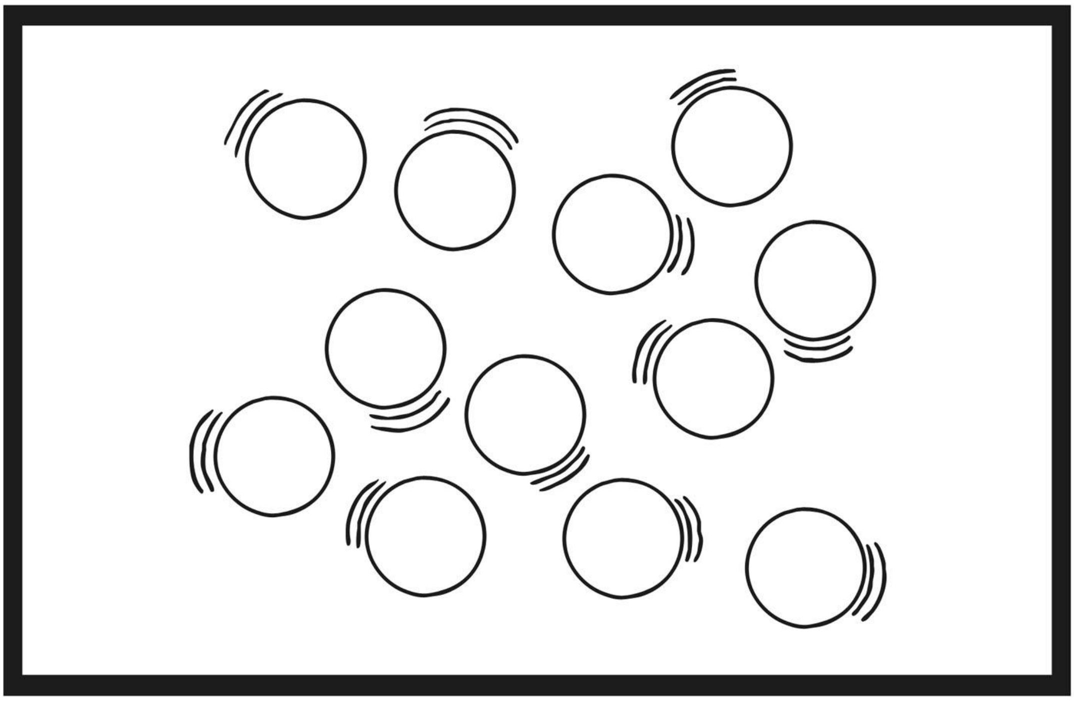


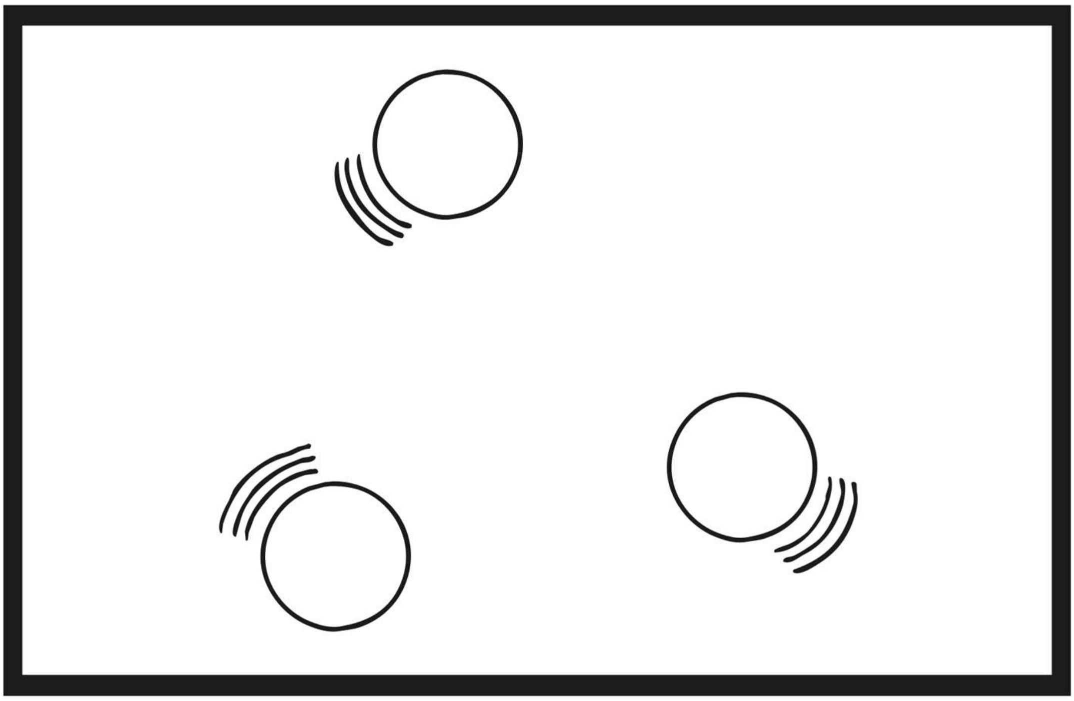


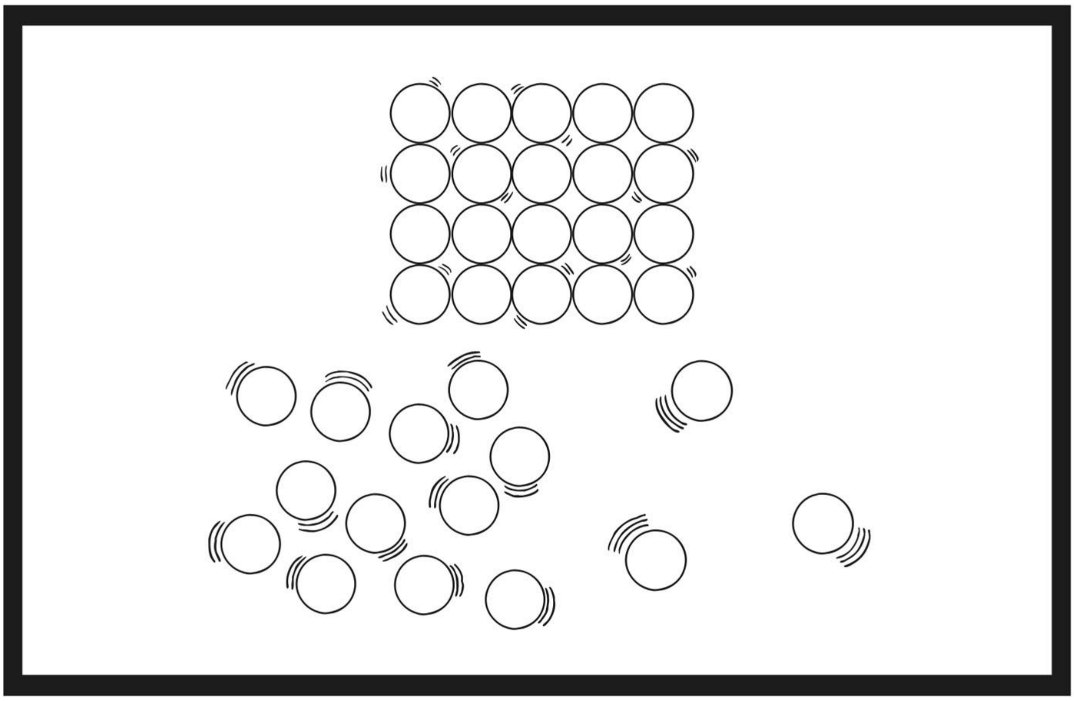


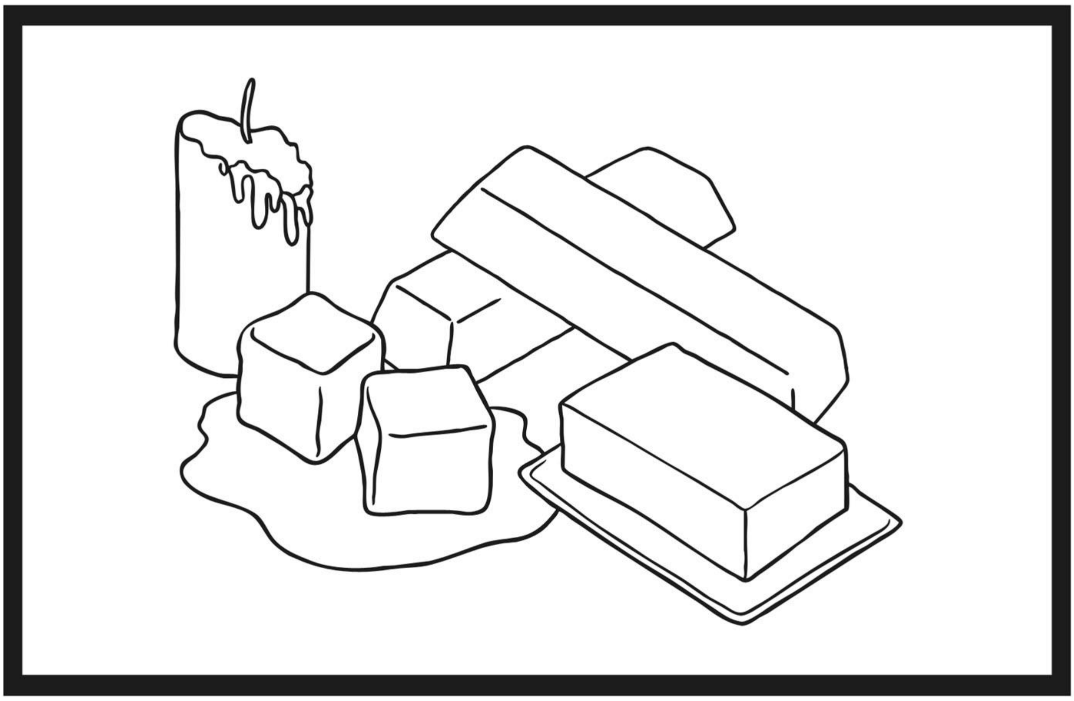


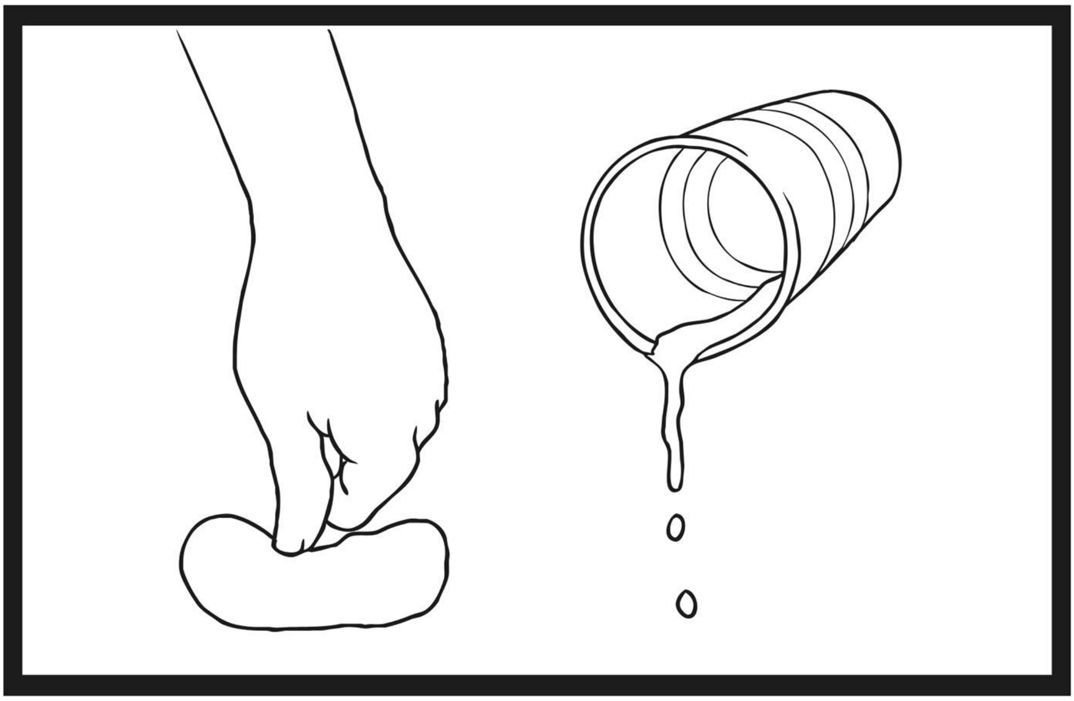


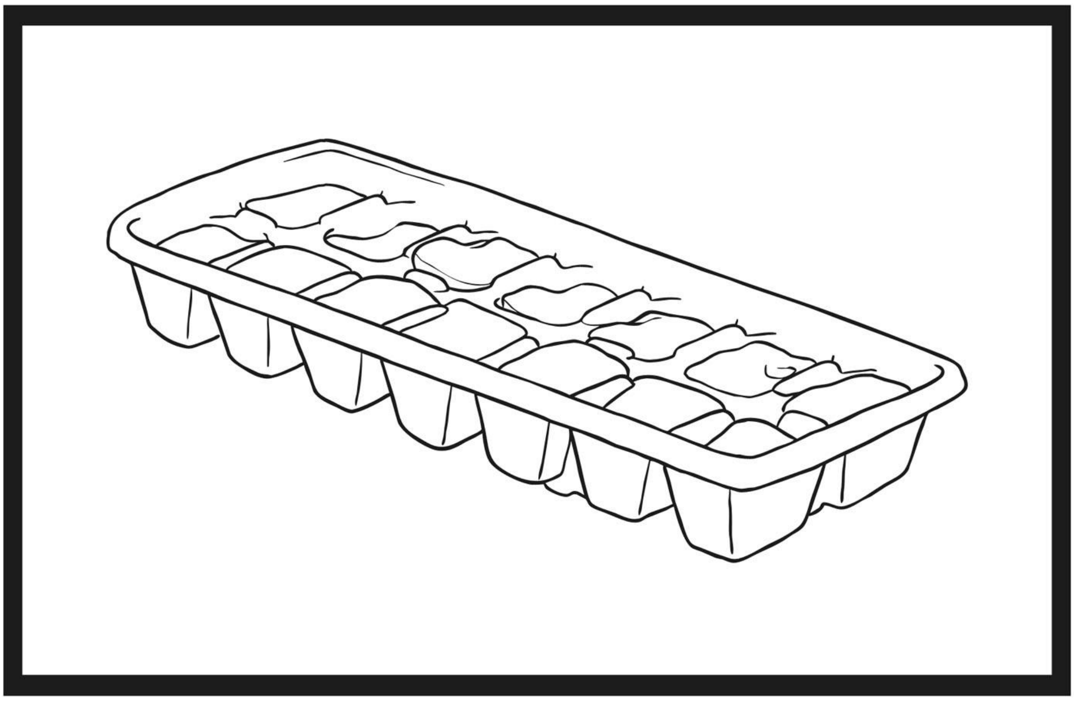


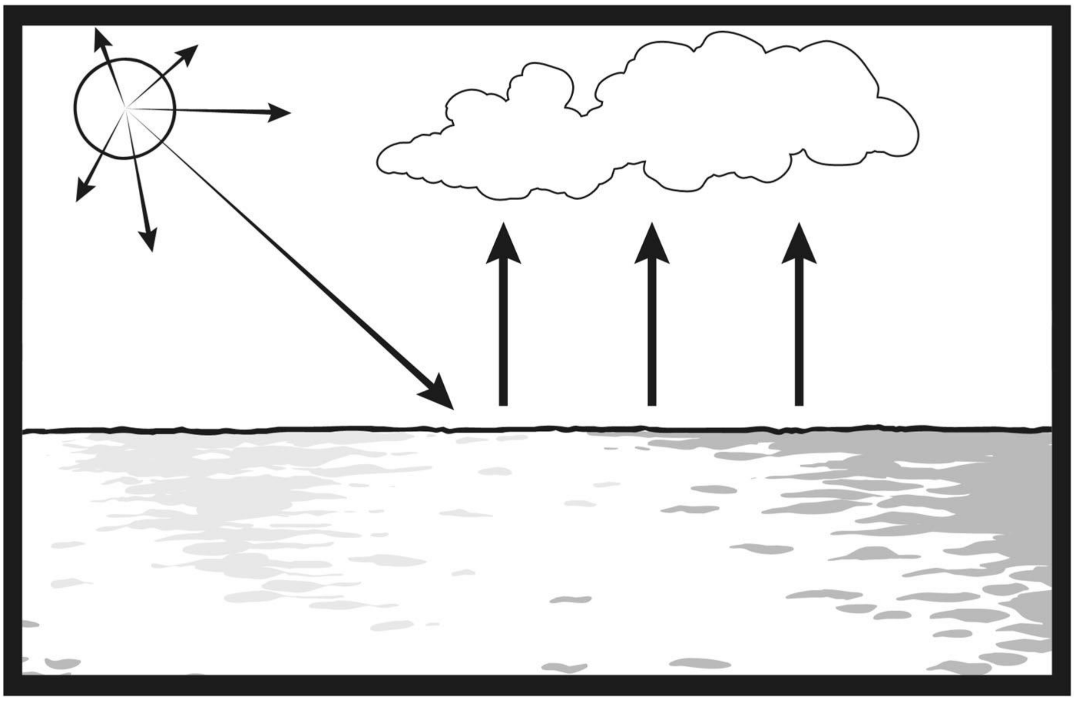


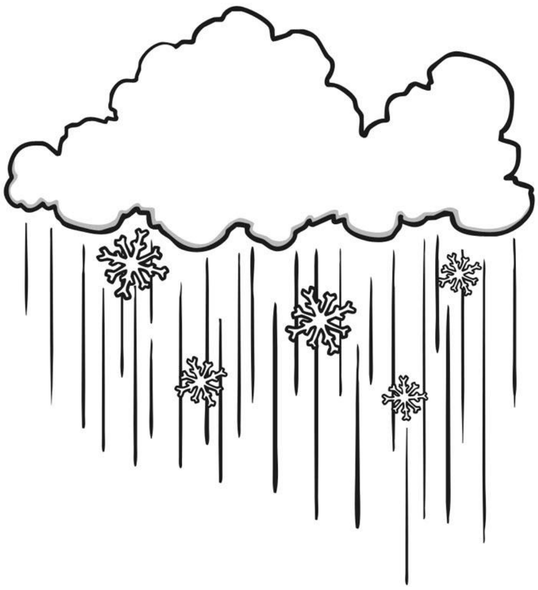


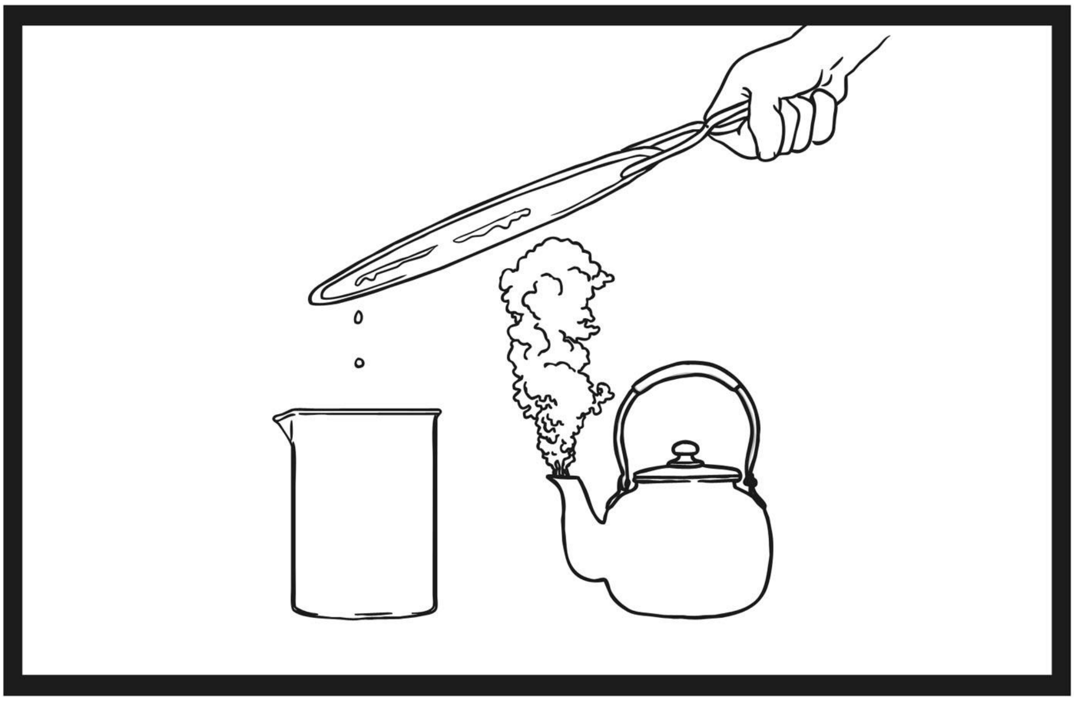












planit

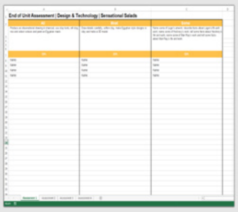
assessment guidance

Plan*it* Unit Assessment Suggestions

Each **plan***it* unit has the following assessment tools included.

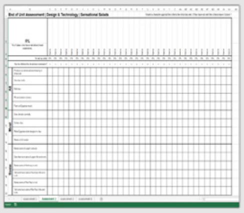
Spreadsheet

Various assessment options have been provided in a spreadsheet to offer maximum flexibility and opportunity for editing to suit your needs.



Assessment One

This sheet lists the 'all/most/some' statements related to what children will learn during the unit. Children's names can be entered in the appropriate column and the spreadsheet will calculate the proportion of the class at each stage.

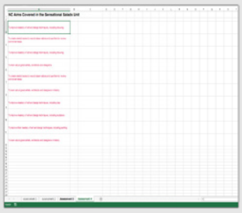


Assessment Two

This sheet splits down the 'all/most/some' statements on the previous sheet in a class grid, allowing a more detailed picture. The spreadsheet will calculate the proportion of the class at each stage as well as the percentage of statements achieved by each child.

Assessment Three

This sheet lists the aim and success criteria for each lesson across the unit in a class grid. The spreadsheet will calculate the percentage of statements achieved by each child. If you would prefer to focus purely on the aims or success criteria alone, the relevant rows can easily be deleted.



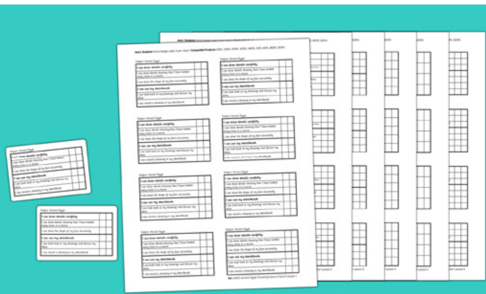
Assessment Four

This sheet simply lists the elements of the National Curriculum addressed by the unit for you to cut and paste if required.

Child Led Assessment

Success Criteria Grids *(per lesson)*

These individual grids listing the aims and success criteria with check boxes can be given out at the start of the lesson so that children have them to refer to during their learning. At the end of the lesson children can self or peer assess against the criteria. A second box is provided for teachers to then record their assessment.

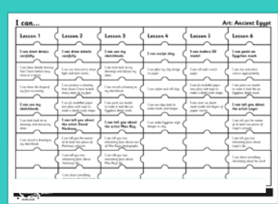


KWL Grid

These grids can be done individually or as a class at the start and end of a unit to record what children **k**now, what they **w**ant to know, and what they have **l**earnt.

Jigsaw Target

These sheets list the aims and success criteria for each lesson across the unit in a child friendly jigsaw grid. These could be stuck in books and coloured in before/during/after the unit as a continuous assessment document to show progression, or used at the end of each lesson or the unit to record learning.



Assessment Ideas within Lessons

Some handy ideas from our **Plan***it* teaching team on how you could assess within a lesson.

Plan*it* Success Criteria Grids

These individual grids are provided for each lesson and will print out on label templates for convenience.

Plan*it* Activity Sheets

Our activity sheets have three circles below the aim box for optional assessment, using the traffic light system or colouring 1, 2 or 3 circles as appropriate.

Whiteboards

Useful throughout the lesson, whiteboards give you the opportunity for individual feedback and a quick way to spot misconceptions.

Traffic Light, Smiley Face Fans or Thumbs Up/Thumbs Down

A fun way for children to show their confidence and understanding at different points throughout the lesson.

Stimulus and Card Response

Useful in a variety of lessons, children can be given a word or a statement and they respond using a relevant card from the pack they have been given. This could be saying a word and children showing the correct picture card, or reading a statement and children showing true or false. These could also be A/B/C/D cards to be used as multiple choice responses to a quiz on the IWB.

Lesson Reflection

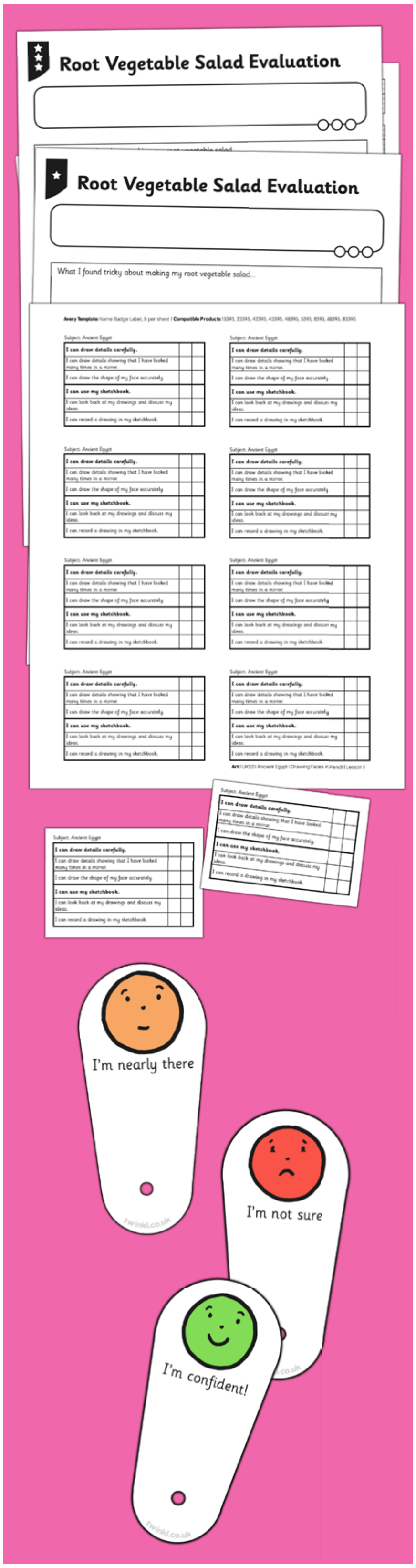
Children record how they felt about the lesson, what their next steps should be and any questions they have. Suggestions within this include:

- Using colour coded pens (e.g. tickled pink, polishing purple, green for growth)
- Smiley faces to indicate enjoyment and understanding of the lesson
- Peer assessment
- Traffic light system to indicate understanding

At the beginning of the next lesson children could be given time to respond to any feedback.

Bookending

A question could be set at the start of the lesson and repeated at the end to show progression.



Be kind to yourself, you're doing **wonderfully.**

If you need us just get in touch, contact

End of Unit Assessment | Science | Year 4 | States of Matter

All	Most	Some
All children should be able to sort materials into solids, liquids and gases, explain that heating causes melting, and cooling causes freezing, identify the melting and freezing point of water, describe evaporation and condensation using practical examples, describe the effect of temperature on evaporation referring to their investigation, identify the stages of the water cycle, predict what will happen in an investigation and make observations.	Most children will be able to describe the properties of solids, liquids and gases, explain that melting and freezing are opposite processes that change the state of a material, identify the melting and freezing point of several different materials, explain that heating causes evaporation and cooling causes condensation, explain that evaporation and condensation are opposite processes that change the state of a material, explain that the higher the temperature, the quicker water evaporates, explain what happens to water at the different stages of the water cycle, make observations and conclusions, and be able to answer questions based on their learning.	Some children will be able to explain the behaviour of the particles in solids, liquids and gases, explain how heating and cooling causes materials to melt and freeze, explain why a material's melting and freezing point is the same temperature, explain how heating and cooling can cause materials to evaporate and condense, explain why a higher temperature will speed up evaporation, use the water cycle to explain why the water we have on Earth today is the same water that has been here for millions of years, set up reliable and accurate investigations, make and explain predictions, make and record accurate observations, use scientific language to explain their findings and be able to ask and answer questions based on their learning using scientific language.
33%	**33%**	**33%**
Name	Name	Name
Name	Name	Name
Name	Name	Name
Name	Name	Name

End of Unit Assessment | Science | Year 4 | States of Matter

Insert a character against the criteria the child has met. If they have not met the criteria leave it blank.

		Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	% of class
	% met by child	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	Has the child met the all and most statements?	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	0%
All	Sort materials into solids, liquids and gases.																																			0%
	Explain that heating causes melting, and cooling causes freezing.																																			0%
	Identify the melting and freezing point of water.																																			0%
	Describe evaporation and condensation using practical examples.																																			0%
	Describe the effect of temperature on evaporation referring to their investigation.																																			0%
	Identify the stages of the water cycle.																																			0%
	Predict what will happen in an investigation.																																			0%
	Make observations.																																			0%
Most	Describe the properties of solids, liquids and gases.																																			0%
	Explain that melting and freezing are opposite processes that change the state of a material.																																			0%
	Identify the melting and freezing point of severa different materials.																																			0%
	Explain that heating causes evaporation and cooling causes condensation.																																			0%
	Explain that evaporation and condensation are opposite processes that change the state of a material.																																			0%
	Explain that the higher the temperature, the quicker water evaporates.																																			0%
	Explain what happens to water at the different stages of the water cycle.																																			0%
	Make observations and conclusions.																																			0%
	Be able to answer questions based on their learning.																																			0%
Some	Explain the behaviour of the particles in solids, liquids and gases.																																			0%
	Explain how heating and cooling causes materials to melt and freeze.																																			0%
	Explain why a material's melting and freezing point is the same temperature.																																			0%
	Explain how heating and cooling can cause materials to evaporate and condense.																																			0%
	Explain why a higher temperature will speed up evaporation.																																			0%
	Use the water cycle to explain why the water w have on Earth today is the same water that has been here for millions of years.																																			0%
	Set up reliable and accurate investigations.																																			0%
	Make and explain predictions.																																			0%
	Make and record accurate observations.																																			0%
	Use scientific language to explain their findings.																																			0%
	Be able to ask and answer questions based on their learning using scientific language.																																			0%

End of Unit Assessment | Science | Year 4 | States of Matter

Insert a character against the criteria the child has met. If they have not met the criteria leave it blank.

	Lesson Aim / *Success Criteria*	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	
	% met by child	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
1	I can sort and describe materials.																																			0%
	I can sort materials into solids, liquids or gases.																																			0%
	I can describe the properties of solids, liquids and gases.																																			0%
	I can show the difference between the particles in solids, liquids and gases.																																			0%
2	I can investigate gases and explain their properties.																																			0%
	I can identify solids, liquids and gases.																																			0%
	I can explain some uses of gases.																																			0%
	I can investigate the weight of a gas.																																			0%
3	I can investigate materials as they change state.																																			0%
	I can understand how heat can cause solids to change to liquids and vice versa.																																			0%
	I can identify materials that melt at different temperatures.																																			0%
	I can investigate the melting and freezing temperature of a material.																																			0%
4	I can explore how water changes state.																																			0%
	I can identify the different states water can be in.																																			0%
	I can identify the temperatures at which water changes state.																																			0%
	I can identify and observe the processes that cause water to change state.																																			0%
5	I can investigate how water evaporates.																																			0%
	I can explain the effect of temperature on the process of evaporation																																			0%
	I can plan and carry out a comparative test using equipment accurately and display my results.																																			0%
6	I can identify and describe the different stages of the water cycle.																																			0%
	I can describe the different stages of the water cycle.																																			0%
	I can explain the role of evaporation and condensation in the water cycle.																																			0%

NC Aims Covered in the States of Matter of Unit

To compare and group materials together, according to whether they are solids, liquids or gases.

To observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C).

To associate the rate of evaporation with temperature.

To make systematic, careful and accurate observations and measurements and report on findings from enquiries by displaying results and conclusions.

To identify the part played by evaporation and condensation in the water cycle.

I can...

Science | Year 4 | States of Matter

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
I can sort and describe materials.	**I can investigate gases and explain their properties.**	**I can investigate materials as they change state.**	**I can explore how water changes state.**	**I can investigate how water evaporates.**	**I can identify and describe the different stages of the water cycle.**
I can sort materials into solids, liquids or gases.	I can identify solids, liquids and gases.	I can understand how heat can cause solids to change to liquids and vice versa.	I can identify the different states water can be in.	I can explain the effect of temperature on the process of evaporation	I can describe the different stages of the water cycle.
I can describe the properties of solids, liquids and gases.	I can explain some uses of gases.	I can identify materials that melt at different temperatures.	I can identify the temperatures at which water changes state.	I can plan and carry out a comparative test using equipment accurately and display my results.	I can explain the role of evaporation and condensation in the water cycle.
I can show the difference between the particles in solids, liquids and gases.	I can investigate the weight of a gas.	I can investigate the melting and freezing temperature of a material.	I can identify and observe the processes that cause water to change state.		

Science: States of Matter

K	W	L
What I know	What I want to know	What I have learnt

States of Matter Crossword

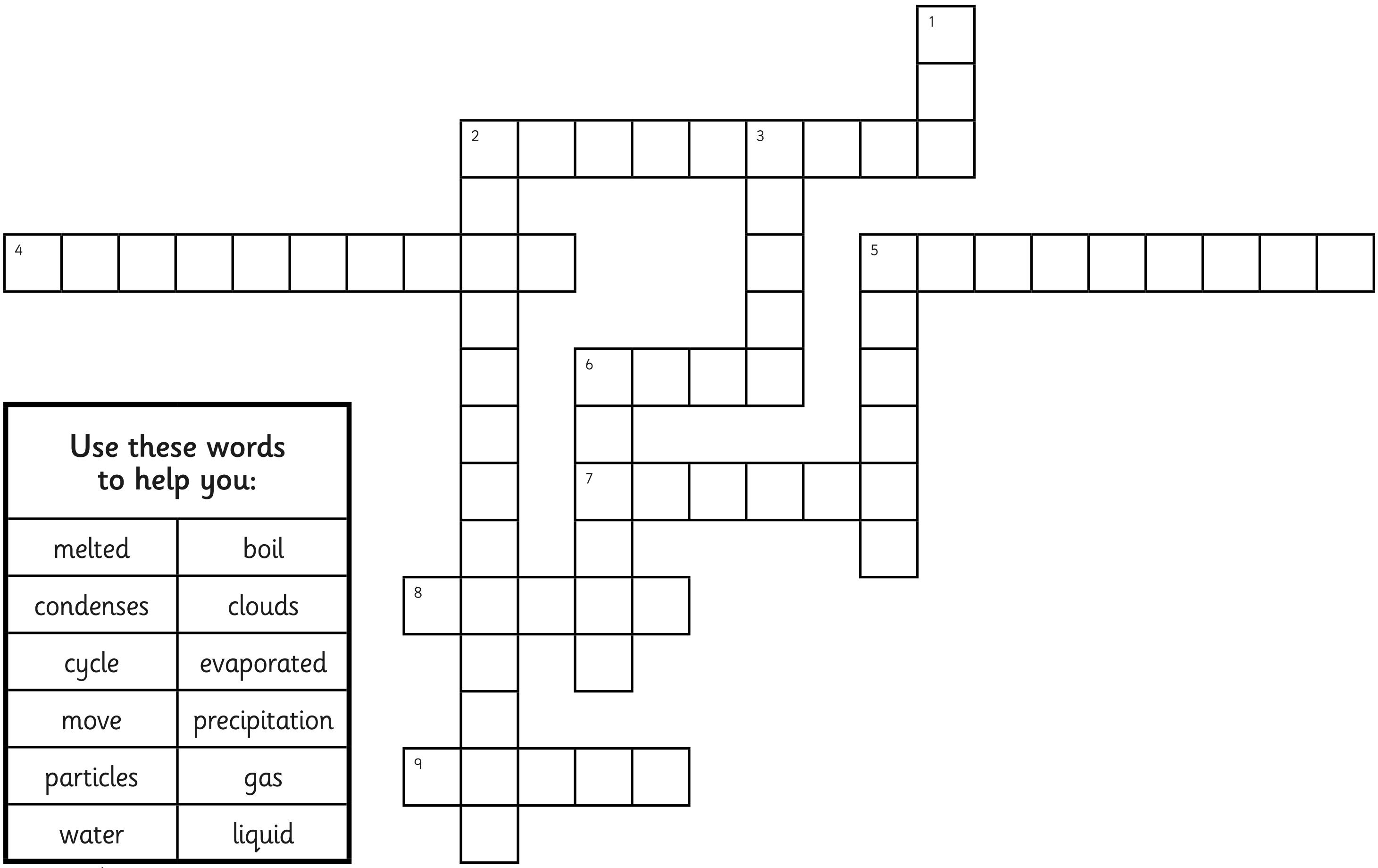
Use your knowledge of states of matter and changing state to complete this crossword.

Across

2. In a liquid, the ______________ are quite close together but move over and around each other.
4. When wet clothes dry on a washing line, the water from the clothes is ________________.
5. When a gas cools, it ________________ and changes into a liquid.
6. The particles in a solid are very close together and ___________ on the spot.
7. Evaporation is the process of a ____________ changing to a gas.
8. The freezing point of _____________ is zero degrees Celsius.
9. Water ___________ at one hundred degrees Celsius.

Down

1. The particles in a ____________ are far apart and move quickly to spread out in the space they are in.
2. Rain, snow, sleet and hail are examples of _______________.
3. The four stages of the water _______________ are evaporation, condensation, precipitation and collection.
5. When water vapour rises from oceans, lakes and rivers, it cools and condenses to form ______________.
6. When a solid changes to a liquid, it has _________________.



Use these words to help you:	
melted	boil
condenses	clouds
cycle	evaporated
move	precipitation
particles	gas
water	liquid

States of Matter Crossword

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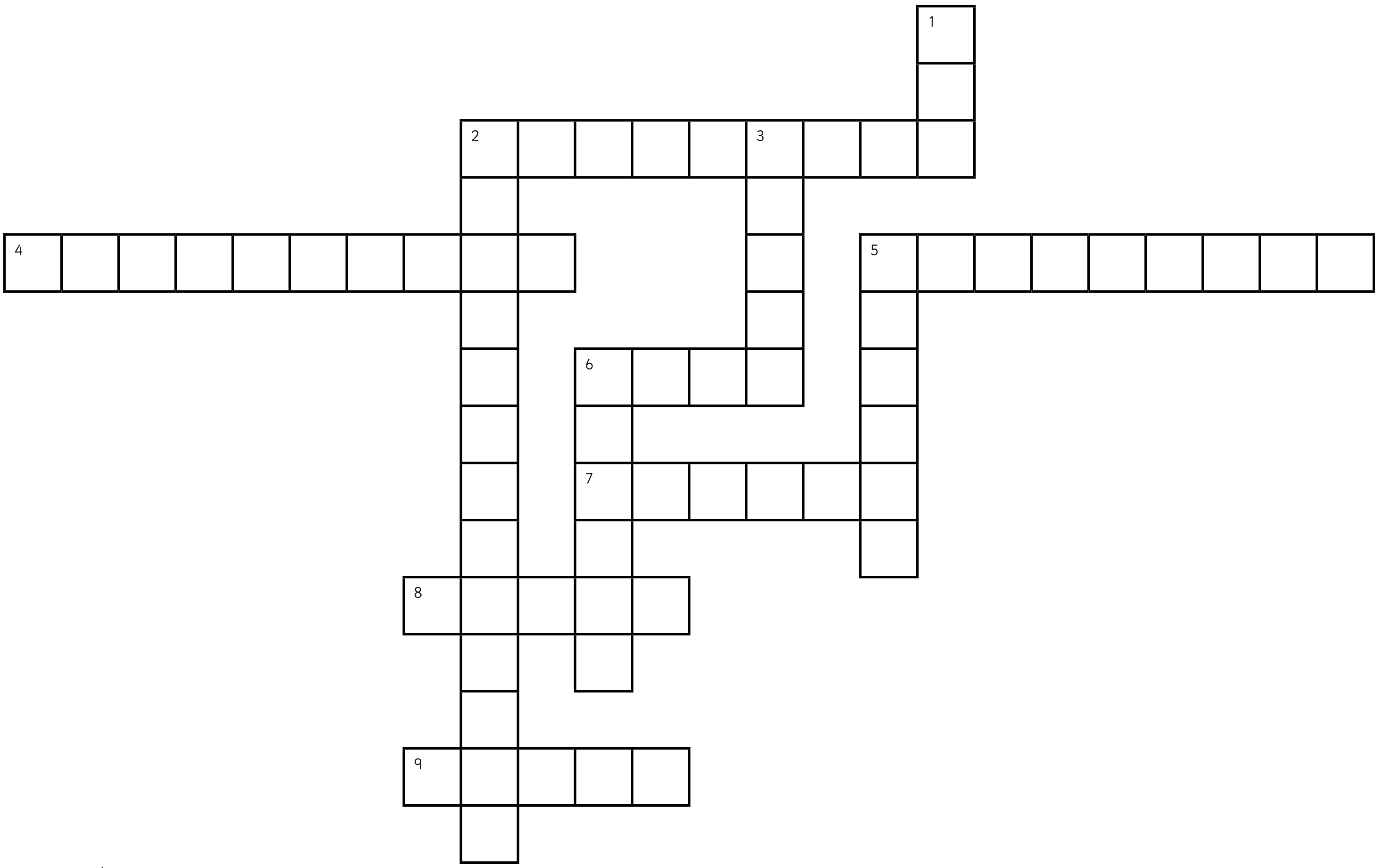


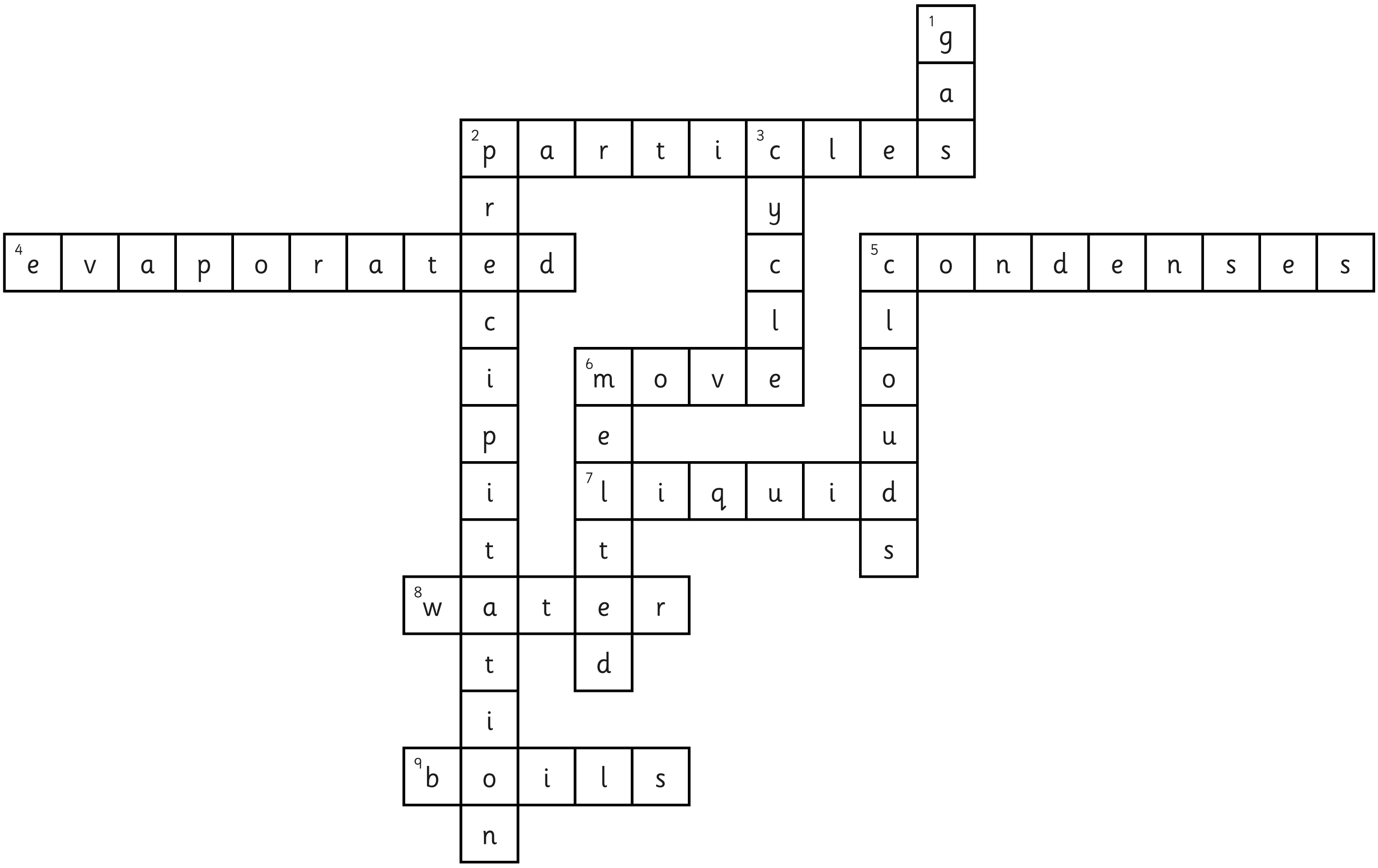
States of Matter Crossword Answers

Across

2. In a liquid, the ___particles____ are quite close together but move over and around each other.
4. When wet clothes dry on a washing line, the water from the clothes is ___evaporated___.
5. When a gas cools, it ___condenses____ and changes into a liquid.
6. The particles in a solid are very close together and ___move____ on the spot.
7. Evaporation is the process of a ____liquid____ changing to a gas.
8. The freezing point of ____water____ is zero degrees Celsius.
9. Water ____boils____ at one hundred degrees Celsius.

Down

1. The particles in a ____gas_____ are far apart and move quickly to spread out in the space they are in.
2. Rain, snow, sleet and hail are examples of __precipitation__.
3. The four stages of the water _____cycle_____ are evaporation, condensation, precipitation and collection.
5. When water vapour rises from oceans, lakes and rivers, it cools and condenses to form ____clouds____.
6. When a solid changes to a liquid, it has ______melted______.



States of Matter Crossword

Type your aims and success criteria here.

Use your knowledge of states of matter and changing state to complete this crossword.

Across

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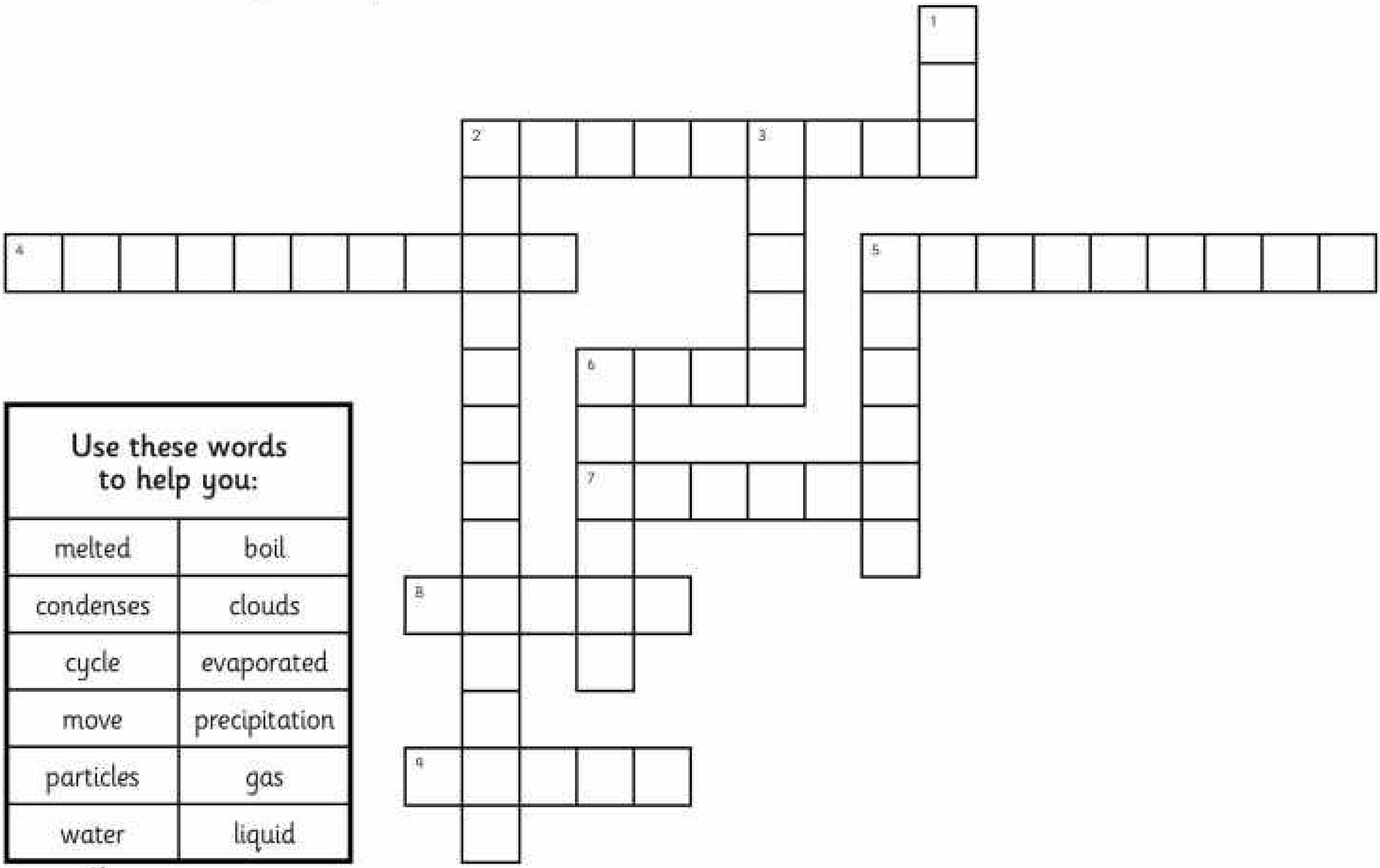

Use these words to help you:	
melted	boil
condenses	clouds
cycle	evaporated
move	precipitation
particles	gas
water	liquid

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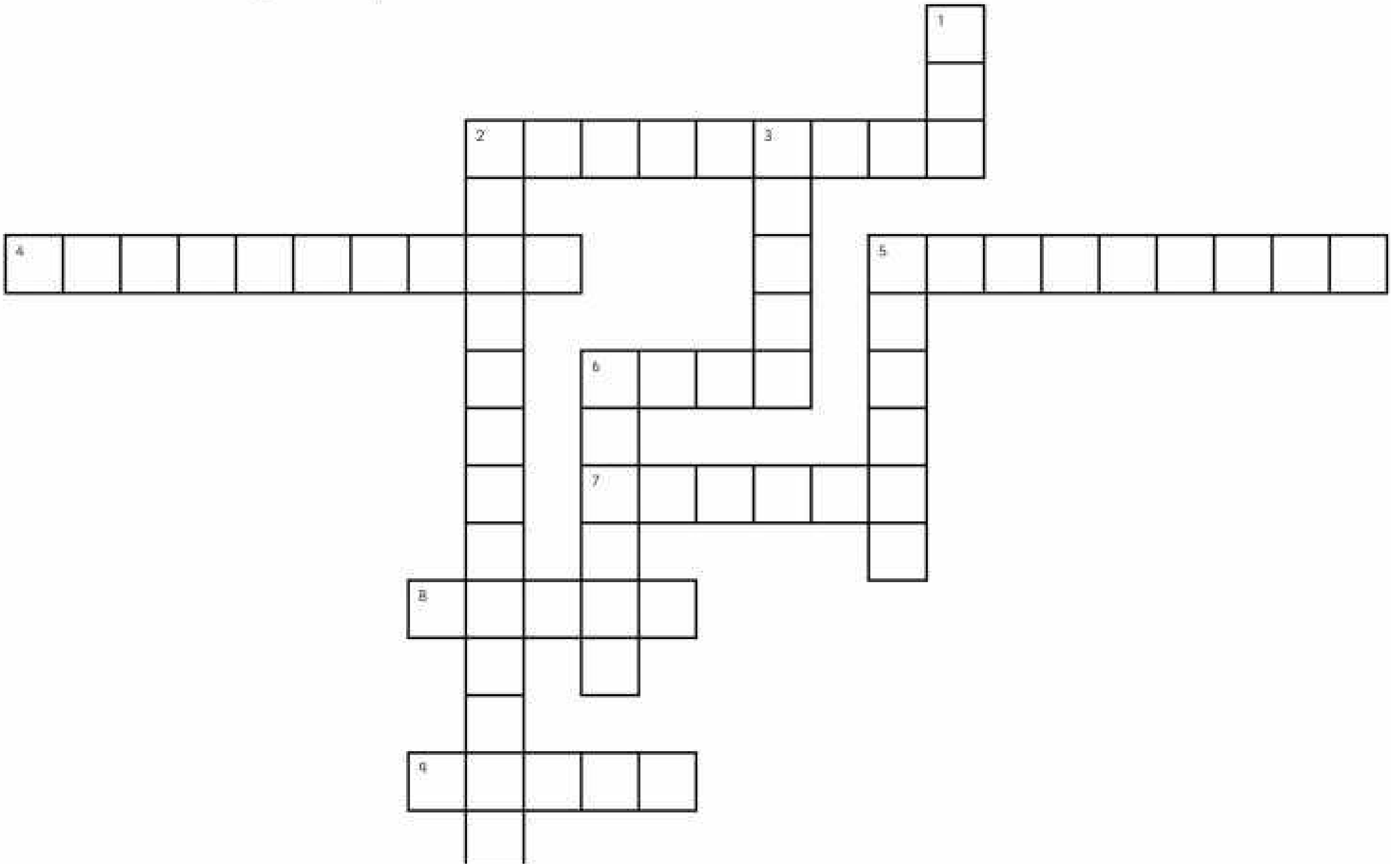


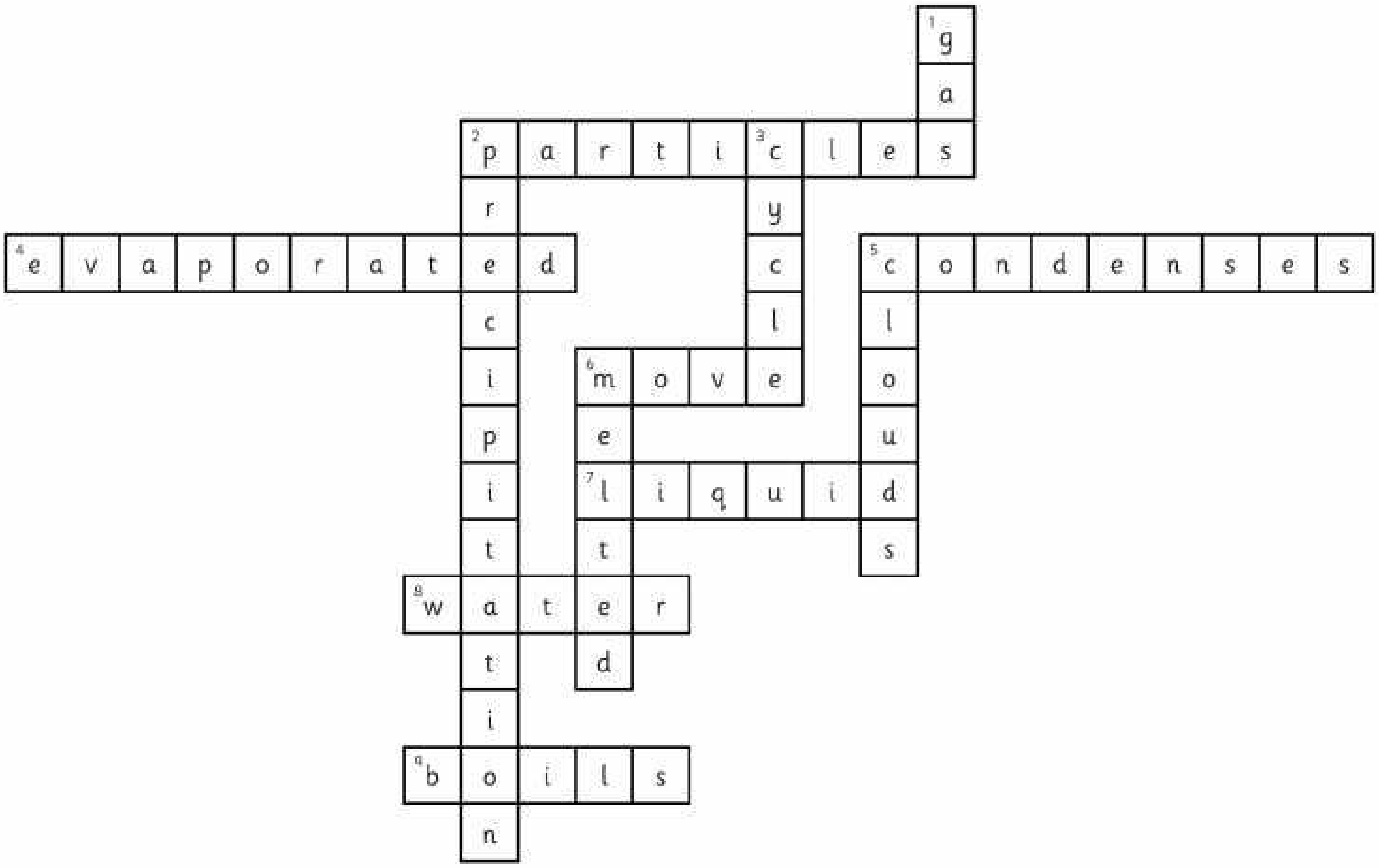
States of Matter Crossword Answers

Across

2. In a liquid, the __particles__ are quite close together but move over and around each other.
4. When wet clothes dry on a washing line, the water from the clothes is __evaporated__.
5. When a gas cools, it __condenses__ and changes into a liquid.
6. The particles in a solid are very close together and __move__ on the spot.
7. Evaporation is the process of a __liquid__ changing to a gas.
8. The freezing point of __water__ is zero degrees Celsius.
9. Water __boils__ at one hundred degrees Celsius.

Down

1. The particles in a __gas__ are far apart and move quickly to spread out in the space they are in.
2. Rain, snow, sleet and hail are examples of __precipitation__.
3. The four stages of the water __cycle__ are evaporation, condensation, precipitation and collection.
5. When water vapour rises from oceans, lakes and rivers, it cools and condenses to form __clouds__.
6. When a solid changes to a liquid, it has __melted__.



Water Cycle Board Game

Use your knowledge of the water cycle to play this board game with your friends or family!

Preparation

You will need 1 counter per player and a 1-6 dice.

Cut out each of the question cards, the Sun cards and the counters.

Place the cards in five piles in the centre of the board, according to their symbol.

Place the counters on the 'Start' square.

How to Play

Each player takes it in turn to roll the dice and move around the board.

If you land on a square with a symbol, an opponent takes a card with a matching symbol.

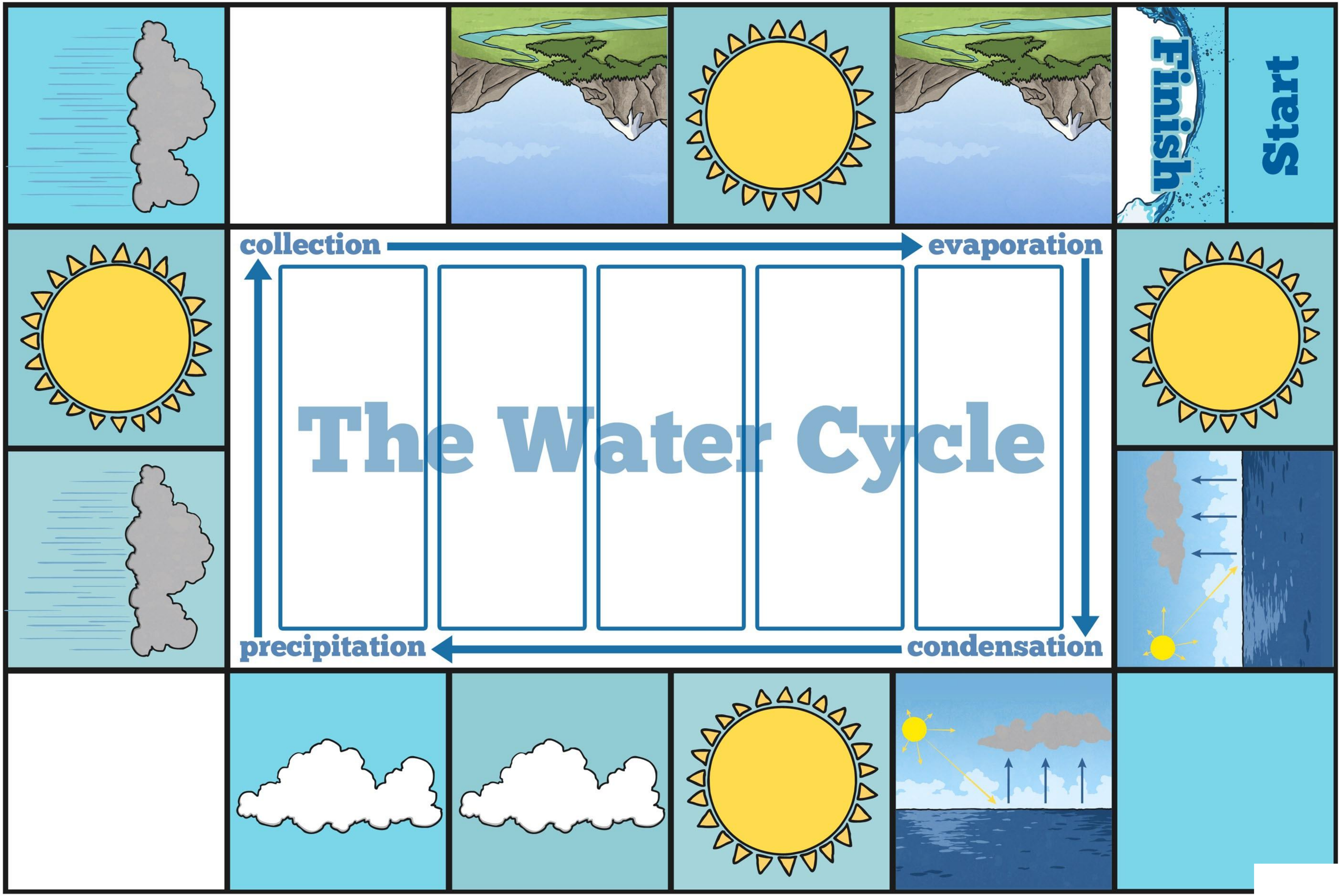
The opponent reads the question to the player, who tries to answer the question on the card.

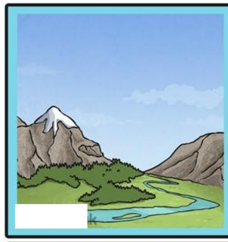
Check the answers are at the bottom of the cards.

If you are correct, you are still in the game! If you are incorrect, you must miss a go.

If you land on a square with a Sun, take a Sun card and follow the instructions.

The winner is the player who gets back to the start first!


The Water Cycle
collection
evaporation
condensation
precipitation
Finish
Start



What happens to water that falls as snow once it has reached Earth?

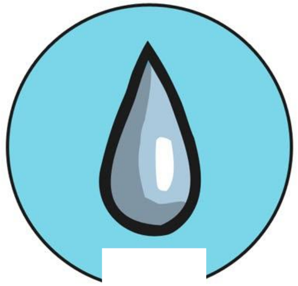
It will eventually melt into liquid water, then either be evaporated, absorbed underground or run over the ground into rivers, lakes or oceans.

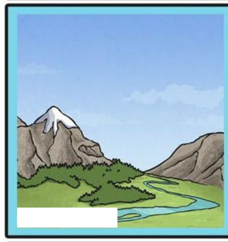
Water that falls on the ground can be absorbed underground, or evaporated. What else could happen to it?

It can run over the ground and collect in rivers,lakes or oceans.

What happens to water once it has been collected in oceans, rivers or lakes?

It is evaporated again.





Water can fall on the oceans. How else does water collect in the oceans?

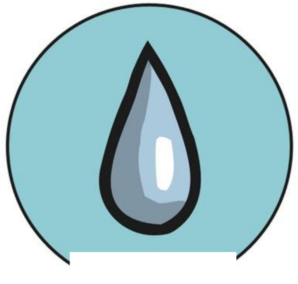
It travels there in streams and rivers.

Around what temperature does it need to be to snow?

The heaviest snow falls tend to be between -2°C and 2°C.

What is precipitation?

Water in any form falling from the sky.

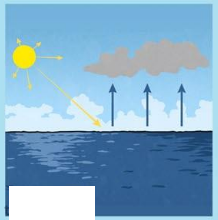


Why does water eventually fall from the clouds?

As the droplets of water clump together and cool down, they get bigger. Eventually they are too big for the air to hold, so they fall down to Earth.

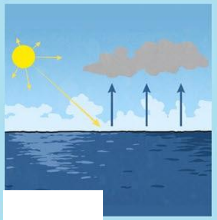
Rain is a form of precipitation. Can you name two other forms?

Snow, sleet or hail.



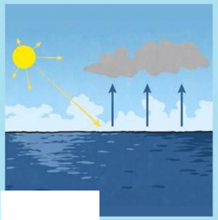
What is the boiling point of water?

100°C



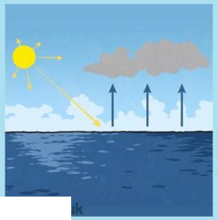
What does a liquid turn into when it evaporates?

A gas.



Does water need to be boiling to evaporate?

No. Water will evaporate at room temperature or lower.



How does temperature affect the speed of evaporation?

The hotter the temperature, the faster the water will evaporate.

What does a gas turn into when it condenses?

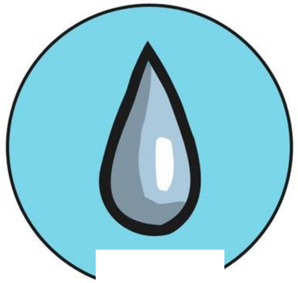
A liquid.

Does a gas have to cool down or heat up to condense?

Cool down.

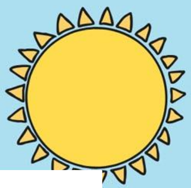
How does condensation cause clouds to form?

When water vapour condenses, the tiny droplets of water clump together to form clouds.

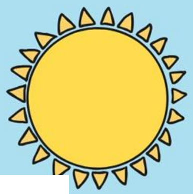


When water vapour has condensed into liquid water, can it change back to water vapour again?

Yes. If the water evaporates it will change back into water vapour.



Go back to the Start.



Move a player of your choice to any space.

Swap two players' counters.

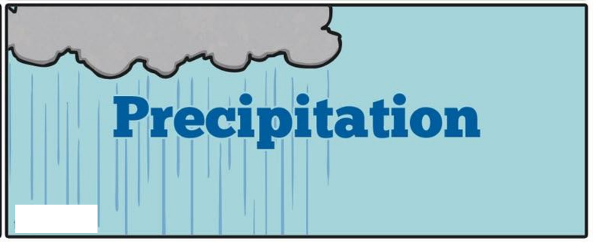
Go back one space.

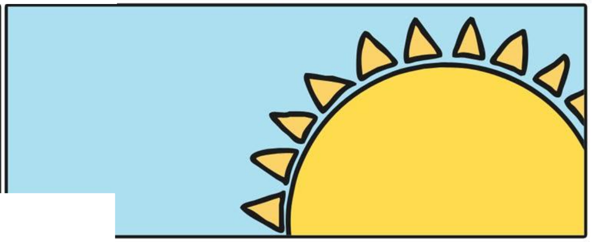
Go forward two spaces.

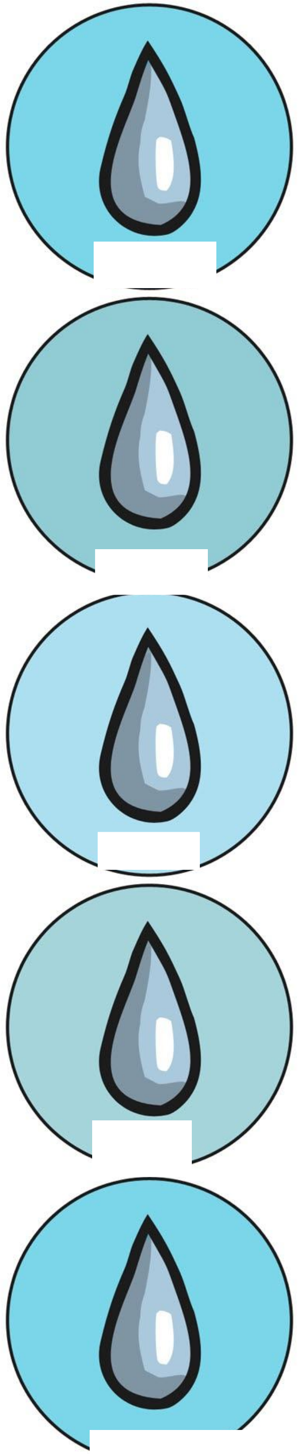
Swap your own counter with another player's counter.

Go back two spaces.

Go forward one space.







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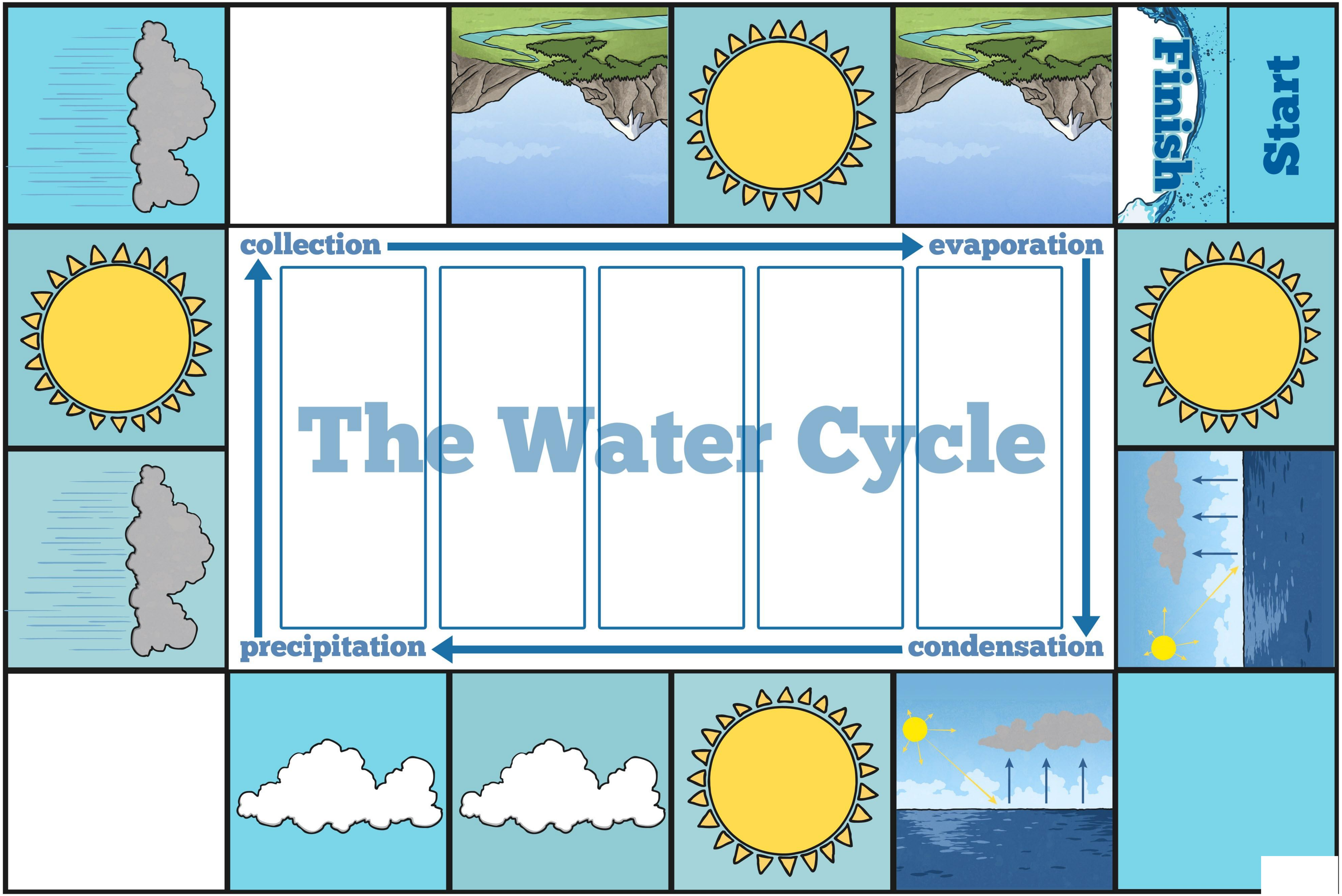
If you land on a square with a Sun, take a Sun card and follow the instructions.

The winner is the player who gets back to the start first!


Finish
Start
collection
evaporation
The Water Cycle
precipitation
condensation

What happens to water that falls as snow once it has reached Earth?

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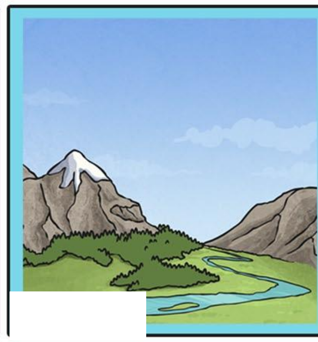
Water that falls on the ground can be absorbed underground, or evaporated.
What else could happen to it?

It can run over the ground and collect in rivers,lakes or oceans.



What happens to water once it has been collected in oceans, rivers or lakes?

It is evaporated again.

Water can fall on the oceans. How else does water collect in the oceans?

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Around what temperature does it need to be to snow?

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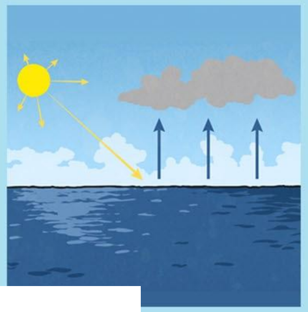
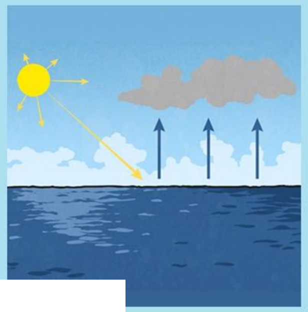


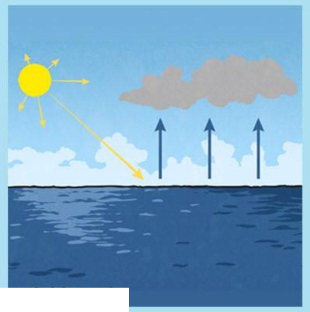
What is the boiling point of water?

100°C



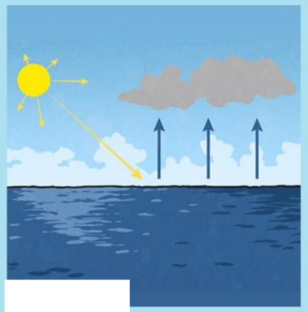
What does a liquid turn into when it evaporates?

A gas.



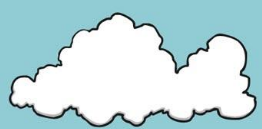
Does water need to be boiling to evaporate?

No. Water will evaporate at room temperature or lower.



How does temperature affect the speed of evaporation?

The hotter the temperature, the faster the water will evaporate.



What does a gas turn into when it condenses?

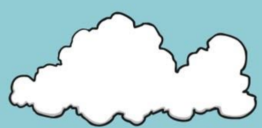
A liquid.

Does a gas have to cool down or heat up to condense?

Cool down.

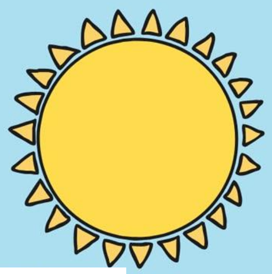
How does condensation cause clouds to form?

When water vapour condenses, the tiny droplets of water clump together to form clouds.

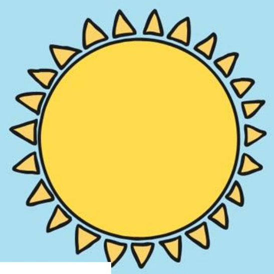


When water vapour has condensed into liquid water, can it change back to water vapour again?

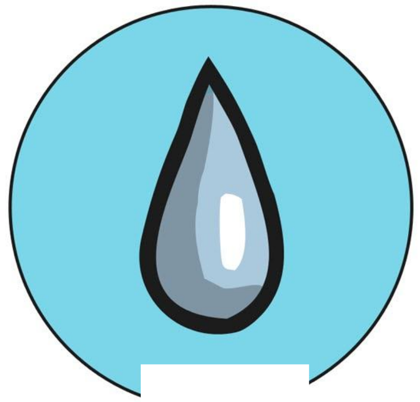
Yes. If the water evaporates it will change back into water vapour.

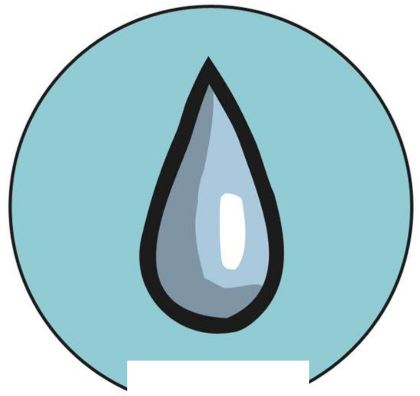


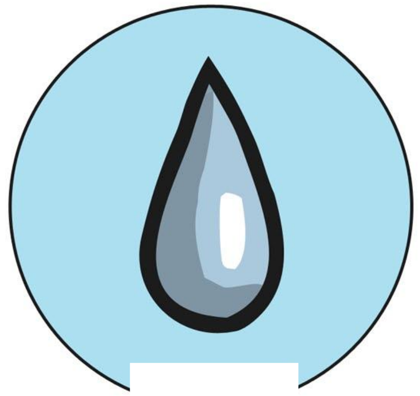
Go back to the Start.

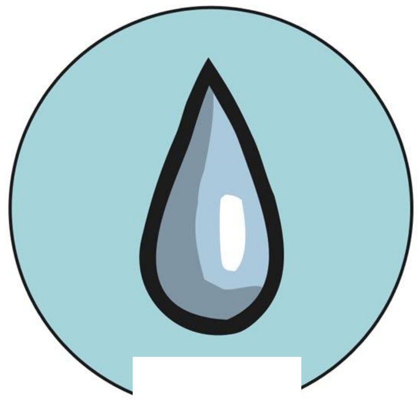


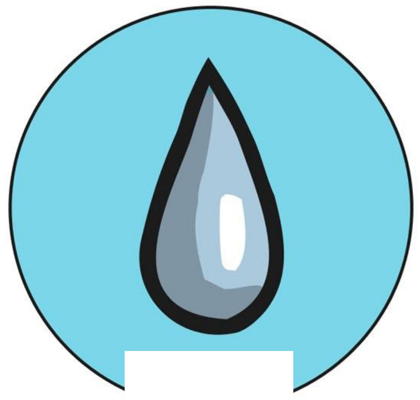
Move a player of your choice to any space.











Swap two players' counters.

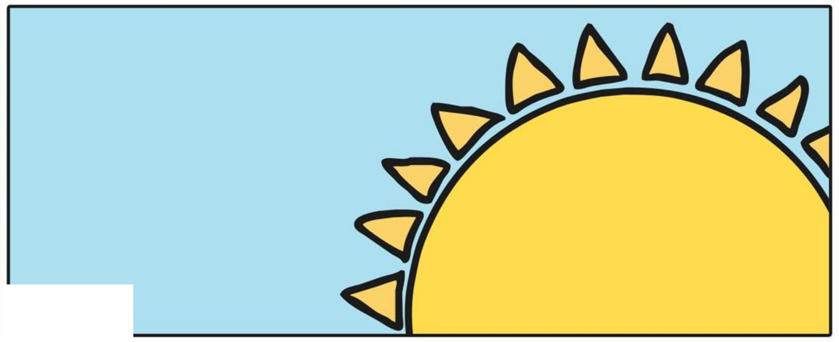
Go back one space.

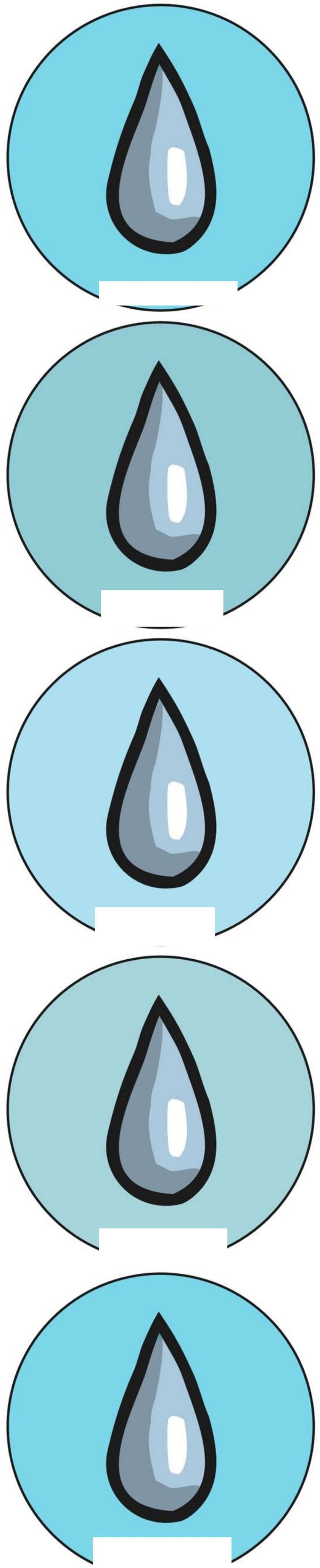
Go forward two spaces.

Swap your own counter with another player's counter.

Go back two spaces.

Go forward one space.





States of Matter: Solid, Liquid or Gas?

Aim:	Success Criteria:	Resources:
To compare and group materials together, according to whether they are solids, liquids or gases by sorting and describing materials into solids, liquids and gases. I can sort and describe materials.	I can sort materials into solids, liquids or gases. I can describe the properties of solids, liquids and gases. I can show the difference between the particles in solids, liquids and gases.	**Lesson Pack** Access to the school hall or an outside space
	Key/New Words: Solid, liquid, gas, particles, state, material, properties.	**Preparation:** Differentiated **Solids, Liquids and Gases Sorting Cards** cut out - one per group. **Particle Information Cards** Differentiated **Particles and Properties Activity Sheet** - one per child.

Prior Learning: It will be helpful if children have studied materials and their properties in earlier year groups.

Learning Sequence

	Sorting Materials: Explain that there are three states of matter: solid, liquid and gas. Sort the children into mixed ability groups and ask them to sort the items on the differentiated **Solids, Liquids and Gases Sorting Cards**. Guide groups where necessary to sort the easier items first. Listen to conversations within the groups and look for children who have a good prior knowledge of the states of matter and their properties to assist with future planning.	
	Properties of Materials: Share the answers from the sorting card activity using the images on the **Lesson Presentation**. Point out and explain the trickier materials: honey is a liquid even though it is viscous; a sponge is a solid, but the spaces inside the sponge are full of air, which is a gas; and the bubbles within the lemonade are carbon dioxide (gas) inside a liquid. Ask children for any words they can think of to describe the materials and states. Explain the properties of solids, liquids and gases using the information on the **Lesson Presentation**. Address any misconceptions or issues arising.	
	Properties of Materials: Ask children to talk to a partner to match the states to their properties on the **Lesson Presentation**.	
	Particles: Using the **Lesson Presentation**, share key information about particles. Look at how they are arranged and how they behave in solids, liquids and gases.	
	Particle Behaviour: Organise children into three equal groups to demonstrate the difference between the particles in solids, liquids and gases using drama and movement. Give each group a card from the **Particle Information Cards** and ask them to follow the instructions to prepare their demonstration. Allow the groups to watch one another's demonstrations in the Hall or outside.	
	Particles and Properties: Children match the three states with their particles and properties using the **Particles and Properties Activity Sheet**. Look for children who can accurately identify solids, liquids and gases and understand their properties. ★ Children match the states to the particle arrangements and materials. ★★ Children match the states to the particle arrangements and properties. ★★★ Children match the properties of materials to the states of matter.	
Whole Class	**Spotting States of Matter:** Show the . Ask the children to spot the different materials and their states while they look through them. Collect responses.	

Task*it*

Collectit: Make a collection of materials and display them in three groups - a group of solids, a group of liquids and a group of gases.

Labelit: Use ____________ to label the different items as solids, liquids or gases.

Craftit: Make a collage of different materials by cutting pictures out of magazines or catalogues. Group the materials into solids, liquids and gases.

Science

States of Matter


Solid, Liquid or Gas?

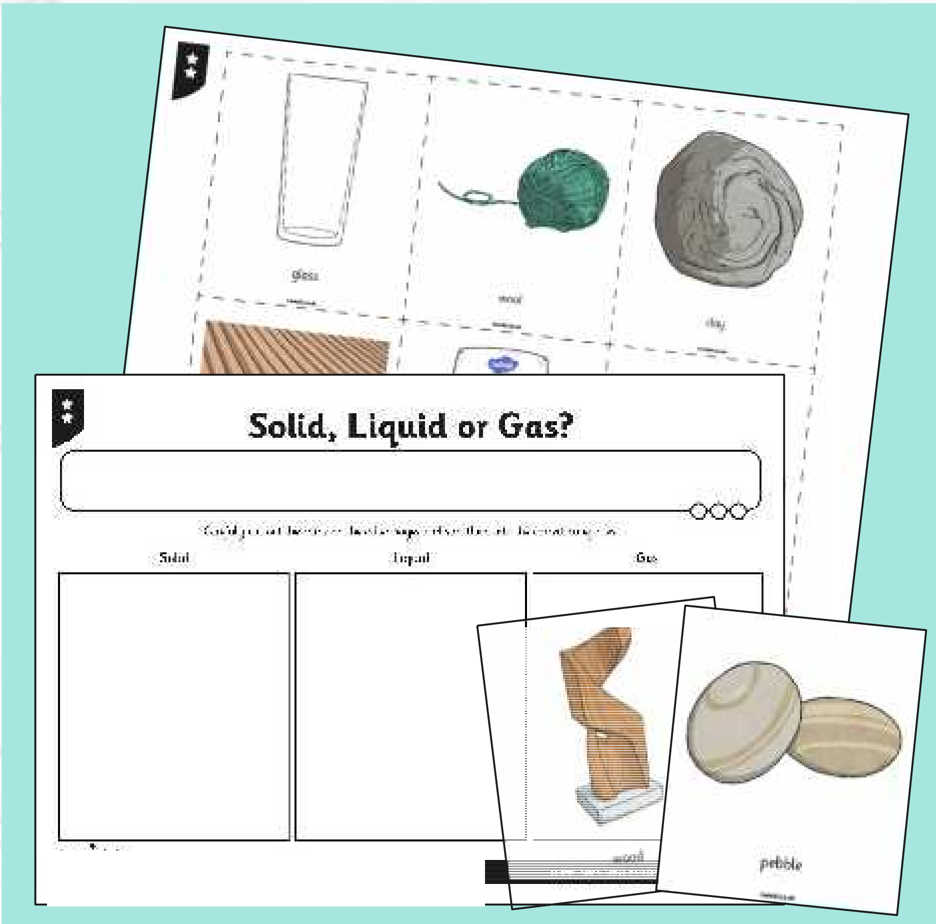
Aim

- I can sort and describe materials.

Success Criteria

- I can sort materials into solids, liquids or gases.
- I can describe the properties of solids, liquids and gases.
- I can show the difference between the particles in solids, liquids and gases.

Sorting Materials



A material may be in one of three states: solid, liquid or gas.

Can you sort the materials into solids, liquids or gases?

Think carefully about each one.

Properties of Materials: Solids

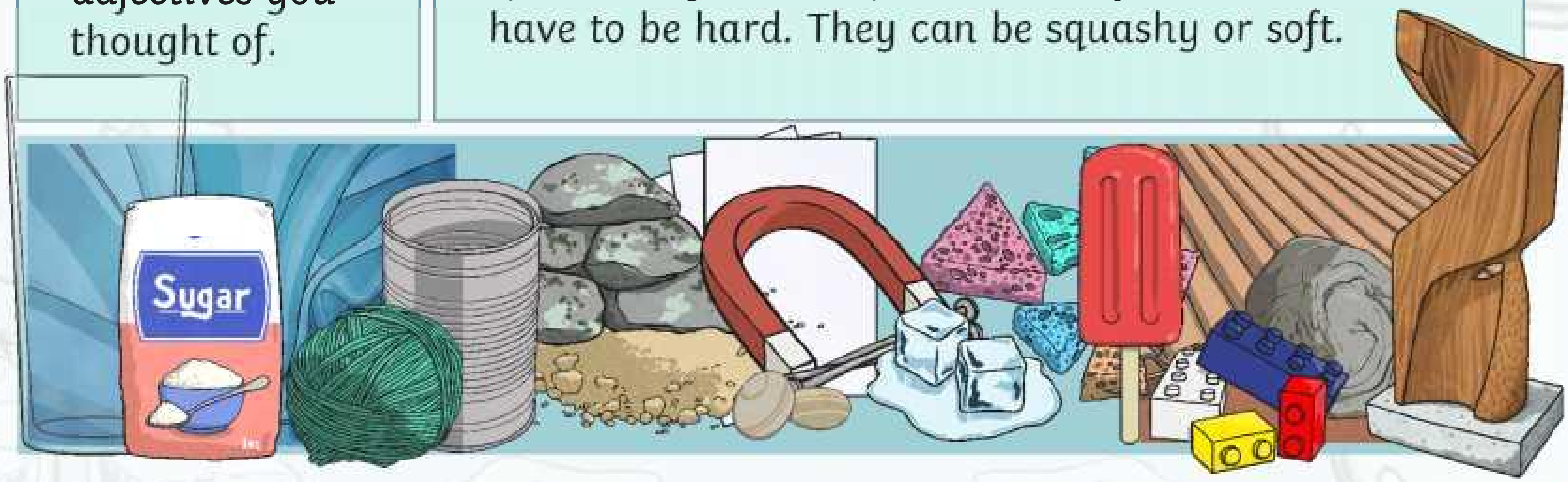
These items are all solids!

What do they have in common? Share the adjectives you thought of.

Materials in a solid state keep their shape unless a force is applied to them.

Solids can be cut, squashed or twisted. They will not change shape on their own.

Solid materials always take up the same amount of space. They do not spread out or flow. Solids do not have to be hard. They can be squashy or soft.



Properties of Materials: Liquids

These items are all liquids!

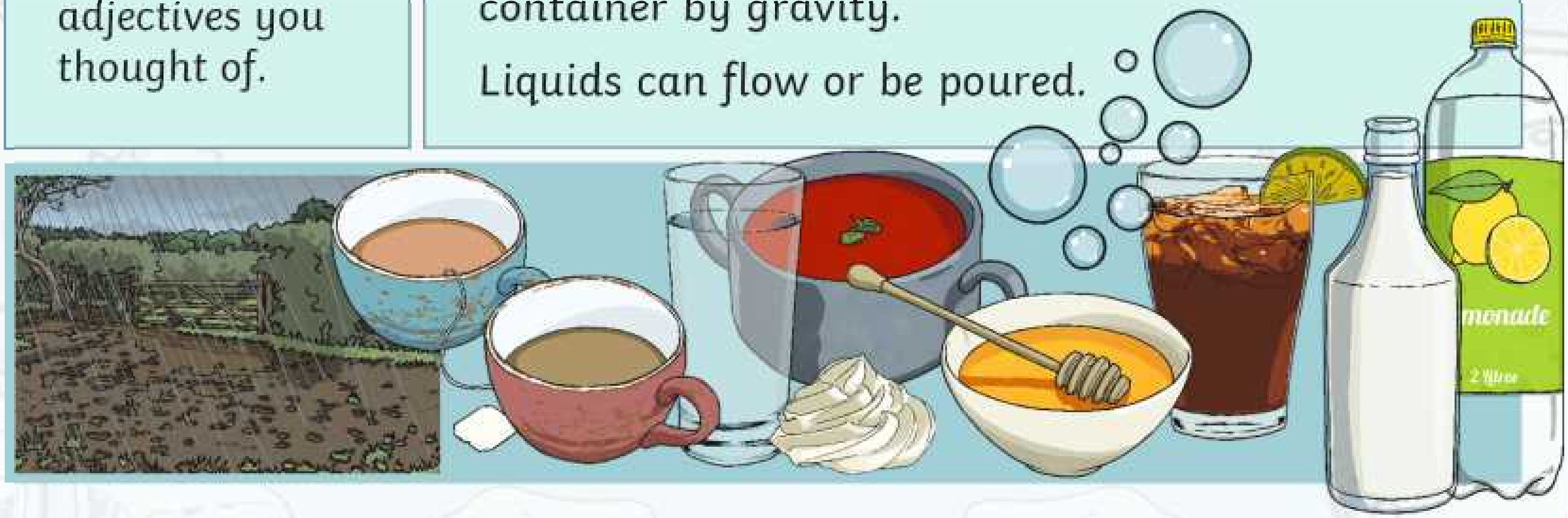
What do they have in common? Share the adjectives you thought of.

Materials in a liquid state take the shape of the container they are in.

Although liquids can change shape, they do not change their volume. This means they still take up the same amount of space.

Liquids are pulled down to the bottom of a container by gravity.

Liquids can flow or be poured.



Properties of Materials: Gases

These items are all gases!

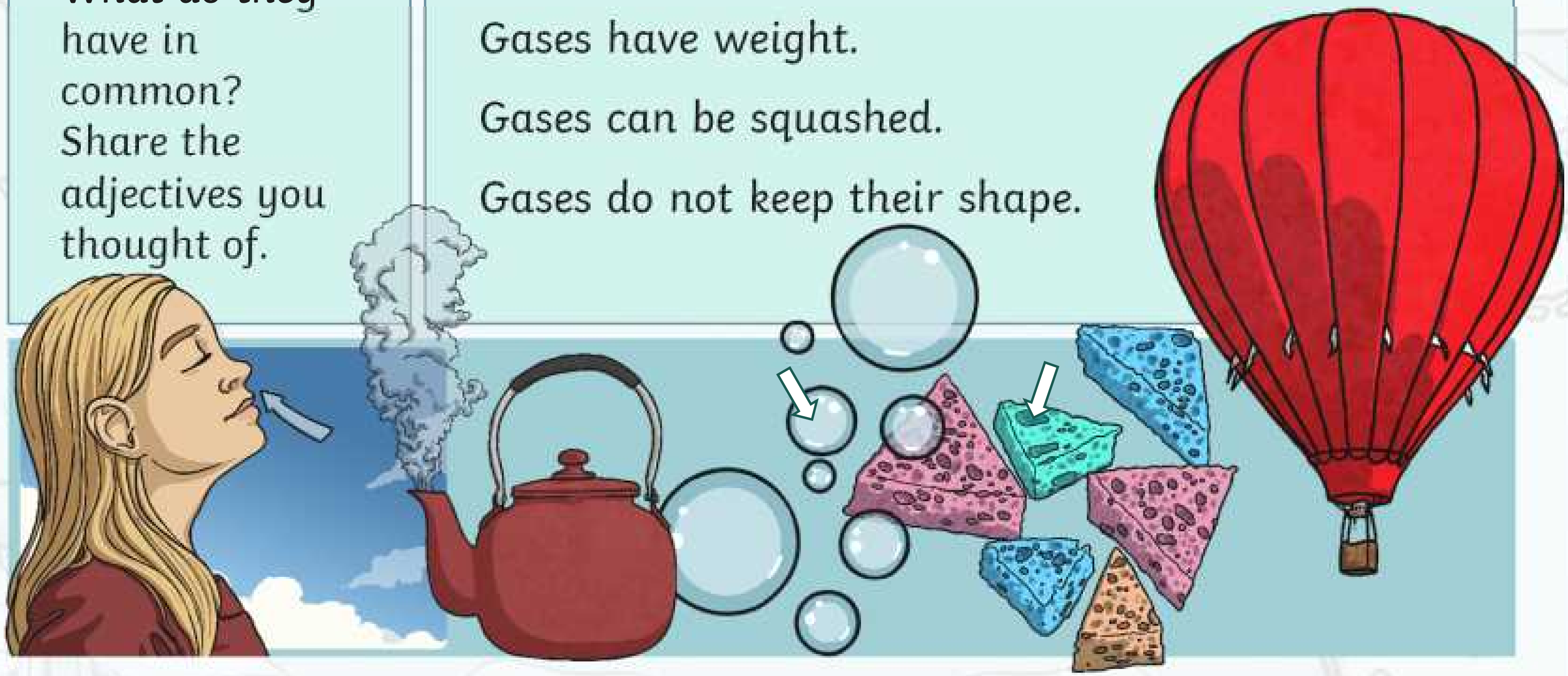
What do they have in common? Share the adjectives you thought of.

Materials in a gaseous state can spread out to completely fill the container or room they are in.

Gases have weight.

Gases can be squashed.

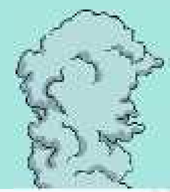
Gases do not keep their shape.



Properties of Materials

Can you match the properties with the correct state?

Talk to your partner to help you.

 solid	 liquid	 gas
Spreads out to fill a space.	Keeps its shape.	Can be cut, squashed or torn.
Takes the shape of the container it is in.	Can be poured.	Does not have any fixed shape.

Particles

We can explain the differences between solids, liquids and gases by knowing what they are made of.

Scientists have found out that all materials are made of very tiny particles. These particles are so small that we cannot see them with our eyes, or even with a microscope!

The position and behaviour of the particles is different in solids, liquids and gases.

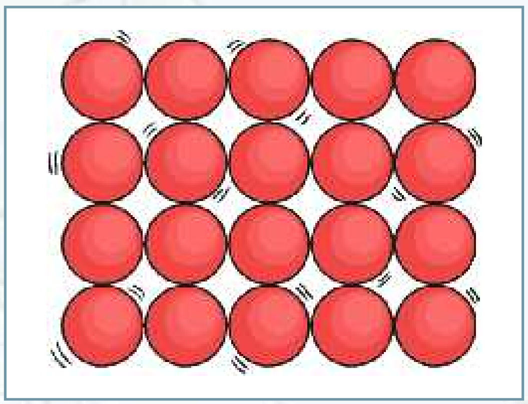
Click here to find out more!

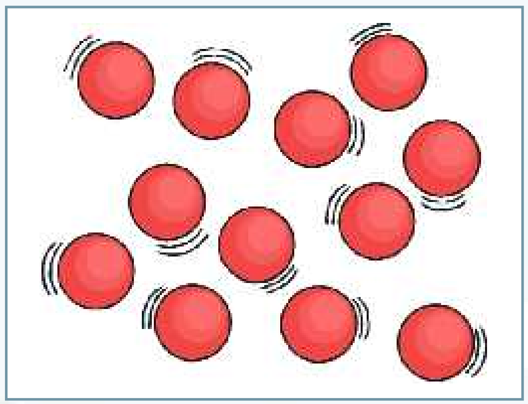
Particles and Properties

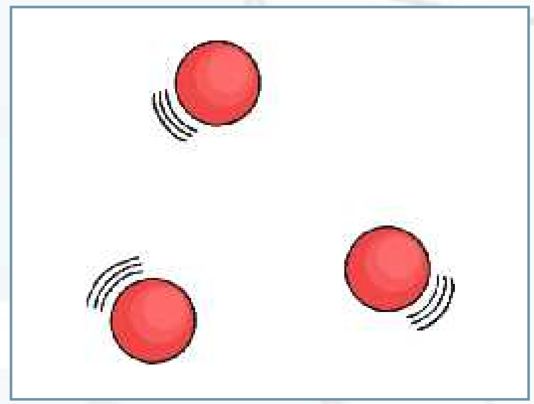
You are going to work as groups to demonstrate the differences in each state!

Follow the instructions on your group's Particle Information Card to find out what you need to do.

Then watch each others' demonstrations to learn about the behaviour of particles in solids, liquids and gases.



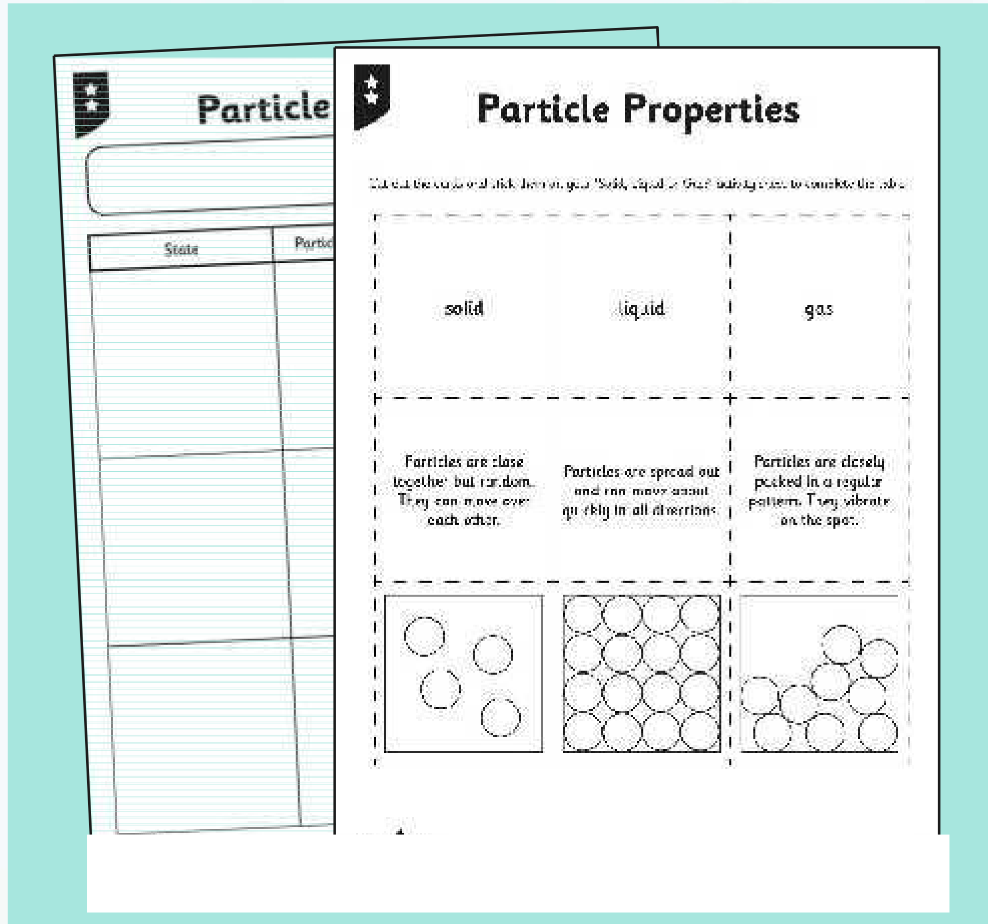




Particles and Properties

Now you have watched the demonstrations, have a look at the information boxes on your Particles and Properties Activity Sheet.

Can you work out which diagram and explanation goes with each state?



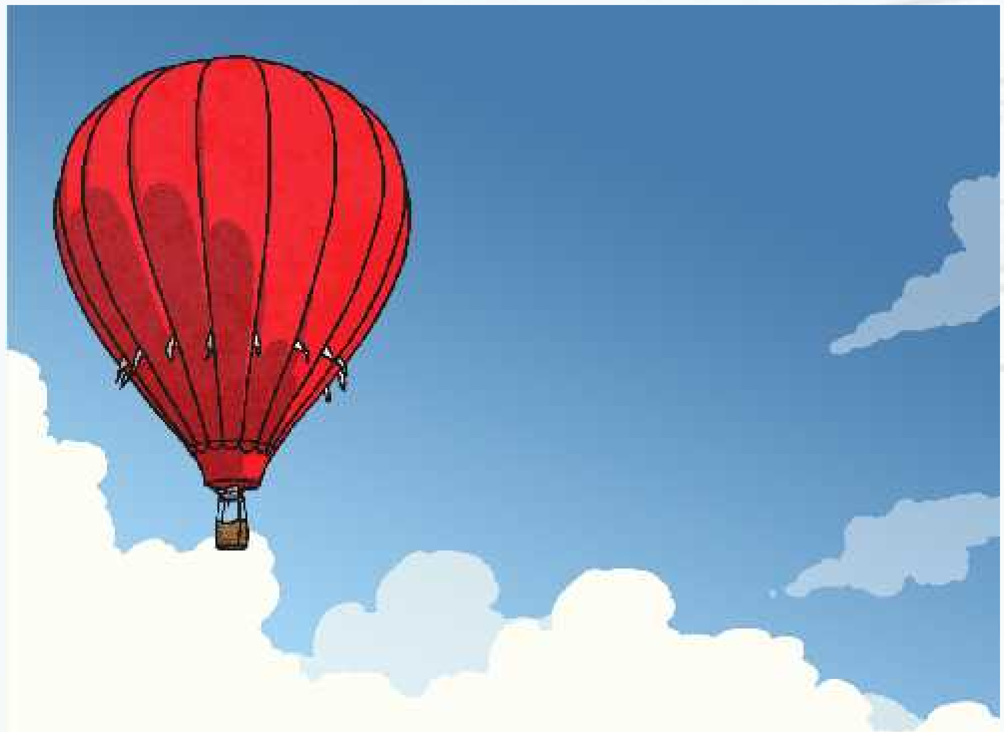
Spotting States of Matter

Whole Class

Watch this short film containing clips of different solids, liquids and gases.

See which materials you can spot, and which states of matter they are.

Share your ideas with the rest of the class.

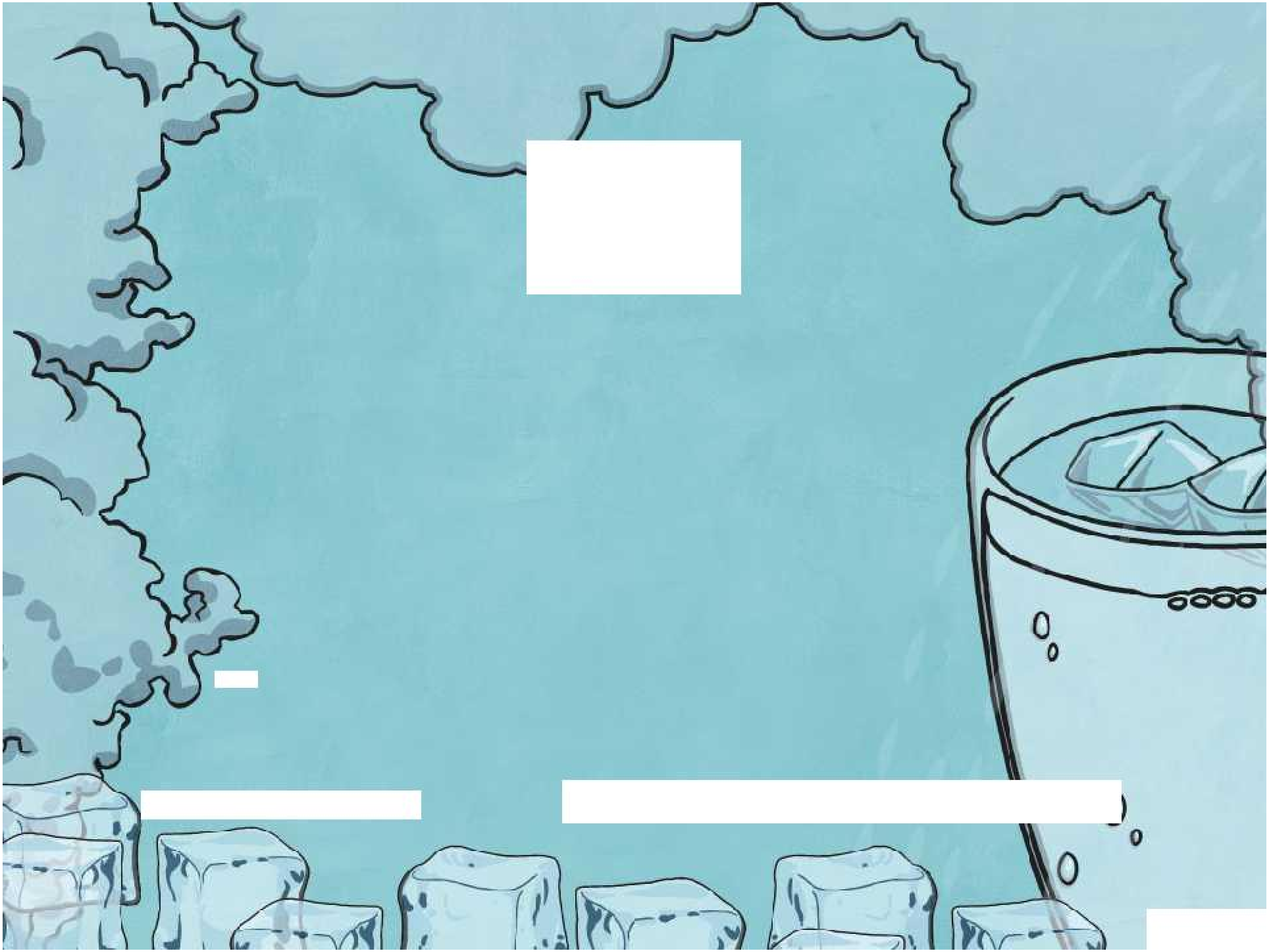


Aim

- I can sort and describe materials.

Success Criteria

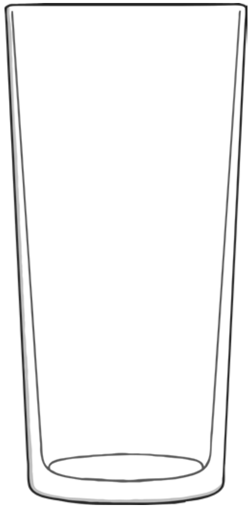
- I can sort materials into solids, liquids or gases.
- I can describe the properties of solids, liquids and gases.
- I can show the difference between the particles in solids, liquids and gases.



Solid, Liquid or Gas?

Carefully cut out the cards on the other pages and sort them into the correct categories.

Solid	Liquid	Gas



glass

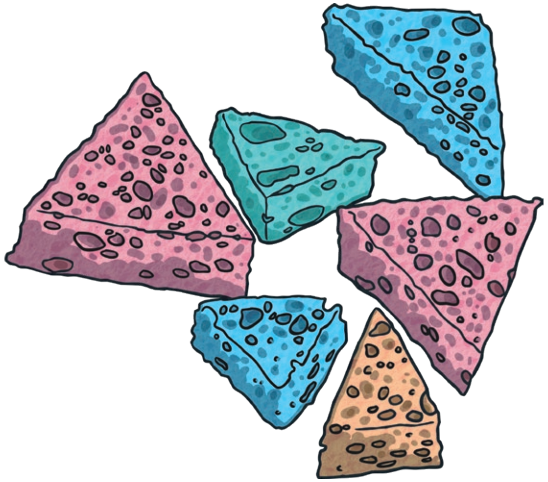
tea

clay

lemonade

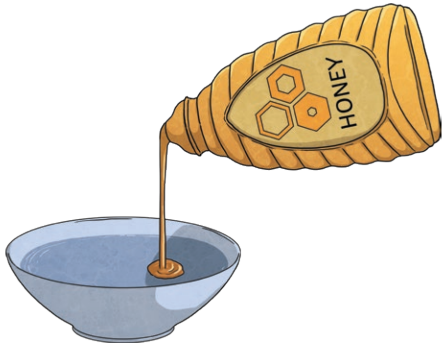
sugar

hot air

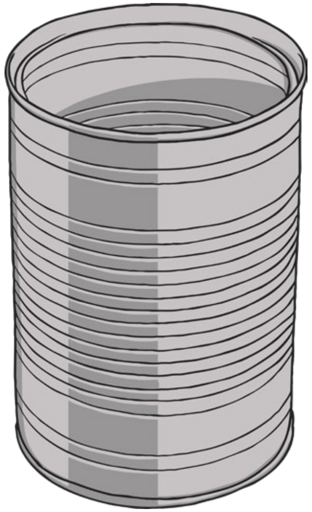


sponge

fabric



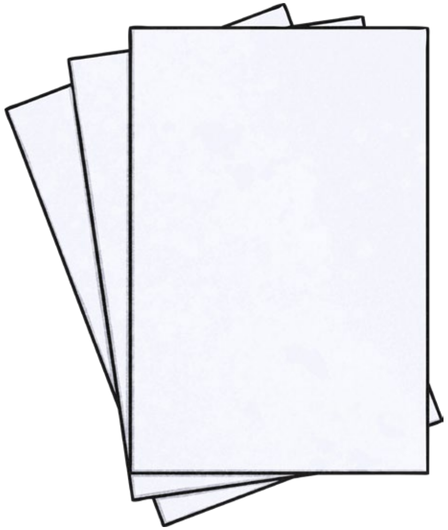
honey



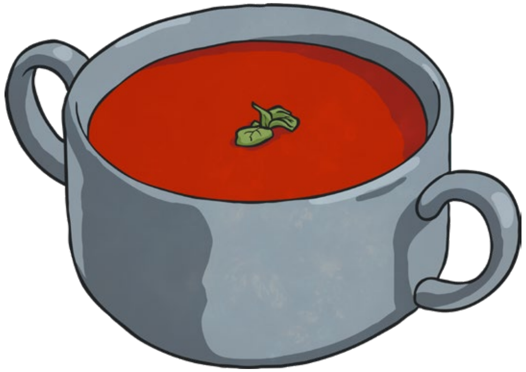
metal

sand

cream

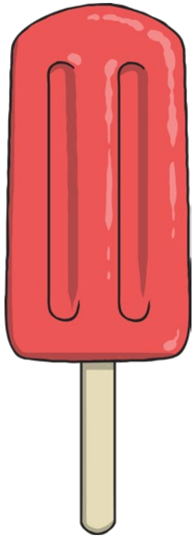


paper



soup

wool

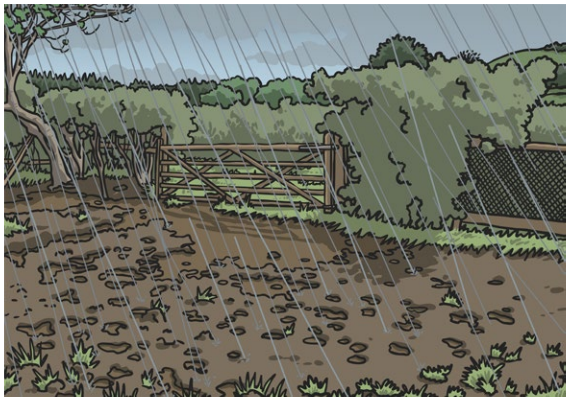


wood

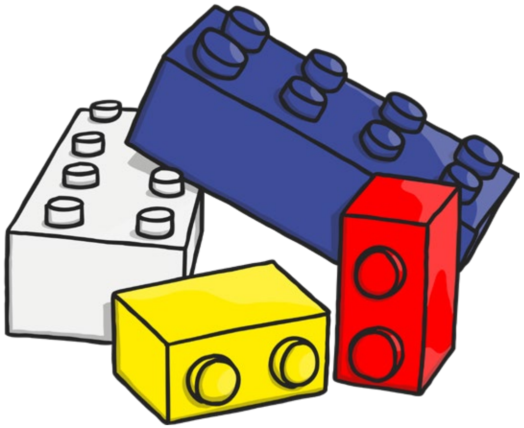
juice

oxygen

rocks



rain



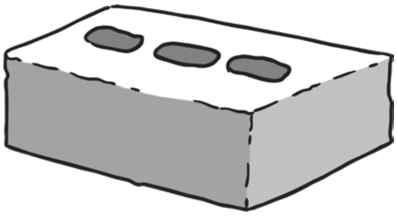
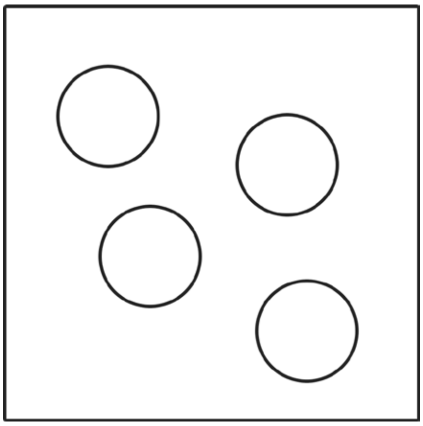
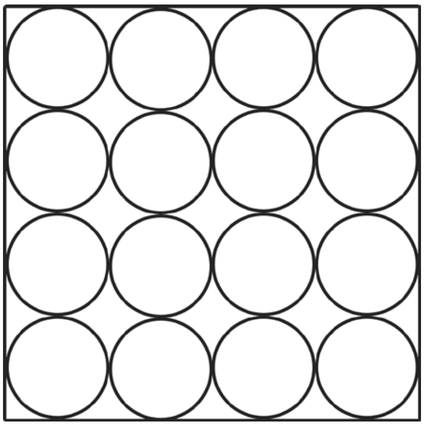
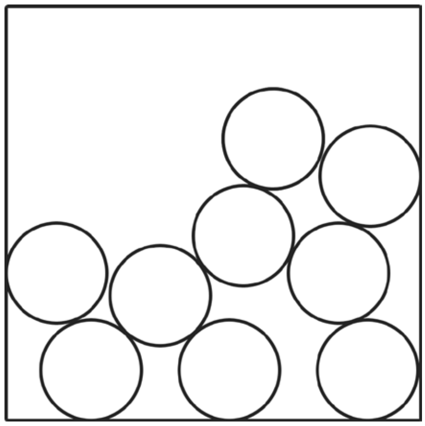
plastic

Particle Properties

State	Particle Arrangement	Material

Particle Properties

Cut out the cards and stick them on your ‘Solid, Liquid or Gas?’ activity sheet to complete the table.

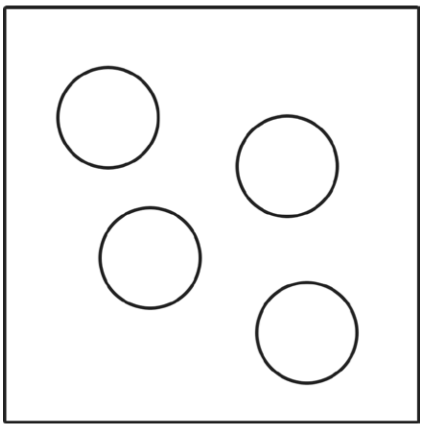
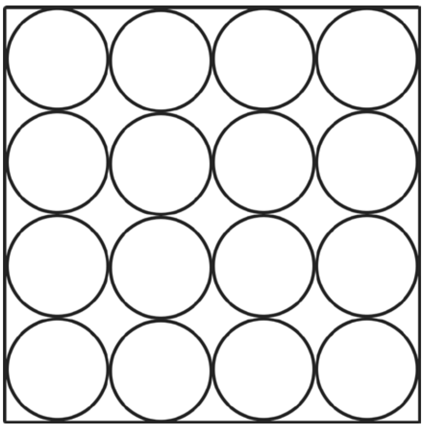
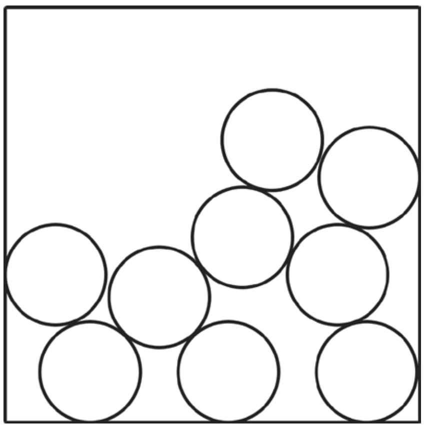
solid	liquid	gas
 milk	 brick	 helium
		

Particle Properties

State	Particle Arrangement	Particle Properties

Particle Properties

Cut out the cards and stick them on your 'Solid, Liquid or Gas?' activity sheet to complete the table.

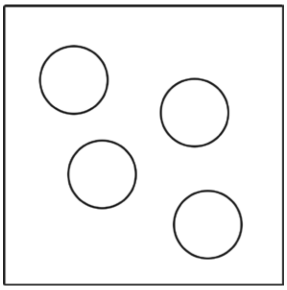
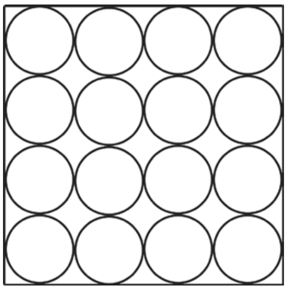
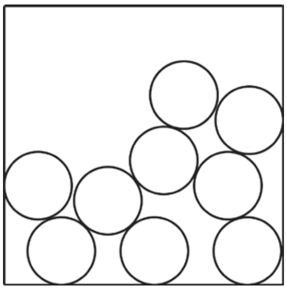
solid	liquid	gas
Particles are close together but random. They can move over each other.	Particles are spread out and can move about quickly in all directions.	Particles are closely packed in a regular pattern. They vibrate on the spot.
		

Particle Properties

State	Particle Arrangement	Particle Properties	Material Properties

Particle Properties

Cut out the cards and stick them on your 'Solid, Liquid or Gas?' activity sheet to complete the table.

solid	Particles are close together but random. They can move over each other.		Keeps its shape unless a force is applied to it. Remains the same volume.
liquid	Particles are spread out and can move about quickly in all directions.		Does not keep its shape. Can spread out to fill the space it is in.
gas	Particles are closely packed in a regular pattern. They vibrate on the spot.		Takes the shape of the container it is in. Stays the same volume.

Solids

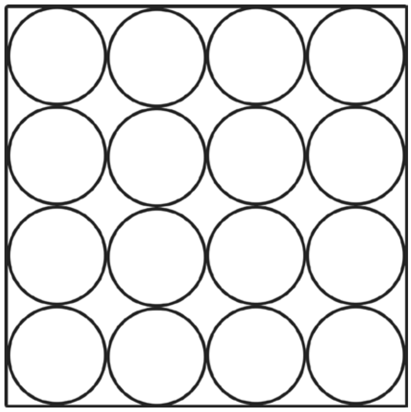
You are the Solids group!

You will work together to act as the particles in a solid material.

In a solid, the particles are close together in ordered rows. They move a little bit on the spot.

Organise your group into rows. Make sure you stand close to each other! Each person should gently move on the spot.

Show your demonstration to the rest of the class.



Liquids

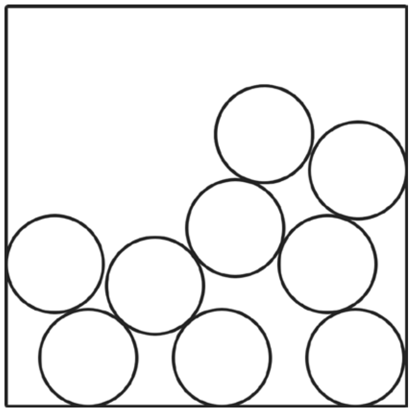
You are the Liquids group!

You will work together to act as the particles in a liquid material.

In a liquid, the particles are quite close together, but can move around each other easily. They move quite a bit, moving gently past each other.

Organise your group so that you are all standing near to each other in a crowd. Each person should gently move around the other people in the group, walking to new positions all the time.

Show your demonstration to the rest of the class.



Gases

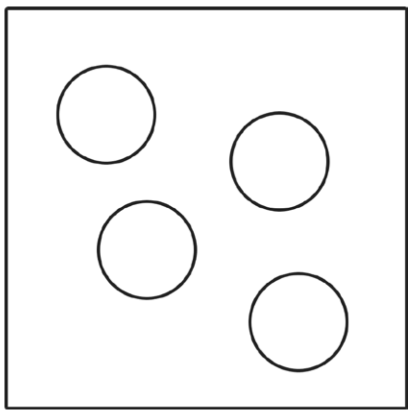
You are the Gases group!

You will work together to act as the particles in a gas.

In a gas, the particles can move around very quickly in all directions. There is a lot of space between each particle.

Organise your group so that you are all standing apart from each other. Make sure you are spread out around the space you are in. Each person should move quickly around the space in different directions. Make sure you take care when you are moving around.

Show your demonstration to the rest of the class.

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REVIVAL
C61 20
SL C61復活号

States of Matter | Solid, Liquid or Gas?

I can sort and describe materials.		
I can sort materials into solids, liquids or gases.		
I can describe the properties of solids, liquids and gases.		
I can show the difference between the particles in solids, liquids and gases.		

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States of Matter | Solid, Liquid or Gas?

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I can describe the properties of solids, liquids and gases.		
I can show the difference between the particles in solids, liquids and gases.		

States of Matter: Investigating Gases

Aim:	**Success Criteria:**	**Resources:**
To compare and group materials together, according to whether they are solids, liquids or gases by investigating gases and their uses. I can investigate gases and explain their properties.	I can identify solids, liquids and gases. I can explain some uses of gases. I can investigate the weight of a gas.	**Lesson Pack** Plastic bottle of lemonade per group 3-5 different fizzy drinks Digital weighing scales Beakers or plastic cups
	Key/New Words: Gas, carbon dioxide, state, matter, material, weight, mass.	**Preparation:** Differentiated **Comparing Gases Activity Sheet** - 1 per child.

Prior Learning: Children will have learnt about solids, liquids and gases in lesson 1.

Learning Sequence

Whole Class	**Identifying States of Matter:** Place a clear bottle of fizzy drink on each table. Children identify the materials they can see, as well as their states. Explain using the **Lesson Presentation** how all three states can be seen in the fizzy drink bottle.	
Whole Class	**Bubbles of Gas:** Look more closely at the bubbles in the fizzy drink. Children discuss the questions on the **Lesson Presentation**.	
	Bubbles of Gas: Discuss further uses of carbon dioxide using the information on the **Lesson Presentation**.	
	Do Gases Weigh Anything? Show children the video experiment on the **Lesson Presentation** and ask them to discuss what they think is happening and why.	
Whole Class	**Do Gases Weigh Anything?** Discuss the question on the slide. Discuss the answer and ensure that children understand that gases do have a mass and do weigh something.	
	Comparing the Weight of Gases: Explain the context and method of the investigation to the children using the **Lesson Presentation**. Ensure that they understand how to find the weight of the carbon dioxide present in each drink. Children complete predictions and answer the questions on their differentiated **Comparing Gases Activity Sheet**. ★ Children answer the questions by underlining the correct options in the sentences. They may need support to find the difference between the weights for each drink. ★★ Children explain their prediction and use the prompts to answer the questions ★★★ Children consider the reliability of the investigation and answer the questions without prompts.	
	Evaluating: Ask pairs to discuss possible improvements they would make to the investigation. Take feedback on ideas as a class. Ask pairs to talk about any scientific questions they would like to investigate, following on from this investigation.	
Whole Class	**True or False?** Children decide if statements on the **Lesson Presentation** and are true or false.	

Task*it*

***Research*it:** Can you find out who invented fizzy drinks? Why not make a fact file about their life and work?

***Explore*it:** Can you make raisins dance?! Add five or six raisins to a glass of fizzy lemonade and watch what they do. The bubbles stick to the rough surface of the raisins, making them float to the top of the glass. The bubbles pop on the surface of the drink, and the raisin sinks back down. This will continue until most of the carbon dioxide in the drink has escaped.

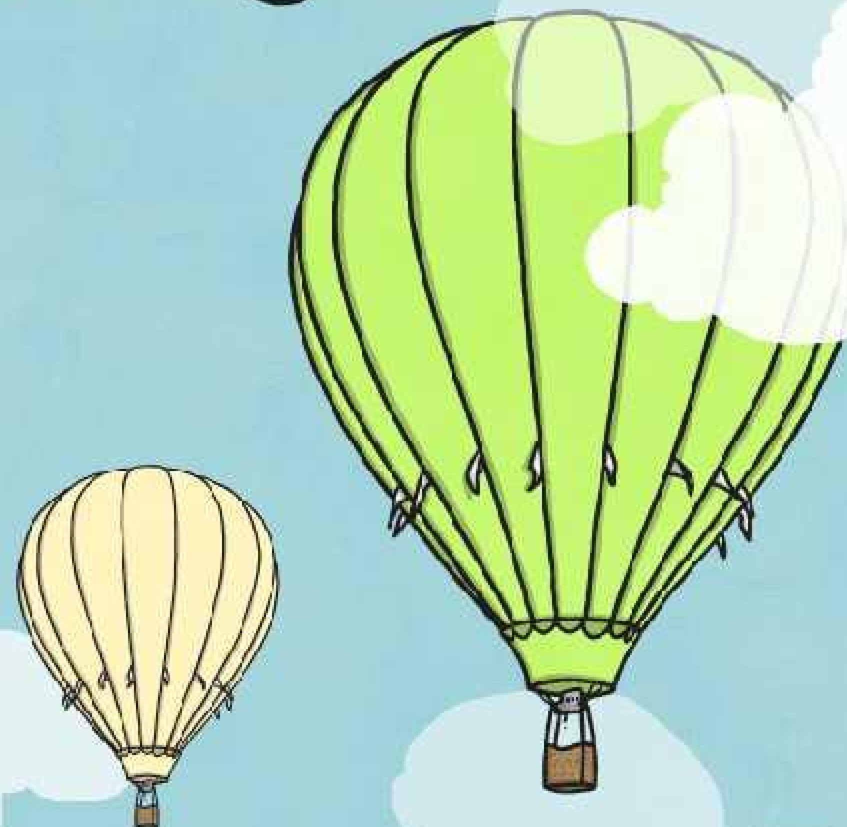
***Answer*it:** How do we use gases every day? Think about the different ways you have used gas today - perhaps in cooking food, heating your house and of course breathing!

Science

States of Matter

Science | Year 4 | States of Matter | Investigating Gases | Lesson 2

Investigating Gases



Aim

- *I can investigate gases and explain their properties.*

Success Criteria

- *I can identify solids, liquids and gases.*
- *I can explain some uses of gases.*
- *I can investigate the weight of a gas.*

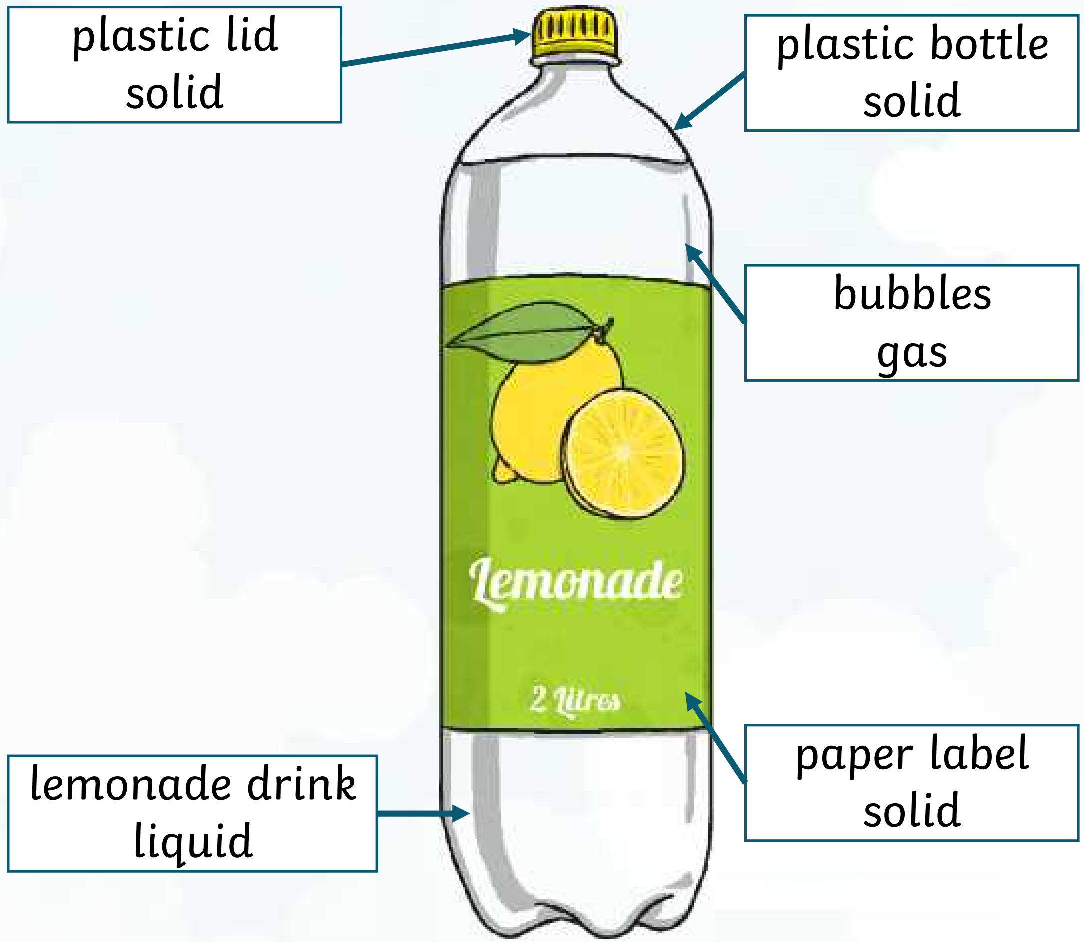
Identifying States of Matter

On your table you will see a bottle of fizzy drink.

Which states of matter can you identify in the materials that make up the bottle of fizzy drink?

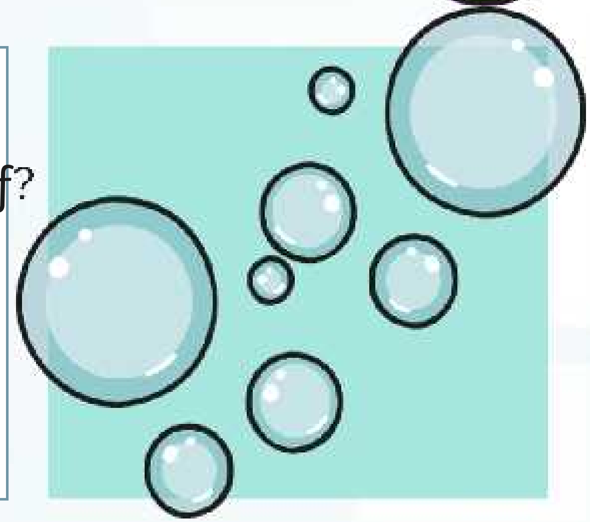
Identifying States of Matter

Which of these materials and states of matter did you identify?



Bubbles of Gas

- What are the bubbles in fizzy drinks made of?
- Why are there bubbles in fizzy drinks?
- How are fizzy drinks made?



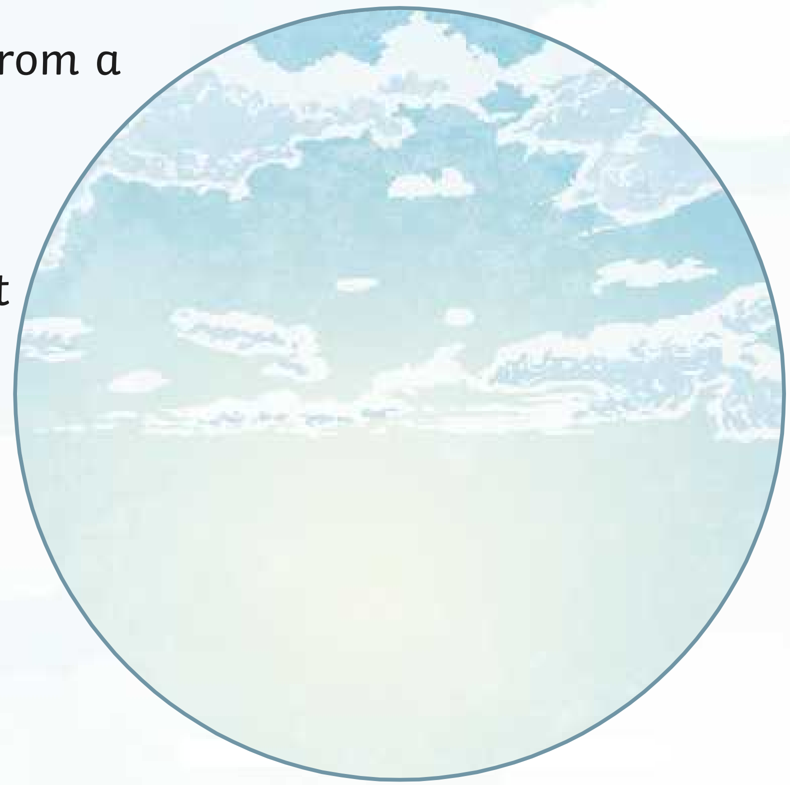
Click on the bubbles by each question and read the short fact files to find the answers to these questions!

Next

What Are the Bubbles in Fizzy Drinks Made Of?

Bubbles in fizzy drinks are made from a gas called **carbon dioxide**.

Carbon dioxide is a gas that is all around us. It makes up only about 0.04% of the Earth's atmosphere.

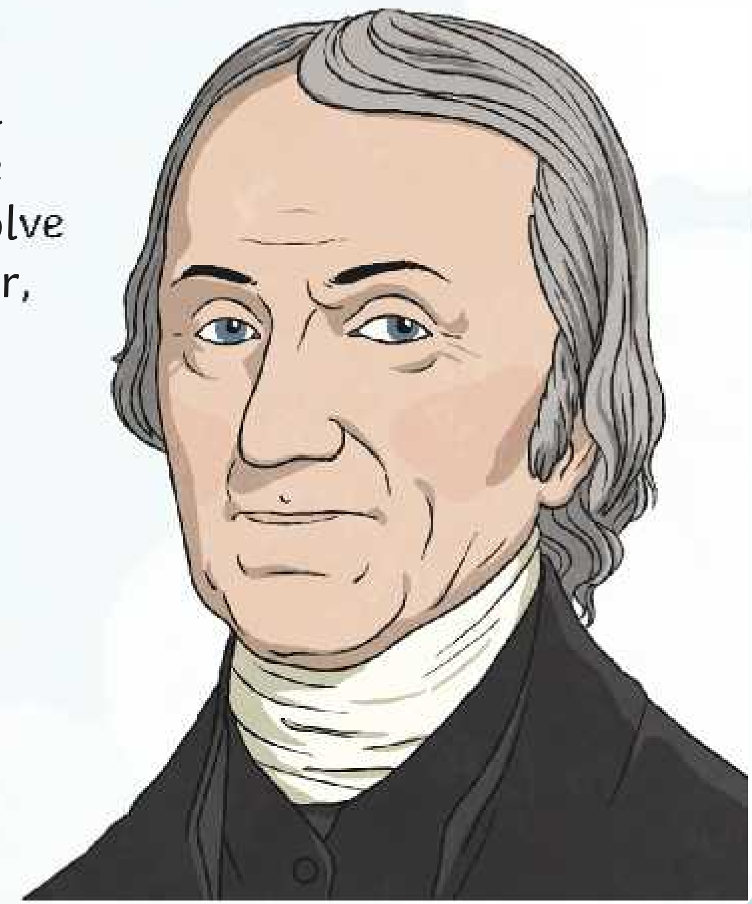


Back

Who Invented the First Fizzy Drink?

In 1767, a clergyman and scientist called Joseph Priestly accidentally invented the first fizzy drink. He found a way to dissolve gas in water, making the first soda water, or carbonated water.

When he drank the fizzy water, he described a "peculiar satisfaction".



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How Are Fizzy Drinks Made?

Fizzy drinks are made by adding carbon dioxide to liquid under huge pressure. The carbon dioxide dissolves in the liquid and settles in the space above the liquid in the bottle or can.

When the container is opened, the pressure decreases and the gas escapes quickly, making a hissing sound. The bubbles appear as the carbon dioxide turns into gas.

Back

Bubbles of Gas

Carbon dioxide can be very useful.

Some fire extinguishers use carbon dioxide to cool flames and to stop oxygen getting to the fire.

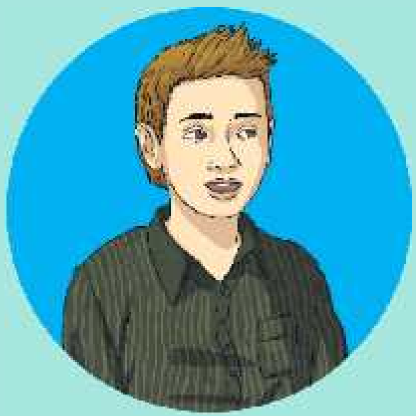
Carbon dioxide freezes at -78°C, and it becomes a solid called dry ice. It is used to transport food that needs to be kept cool and fresh, such as on aeroplanes and trains.

And as you have read, carbon dioxide is dissolved in water to create fizzy drinks.

Do Gases Weigh Anything?

These children are talking about the weight of gas. Who do you agree with?

Gases are lighter than air, so they do not weigh anything.



Gas has no weight because it is invisible.

A gas does have weight because it is a material.

Do Gases Weigh Anything?

Watch this video to see if the gases in fizzy drinks weigh anything. Think about what is happening to the gas and how this affects the weight of the fizzy drink.

Do Gases Weigh Anything?

This is Maya. She weighed a glass of fizzy lemonade. It weighed 173.1g. Gently, she swirled the glass around to make the liquid flat, in other words, to remove the carbon dioxide. She weighed the glass again and this time it weighed 172.6g. The drink was **lighter** after the gas had been removed.

This shows that the gas in the fizzy drink, carbon dioxide, does have a weight.
Do Gases Weigh Anything?
Answer: The glass of fizzy lemonade was heavier than the flat drink because it contained carbon dioxide. Some gases are lighter than air and some are heavier. Carbon dioxide is heavier than air.

Comparing the Weight of Gases

Maya wants to find the fizziest drink to serve to guests at her party.

What type of scientific enquiry do you think would be a good way for Maya to find out which drink is fizziest?

E.g.

- observing;
- noticing patterns;
- grouping and classifying;
- comparative and fair testing
- researching from books or the internet.

Comparing the Weight of Gases

You will carry out a fair and comparative test.

You will weigh each fizzy drink, then shake it until it is flat and weigh it again.

The difference between the two weights will tell you how much carbon dioxide is in each drink.

Use your Comparing Gases Activity Sheet to make your prediction, and answer the questions about your investigation.

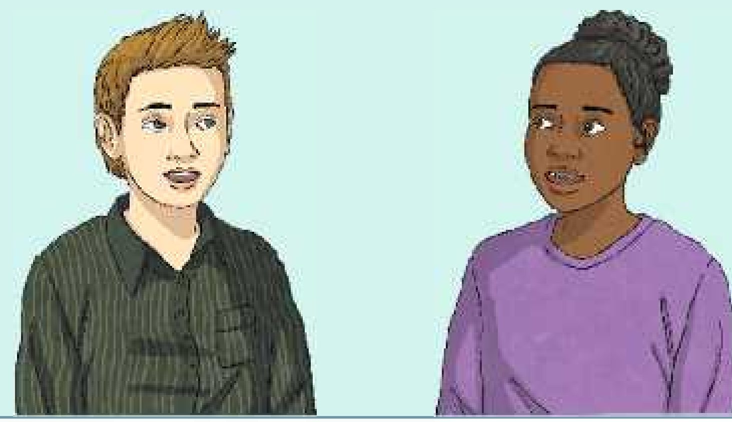
When you have gathered your results, come to a conclusion and recommend a drink for Maya to serve at her party.

Evaluating

Can you think of any ways this investigation could be improved? Share your ideas with
your partner.

Having completed this investigation, are there any further questions you would like to test?

Discuss your ideas.



True or False?

Look at the statements and decide whether they are true or false.

Carbon dioxide is a gas at room temperature.	Gases keep their shape.	Carbon dioxide is useful.
The bubbles in fizzy drinks are bubbles of gas.	Gases that are lighter than air weigh nothing.	You can find the weight of gases.

True or False?

How did you do?

True.	False.	True.
True.	False.	True.

Aim

- *I can investigate gases and explain their properties.*

Success Criteria

- *I can identify solids, liquids and gases.*
- *I can explain some uses of gases.*
- *I can investigate the weight of a gas.*

Comparing Gases

Maya wants to find the fizziest drink to serve to her friends at her party. You will set up a comparative investigation to find out which fizzy drink has the most carbon dioxide in it, as this is likely to be the fizziest drink. You will weigh each fizzy drink, then shake it until it is flat and weigh it again. The difference between the two weights will tell you how much carbon dioxide is in each drink.

Have a look at the different drinks. Which one do you predict has the most carbon dioxide in it?

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How can you make sure your investigation is reliable? Underline the correct option in each sentence.

Use the same amount/different amounts of each fizzy drink.

Shake each drink for the same length/different lengths of time.

Use the same/different weighing scales each time.

Carry out the investigation and complete the table of results below.

Name of drink:	Weight when fizzy:	Weight when flat:	Weight of carbon dioxide (the difference between the two weights):

Look at your results and come to a conclusion. Which fizzy drink has the most carbon dioxide in? Which drink should Maya serve to her friends at her party?

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Have a look at the different drinks. Which one do you predict has the most carbon dioxide in it and why?

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How will you know when the fizzy drinks are flat? Think about the bubbles you can see.

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How can you make sure your investigation is reliable? Think about what you need to keep the same every time.

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How will you know when the fizzy drinks are flat? Think about the bubbles you can see.

Will you need to shake each fizzy drink for the same amount of time?

How will you make sure your investigation is reliable?

Carry out the investigation and complete the table of results below.

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States of Matter | Investigating Gases

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States of Matter: Heating and Cooling

Aim:
To observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (˚C) by investigating how heating and cooling can change a material's state.

I can investigate materials as they change state.

Success Criteria:
I can understand how heat can cause solids to change to liquids and vice versa.

I can identify materials that melt at different temperatures.

I can investigate the melting and freezing temperature of a material.

Resources:
Lesson Pack

Thermometers

Foil pie tins

Chocolate broken into equal sized squares

Three trays per group - each tray filled with a different temperature of water (approximately 5˚C, 30˚C and 40˚C would work well)

Stopwatches

Key/New Words:
Solid, liquid, particles, melt, freeze, thermometer, temperature.

Preparation:
Melting and Freezing Points Activity Sheet - 1 per pair

Differentiated **Melting Chocolate Investigation Activity Sheet** - 1 per child

Prior Learning: The children will have learnt about changing state in lesson 1.

Learning Sequence

What Makes Materials Change State? Ask the children to choose the correct labels for the diagram on the **Lesson Presentation**. Explain the processes of melting and freezing, and how a material's particles behave when they change state using the information and diagrams on the **Lesson Presentation**. Address any misconceptions or issues.

Melting and Freezing Points: Explain freezing and melting points, using the diagram on the **Lesson Presentation** to illustrate this concept.

Melting Points: Children match materials with their melting and freezing points using the **Melting Points Activity Sheet**. Reveal the answers using the **Lesson Presentation**.

Melting Chocolate: Introduce the context for the investigation using the **Lesson Presentation**. Model the investigation by placing a square of chocolate in three different foil tins, and then floating the tins on trays of water, each of which has a different temperature. State that they will observe how long it takes the chocolate at each temperature to melt. Children should plan their investigation and make a prediction on their differentiated **Melting Chocolate Investigation Activity Sheet** and then conduct the investigation. Look for children who have a good understanding of how materials change state by heating and cooling.

- Children use the pictures and underline the correct words and phrases to plan their investigation. They should present their results on a bar chart on the labelled axes.
- Children use the prompts to plan their investigation. They should try to explain their prediction and conclusion. They will present their results on a bar chart that requires axes labelling.
- Children plan their investigation without prompts. They should refer to the behaviour of the particles in their explanations. They should present their results and label their axes, considering suitable intervals to show the time taken.

Freezing Chocolate: Children discuss Maya's idea on the Lesson Presentation with a partner. *Their thoughts may depend on what the weather is like, leading to discussion of the freezing point of chocolate.*

Task*it*

Bake*it*: Why not use some melted chocolate to make your own chocolate crispy cakes? Mix some cornflakes or rice crispies into the melted chocolate, spoon the mixture into cake cases and leave to freeze solid. Enjoy!

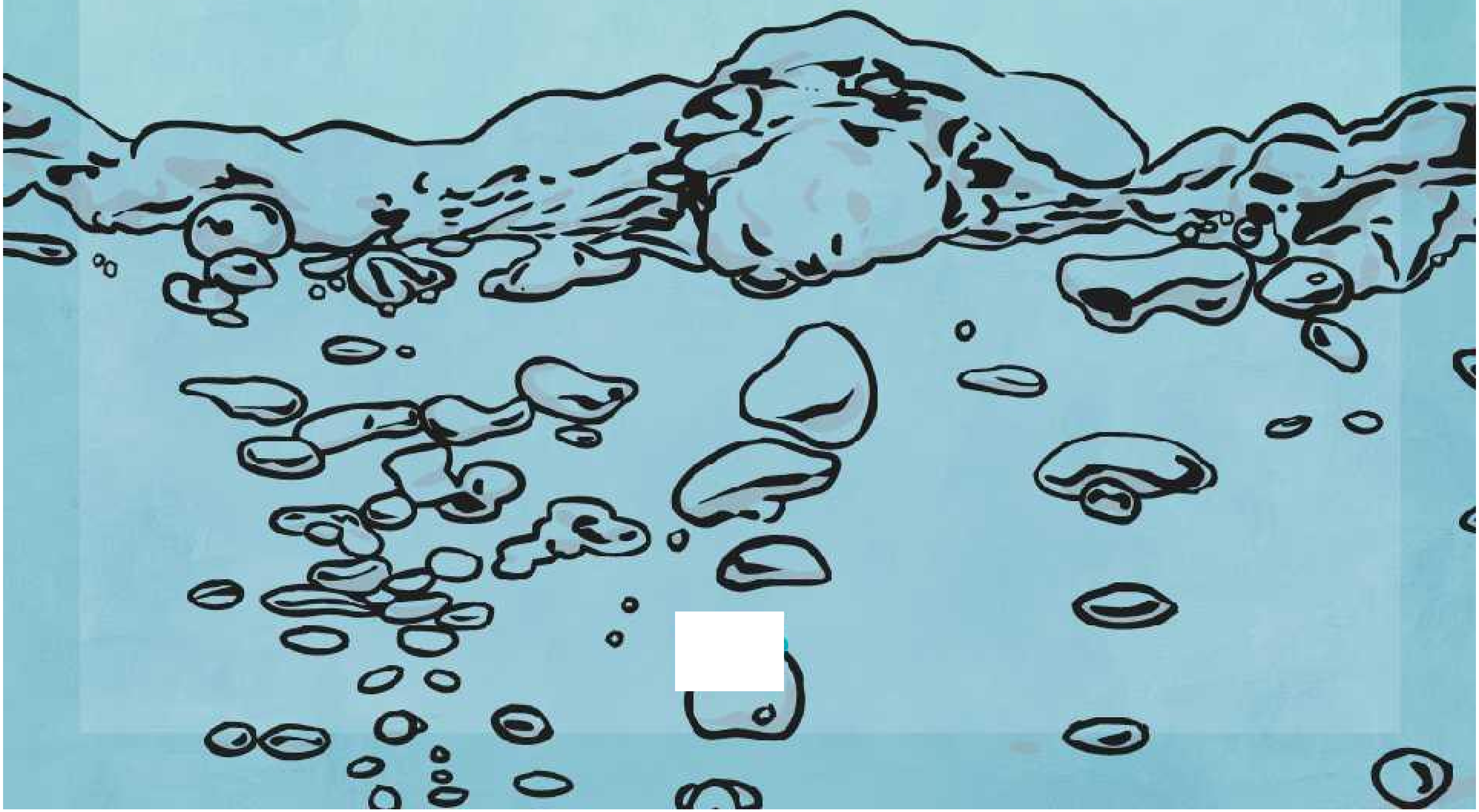
Research*it*: Find out about how different materials are melted and their uses. For example, iron and glass.

Make*it*: Can you make some frozen yoghurt or ice cream? Add your favourite fruits and put it in the freezer to change into a solid.

Science

States of Matter

Heating and Cooling



Aim

- I can investigate materials as they change state.

Success Criteria

- I can understand how heat can cause solids to change to liquids and vice versa.
- I can identify materials that melt at different temperatures.
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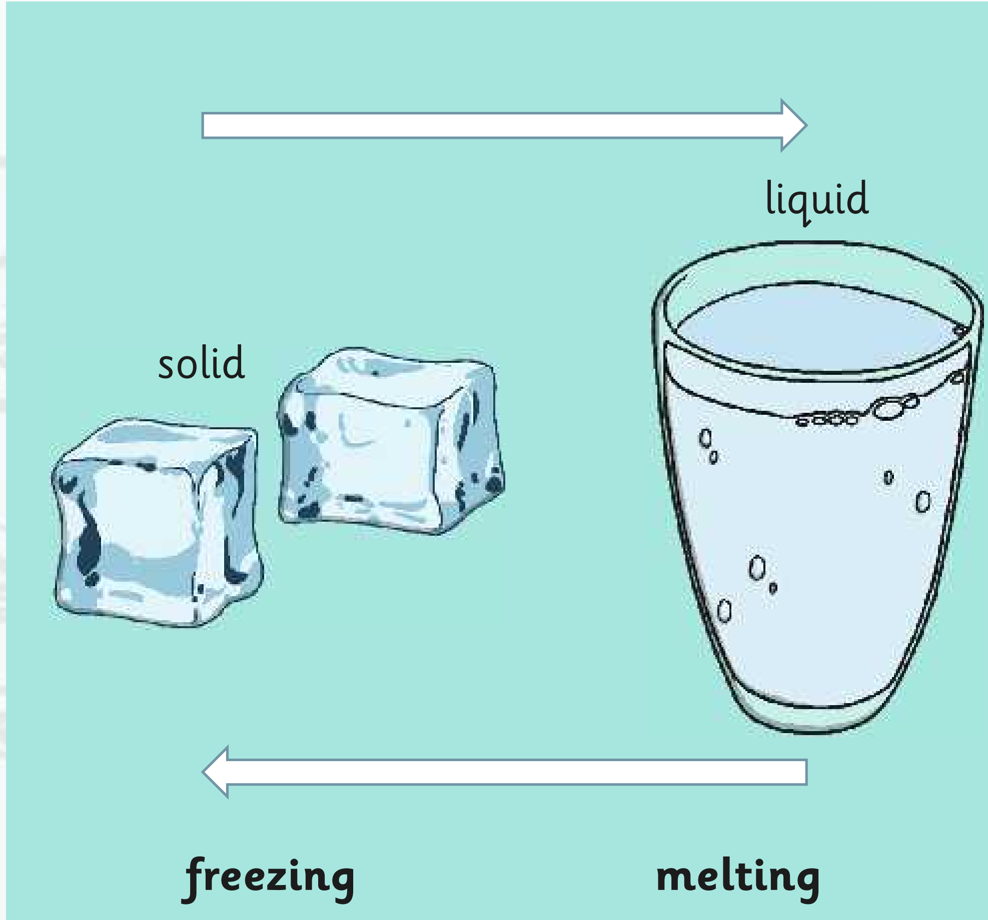
What Makes Materials Change State?

Materials can be in three different states: solid, liquid or gas.

But how do materials change state?

Have a look at the diagram opposite and choose the correct labels for each arrow.



What Makes Materials Change State?

When a solid turns into a liquid it is called melting.

The temperature at which a solid material melts is called its melting point. Different materials have different melting points.

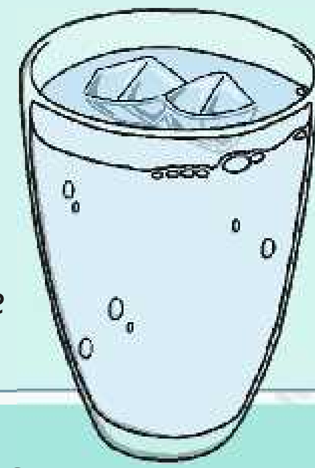
If a solid material is heated to its melting point, it will start to melt and will change state from a solid to a liquid.

In a solid, the particles are closely packed together and are vibrating on the spot. When a solid is heated, the particles start to move faster and faster. If enough heat is applied, the particles will have enough energy to move about. They are still close together, but can move over and around each other. At this point, the solid has melted to form a liquid.

What Makes Materials Change State?

When a liquid turns into a solid it is called freezing.

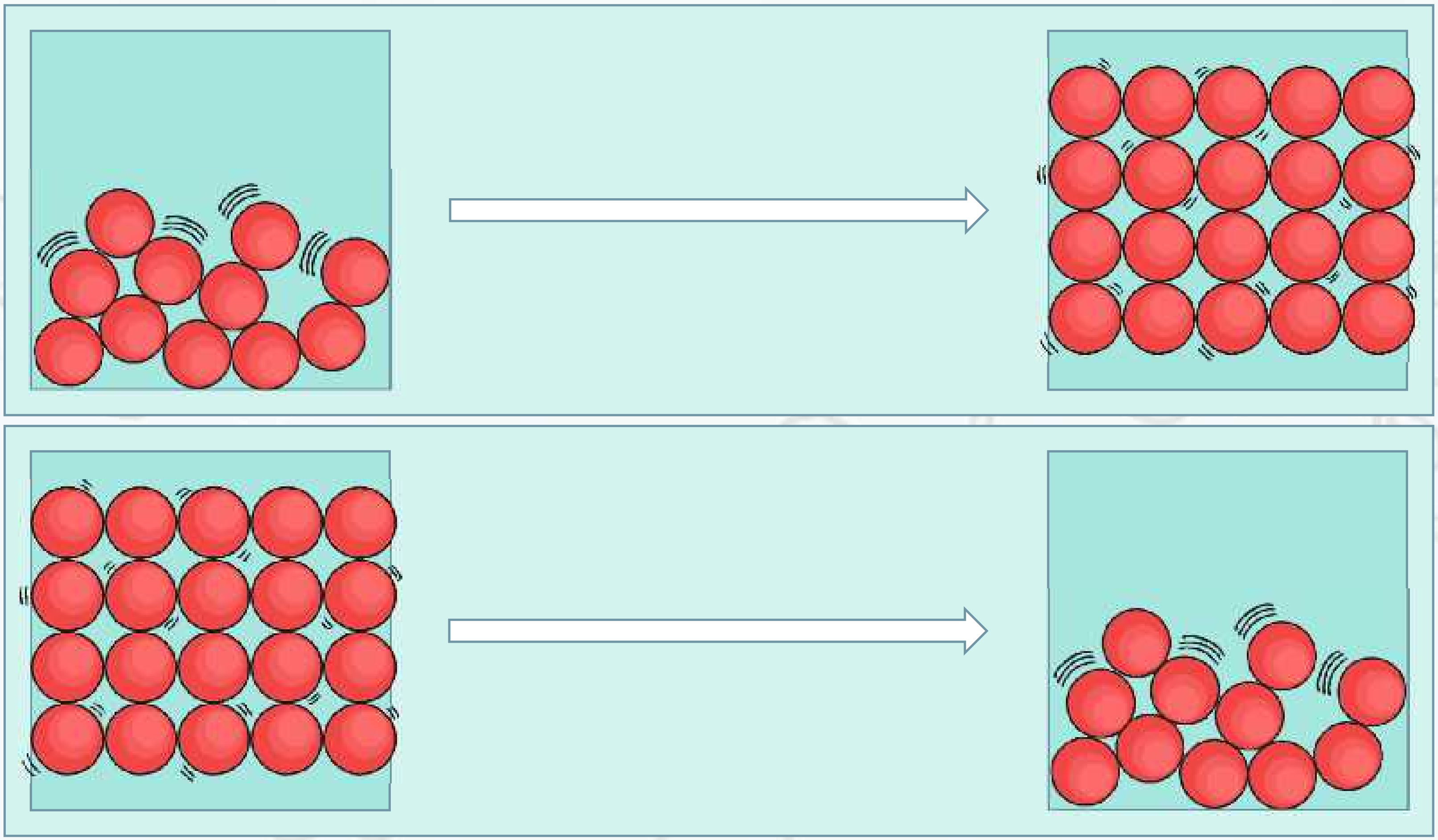
The temperature at which a liquid material freezes is called its freezing point. Different materials have different freezing points. It is important to remember that some materials have freezing points above 0°C. For example, the freezing point of iron is around 1550°C! Interestingly, this means its melting point is also its freezing point, just in reverse! Above this temperature, it will be liquid iron. Below this temperature, it will be solid iron.



If a liquid material is cooled to its freezing point, it will turn from a liquid to a solid.

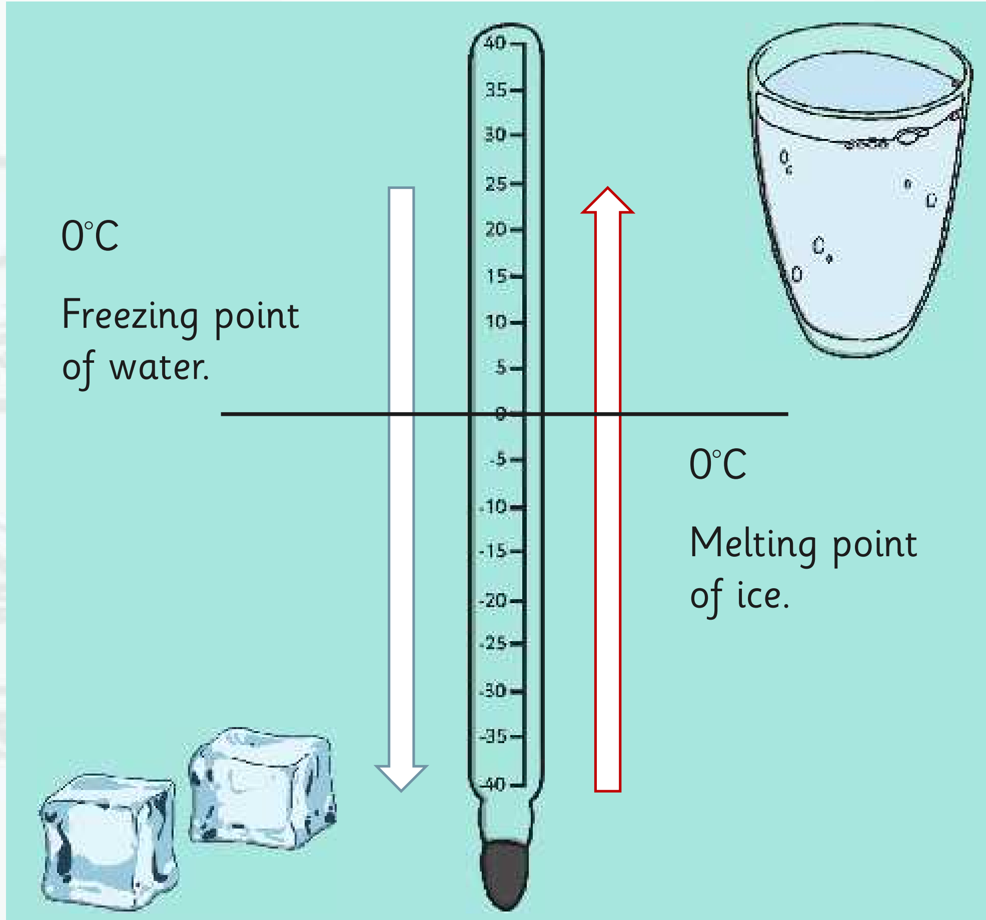
The particles in a liquid are close together, but can move quite quickly around and over each other. As it is cooled, the particles start to slow down. Eventually, they slow down so much that they only move gently on the spot, and a solid structure is formed. The material has frozen.

What Makes
Materials Change State?



Melting and Freezing Points

For most materials, their melting and freezing points are the same. Although it sounds strange, think of the melting and freezing point as a barrier. If the material is heated to a temperature higher than this, it will melt. If the material is cooled to a temperature lower than this, it will freeze.



Melting Points

Can you match these materials with their approximate freezing and melting points?

wax	butter	gold
aluminium	silver	ice cream
35°C	50°C	1060°C
660°C	0°C	960°C

Melting Points

How did you do? Why would it be useful for someone to know the freezing and melting points of these materials?

wax	butter	gold
aluminium	silver	ice cream
35°C	50°C	1060°C
660°C	0°C	960°C

Melting Chocolate

This is Maya. She is getting the food ready for her birthday party, and wants to make some chocolate crispy cakes.

Her party is only a few hours away, so she needs to make them fast! She needs to know the best temperature for melting chocolate.

When she has melted the chocolate, she can then add the cereal, shape the mixture into cakes and leave them to freeze in time for her party!

Can you help her find the best temperature for melting chocolate?

Melting Chocolate

You will place a piece of chocolate in a foil tin and float each tin on a different temperature of water.

You will see how long it takes for the pieces of chocolate to melt at the different temperatures.

Complete your Melting Chocolate Investigation Activity Sheet with your ideas about the equipment you will need, how you will carry out the investigation and your prediction.

Then carry out your investigation in groups.

Freezing Chocolate

Do you think Maya's idea is a good one?

Talk to your partner then share your thoughts with the class.

Aim

- I can investigate materials as they change state.

Success Criteria

- I can understand how heat can cause solids to change to liquids and vice versa.
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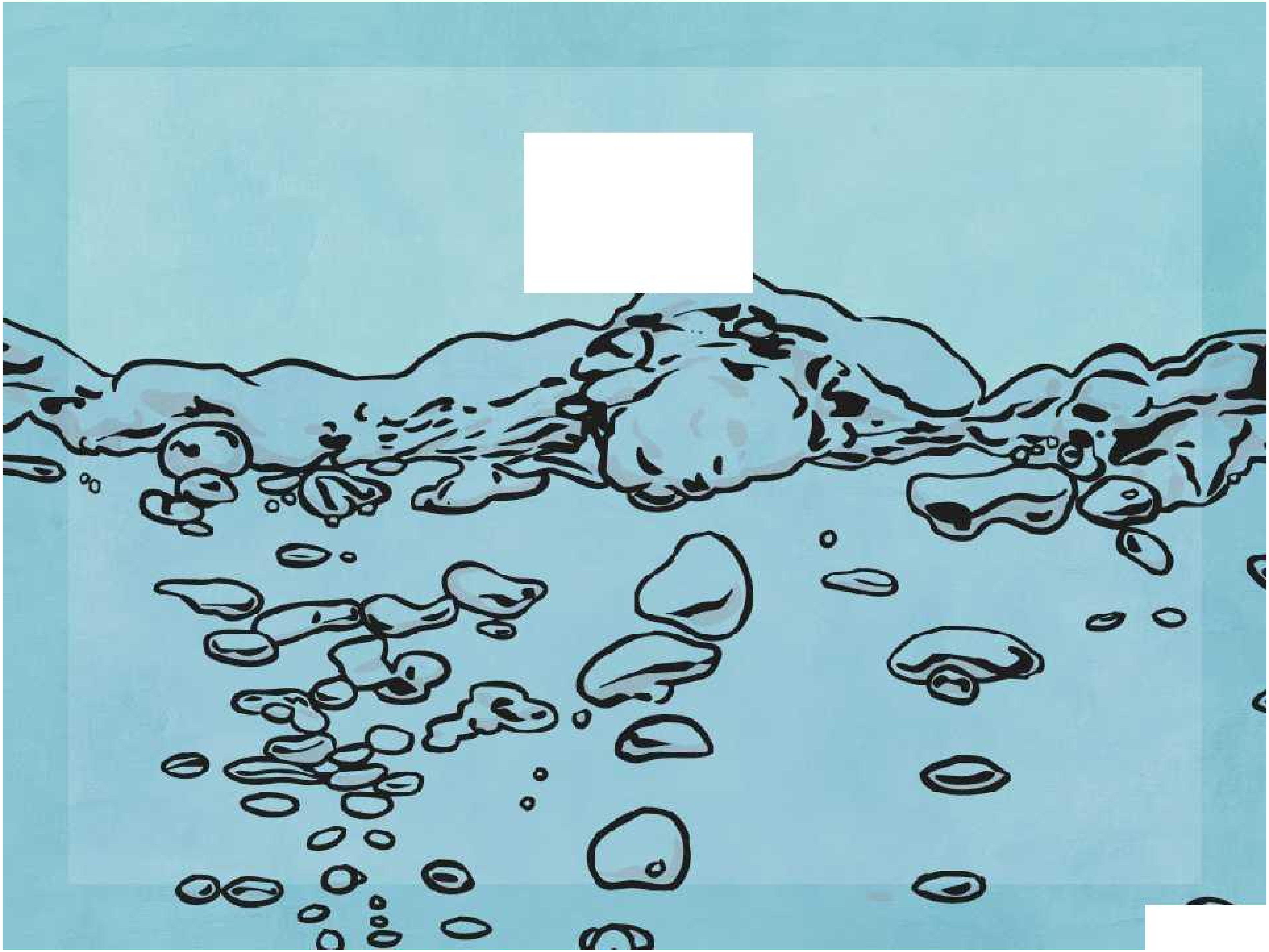
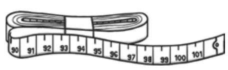
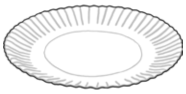
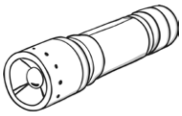
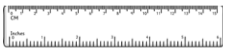
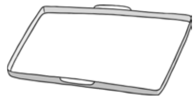


Chocolate Investigation

Can you help Maya find the temperature that melts chocolate the fastest? Plan your investigation then carry it out!

Equipment: Circle the things you will need.		
thermometer 	tape measure 	magnifying glass 
foil tins 	sand 	stopwatch 
torch 	chocolate 	water 
ruler 	pipette 	trays 

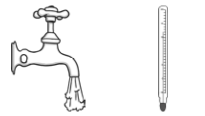
You will float the pieces of chocolate in foil tins on trays filled with different temperatures of water. Underline the correct words or phrases below to show how you will make sure your investigation is reliable.

I will make sure each piece of chocolate is the same/a different size. I will use the same/different amounts of water in each tray. The temperatures of the water in each tray should be the same/different.

What will you measure and observe in this investigation? Use the pictures to help you.

I will measure the...

____



I will measure the...

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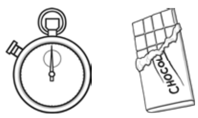


I will observe the...

____

What do you predict will happen? Which temperature of water will melt the chocolate fastest?

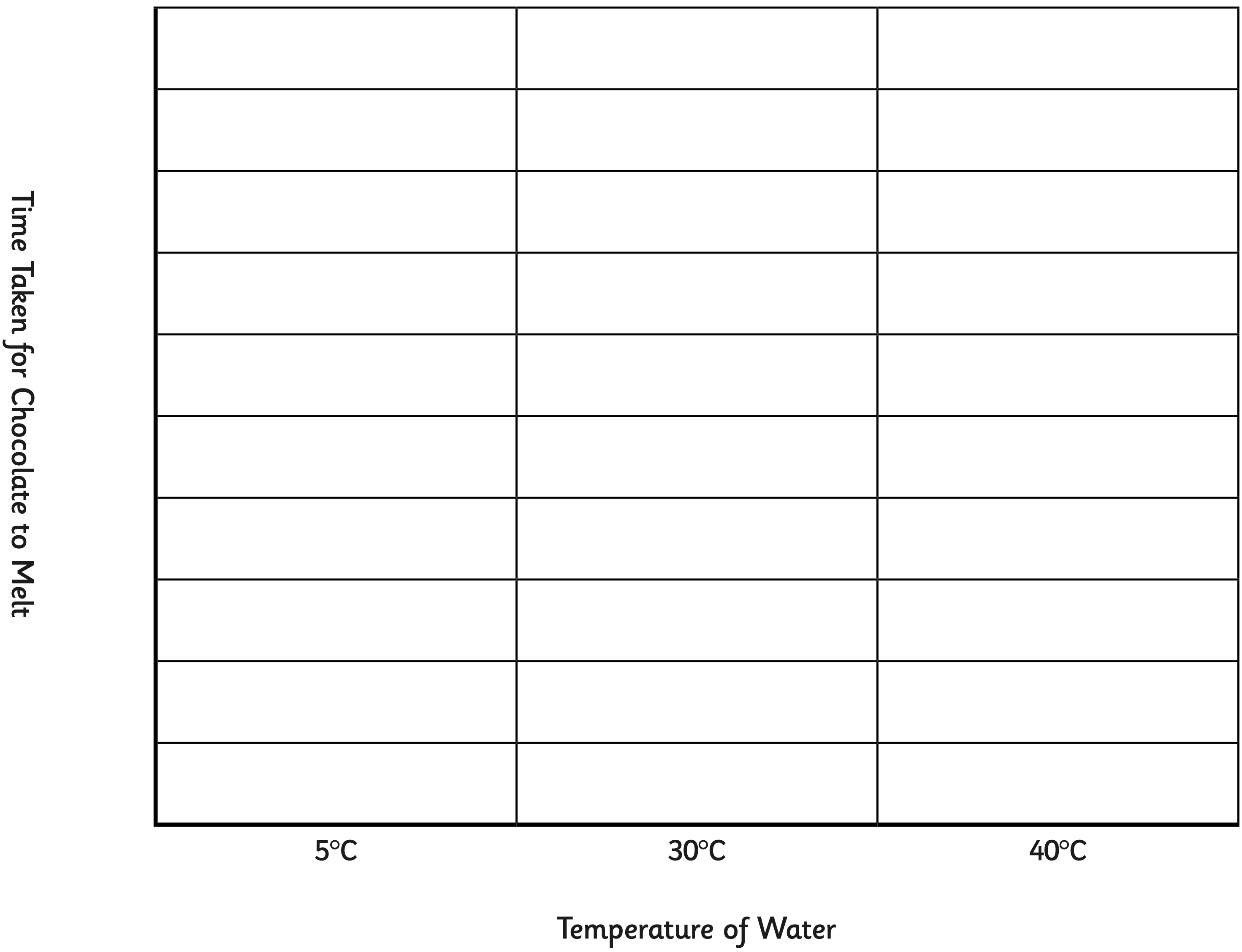
____

Chocolate Investigation

Complete this table with your results:

	Tray 1	Tray 2	Tray 3
Temperature of water			
Time taken for chocolate to melt			

Draw a bar chart using your results:



What is your conclusion? Can you tell Maya which temperature melts chocolate the fastest?

Use these words to help you.

chocolate	water	hot	cold	faster	slower	shorter	longer

Chocolate Investigation

Can you help Maya find the temperature that melts chocolate the fastest? Plan your investigation then carry it out!

Equipment: Draw or write the things you will need.

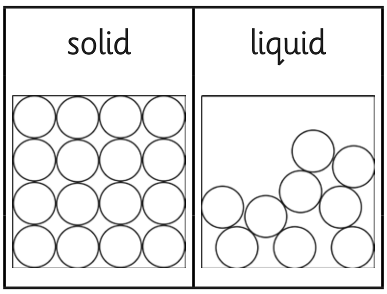
You will float the pieces of chocolate in foil tins on trays filled with different temperatures of water. How will you make sure your results are reliable? Think about what you will keep the same and what you will change.

What will you measure and observe in this investigation? Use the pictures to help you.

I will measure...

I will observe...

What do you predict will happen? Which temperature of water will melt the chocolate fastest? Why do you think this will happen? Refer to the behaviour of the particles in the pieces of chocolate in your answer.



Chocolate Investigation

Complete this table with your results:

	Tray 1	Tray 2	Tray 3
Temperature of water			
Time taken for chocolate to melt			

Draw a bar chart using your results. Don't forget to label the axes.

What is your conclusion? Can you tell Maya which temperature melts chocolate the fastest? Can you explain why this happened?

Chocolate Investigation

Can you help Maya find the temperature that melts chocolate the fastest? Plan your investigation then carry it out!

Equipment: Draw or write the things you will need.

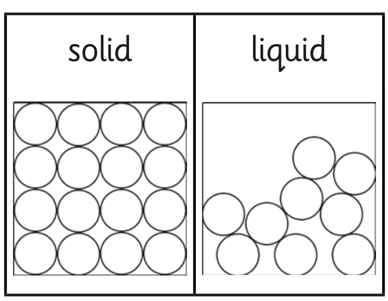
You will float the pieces of chocolate in foil tins on trays filled with different temperatures of water. How will you make sure your results are reliable? Think about what you will keep the same and what you will change.

What will you measure and observe in this investigation? Use the pictures to help you.

I will measure...

I will observe...

What do you predict will happen? Which temperature of water will melt the chocolate fastest? Why do you think this will happen? Refer to the behaviour of the particles in the pieces of chocolate in your answer.



Chocolate Investigation

Complete this table with your results:

	Tray 1	Tray 2	Tray 3
Temperature of water			
Time taken for chocolate to melt			

Draw a bar chart using your results. Don't forget to label the axes. Choose suitable intervals for the 'Time taken for the chocolate to melt' axis.

What is your conclusion? Can you tell Maya which temperature melts chocolate the fastest? Can you explain why this happened by referring to the particles in the chocolate?

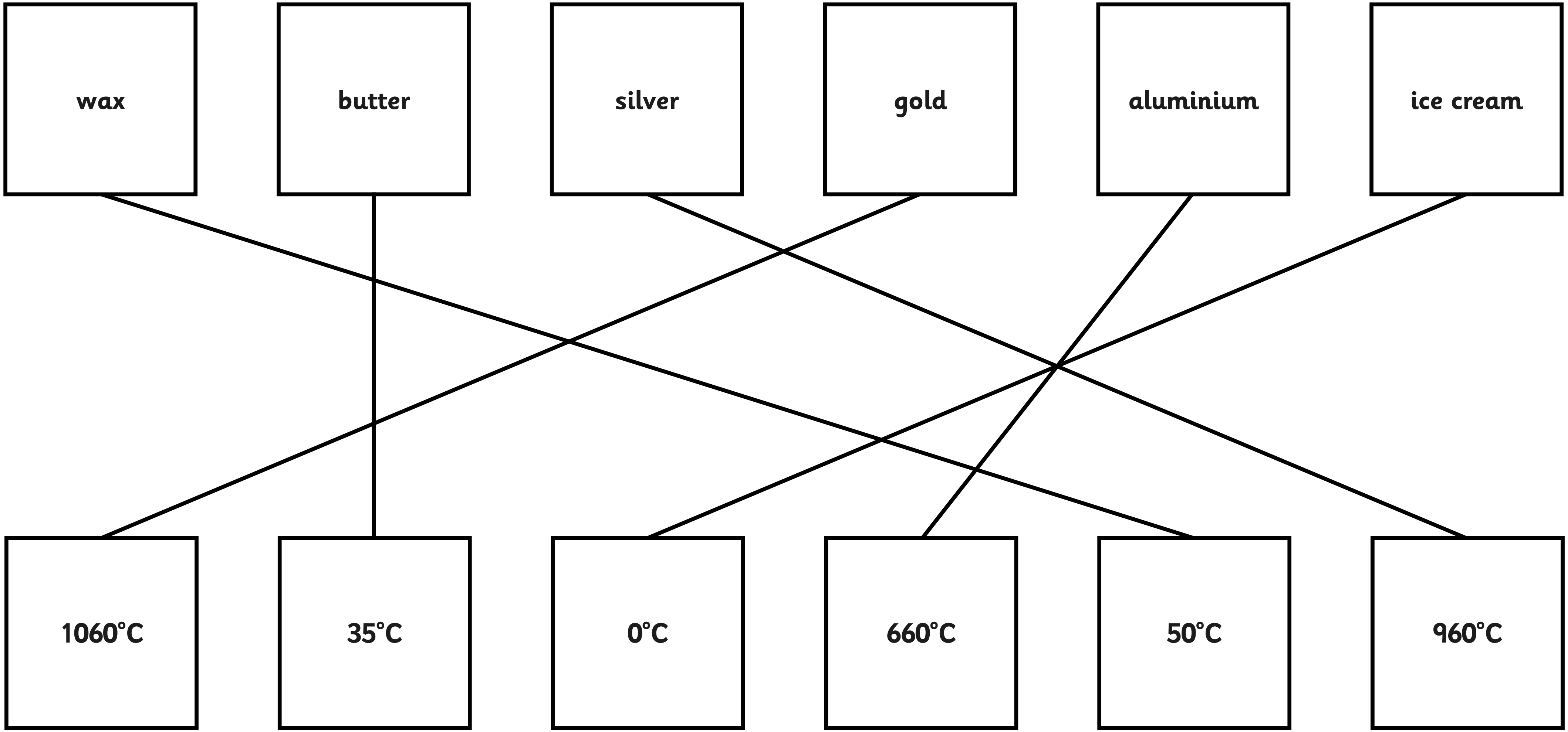
Melting Points

Can you match these materials with their approximate melting points?

wax	butter	silver	gold	aluminium	ice cream
1060°C	35°C	0°C	660°C	50°C	960°C

Why would it be useful for someone to know the melting points of these materials?

Melting Points Answers



Avery Template: Name Badge Label, 8 per sheet | **Compatible Products**:15395, 25395, 42395, 45395, 48395, 5395, 8395, 88395, 85395.

States of Matter | Heating and Cooling

I can investigate materials as they change state.		
I can understand how heat can cause solids to change to liquids and vice versa.		
I can identify materials that melt at different temperatures.		
I can investigate the melting and freezing temperature of a material.		

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States of Matter: Wonderful Water

Aim:	**Success Criteria:**	**Resources:**
To observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (˚C) by exploring how water can change its state to a solid, liquid or a gas. I can explore how water changes state.	I can identify the different states water can be in. I can identify the temperatures at which water changes state. I can identify and observe the processes that cause water to change state.	**Lesson Pack** Container of warm water with cling film stretched over it (warm water may need to be replenished as groups move round the activities) Ice cubes Kettle Plate Beakers Teaspoon Salt

Key/New Words:
Melt, freeze, condense, evaporate, process, state, water, ice, water vapour.

Preparation:
Three States of Water Questions Activity Sheet - one per group.
Three States of Water Answer Cards cut up and placed at the front of the classroom.
Differentiated **Changing State Activity Sheet** - one per child.

Prior Learning: The children will have learnt about changes of state in lessons 1 and 3.

Learning Sequence

Whole Class

The Three States of Water: Children work in groups to find answers to the questions on their **Three States of Water Questions Activity Sheet**. Place the eight **Three States of Water Answer Cards** at the front of the classroom. Each group should choose one child to come to the front to choose an answer card, then bring it back to their group. The group should work together to decide which question it answers, then write the answer card's letter next to the question. Finally, they choose a different group member to take the answer card back and swap it for a new one. They should continue until they have matched all the answers with their questions.

Exploring the Processes: Explain and clarify the children's understanding of the process of melting, freezing, evaporation and condensation by discussing the slides on the **Lesson Presentation**.

Ice Cube Investigation, Reversing Changes and Salt and Ice: Organise the children into groups. The children should draw and label their observations on their differentiated **Changing State Activity Sheet** as they work through the carousel of activities as described on the **Lesson Presentation**. Look for children who can identify the different states that the water is in, and who can explain the processes that change the state of the water.

★ Children identify the different states of water in each activity. They should use the process prompts to help them.

★★ Children identify the different states of water and the processes that occurred in each activity.

★★★ Children colour code the processes, using blue for those caused by cooling and red for those caused by heating.

Guess the Process: Children play this game in teams. Each group should choose an artist, who should come to you. Tell the artists the name of a process that causes a change of state. The artists go back to their groups, and without talking or writing words, draw a picture of the process for their group to guess. They group that guesses correctly first wins! This can be played several times.

Task*it*

***Answer*it:** Complete this worksheet by filling in the gaps to answer questions about changing state.

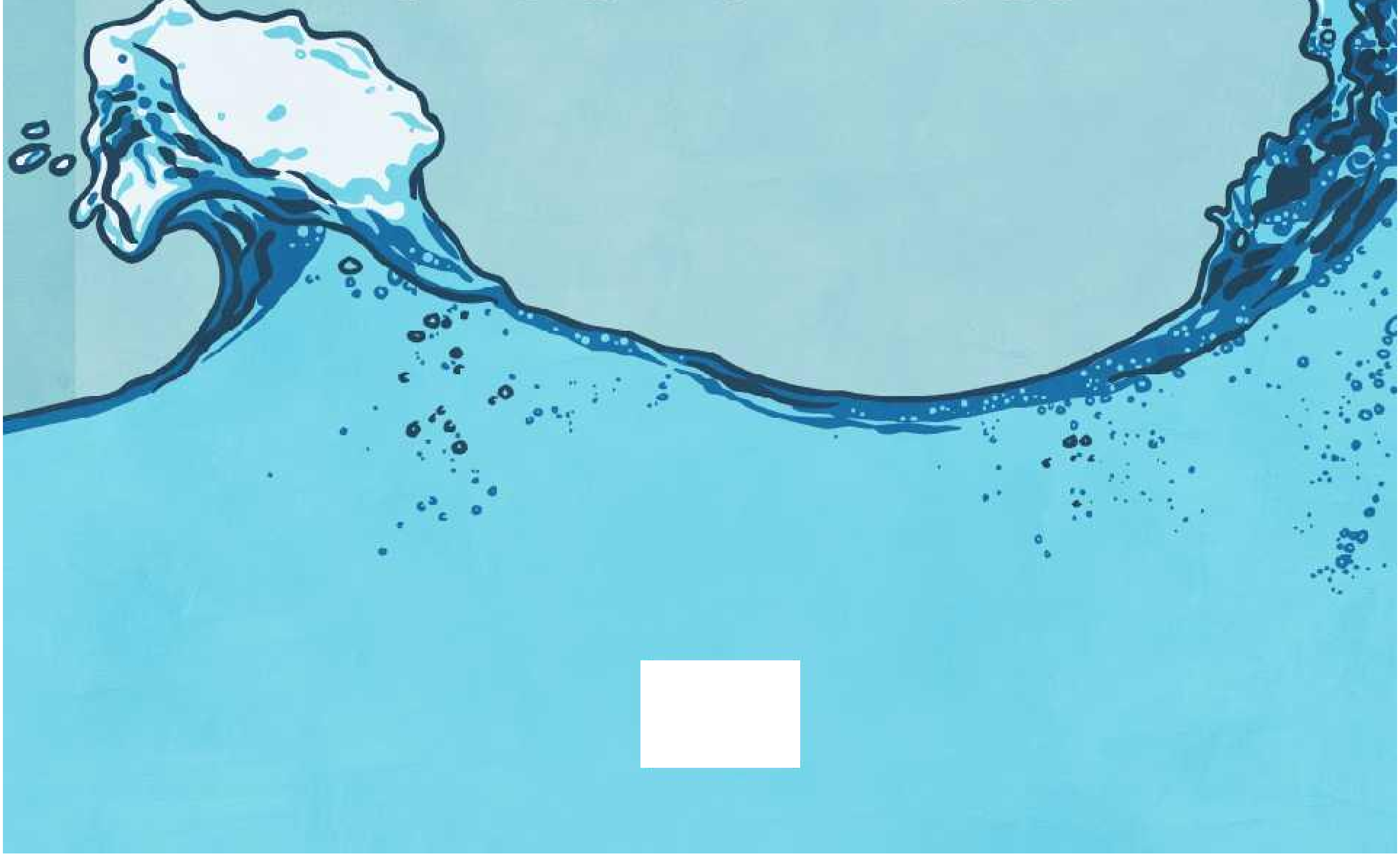
***Act*it:** Work in groups to act as the water particles as it changes state. Think about how the particles behave as they are heated or cooled.

***Explain*it:** Make a poster to explain the three states of water and the processes that change the states.

Science

States of Matter

Wonderful Water



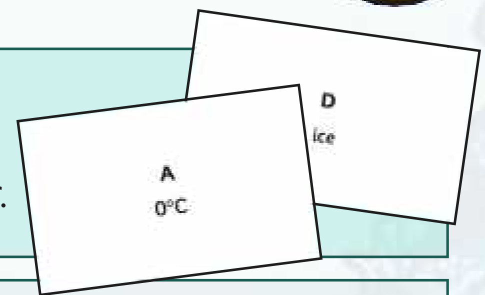
Aim

- I can explore how water changes state.

Success Criteria

- I can identify the different states water can be in.
- I can identify the temperatures at which water changes state.
- I can identify and observe the processes that cause water to change state.

The Three States of Water



Water can be in one of three states - solid, liquid or gas.

Your group has six questions about the three states of water.

At the front of the classroom are eight answers. Your task is to match the numbers of the questions with the letters of the answers!

Send one person from your group to the front to collect an answer card.

Bring it back to your group and decide which of your questions it answers.

Write the letter of the answer next to the question.

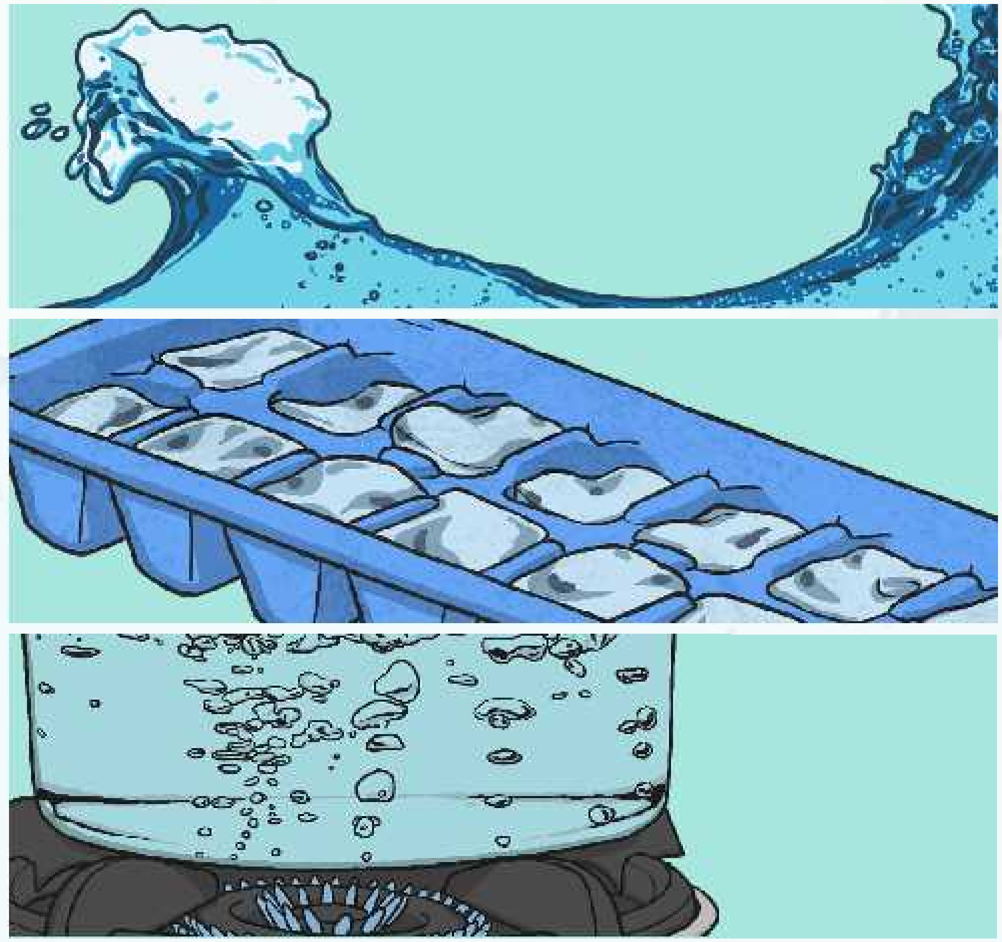
Send another person to put the answer card back and swap it for a different one.

Two of the answers are trick ones - they don't match with any question!

Repeat until you have matched all the answers to your questions.

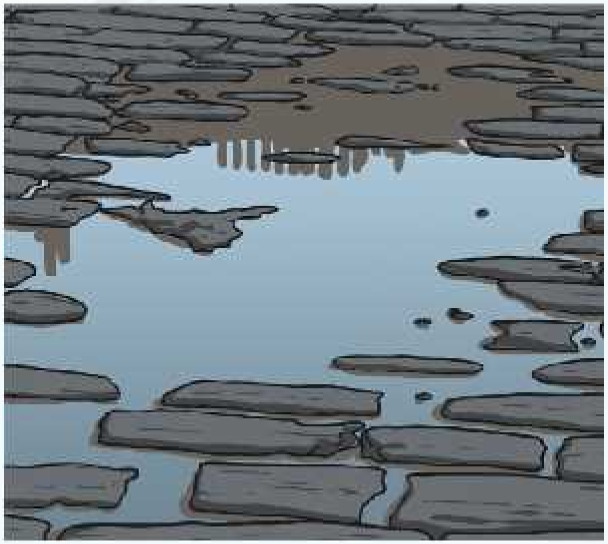
Exploring the Processes

Let's find out more about how water changes state, the processes that cause it to change and the temperatures at which it changes.

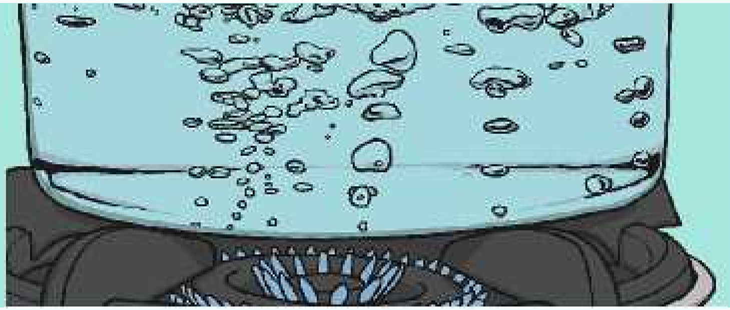


Exploring the Processes

Evaporation is when water turns into water vapour (a liquid turning to a gas).



Evaporation happens very easily when water reaches its boiling point of 100°C.



However, evaporation can happen more slowly at much lower temperatures. For example, when water in a puddle warms up, water from the surface of the puddle slowly changes to water vapour.

Exploring the Processes

Condensation is when water vapour is cooled down and turns to water (a gas turning to a liquid).

You can see that condensation has happened when you see droplets of water on a window or mirror in a warm room. The water vapour in the air has been cooled by touching the cold surface and this causes it to change to water.

Exploring the Processes

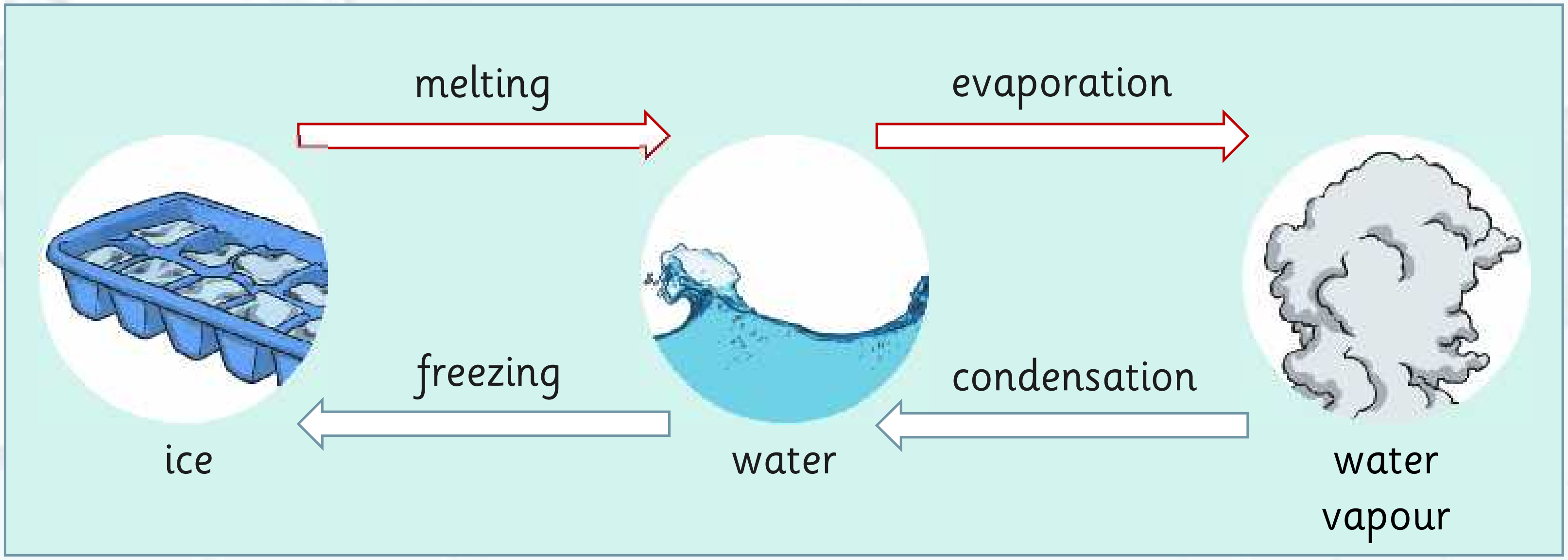
Freezing occurs when water is made very cold. When water reaches 0°C it turns to ice. (Freezing is a liquid turning to a solid.)

Exploring the Processes

Melting occurs when ice warms up and changes to water (a solid changing to a liquid).

At temperatures above 0°C, ice will melt.

Exploring the Processes



Water changes state as a result of these processes.

You will move around the classroom to explore the different processes in a series of activities.

Keep a record of your observations on your Changing State Activity Sheet.

Ice Cube Investigation

In this activity, you will place two or three ice cubes on some cling film stretched over a container of warm water.

What do you see in the container?

What can you observe on the cling film?

What processes are occurring?

Reversing Changes

Work with an adult for this activity.

Your teacher will boil a kettle. Watch the water vapour form as it boils.

How can this gas be turned back into a liquid?
Can you reverse the change?

Watch your teacher demonstrate this process.

What can you see?

Which processes have you observed?

How has the temperature caused these processes?

Salt and Ice

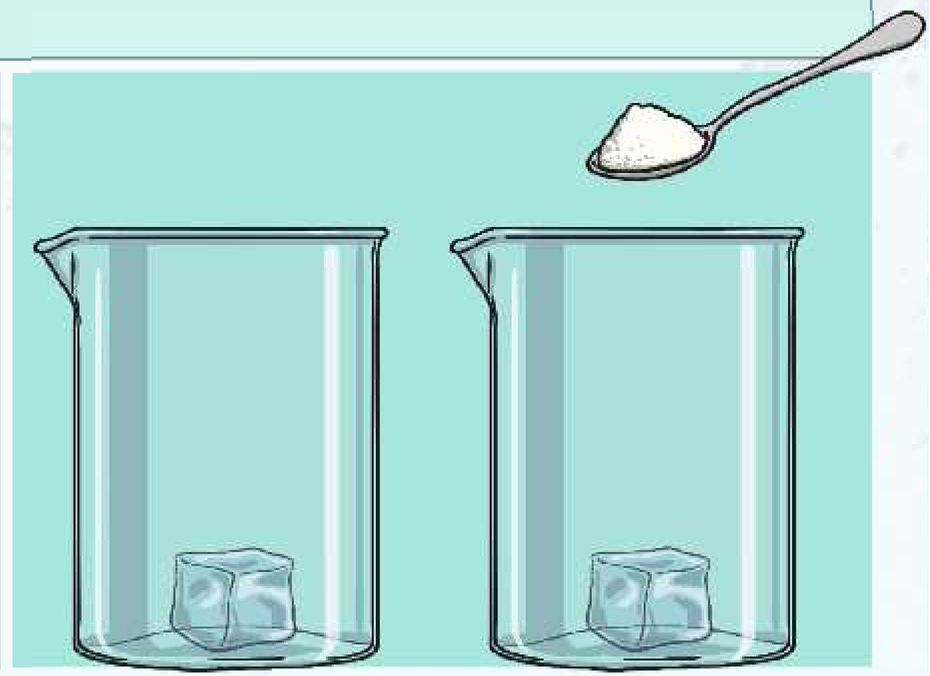
Put two ice cubes in two beakers. Put a teaspoon of salt on one ice cube, and observe what happens over a few minutes.

Use a thermometer to observe how the temperature in the beakers changes.

What do you notice happening to the two ice cubes?

What process is occurring?

What happened to the temperature in the different glasses?



Guess the Process

This is a team game in which you have to guess what your team member is drawing.

Choose one person from your group to be the artist.

The artists should go to the teacher, who will tell you the name of a process that causes a change of state.

The artists should go back to their groups, and when everybody is ready they should draw the process for their group to guess. The artist is not allowed to speak or write any words.

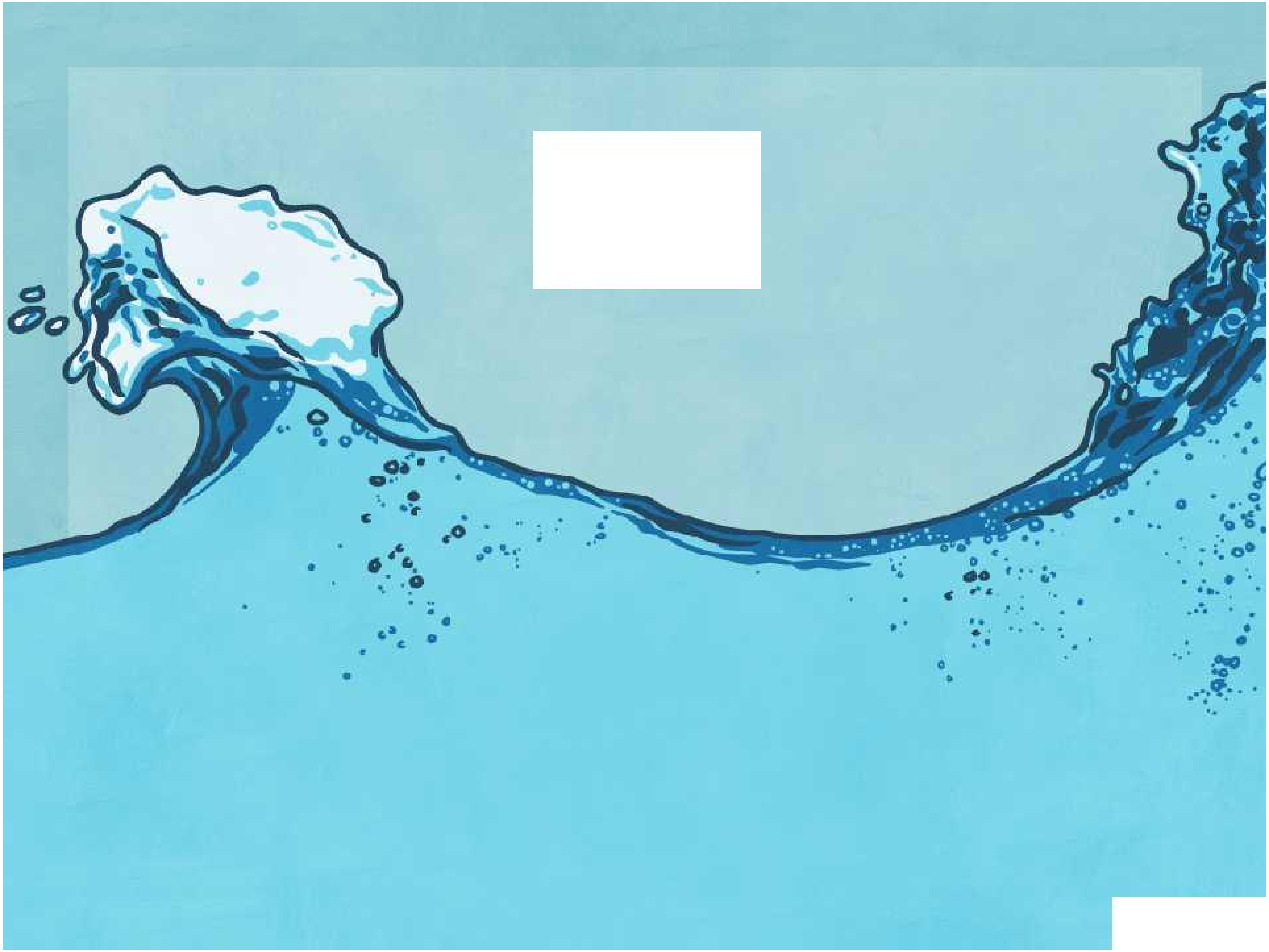
The first group to guess the process is the winner!

Aim

- I can explore how water changes state.

Success Criteria

- I can identify the different states water can be in.
- I can identify the temperatures at which water changes state.
- I can identify and observe the processes that cause water to change state.



Changing State

I can identify the different states water can be in. I can identify the temperatures at which water changes state. I can identify and observe the processes that cause water to change state.

Ice Cube Investigation

Draw a picture of this activity. Add labels to describe the different states of water.

Reversing Changes

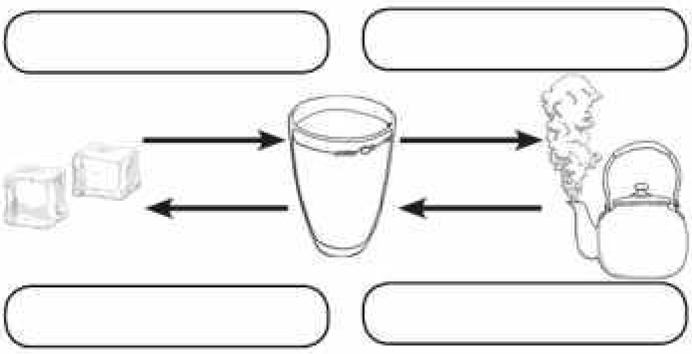
Draw a picture of the experiment your teacher carried out. Add labels to describe the different states of water.

Salt and Ice

Draw a picture of the investigation you carried out. Add labels to describe the different states of water.

Changing State Diagram

Add labels to this diagram to show the processes.

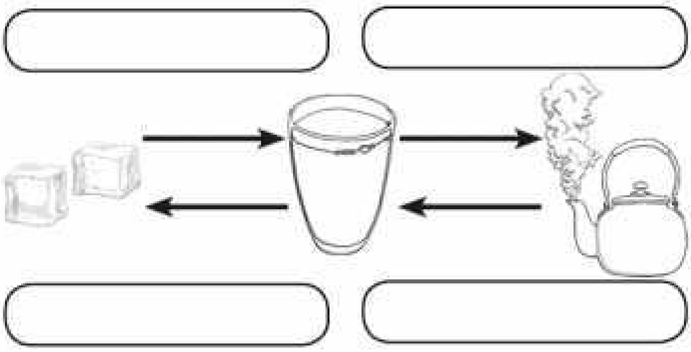


Use these words to help you:

evaporation freezing condensation melting

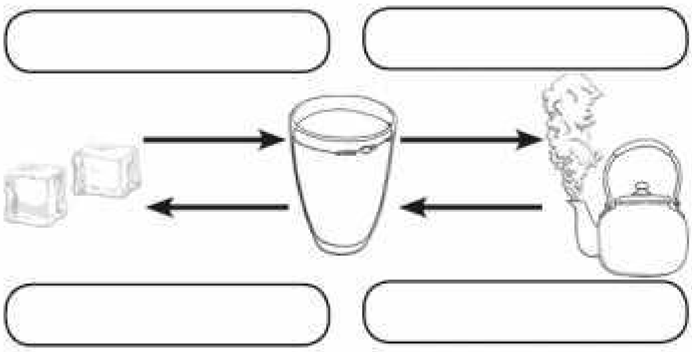
Changing State

I can identify the different states water can be in. I can identify the temperatures at which water changes state. I can identify and observe the processes that cause water to change state.

Ice Cube Investigation Draw a picture of this activity. Add labels to describe the different states of water and to identify the processes that are occurring.	**Reversing Changes** Draw a picture of the experiment your teacher carried out. Add labels to describe the different states of water and to identify the processes that occurred.
Salt and Ice Draw a picture of the investigation you carried out. Add labels to describe the different states of water and to identify the processes that occurred.	**Changing State Diagram** Add labels to this diagram to show the processes. 

Changing State

I can identify the different states water can be in. I can identify the temperatures at which water changes state. I can identify and observe the processes that cause water to change state.

Ice Cube Investigation	**Reversing Changes**
Draw a picture of this activity. Add labels to explain how the water is changing state and to identify the processes that are occurring. Use blue pen for processes caused by cooling and red for ones caused by heating.	Draw a picture of the experiment your teacher carried out. Add labels to explain how the water changed state and to identify the processes that occurred. Use blue pen for processes caused by cooling and red for ones caused by heating.
Salt and Ice Draw a picture of the investigation you carried out. Add labels to explain how the water changed state and to identify the processes that occurred. Use blue pen for processes caused by cooling and red for ones caused by heating.	**Changing State Diagram** Add labels to this diagram to show the processes. Colour the box blue if cooling causes the process to occur, or red if heating causes the process to occur. 

Changing State

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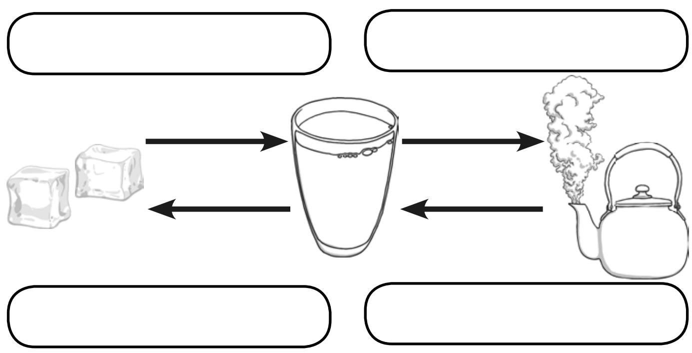

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Changing State

Ice Cube Investigation

Draw a picture of this activity. Add labels to describe the different states of water and to identify the processes that are occurring.

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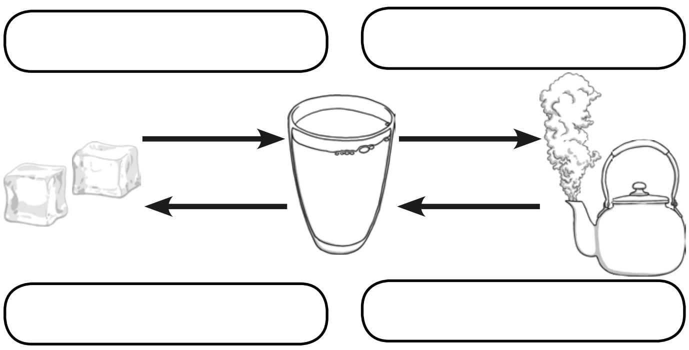

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Ice Cube Investigation	Reversing Changes
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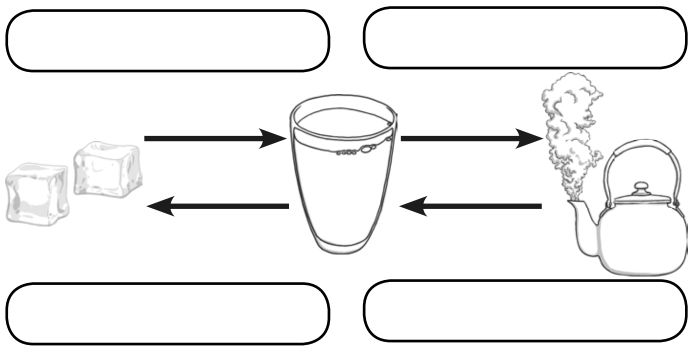
Draw a picture of the investigation you carried out. Add labels to explain how the water changed state and to identify the processes that occurred. Use blue pen for processes caused by cooling and red for ones caused by heating.	Add labels to this diagram to show the processes. Colour the box blue if cooling causes the process to occur, or red if heating causes the process to occur. 

Three States of Water

I can identify the different states water can be in.

I can identify the temperatures at which water changes state.

Write the letters of the correct answer cards next to the questions below.

Questions	Answer Card Letter
1. What is the solid state of water called?	
2. At what temperature does water freeze?	
3. What is the process whereby ice turns to water?	
4. At what temperature does water boil?	
5. What is the name for water when it is in a gaseous state?	
6. What is the name of the process that turns water to water vapour?	

Three States of Water

A 0°C	**B** water vapour
C evaporation	**D** ice
E 100°C	**F** freezing
G 1000°C	**H** melting

Three States of Water

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Three States of Water

A 0°C	**B** water vapour
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States of Matter: Wonderful Water

Aim:
To observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (˚C) by exploring how water can change its state to a solid, liquid or a gas.
I can explore how water changes state.

Success Criteria:
I can identify the different states water can be in.
I can identify the temperatures at which water changes state.
I can identify and observe the processes that cause water to change state.

Resources:
Lesson Pack
Container of warm water with cling film stretched over it (warm water may need to be replenished as groups move round the activities)
Ice cubes
Kettle
Plate
Beakers
Teaspoon
Salt

Key/New Words:
Melt, freeze, condense, evaporate, process, state, water, ice, water vapour.

Preparation:
Three States of Water Questions Activity Sheet - one per group.
Three States of Water Answer Cards cut up and placed at the front of the classroom.
Differentiated **Changing State Activity Sheet** - one per child.

Prior Learning: The children will have learnt about changes of state in lessons 1 and 3.

Learning Sequence

Whole Class	**The Three States of Water:** Children work in groups to find answers to the questions on their **Three States of Water Questions Activity Sheet**. Place the eight **Three States of Water Answer Cards** at the front of the classroom. Each group should choose one child to come to the front to choose an answer card, then bring it back to their group. The group should work together to decide which question it answers, then write the answer card's letter next to the question. Finally, they choose a different group member to take the answer card back and swap it for a new one. They should continue until they have matched all the answers with their questions.
	Exploring the Processes: Explain and clarify the children's understanding of the process of melting, freezing, evaporation and condensation by discussing the slides on the **Lesson Presentation**.
	Ice Cube Investigation, Reversing Changes and Salt and Ice: Organise the children into groups. The children should draw and label their observations on their differentiated **Changing State Activity Sheet** as they work through the carousel of activities as described on the **Lesson Presentation**. Look for children who can identify the different states that the water is in, and who can explain the processes that change the state of the water. ★ Children identify the different states of water in each activity. They should use the process prompts to help them. ★★ Children identify the different states of water and the processes that occurred in each activity. ★★★ Children colour code the processes, using blue for those caused by cooling and red for those caused by heating.
	Guess the Process: Children play this game in teams. Each group should choose an artist, who should come to you. Tell the artists the name of a process that causes a change of state. The artists go back to their groups, and without talking or writing words, draw a picture of the process for their group to guess. They group that guesses correctly first wins! This can be played several times.

Task*it*
***Answer*it:** Complete this worksheet by filling in the gaps to answer questions about changing state.
***Act*it:** Work in groups to act as the water particles as it changes state. Think about how the particles behave as they are heated or cooled.
***Explain*it:** Make a poster to explain the three states of water and the processes that change the states.

Science

States of Matter


Wonderful Water

Aim

- I can explore how water changes state.

Success Criteria

- I can identify the different states water can be in.
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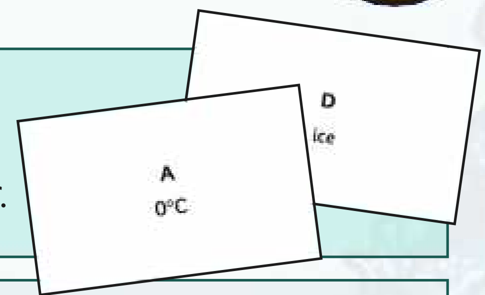
The Three States of Water



Water can be in one of three states - solid, liquid or gas.

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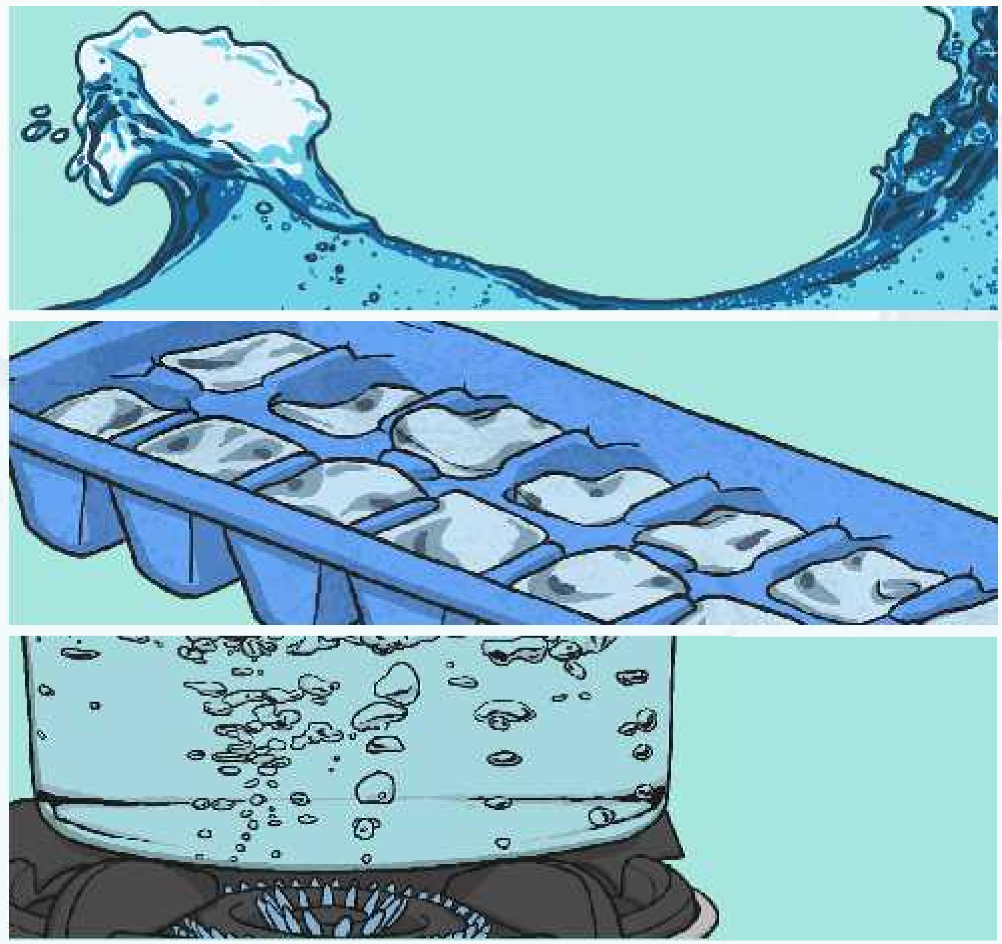
Send another person to put the answer card back and swap it for a different one.

Two of the answers are trick ones - they don't match with any question!

Repeat until you have matched all the answers to your questions.

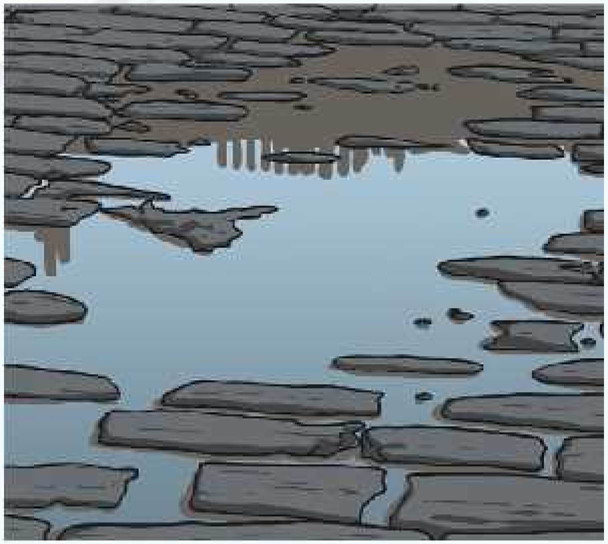
Exploring the Processes

Let's find out more about how water changes state, the processes that cause it to change and the temperatures at which it changes.

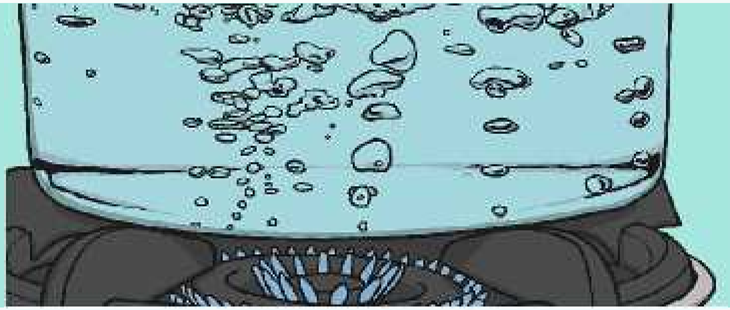


Exploring the Processes

Evaporation is when water turns into water vapour (a liquid turning to a gas).



Evaporation happens very easily when water reaches its boiling point of 100°C.



However, evaporation can happen more slowly at much lower temperatures. For example, when water in a puddle warms up, water from the surface of the puddle slowly changes to water vapour.

Exploring the Processes

Condensation is when water vapour is cooled down and turns to water (a gas turning to a liquid).

You can see that condensation has happened when you see droplets of water on a window or mirror in a warm room. The water vapour in the air has been cooled by touching the cold surface and this causes it to change to water.

Exploring the Processes

Whole Class

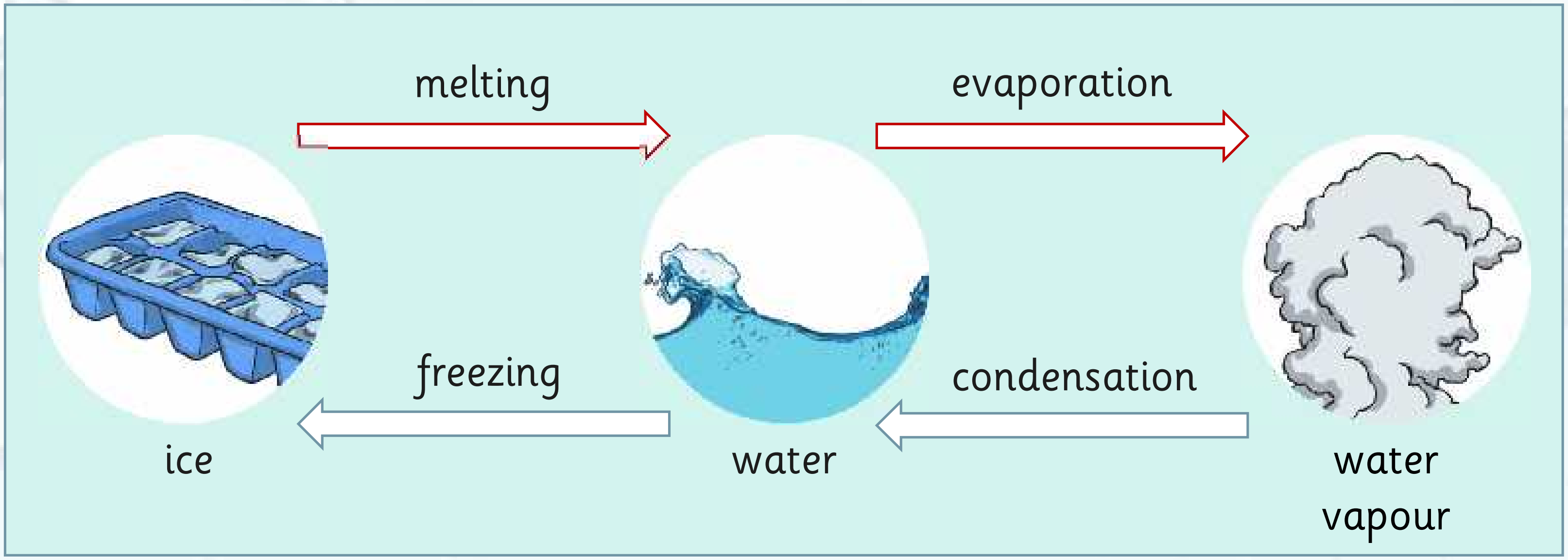
Freezing occurs when water is made very cold. When water reaches 0°C it turns to ice. (Freezing is a liquid turning to a solid.)

Exploring the Processes

Melting occurs when ice warms up and changes to water (a solid changing to a liquid).

At temperatures above 0°C, ice will melt.

Exploring the Processes



Water changes state as a result of these processes.

You will move around the classroom to explore the different processes in a series of activities.

Keep a record of your observations on your Changing State Activity Sheet.

Ice Cube Investigation

In this activity, you will place two or three ice cubes on some cling film stretched over a container of warm water.

What do you see in the container?

What can you observe on the cling film?

What processes are occurring?

Reversing Changes

Work with an adult for this activity.

Your teacher will boil a kettle. Watch the water vapour form as it boils.

How can this gas be turned back into a liquid?
Can you reverse the change?

Watch your teacher demonstrate this process.

What can you see?

Which processes have you observed?

How has the temperature caused these processes?

Salt and Ice

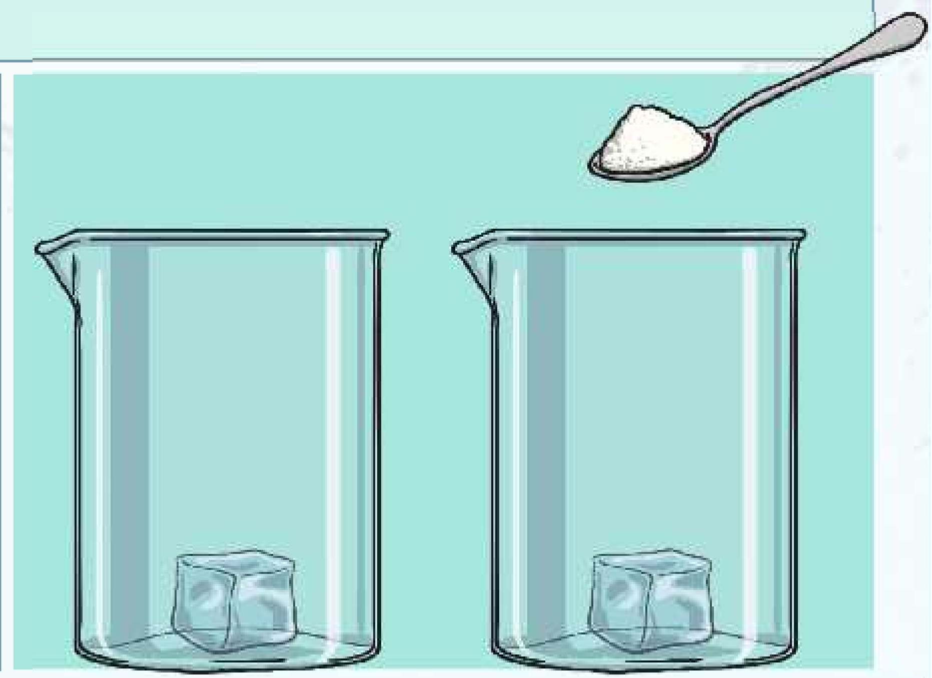
Put two ice cubes in two beakers. Put a teaspoon of salt on one ice cube, and observe what happens over a few minutes.

Use a thermometer to observe how the temperature in the beakers changes.

What do you notice happening to the two ice cubes?

What process is occurring?

What happened to the temperature in the different glasses?



Guess the Process

This is a team game in which you have to guess what your team member is drawing.

Choose one person from your group to be the artist.

The artists should go to the teacher, who will tell you the name of a process that causes a change of state.

The artists should go back to their groups, and when everybody is ready they should draw the process for their group to guess. The artist is not allowed to speak or write any words.

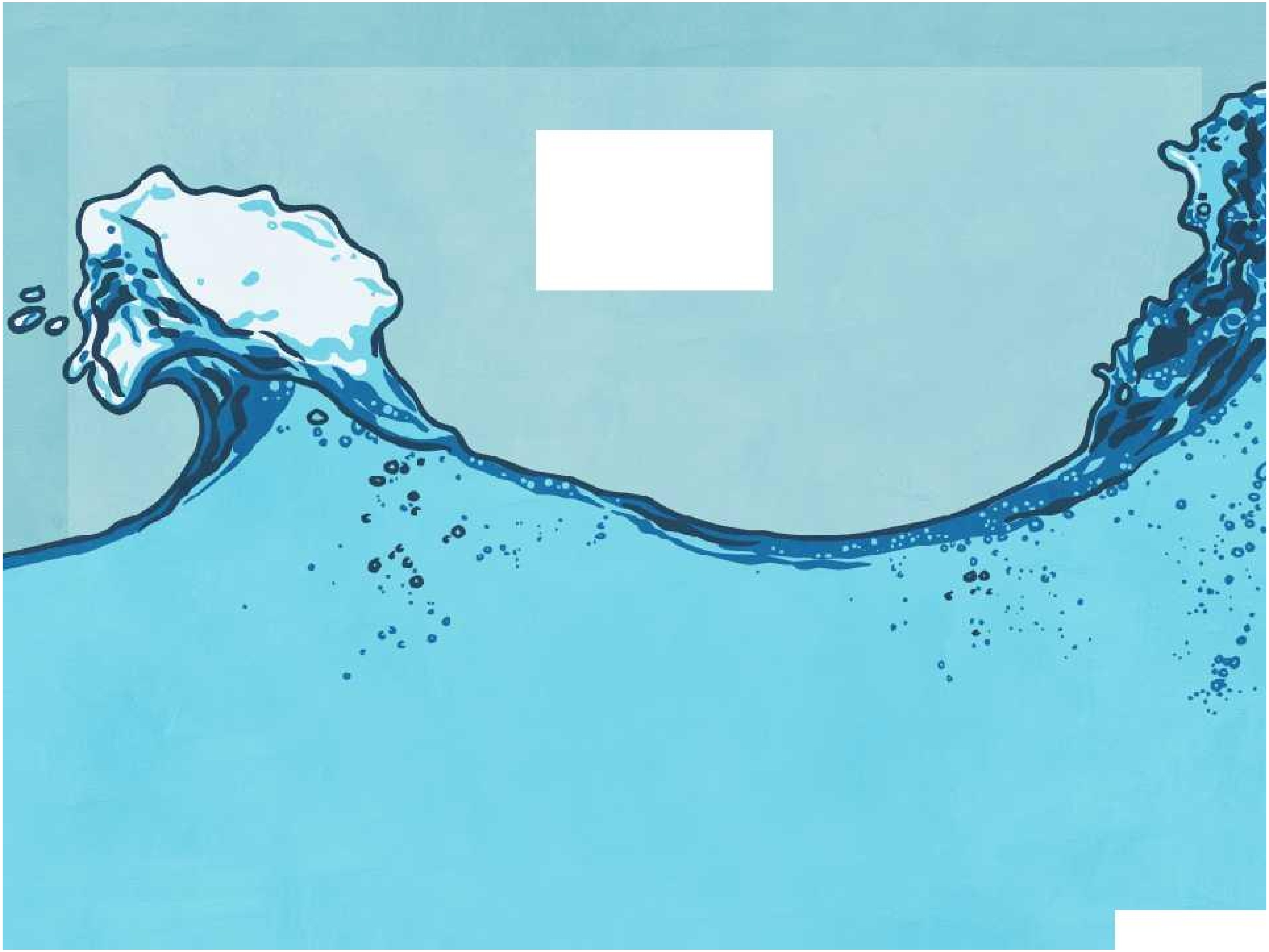
The first group to guess the process is the winner!

Aim

- I can explore how water changes state.

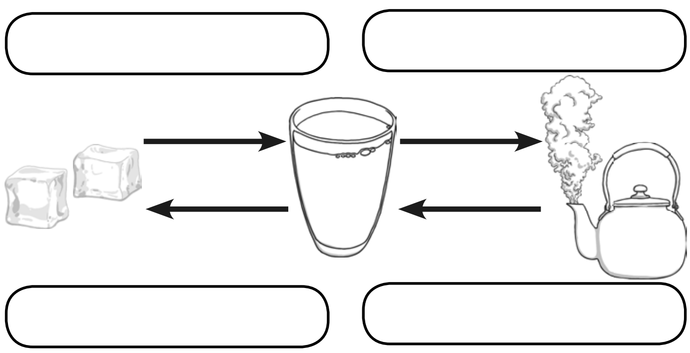
Success Criteria

- I can identify the different states water can be in.
- I can identify the temperatures at which water changes state.
- I can identify and observe the processes that cause water to change state.



Changing State

Ice Cube Investigation	Reversing Changes
Draw a picture of this activity. Add labels to describe the different states of water.	Draw a picture of the experiment your teacher carried out. Add labels to describe the different states of water.

Salt and Ice	Changing State Diagram
Draw a picture of the investigation you carried out. Add labels to describe the different states of water.	Add labels to this diagram to show the processes.  **Use these words to help you:** evaporation freezing condensation melting

Changing State

Ice Cube Investigation

Draw a picture of this activity. Add labels to describe the different states of water and to identify the processes that are occurring.

Reversing Changes

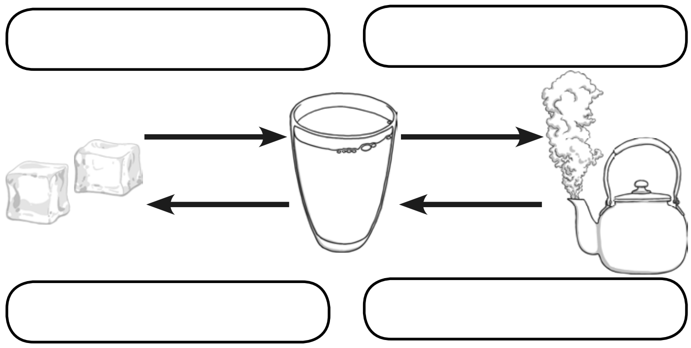
Draw a picture of the experiment your teacher carried out. Add labels to describe the different states of water and to identify the processes that occurred.

Salt and Ice

Draw a picture of the investigation you carried out. Add labels to describe the different states of water and to identify the processes that occurred.

Changing State Diagram

Add labels to this diagram to show the processes.



Changing State

Ice Cube Investigation

Draw a picture of this activity. Add labels to explain how the water is changing state and to identify the processes that are occurring. Use blue pen for processes caused by cooling and red for ones caused by heating.

Reversing Changes

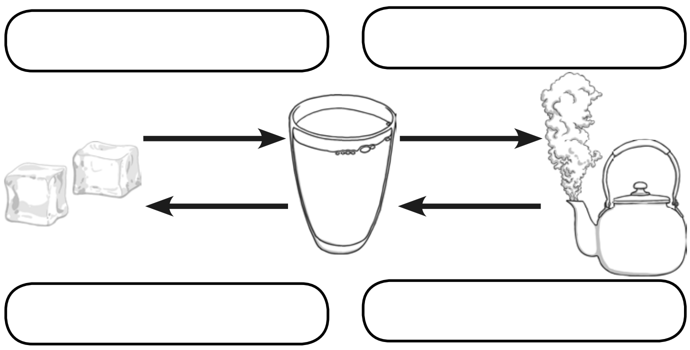
Draw a picture of the experiment your teacher carried out. Add labels to explain how the water changed state and to identify the processes that occurred. Use blue pen for processes caused by cooling and red for ones caused by heating.

Salt and Ice

Draw a picture of the investigation you carried out. Add labels to explain how the water changed state and to identify the processes that occurred. Use blue pen for processes caused by cooling and red for ones caused by heating.

Changing State Diagram

Add labels to this diagram to show the processes. Colour the box blue if cooling causes the process to occur, or red if heating causes the process to occur.



Three States of Water

Write the letters of the correct answer cards next to the questions below.

Questions	Answer Card Letter
1. What is the solid state of water called?	
2. At what temperature does water freeze?	
3. What is the process whereby ice turns to water?	
4. At what temperature does water boil?	
5. What is the name for water when it is in a gaseous state?	
6. What is the name of the process that turns water to water vapour?	

Three States of Water

A 0°C	**B** water vapour
C evaporation	**D** ice
E 100°C	**F** freezing
G 1000°C	**H** melting

States of Matter | Wonderful Water

I can explore how water changes state.		
I can identify the different states water can be in.		
I can identify the temperatures at which water changes state.		
I can identify and observe the processes that cause water to change state.		

States of Matter | Wonderful Water

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States of Matter: Evaporation Investigation

Aim:	**Success Criteria:**	**Resources:**
To associate the rate of evaporation with temperature by investigating the effect of temperature on drying washing. To make systematic, careful and accurate observations and measurements and report on findings from enquiries by displaying results and conclusions by investigating the effect of temperature on drying washing. I can investigate how water evaporates.	I can explain the effect of temperature on the process of evaporation. I can plan and carry out a comparative test using equipment accurately and display my results.	**Lesson Pack** Tea towels - 3 per group Water and measuring jugs - 1 per group Weighing scales - 1 set per group Three washing lines and pegs Thermometers - 1 per group Clock Access to places in different temperatures, where the washing lines can be set up

Key/New Words:
Evaporation, particles, liquid, gas, weight, dry, energy, state, heat.

Preparation:
This lesson involves an investigation into how fast water evaporates in order to dry towels. It may be best to start the lesson in the morning, set up the investigation, then return to it in the afternoon to gather results and form conclusions. Alternatively, it could be set up in the afternoon and returned to the following day.
Evaporation Statements stuck up around the classroom
Differentiated **Evaporation Investigation Activity Sheet** - 1 per child
States of Matter Vocabulary Poster - as required.

Prior Learning: The children will have learnt about the evaporation of water in lesson 4.

Learning Sequence

How Do Wet Clothes Dry? Recap the process of evaporation using the diagram on the **Lesson Presentation**. Explain that evaporation is responsible for the fact that clothes dry when you hang them on a washing line. Children read the **Evaporation Statements** stuck around the room, and think about whether they disagree or agree with each one. They can write their thoughts and ideas around the statements. Share the answer using the **Lesson Presentation** and address any misconceptions.

Does the Temperature Affect How Fast Towels Dry? Introduce the investigation. Ensure that children understand that when the towels dry, the water will evaporate from them. Describe the equipment the children will have access to. Encourage the children to think about the points on the **Lesson Presentation**. If necessary, point out the measuring jug and suggest they pour the same amount of water over each towel, or soak each towel in the same amount of water. You may want to point out the scales, and suggest they weigh the wet towels at the start, and then weigh them again at the end. The difference between the two weights will show how much water has evaporated from each towel. Ask the children to plan their investigation using their differentiated **Evaporation Investigation Activity Sheet**. Look for children who can plan and carry out their investigation accurately.

- ★ Children use the prompts to answer questions in order to plan the investigation. Make a prediction.
- ★★★ Children answer questions to plan the investigation and explain their prediction.

Finding the Answer: Children carry out the investigation and record their results on their differentiated **Evaporation Investigation Activity Sheet**.

Displaying Your Conclusions: Ask the children to look at their results. They should describe their results and come to a conclusion using their differentiated **Washing Line Conclusions Activity Sheet**. This sheet is designed for display, allowing the children to share their thoughts with others. Look for children who can describe and explain the effect of temperature on evaporation in the context of drying washing.

- ★ Children use the prompts to describe their results, make a conclusion and explain what happened. They could use the **States of Matter Vocabulary Poster** for support.
- ★★ Children use the prompts to describe their results, make a conclusion and explain what happened.
- ★★★ Children complete the activity sheet without prompts.

Sharing Ideas and Evaluating: Display the **Washing Line Conclusions Activity Sheets** where others can see them. In this lesson (by placing them on tables so that the class can walk round and view them, or on a display board). Children look at each others' results and conclusions, and discuss whether they agree and if their conclusions and answers are similar. Discuss similarities and differences. Ask children to talk to their partner about ways they might improve the investigation and then feedback as a whole class. Can children also discuss any further scientific questions they would like to investigate following on from this investigation?

Task*it*

***Investigate*it:** Set up a different evaporation investigation! Try placing beakers of water with different temperatures in the same location and see how much water evaporates from each one. Or use three differently shaped containers with the same amount of water and the same temperature.

***Write*it:** Can you write an acrostic poem about evaporation? Or how about a shape poem?

***Snap*it:** After it has rained, take a photo of a puddle every hour. Take pictures until the puddle evaporates (this is best done on a sunny day!). Print out the photos and use them to create a time line of the evaporation process.

Science

States of Matter

Evaporation Investigation

Aim

- I can investigate how water evaporates.

Success Criteria

- I can explain the effect of temperature on the process of evaporation.
- I can plan and carry out a comparative test using equipment accurately and display my results.

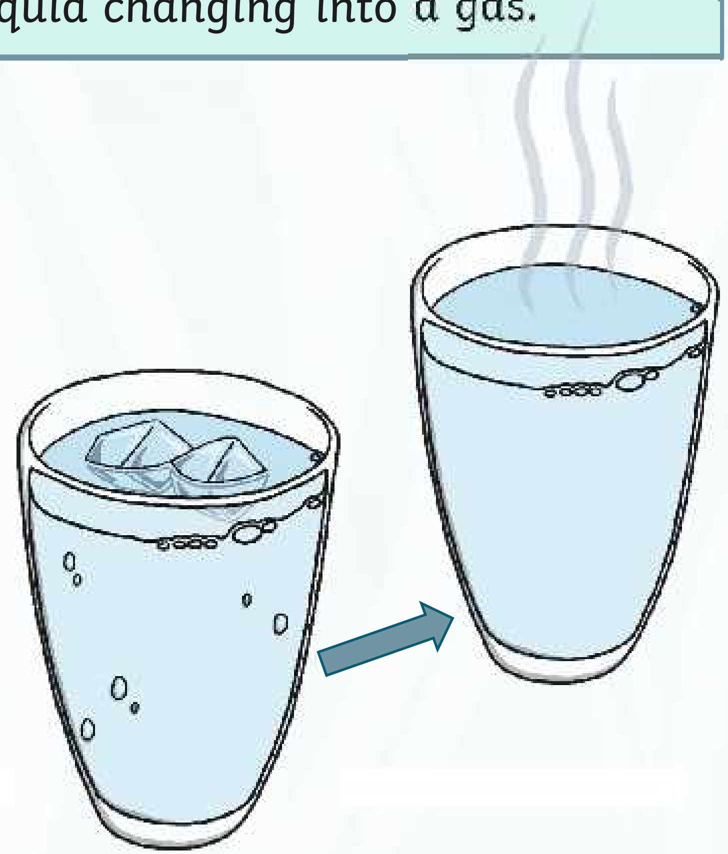
How Do Wet Clothes Dry?

Whole Class

Evaporation is the process of a liquid changing into a gas.

When clothes dry on the washing line, it is evaporation that causes the liquid on the wet clothes to turn into gas, leaving the clothes dry.

But how is the water evaporated from the wet clothes? Around the room are some children's ideas about what makes this happen. Have a look at each statement, think about whether you agree or disagree with it, and write your ideas around it.



How Do Wet Clothes Dry?

This boy has the answer!

The particles in a liquid have energy and are moving around each other quite fast. Some of the particles move so quickly that they turn into a gas and move away from the liquid.

This happens quickly if the liquid is boiling, but when clothes are drying it is not that hot so I think it just happens slower. Eventually all the particles will have changed into a gas and the clothes will be dry!

How Do Wet Clothes Dry?

When clothes are hung on a washing line to dry, they are exposedto heat. They are not boiling, but there is some heat.

The particles in the liquid water are moving around and over each other, and some particles move faster than others.

These particles move so fast that they change state, turning into water vapour. The particles of water vapour move away from the clothes, spreading out into the air. The particles don't turn into air!

Eventually, if the clothes are left on the washing line for long enough, all the particles of liquid water will change state into gaseous water vapour. The water will have evaporated and the clothes will be dry.

Does the Temperature Affect How Fast Towels Dry?

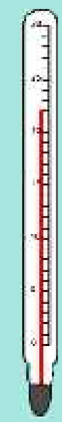
You are going to work in a group to plan and set up an investigation to find the answer to this question.

You will have access to the following equipment:

three tea towels

water

measuring jug



thermometer

scales

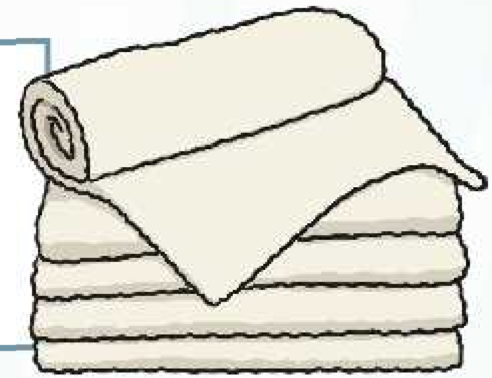
washing lines

a clock

Does the Temperature Affect How Fast Towels Dry?

You will need to decide how to use the equipment to answer this question.

You will also make a prediction about what you think the answer will be.

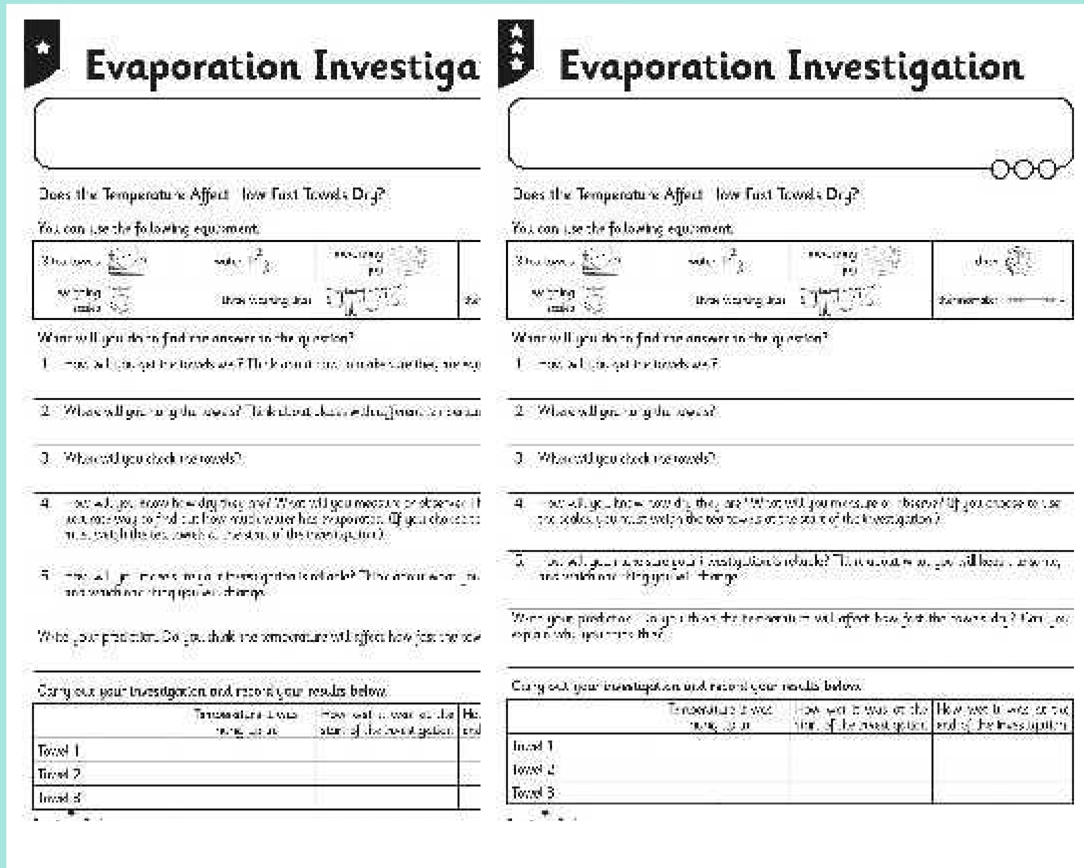


You must think about how you will make sure each towel is equally wet at the start of the investigation. If one towel is completely wet through but another is just damp then you won't get reliable results!

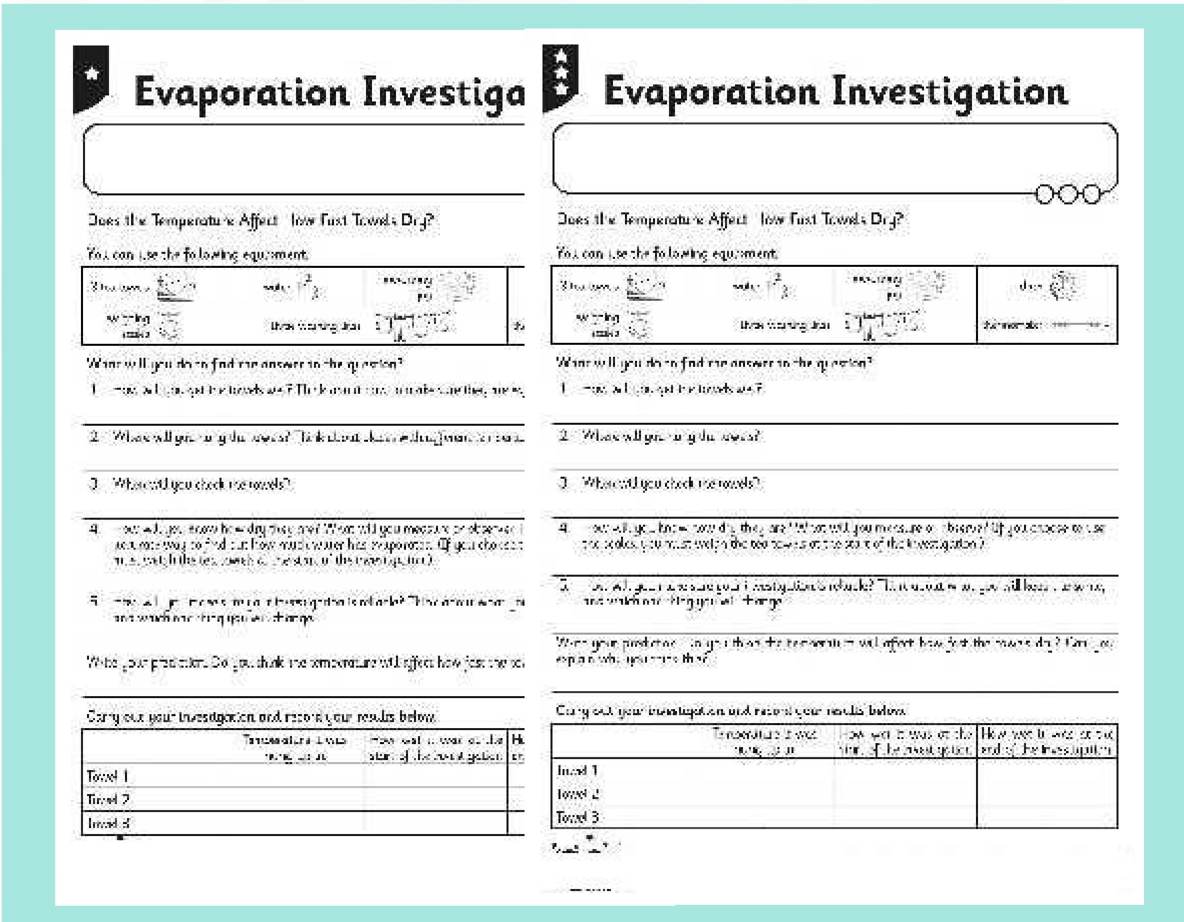
You should also think carefully about how you will be able to tell how dry the tea towels are after they have been hung up on the washing lines for some time. Will you feel them, observe them, measure their temperature, find their weight, or something else?

Does the Temperature Affect How Fast Towels Dry?

Plan your investigation on your Evaporation Investigation Activity Sheet.



Finding the Answer


Evaporation Investigation

Does the Temperature Affect How Fast Towels Dry?

You can use the following equipment:

What will you do to find the answer to the question?

Carry out your investigation and record your results below.

	Temperature it was hung up at	How wet it was at the start of the investigation	How wet it was at the end of the investigation
Towel 1			
Towel 2			
Towel 3			

When you are ready, carry out the investigation!

Record your results on the table on your Evaporation Investigation Activity Sheet.

Sharing Ideas and Evaluating

Whole Class

Display your results and conclusions so that others can see them.

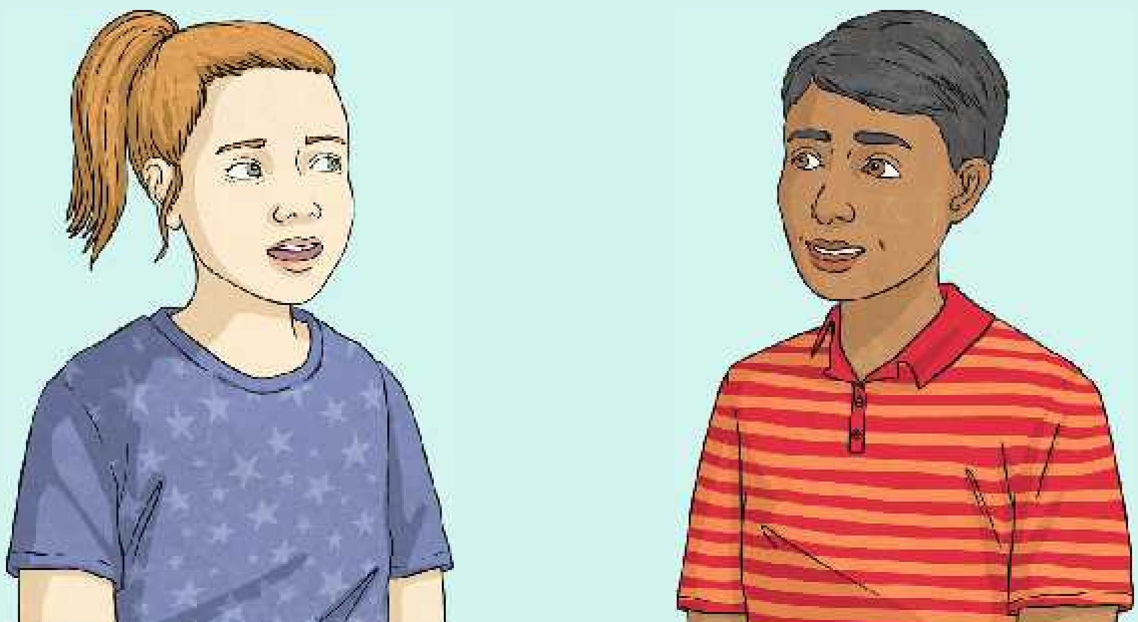
Have a look at other children's results and conclusions.

Have your classmates found out whether temperature affects how fast towels dry? Do they agree with you?

Sharing Ideas and Evaluating

How could we improve this investigation?

Are there any further questions you would like to investigate following on from this investigation?



Aim

- I can investigate how water evaporates.

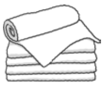
Success Criteria

- I can explain the effect of temperature on the process of evaporation.
- I can plan and carry out a comparative test using equipment accurately and display my results.

Evaporation Investigation

Does the Temperature Affect How Fast Towels Dry?

You can use the following equipment:

3 tea towels 	water 	measuring jug 	clock 
weighing scales 	three washing lines 		thermometer

What will you do to find the answer to the question?

1. How will you get the towels wet? Think about how to make sure they are equally wet.

2. Where will you hang the towels? Think about places with different temperatures.

3. When will you check the towels?

4. How will you know how dry they are? What will you measure or observe? Think about the most accurate way to find out how much water has evaporated. (If you choose to use the scales, you must weigh the tea towels at the start of the investigation.)

5. How will you make sure your investigation is reliable? Think about what you will keep the same, and which one thing you will change.

Write your prediction. Do you think the temperature will affect how fast the towels dry?

Carry out your investigation and record your results below.

	Temperature it was hung up in	How wet it was at the start of the investigation	How wet it was at the end of the investigation
Towel 1			
Towel 2			
Towel 3			

Evaporation Investigation

Does the Temperature Affect How Fast Towels Dry?

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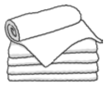
3 tea towels 	water 	measuring jug 	clock 
weighing scales 	three washing lines 		thermometer

What will you do to find the answer to the question?

1. How will you get the towels wet?

2. Where will you hang the towels?

3. When will you check the towels?

4. How will you know how dry they are? What will you measure or observe? (If you choose to use the scales, you must weigh the tea towels at the start of the investigation.)

5. How will you make sure your investigation is reliable? Think about what you will keep the same, and which one thing you will change.

Write your prediction. Do you think the temperature will affect how fast the towels dry? Can you explain why you think this?

Carry out your investigation and record your results below.

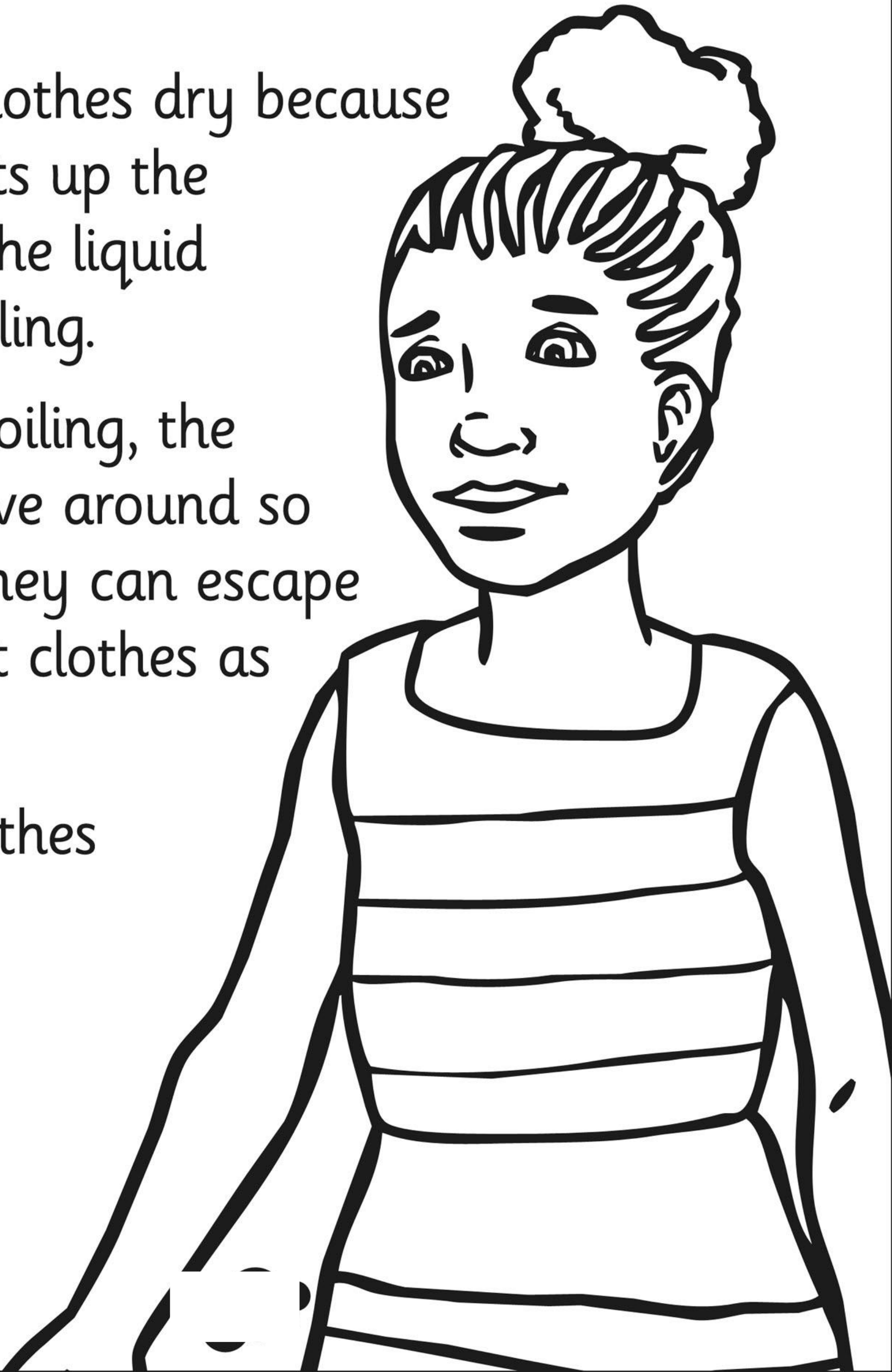
	Temperature it was hung up in	How wet it was at the start of the investigation	How wet it was at the end of the investigation
Towel 1			
Towel 2			
Towel 3			

How Do Wet Clothes Dry?

I think the clothes dry because the Sun heats up the particles in the liquid until it is boiling.

When it is boiling, the particles move around so much that they can escape from the wet clothes as steam.

Then the clothes will be dry!



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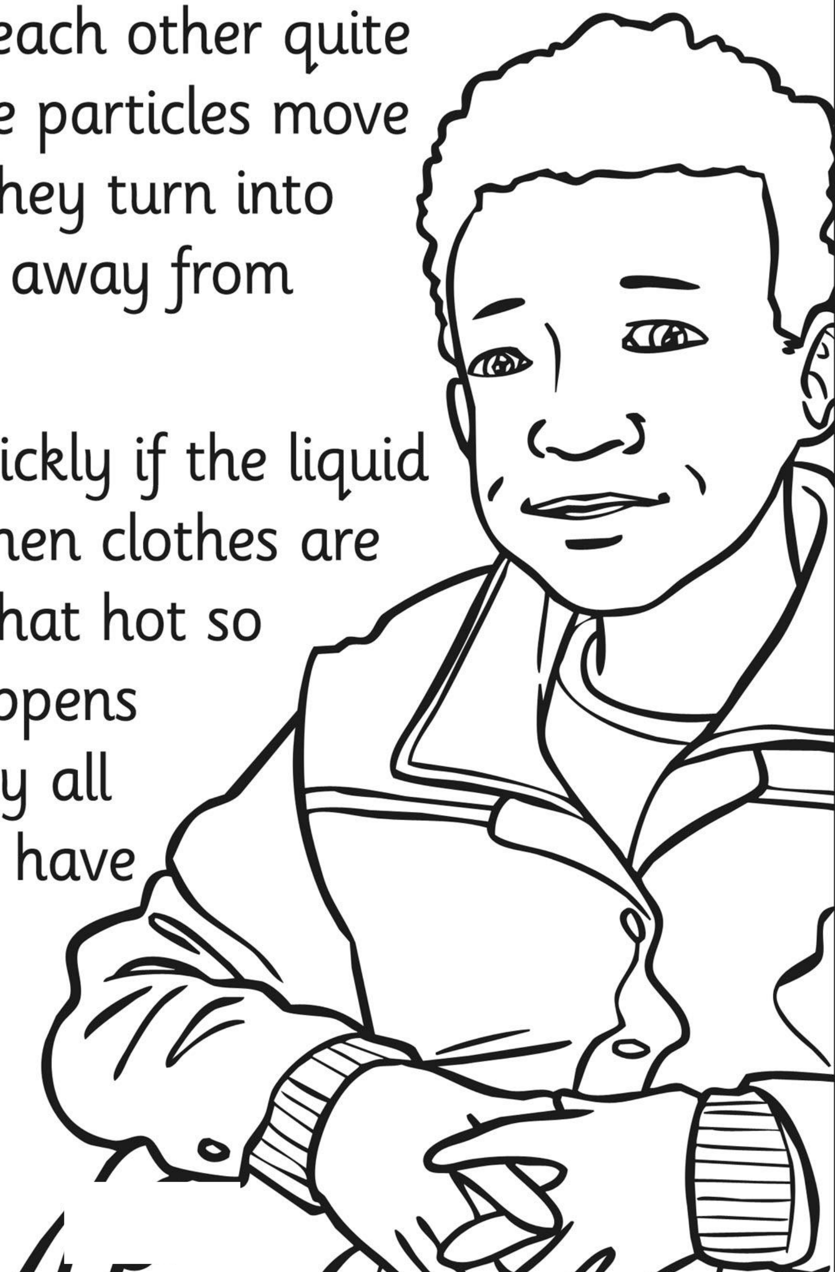
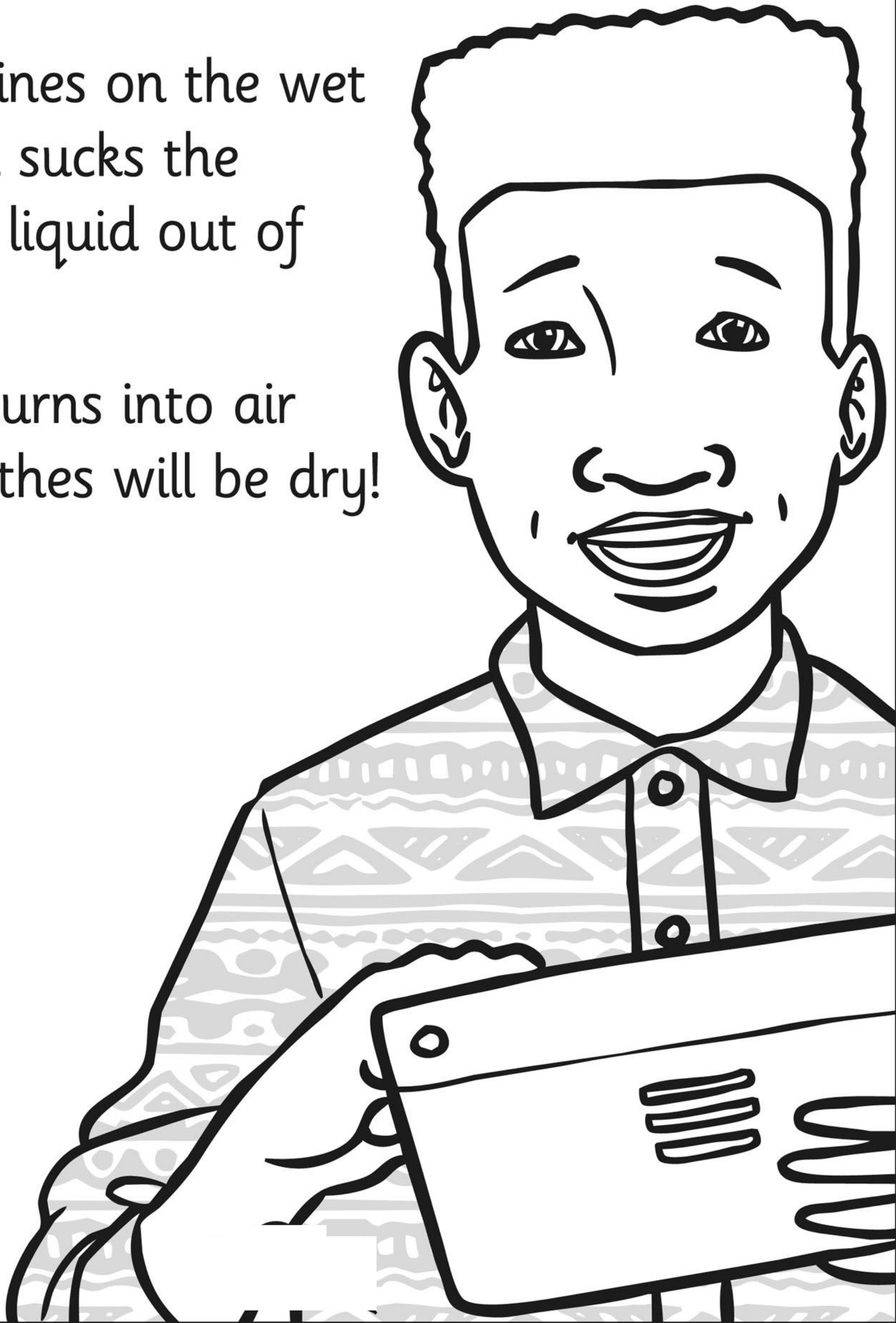


This happens quickly if the liquid is boiling, but when clothes are drying it is not that hot so I think it just happens slower. Eventually all the particles will have changed into a gas the clothes will be dry!

How Do Wet Clothes Dry?

The Sun shines on the wet clothes and sucks the particles of liquid out of the clothes.

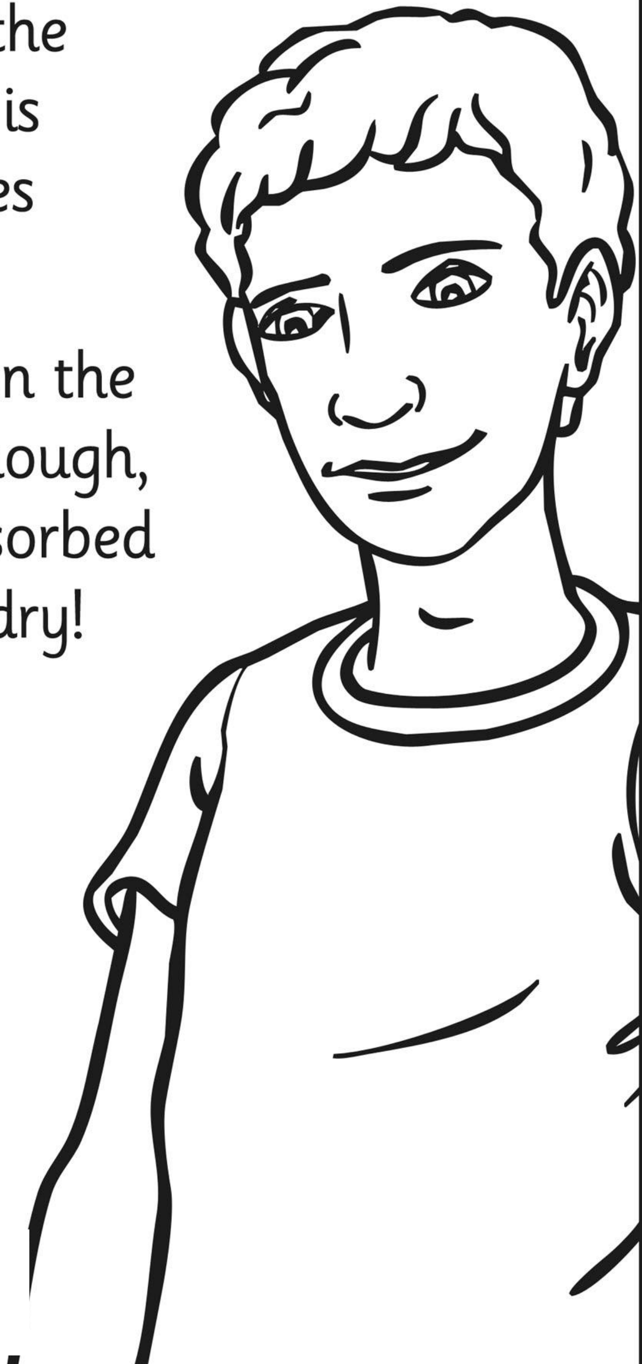
The liquid turns into air and the clothes will be dry!



How Do Wet Clothes Dry?

When clothes hang on the washing line, the water is absorbed into the clothes by the Sun.

When they have been on the washing line for long enough, all the water will be absorbed and the clothes will be dry!



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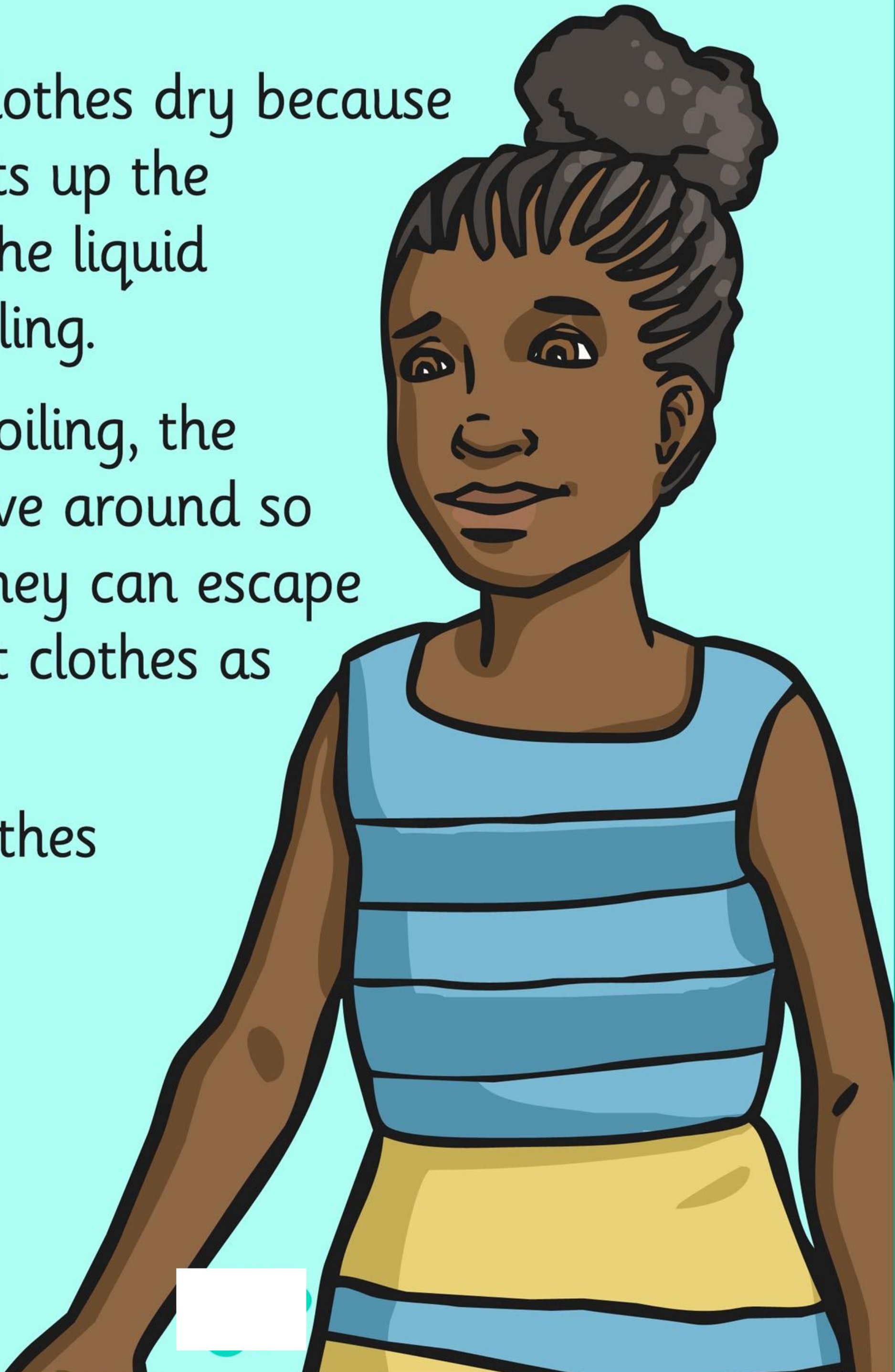

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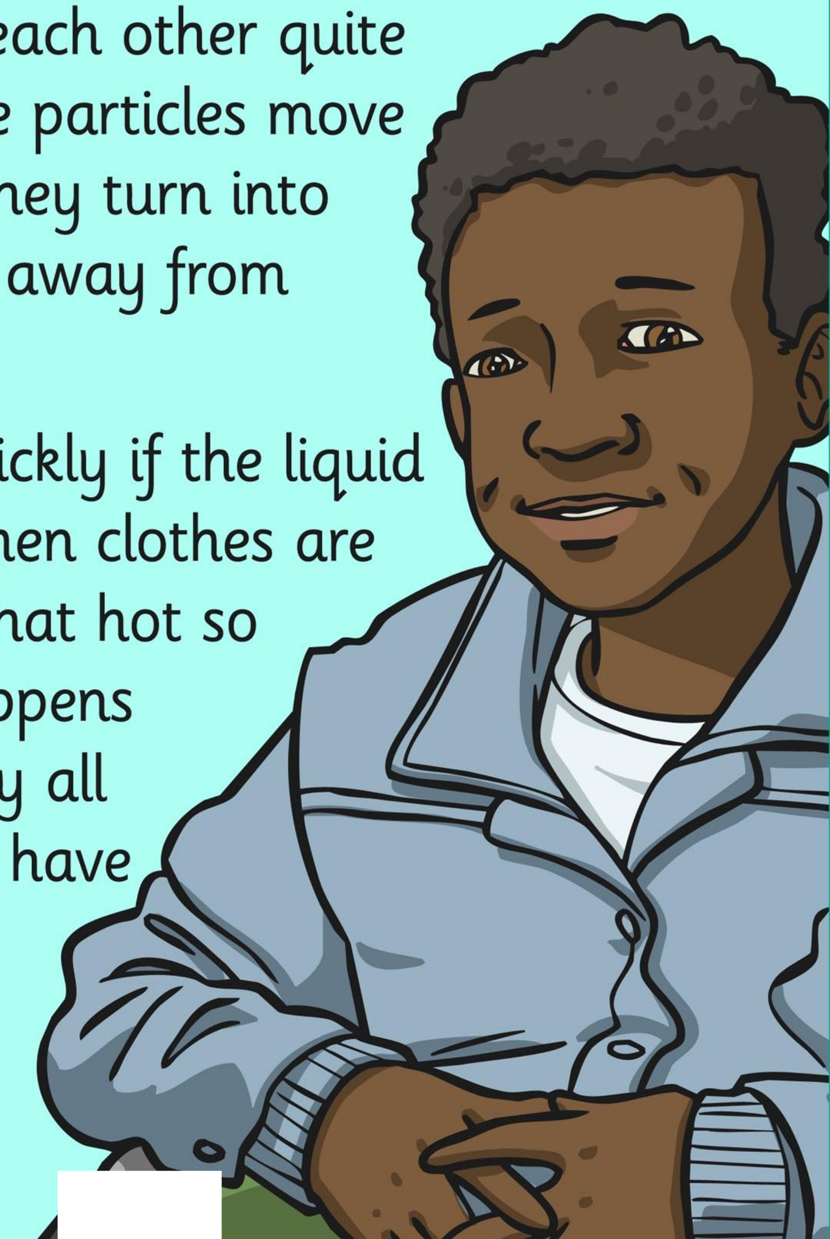

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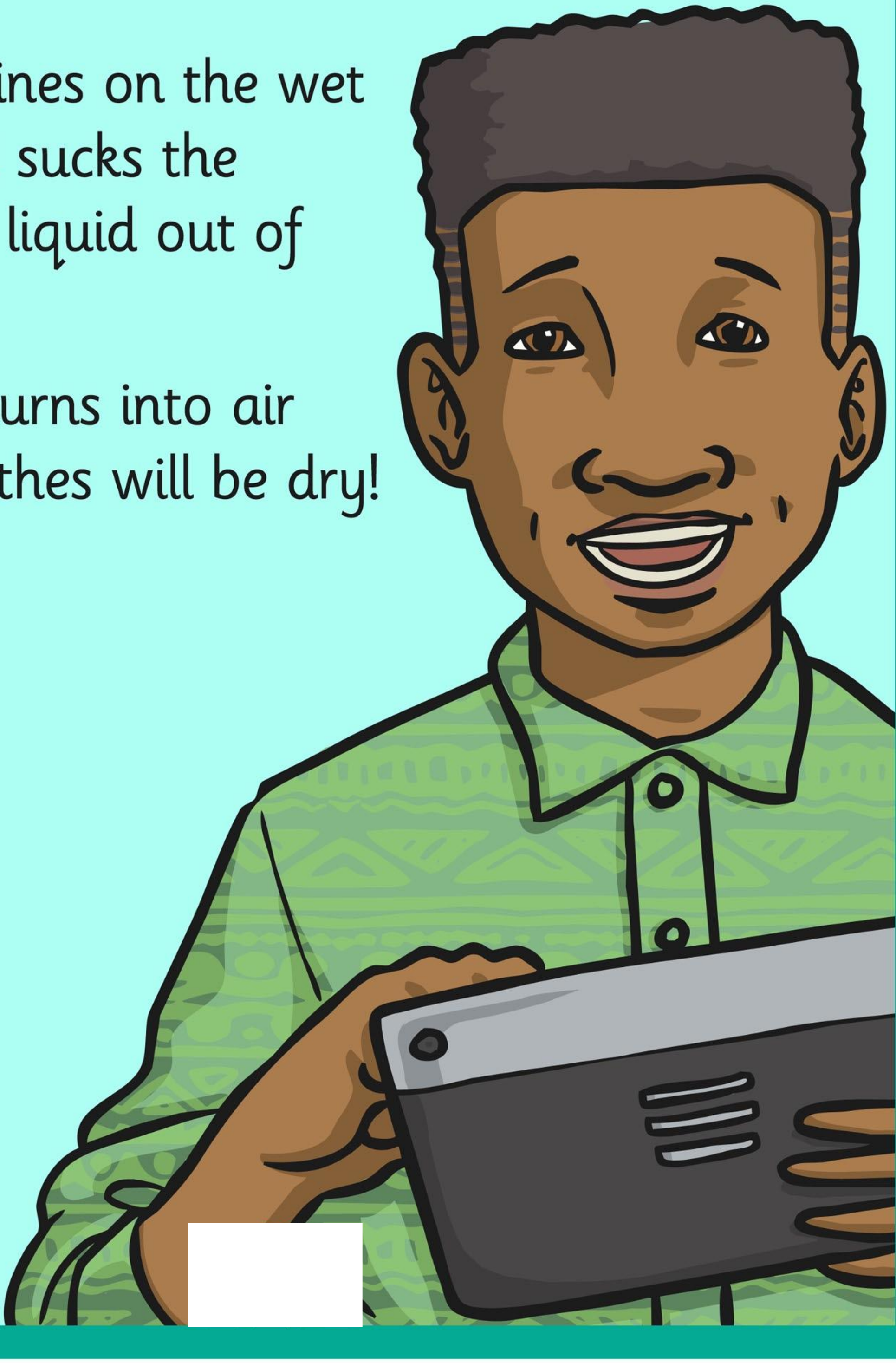

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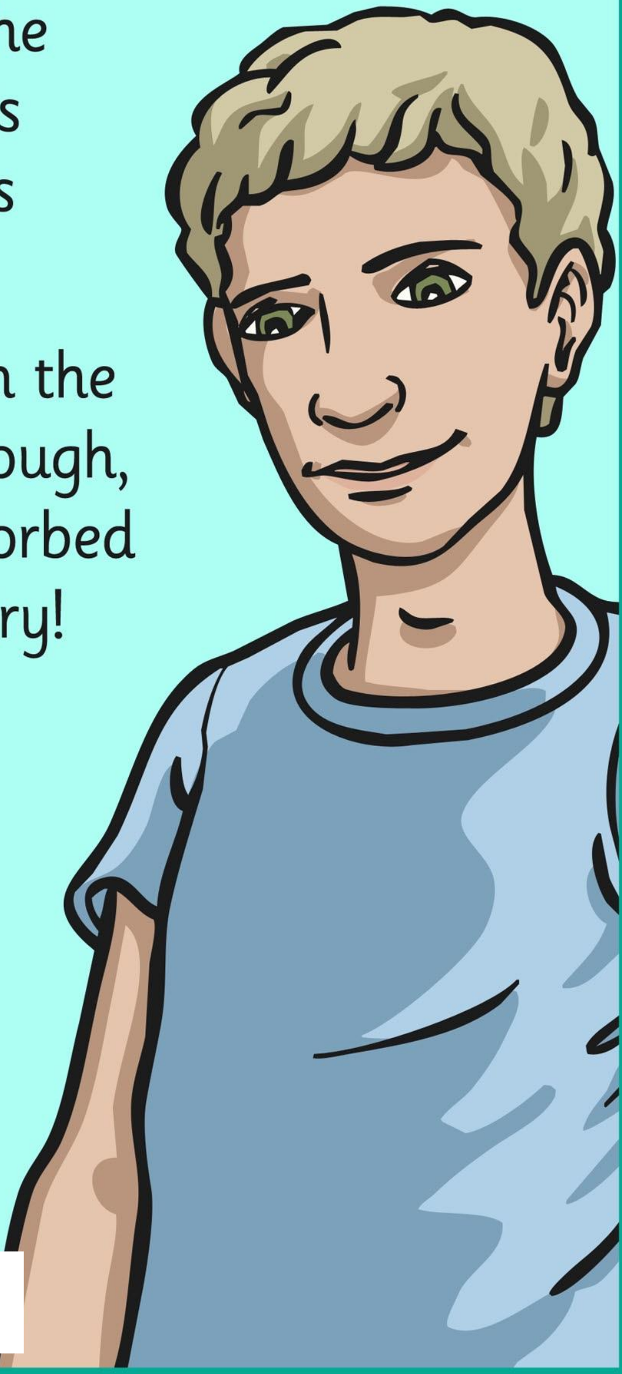


Washing Line Conclusions

Does the Temperature Affect How Fast Towels Dry?

What did you observe or measure?

Towel 1: Describe how much it had dried and how you could tell.

Towel 2: Describe how much it had dried and how you could tell.

Towel 3: Describe how much it had dried and how you could tell.

What is your conclusion? Can you answer the question?

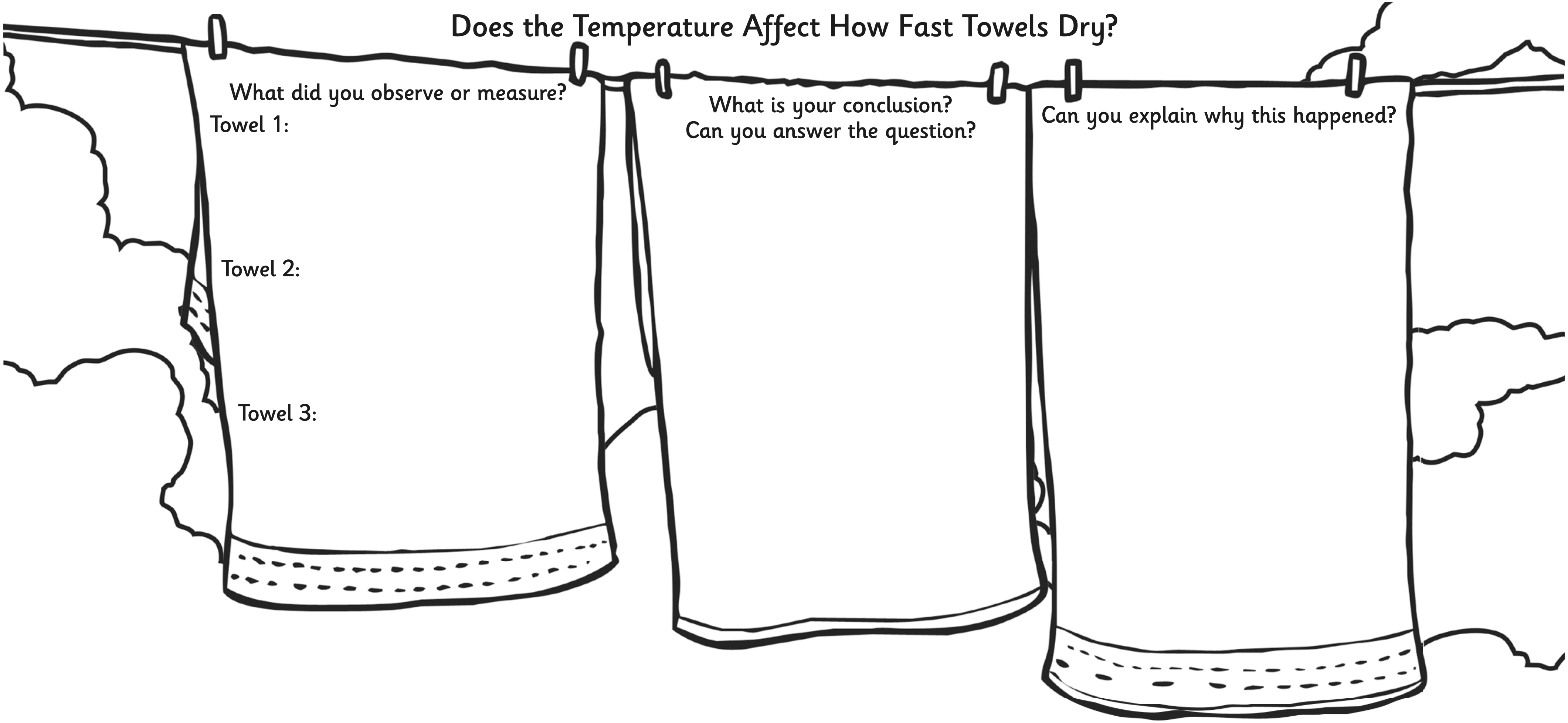
Can you use your observations and measurements to answer the question? Did your towels dry differently in the different temperatures?

Can you explain why this happened?

Think about what causes water to evaporate, and try to explain why your towels dried in the different temperatures. You can use pictures or diagrams.

Washing Line Conclusions

Does the Temperature Affect How Fast Towels Dry?



Washing Line Conclusions

Does the Temperature Affect How Fast Towels Dry?

What did you observe or measure?

Towel 1: Describe how much it had dried and how you could tell.

Towel 2: Describe how much it had dried and how you could tell.

Towel 3: Describe how much it had dried and how you could tell.

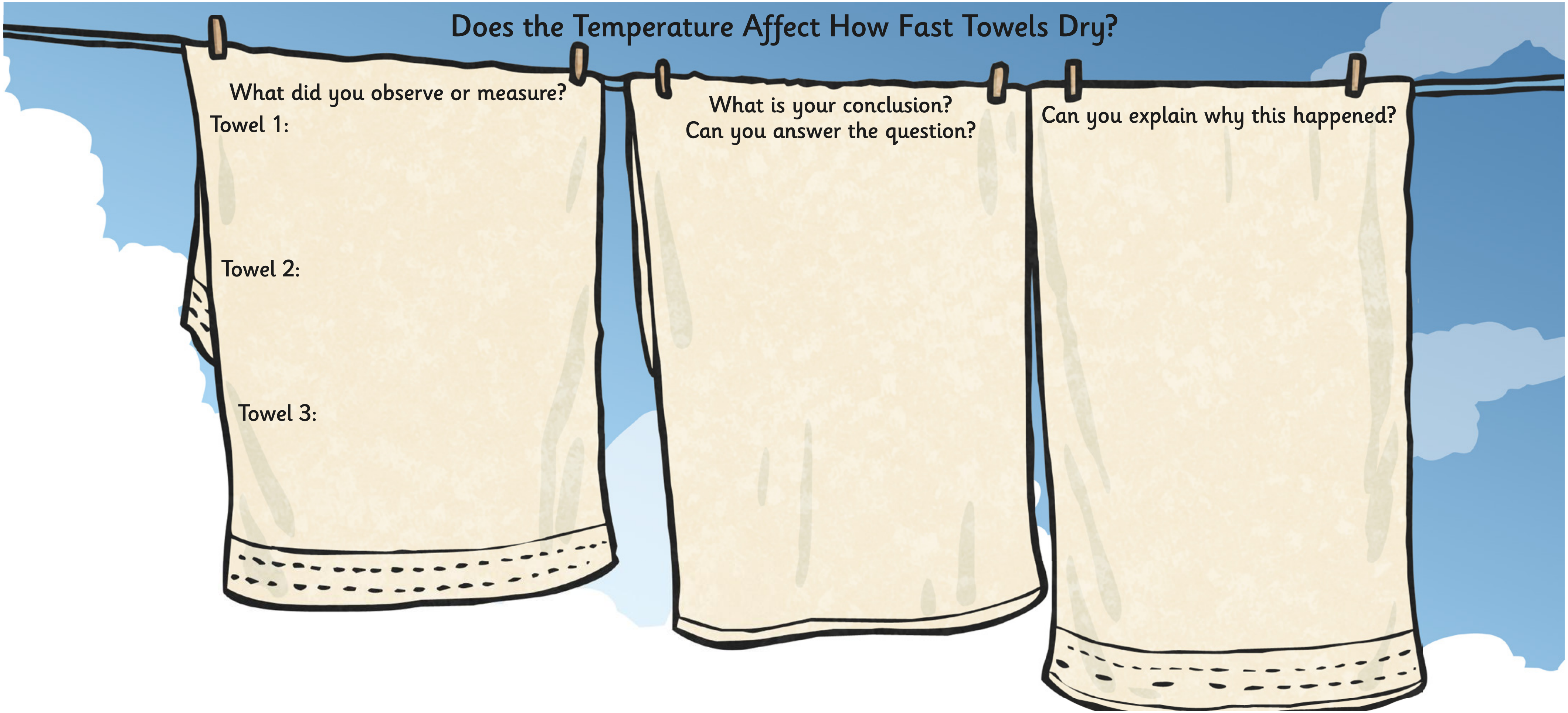
What is your conclusion? Can you answer the question?

Can you use your observations and measurements to answer the question? Did your towels dry differently in the different temperatures?

Can you explain why this happened?

Think about what causes water to evaporate, and try to explain why your towels dried in the different temperatures. You can use pictures or diagrams.

Washing Line Conclusions



States of Matter | Evaporation Investigation

I can investigate how water evaporates.		
I can explain the effect of temperature on the process of evaporation.		
I can plan and carry out a comparative test using equipment accurately and display my results.		

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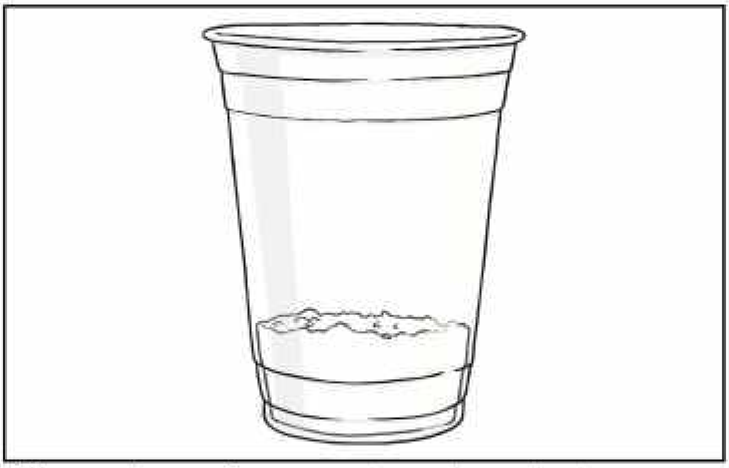
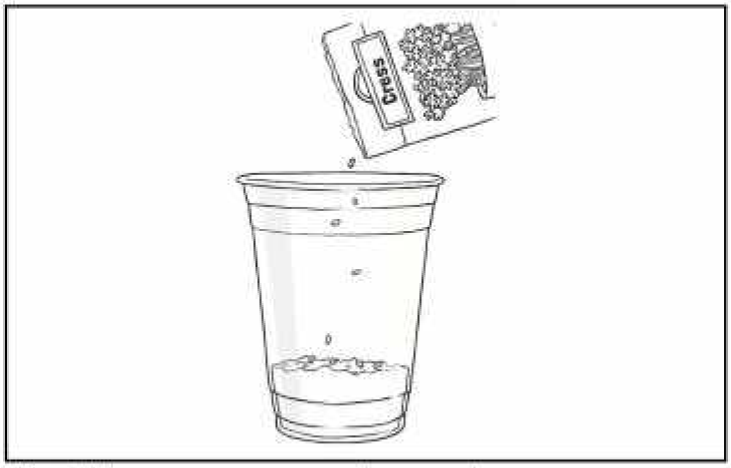
Mini Water World

I can explain how a model of the water cycle demonstrates the different stages.

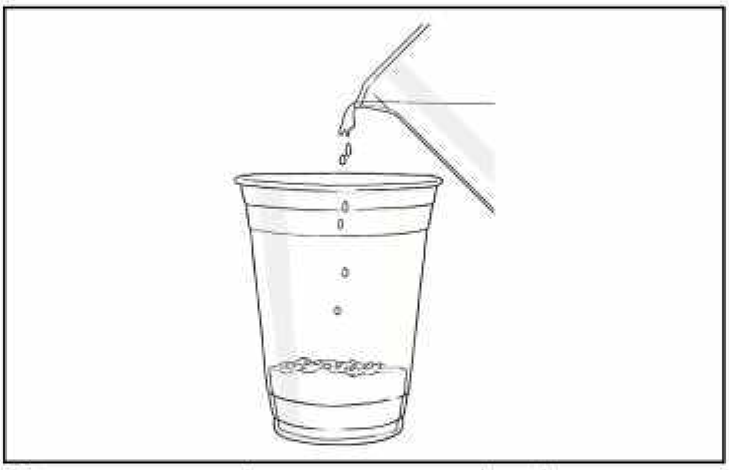
Follow these instructions to make your own Mini Water World!



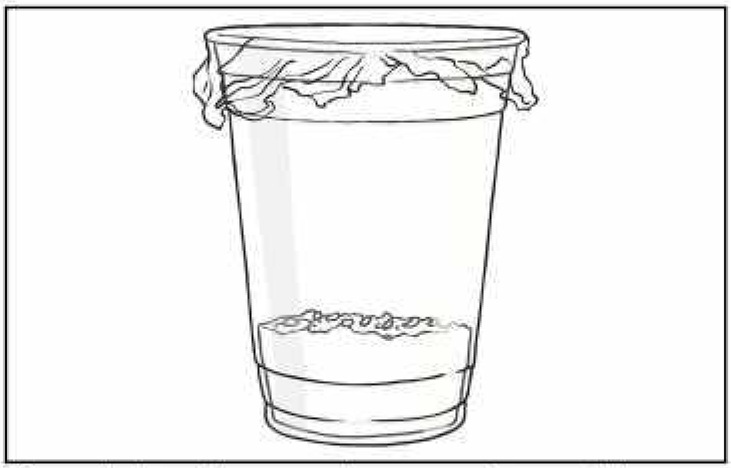
Place a layer of compost in a clear plastic cup.



Sprinkle some cress seeds onto the compost.



Pour on enough water to make the compost damp, but not soaking.



Stretch cling film over the cup to form a lid.

Over the next few days, watch your Mini Water World. You should be able to see the water cycle in action!

The water from the compost will evaporate as water vapour. When it rises, it will hit the cooler cling film and condense, forming water droplets on the cling film. As these droplets grow bigger, they will get heavier, and eventually fall from the cling film back onto the compost. The cycle will then start again!

States of Matter: The Water Cycle

Aim:	**Success Criteria:**	**Resources:**
To identify the part played by evaporation and condensation in the water cycle by creating a model of the water cycle. I can identify and describe the different stages of the water cycle.	I can describe the different stages of the water cycle. I can explain the role of evaporation and condensation in the water cycle.	**Lesson Pack** Clear plastic cup - 1 per pair Compost Cress seeds Cling film
	Key/New Words: Evaporation, condensation, precipitation, collection, clouds, rain, sleet, hail, snow.	**Preparation:** **Mini Water Worlds Activity Sheet** - 1 per pair Differentiated **Water Wheel Activity Sheet** - 1 per child

Prior Learning: The children will have learnt about condensation and evaporation in lessons 4 and 5.

Learning Sequence

Whole Class	**What Is the Water Cycle?** Share the information on the **Lesson Presentation**. Discuss each part of the cycle and locate its label on the diagram.	
	The Stages of the Water Cycle: Use the diagrams and information on the **Lesson Presentation** to explain the four stages of the water cycle: evaporation, condensation, precipitation and collection. Ensure children understand that the water changes state as a result of these processes. Address any misconceptions.	
	Mini Water Worlds: Ask the children to work in pairs to make mini water worlds using the **Mini Water Worlds Activity Sheet**. Children will be able to view evaporation, condensation and precipitation in action over the next few days. You could take photos of the water worlds as they develop, and stick the printed photos into the children's books.	
	Water Wheel: Children use the differentiated **Water Wheel Activity Sheet** to create an interactive model of the water cycle. Look for children who know the stages of the water cycle and can explain what happens at each stage. ★ Children fill in the gaps in the explanations of the stages. ★★ Children match the explanations to the correct stages and fill in the gaps. ★★★ Children write their own explanations for each stage.	
Whole Class	**Sort the Stages:** Children try to solve the anagrams of the four stages of the water cycle on the Lesson Presentation before placing the stages in the correct order.	

Task*it*

***Create*it:** Make a model to demonstrate precipitation. Fill a clear plastic cup about two-thirds full of water. Spray some shaving foam on top of the water to represent a cloud. Use a pipette to drop water coloured with blue food colouring onto the 'cloud'. Now watch it rain! You should see the blue water dripping from the shaving foam cloud.

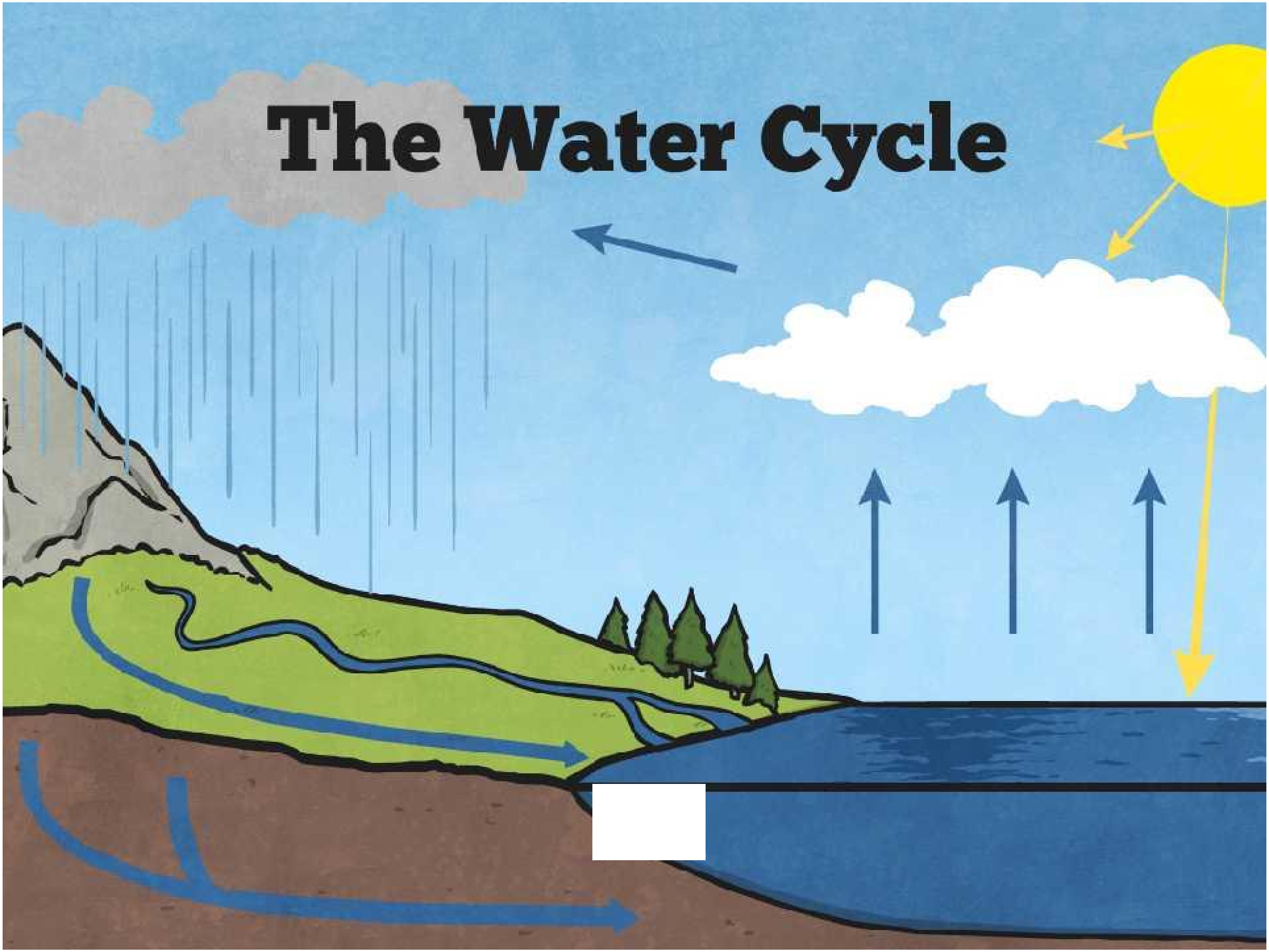
***Label*it:** Use ______________ to label the stages of the water cycle.

***Write*it:** Write a story about the water cycle from the point of view of a water droplet! Explain what happens to the water droplet at each stage, and how it changes.

Science

States of Matter

Science | Year 4 | States of Matter | The Water Cycle | Lesson 6


The Water Cycle

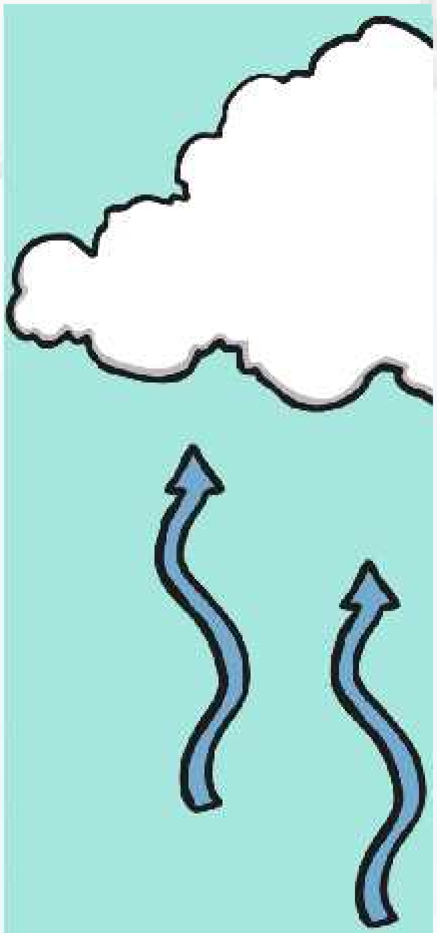
Aim

- I can identify and describe the different stages of the water cycle.

Success Criteria

- I can describe the different stages of the water cycle.
- I can explain the role of evaporation and condensation in the water cycle.

What Is the Water Cycle?



More than three quarters of the Earth's surface is water.

Some of this water evaporates in the heat of the Sun.

When the water has evaporated, it is in the form of water vapour.

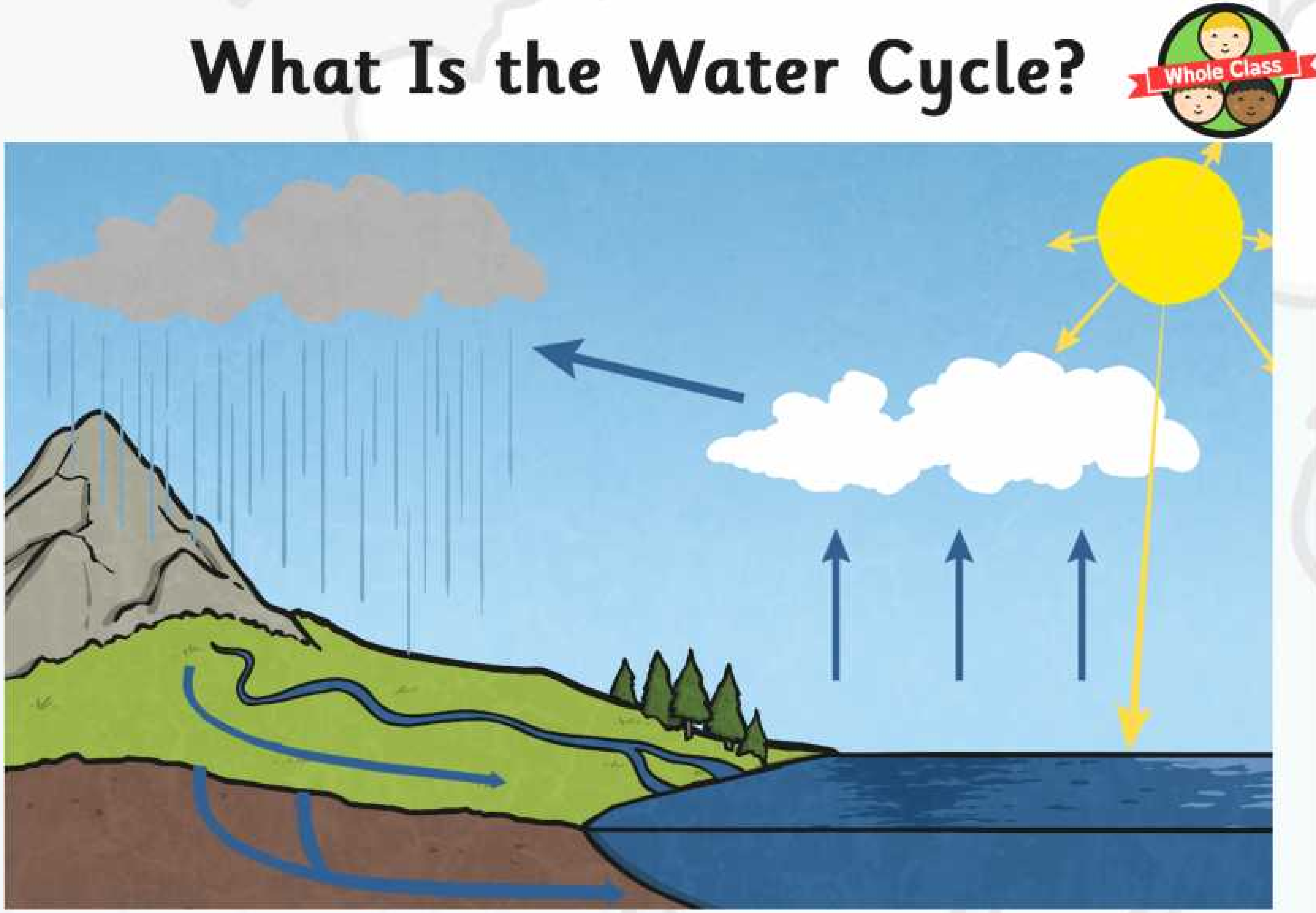
Clouds are made from water vapour that has condensed to form tiny water droplets.

When the water droplets get too big, they fall from the clouds.

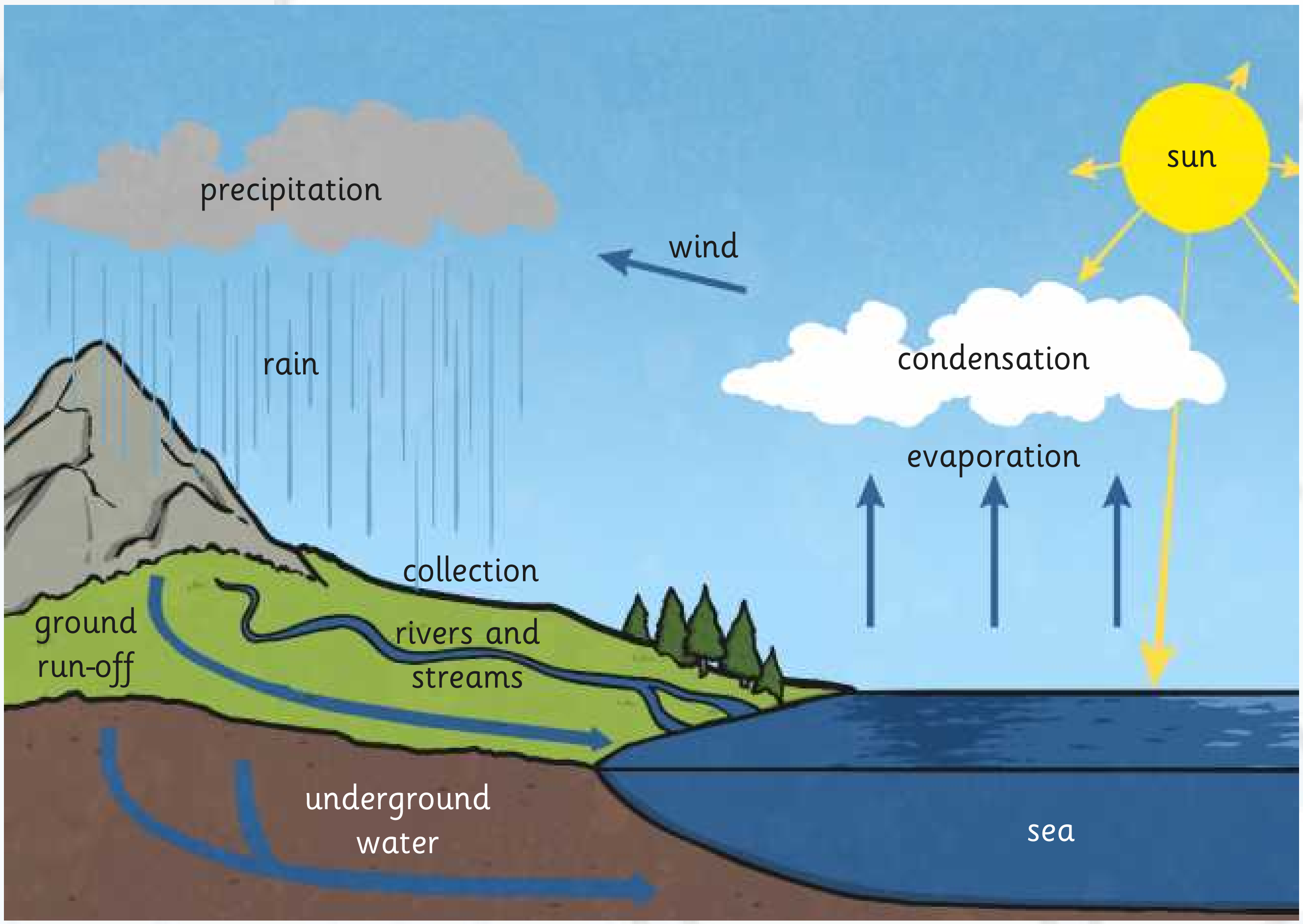
The water droplets can fall as rain, hail or snow.

Three hundred millions litres of water falls on dry land each day.

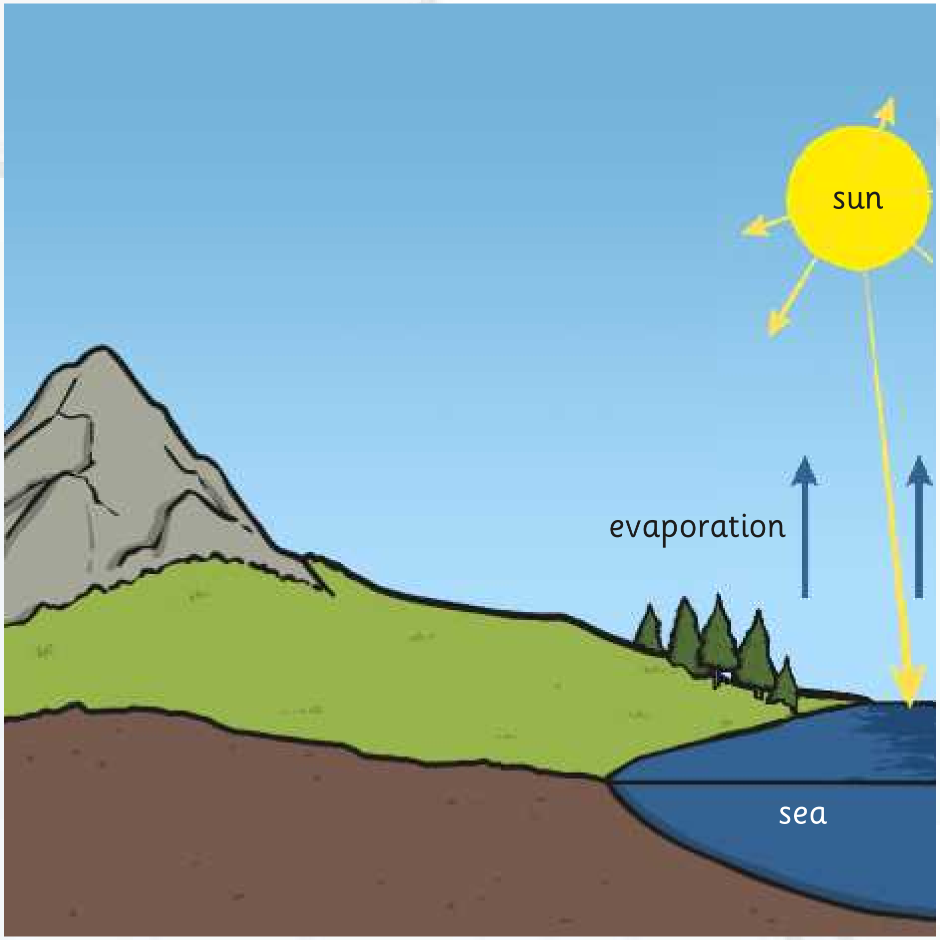
What Is the Water Cycle?



The Stages of the Water Cycle



The Stages of the Water Cycle



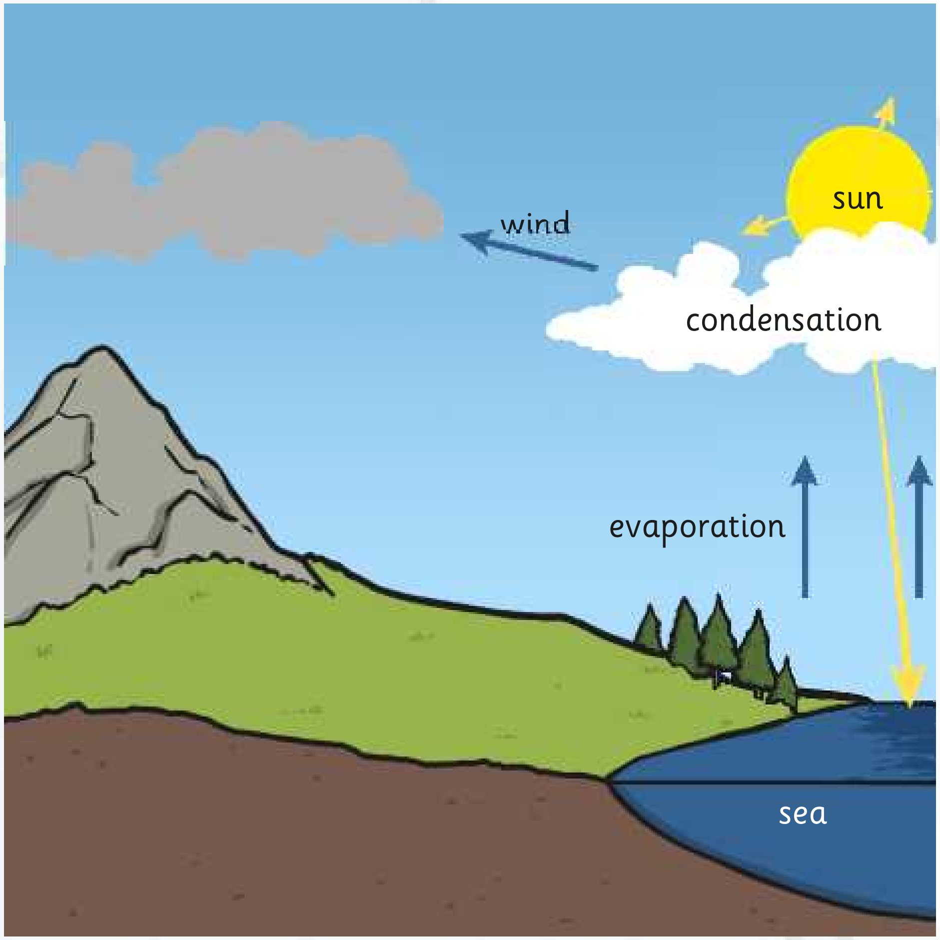
Evaporation

Heat from the Sun causes water to evaporate from seas, lakes, rivers and streams. Water also evaporates from puddles and ponds.

This evaporation happens even on cloudy or cold days.

The liquid water turns into water vapour when it has evaporated.

The Stages of the Water Cycle



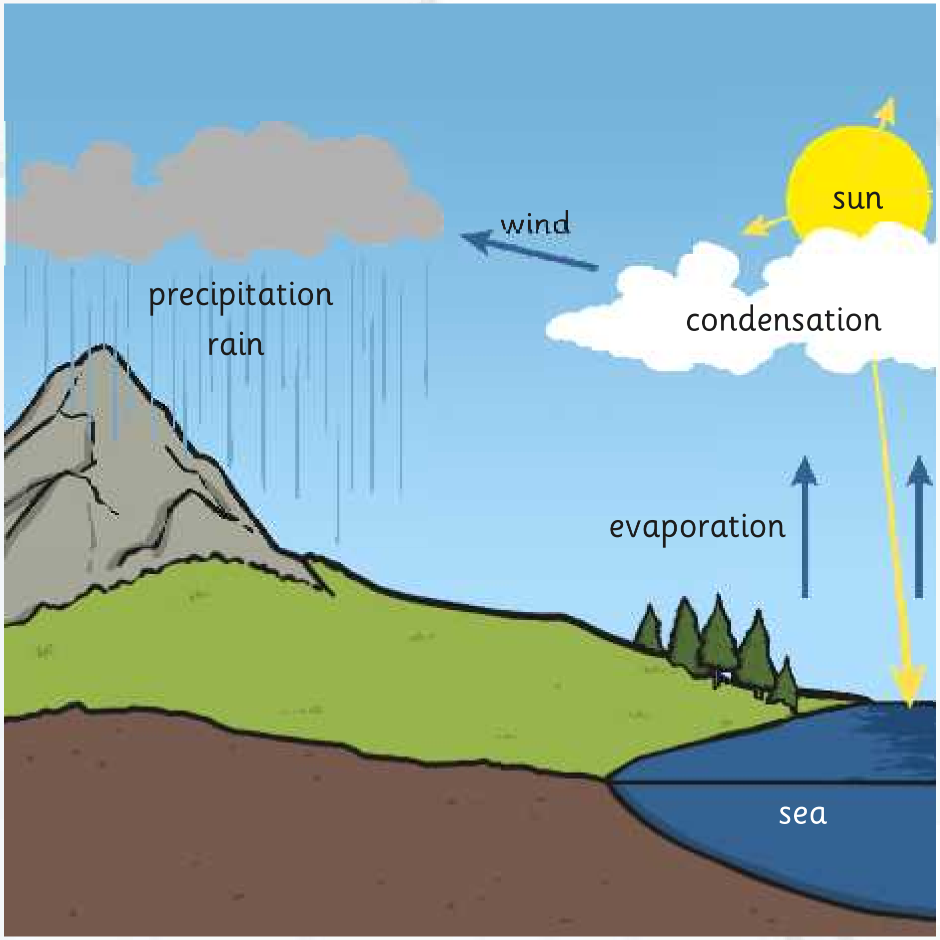
Condensation

The water vapour in the air rises, and as it does so, it cools down.

Eventually, it cools enough for the water vapour to condense and form small droplets of water.

The droplets of water clump together to form clouds.

The Stages of the Water Cycle



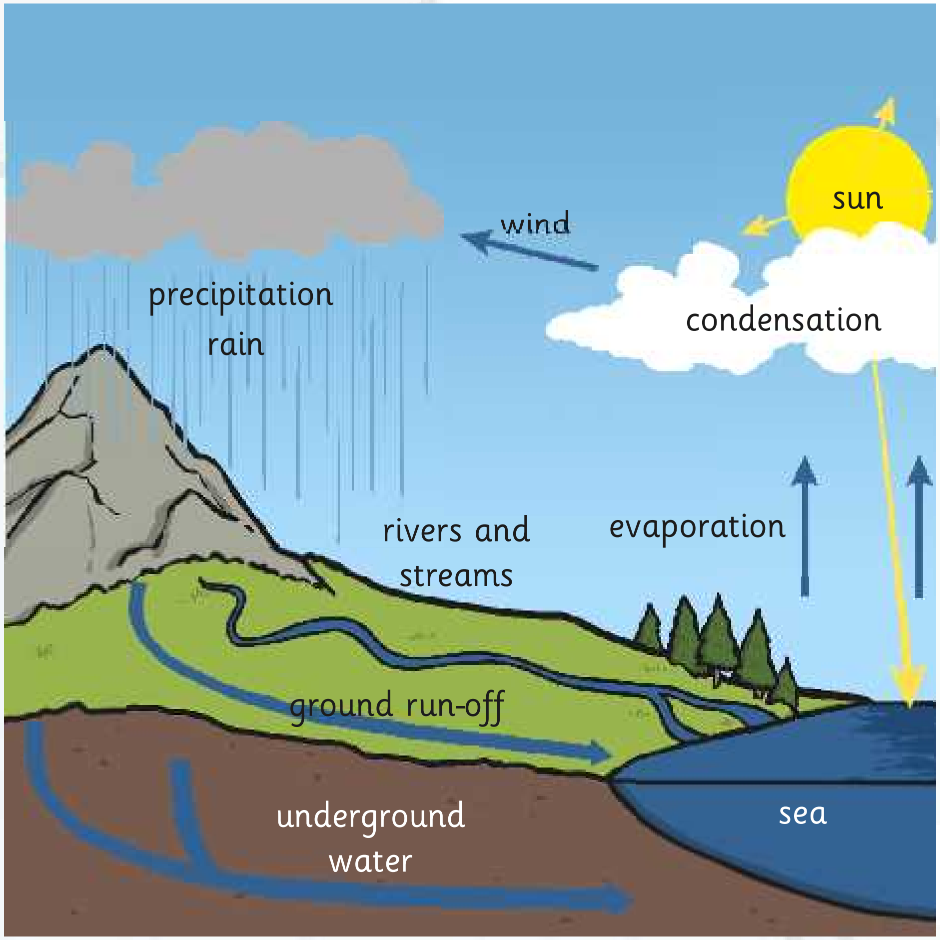
Precipitation

As more water vapour condenses, more water droplets are formed in the clouds.

Eventually, the water droplets are large enough and heavy enough to fall back to the surface of the Earth.

These droplets of water fall from the clouds in the form of rain, sleet, hail or snow.

The Stages of the Water Cycle



Collection

When water falls back to Earth as precipitation, the water may fall on oceans, lakes, rivers or on the ground.

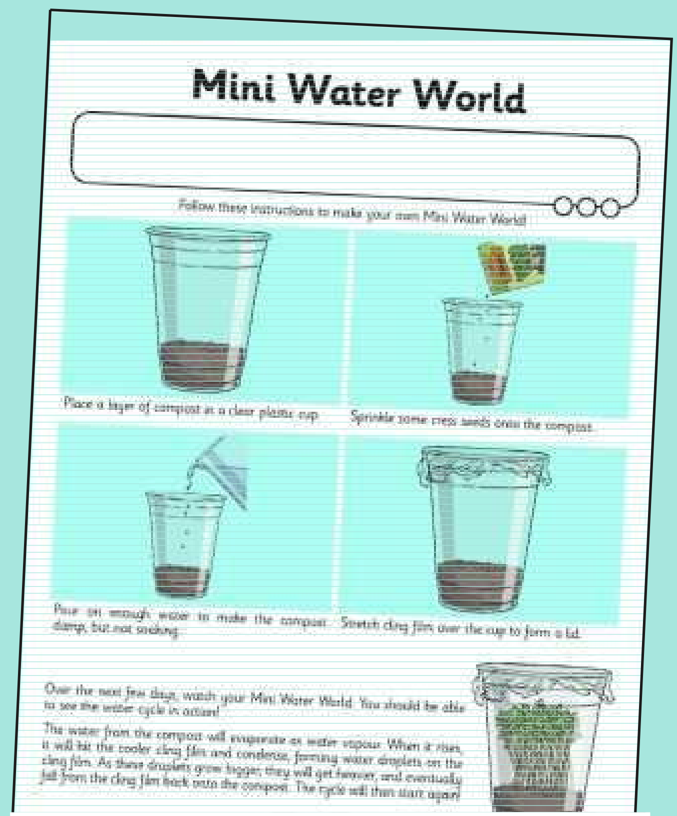
Water that falls on the ground is either absorbed into the soil, and is used as drinking water for animals and plants, or it runs over the ground and collects in the oceans, lakes and rivers.

This water is then evaporated and the cycle starts all over again!

Mini Water Worlds

Make your own mini water world to watch the water cycle in action!

Follow the instructions on your Mini Water Worlds Activity Sheet.



Mini Water World

Follow these instructions to make your own Mini Water World.

Place a layer of compost in a clear plastic cup.

Sprinkle some cress seeds onto the compost.

Pour on enough water to make the compost damp, but not soaking.

Stretch cling film over the cup to form a lid.

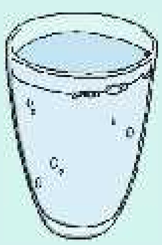
Over the next few days, watch your Mini Water World. You should be able to see the water cycle in action!

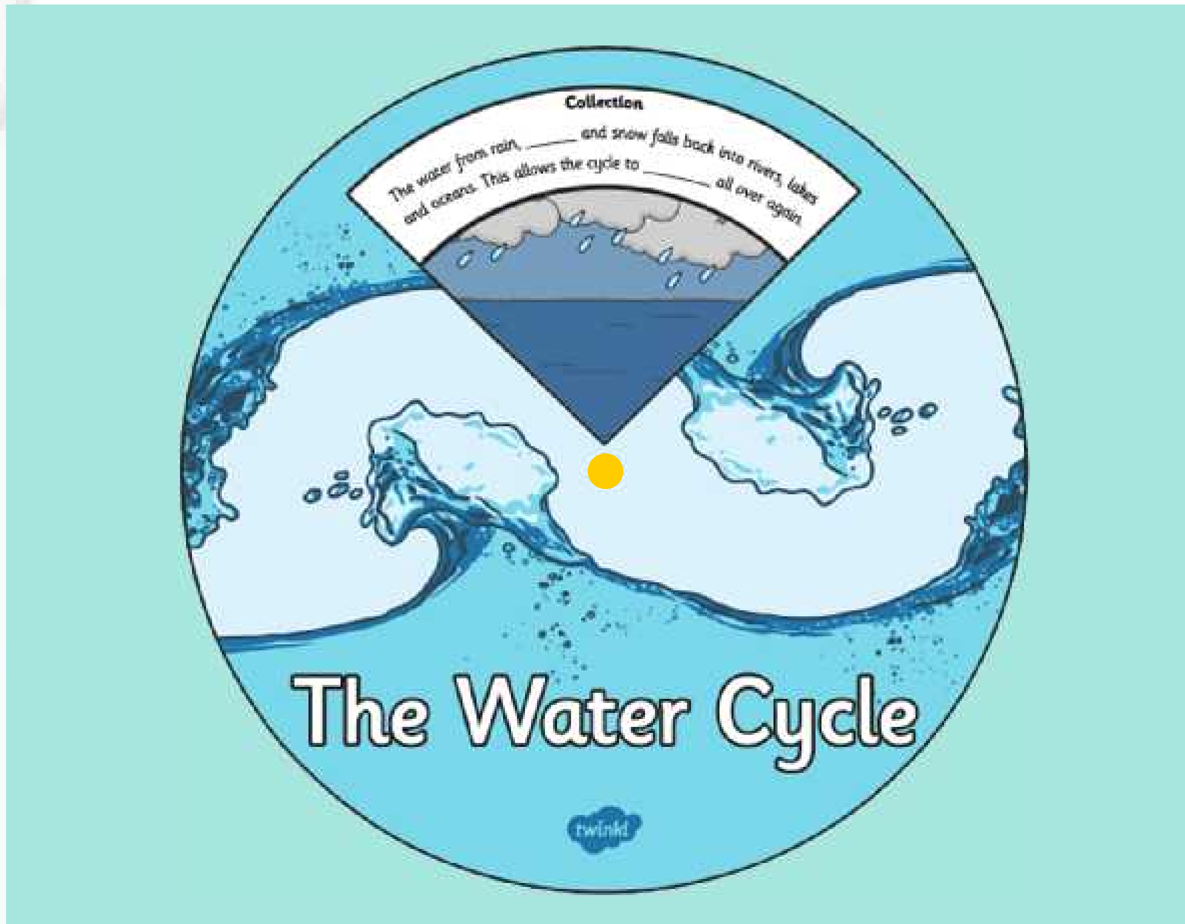
The water from the compost will evaporate as water vapour. When it rises, it will hit the cooler cling film and condense, forming water droplets on the cling film. As these droplets grow bigger, they will get heavier, and eventually fall from the cling film back onto the compost. The cycle will then start again!

Water Wheel

Can you remember the stages of the water cycle?

Use your knowledge to create this interactive Water Wheel.





Sort the Stages

Whole Class

Rearrange the letters of each word below to make the name of a stage of the water cycle.

Can you put the stages in order?

1 condensation	2 collection
3 precipitation	4 evaporation

Aim

- I can identify and describe the different stages of the water cycle.

Success Criteria

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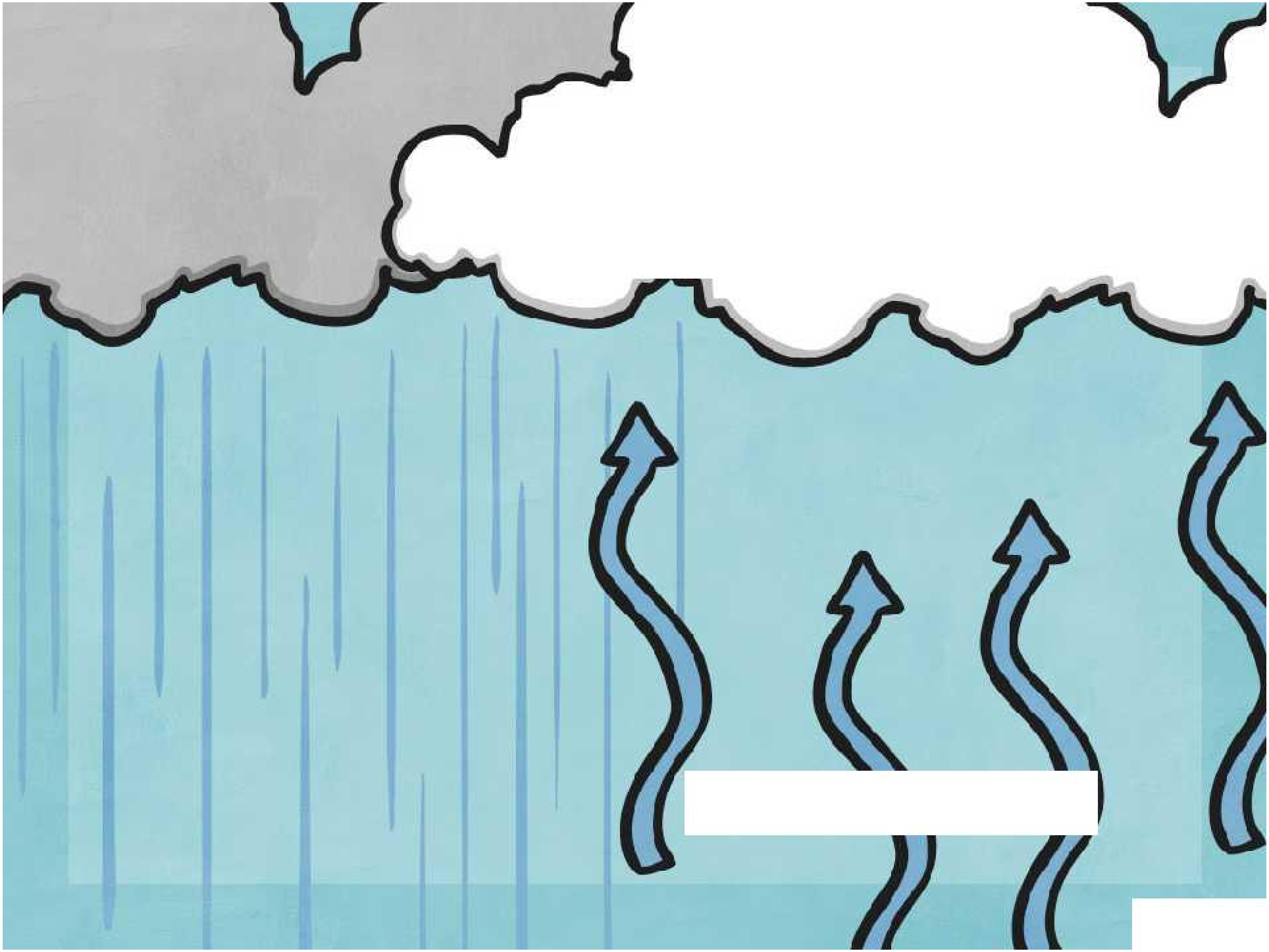
- I can explain the role of evaporation and condensation in the water cycle.



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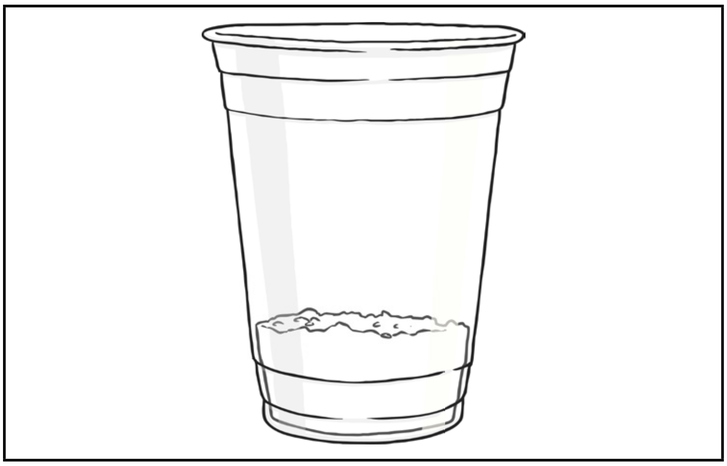

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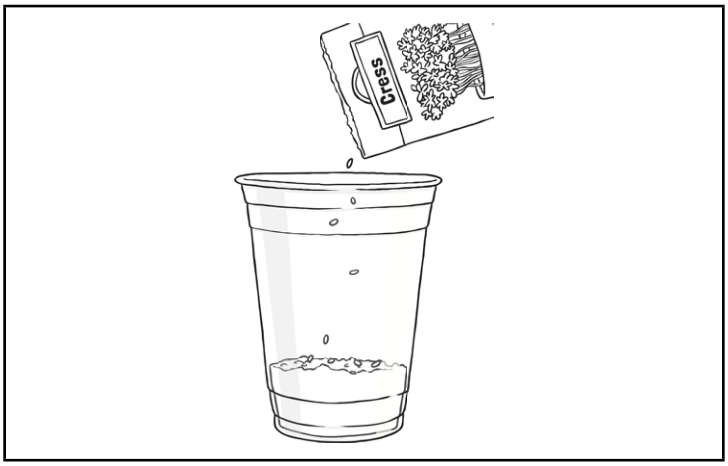

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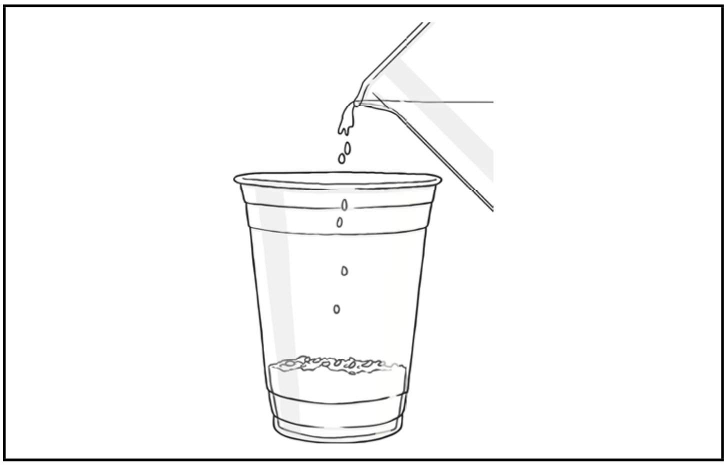
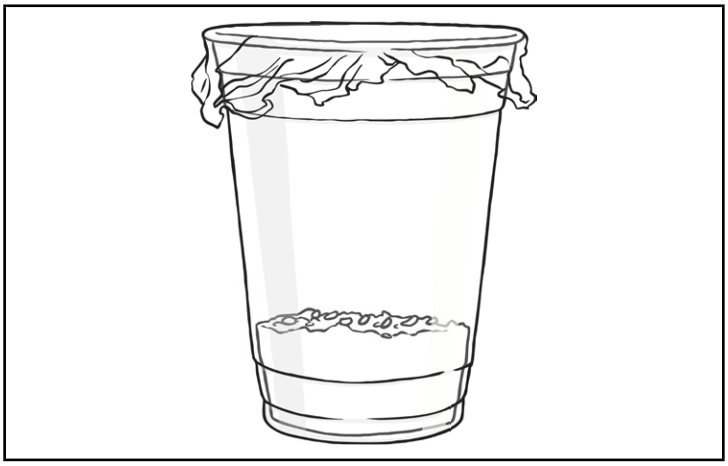


Pour on enough water to make the compost damp, but not soaking.



Stretch cling film over the cup to form a lid.

Over the next few days, watch your Mini Water World. You should be able to see the water cycle in action!

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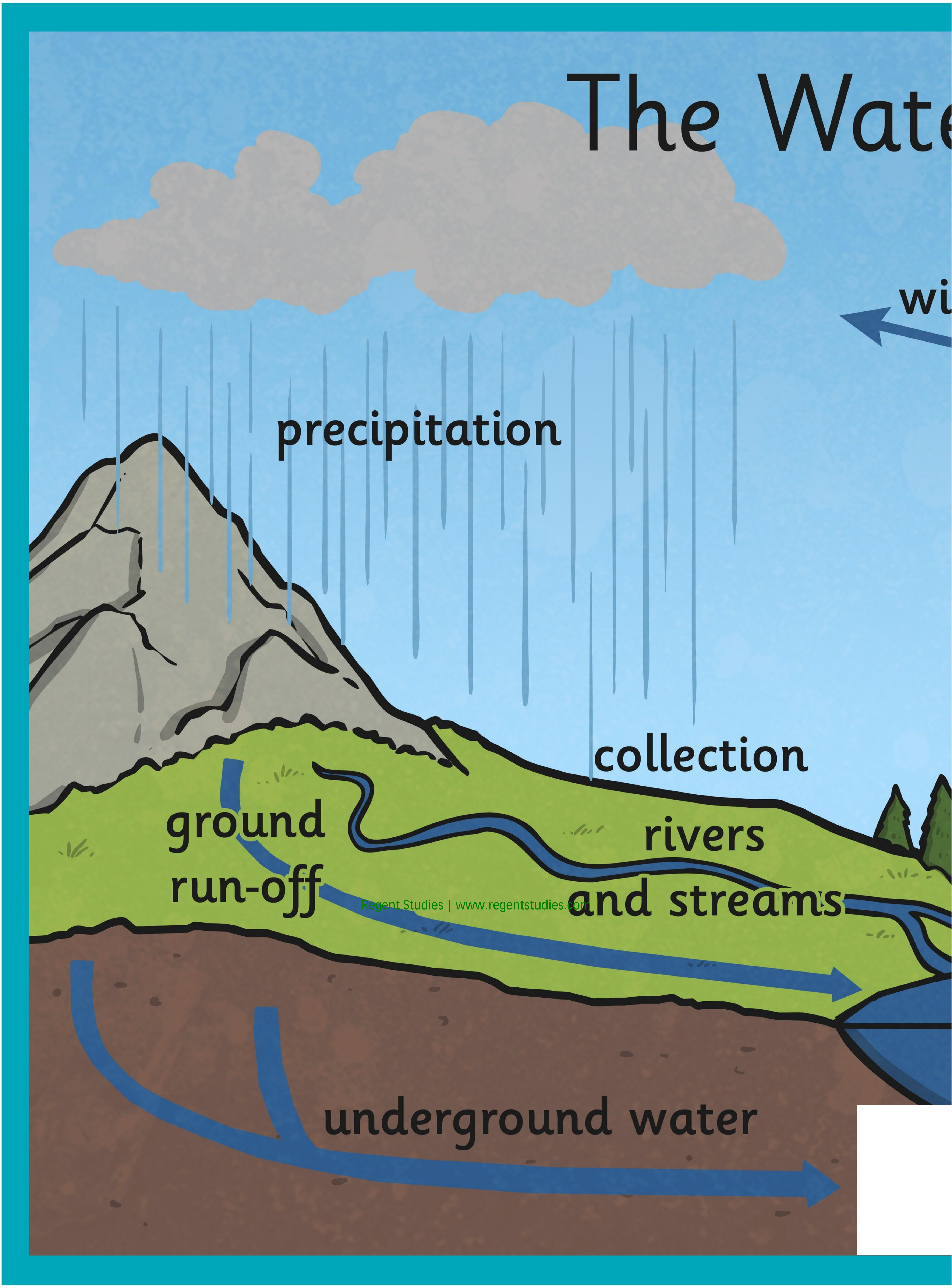
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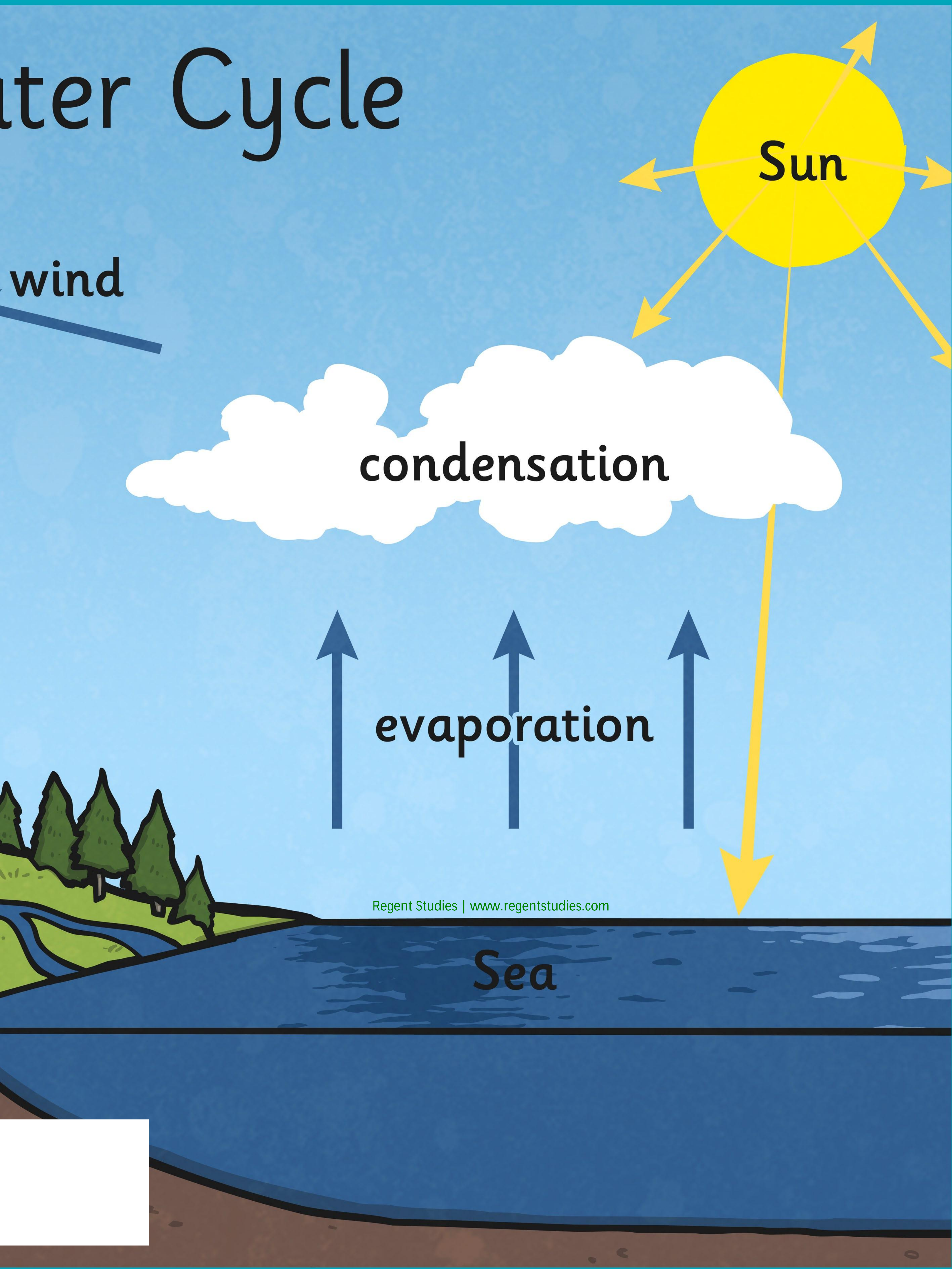
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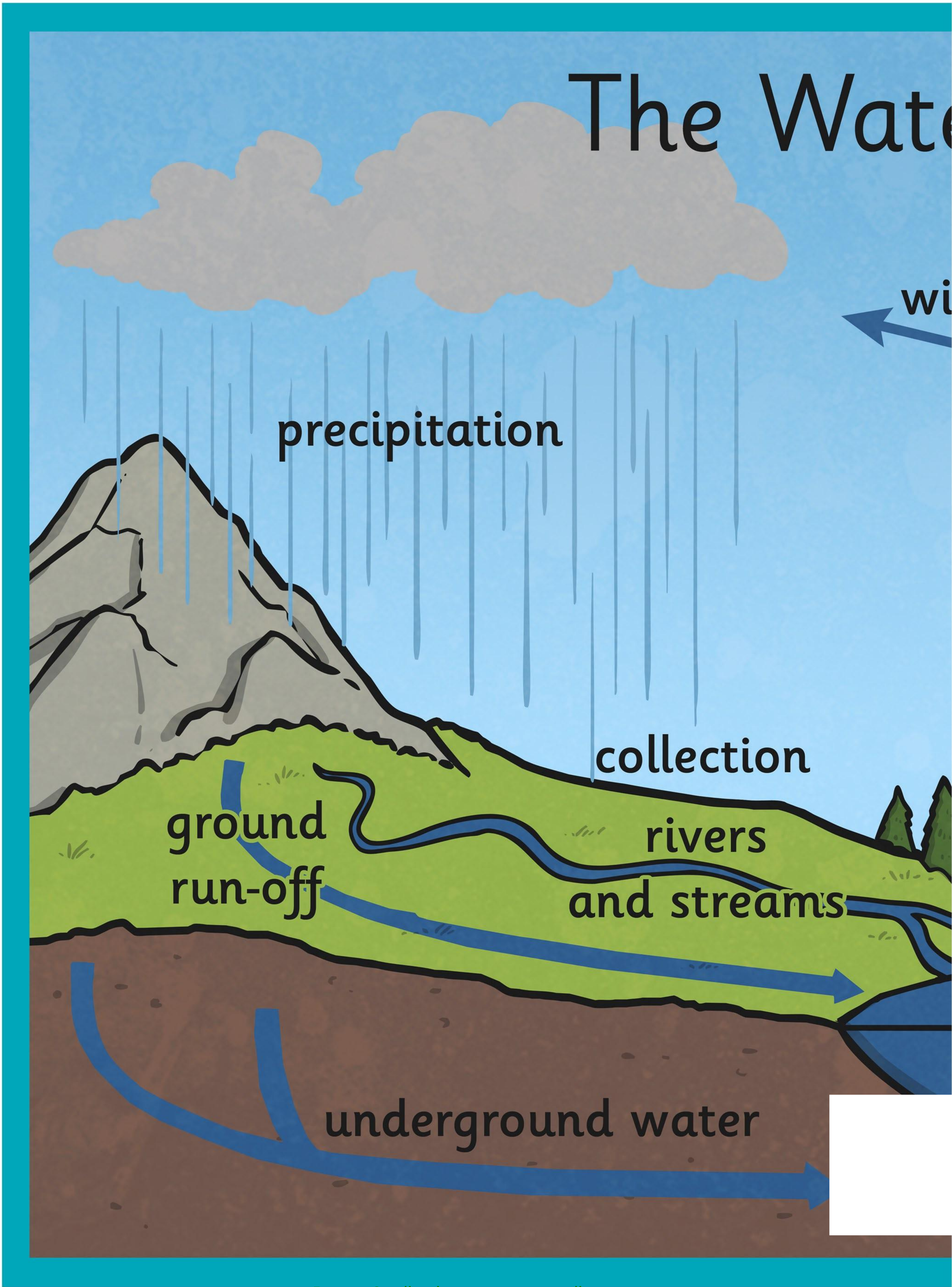
Sun
wind
condensation
evaporation
Sea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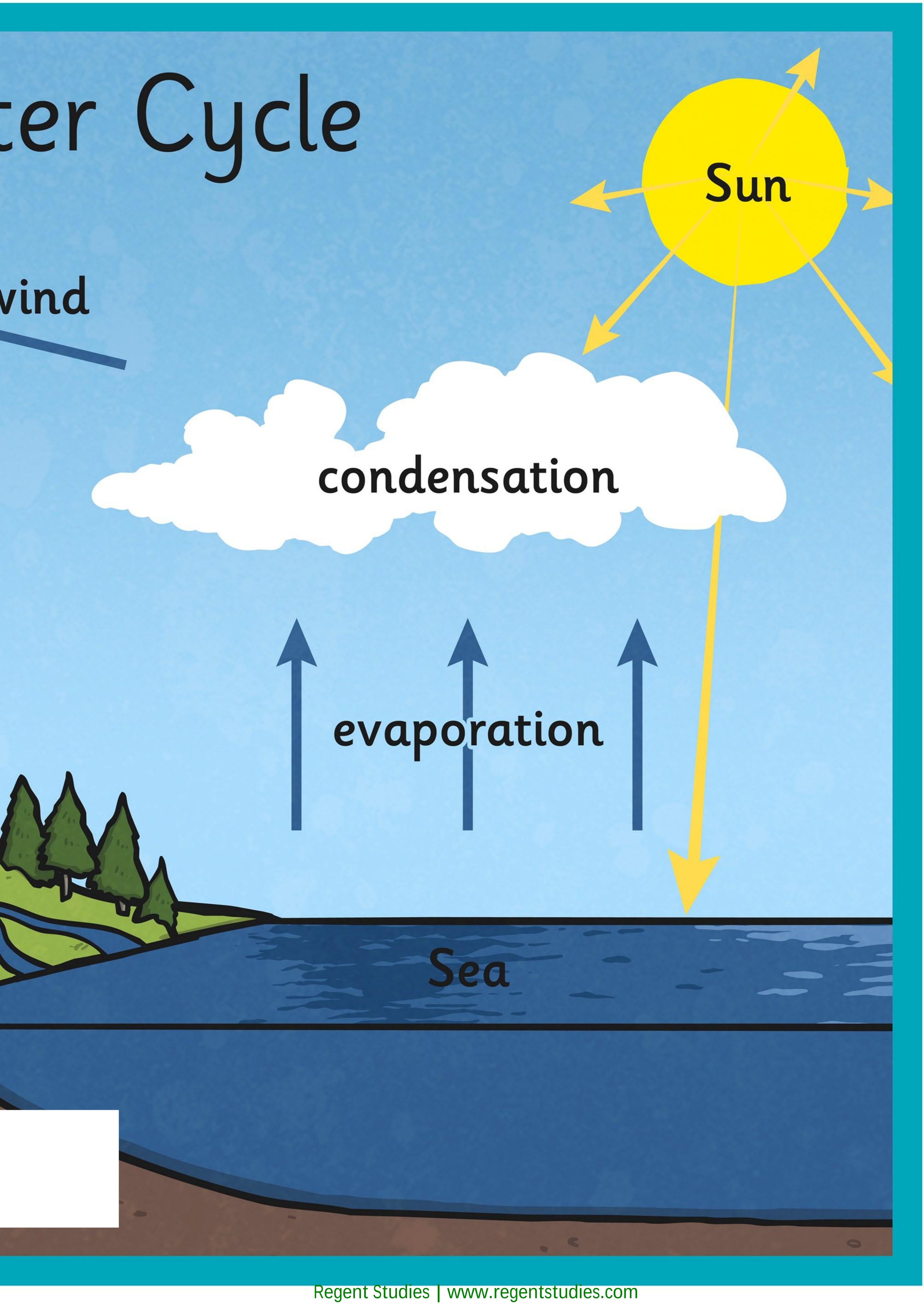
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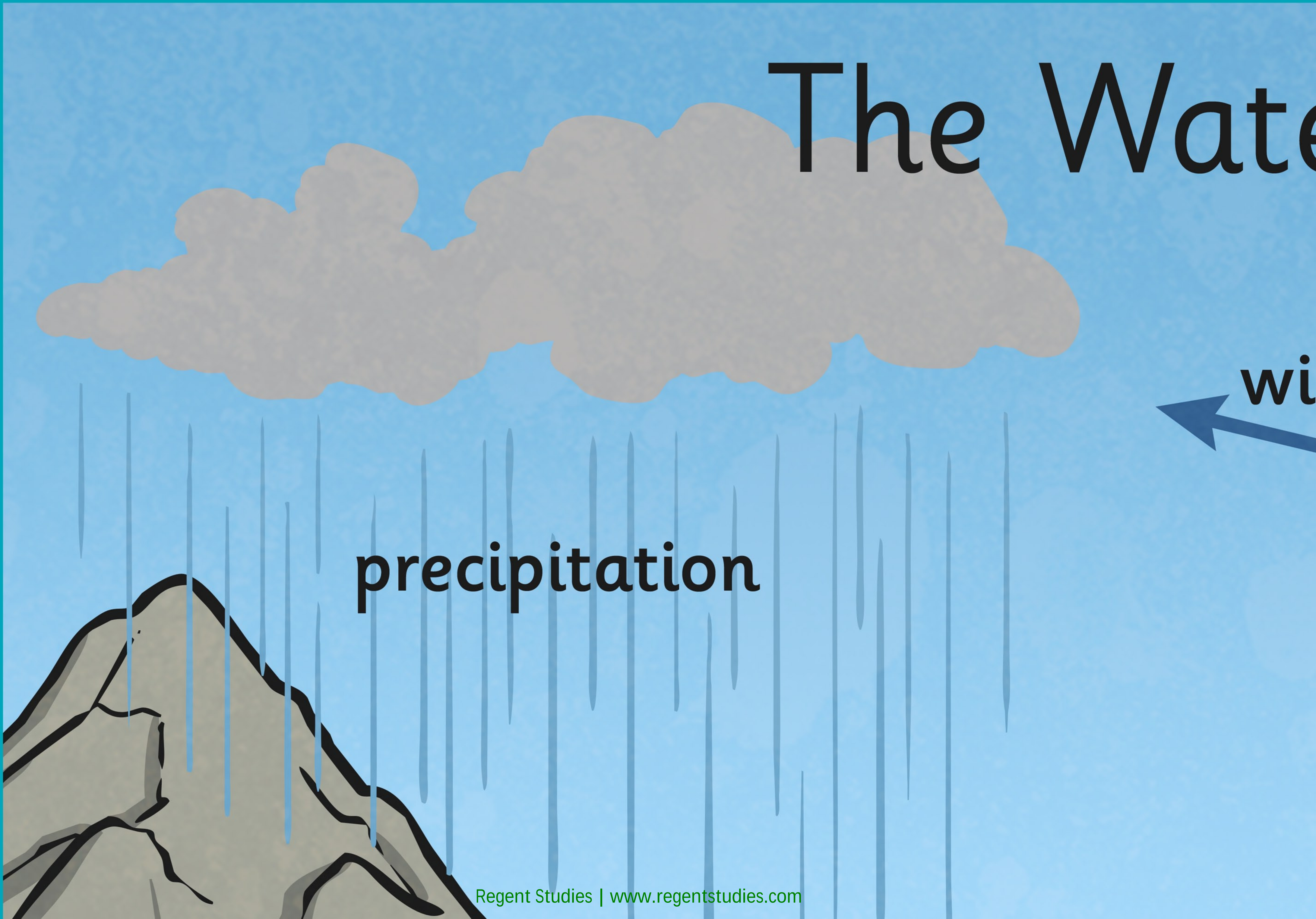
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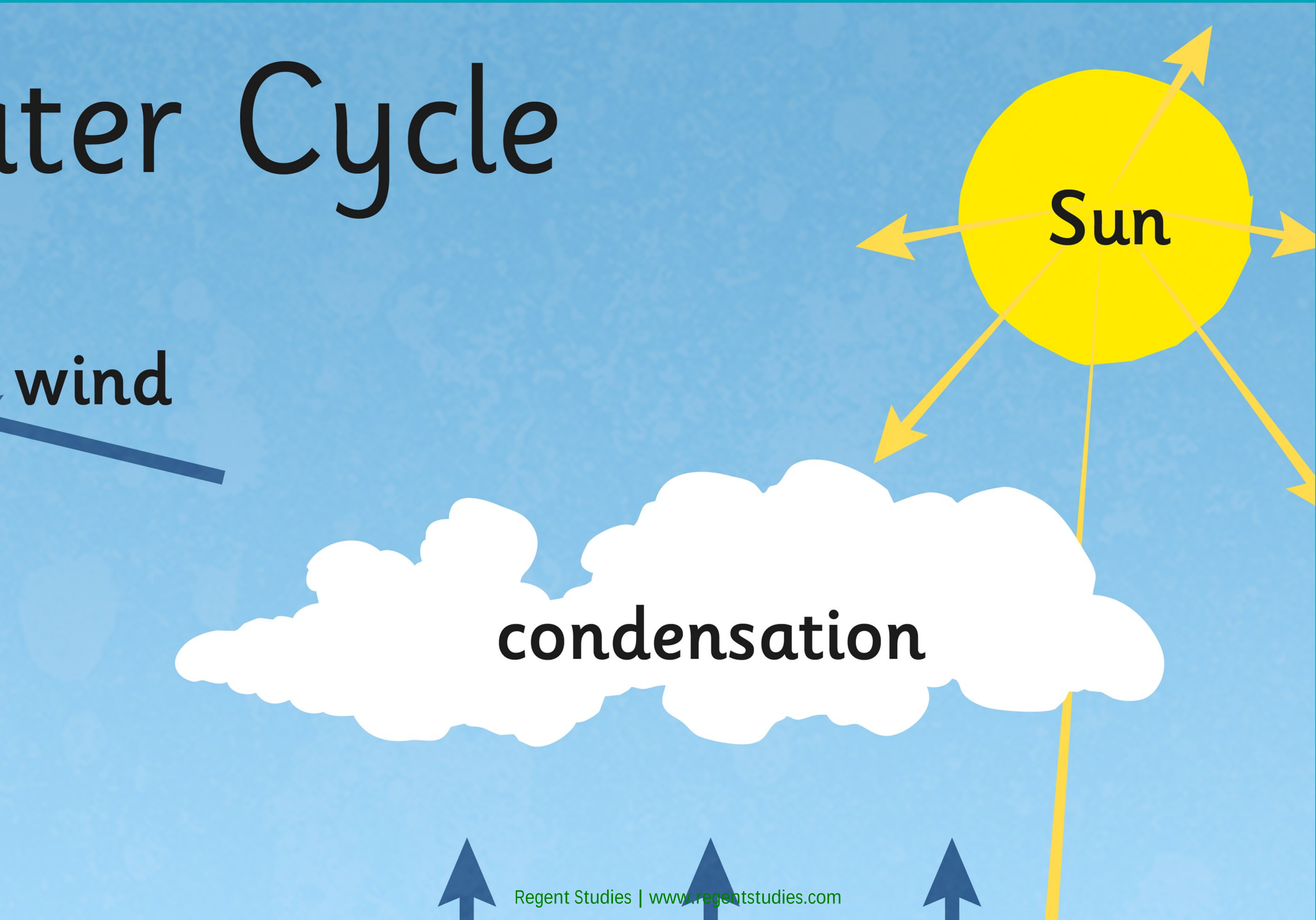
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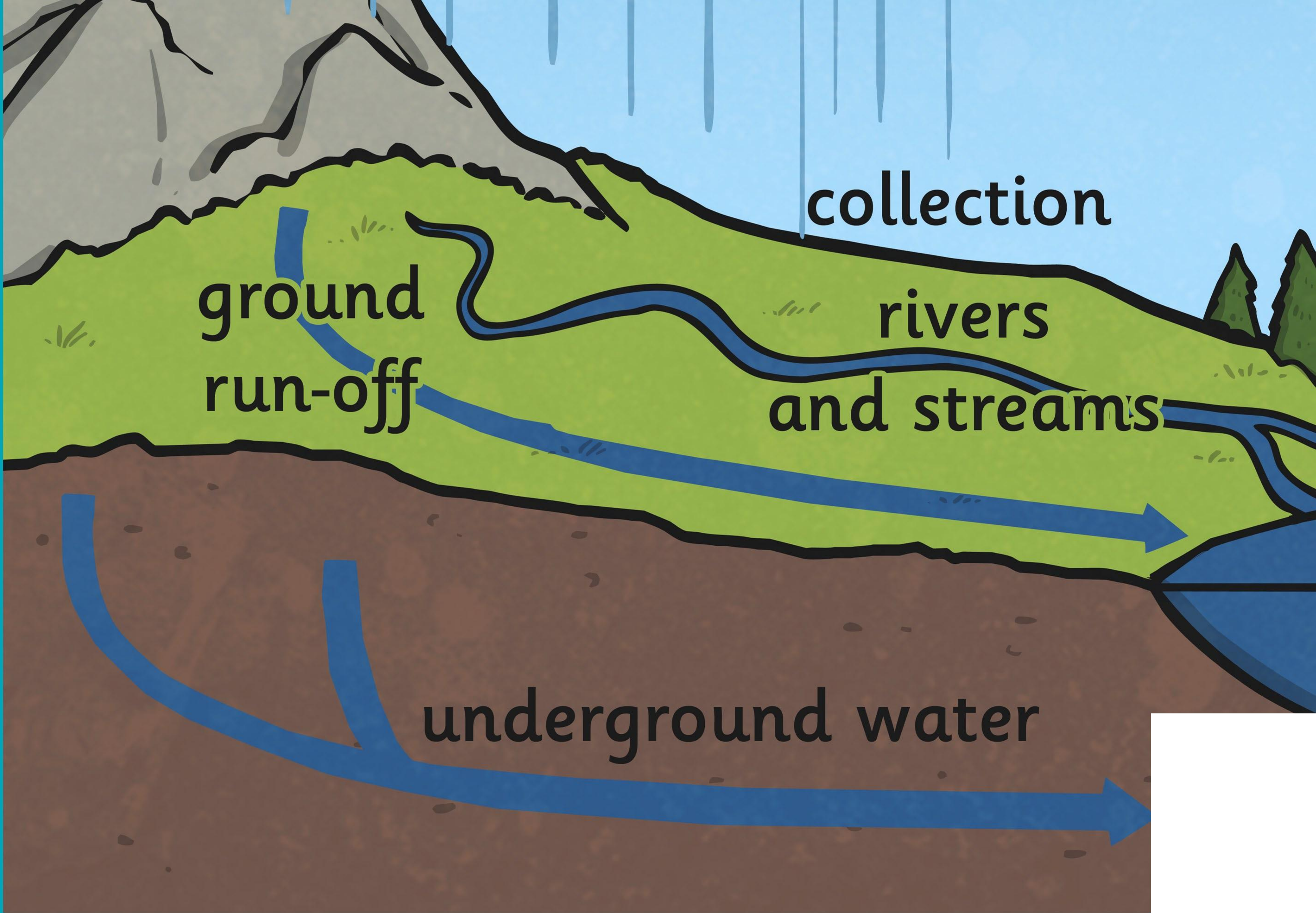
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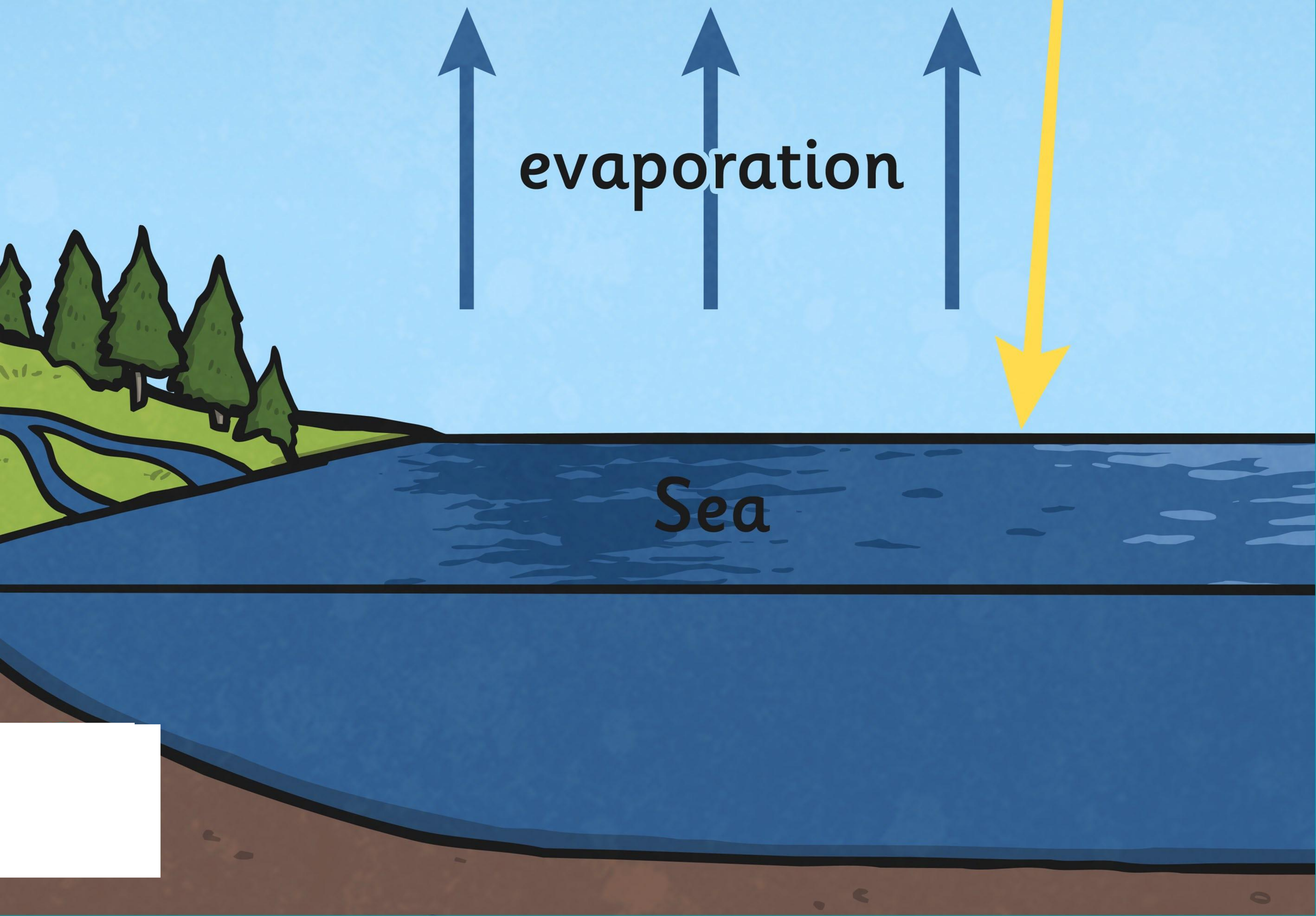
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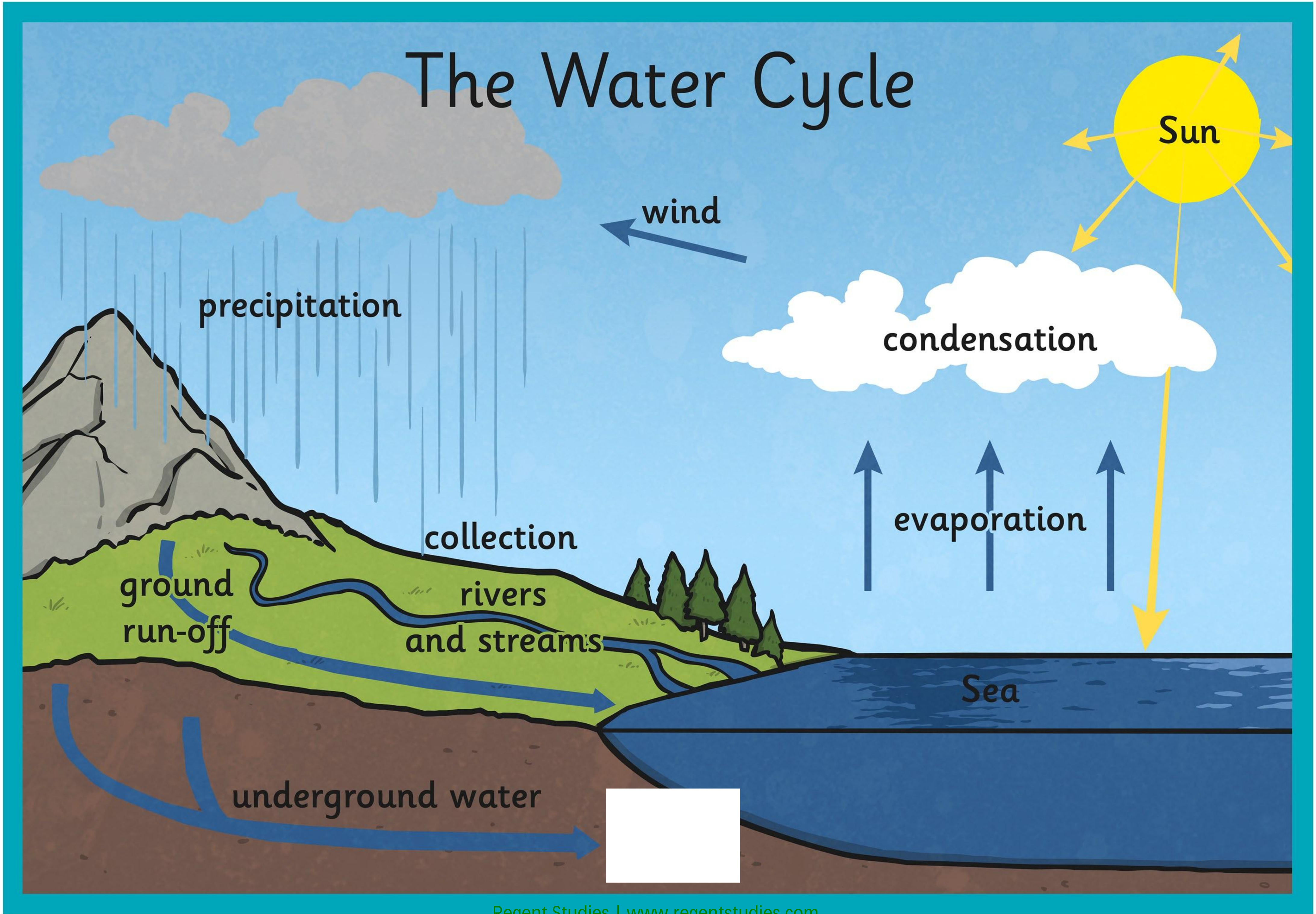
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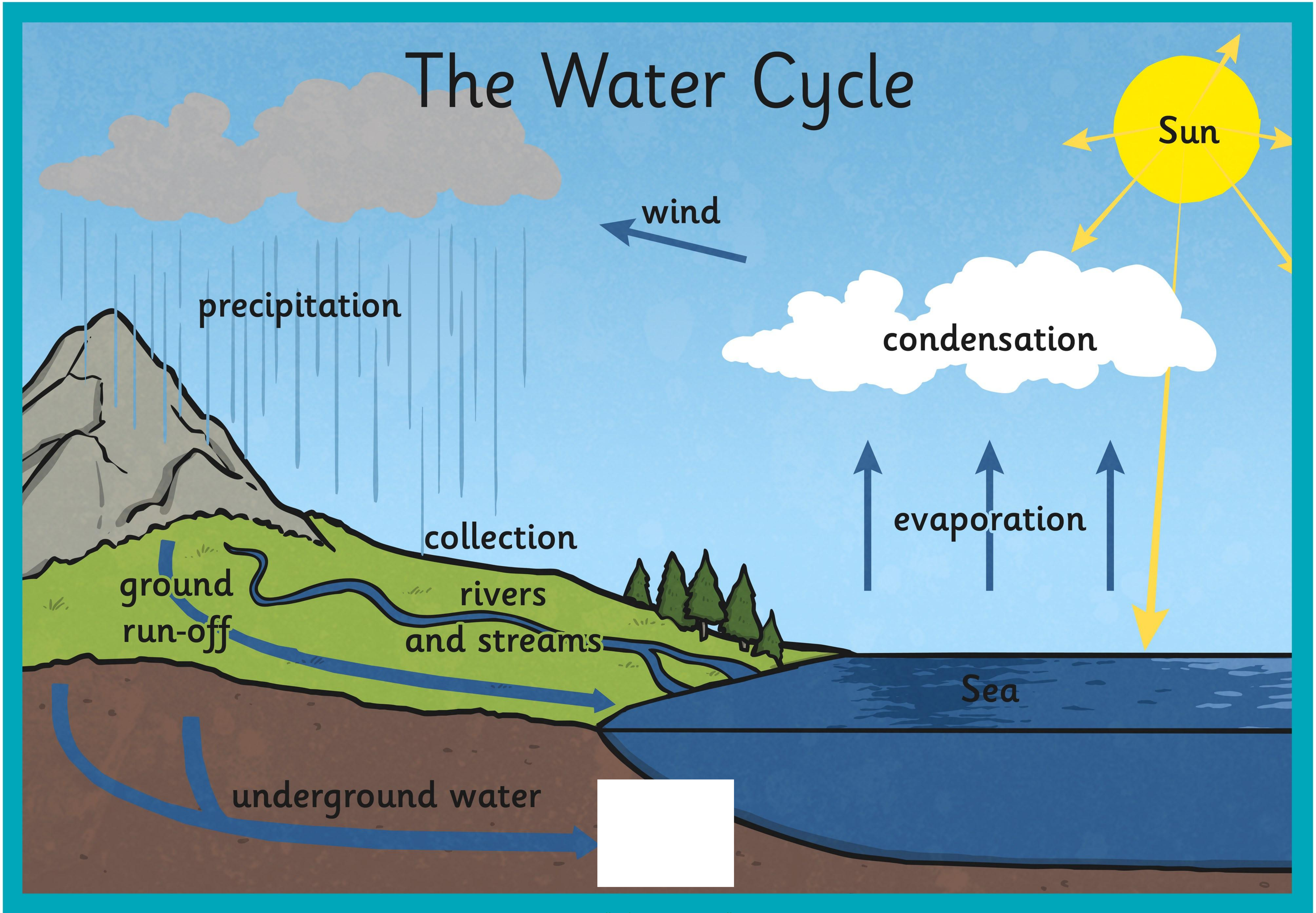
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Water Cycle Wheel

All the water on the Earth has been around forever.

The water cycle keeps our water supply going around and around.

Have you ever seen water drops on a plant?

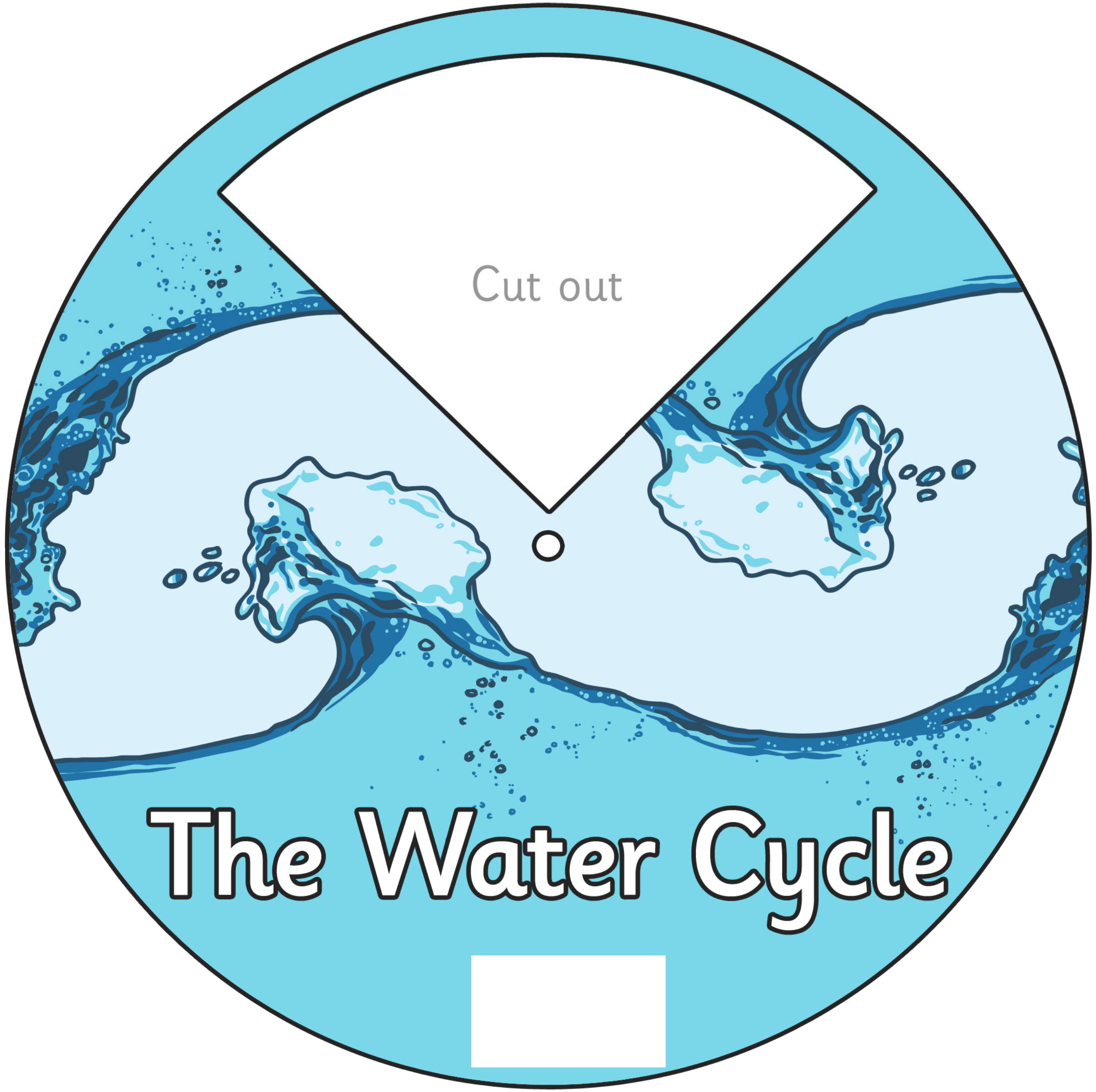
No, it's not sweating. Plants are going through transpiration in which the plants lose water through their leaves. Transpiration helps out by putting water vapour back into the air.

Do you know that you have seen condensation at work?

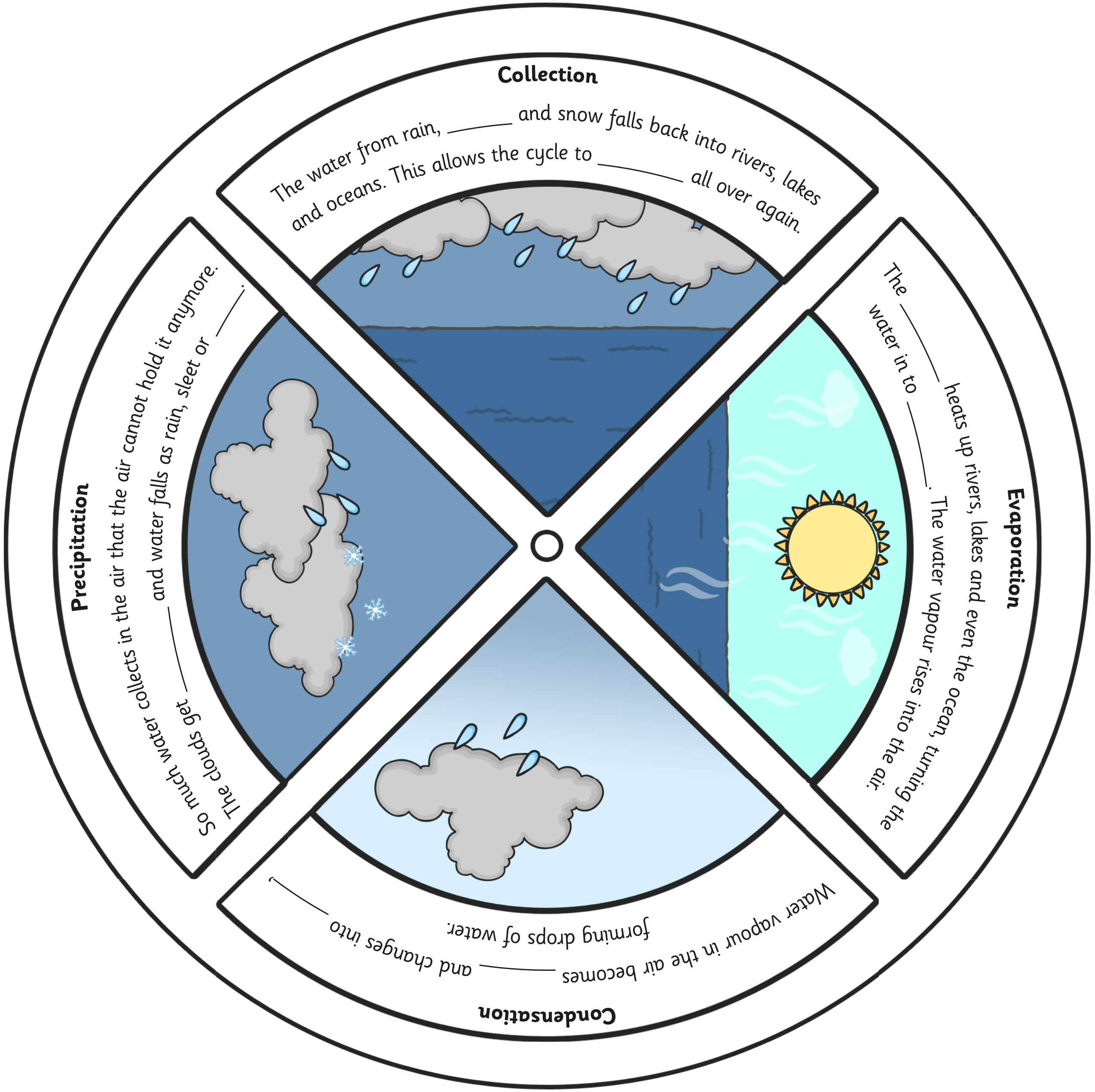
If you've ever had a drink in a cold glass or a can and the air is warm outside, you'll see water drops on the outside of the glass. This is because the water vapour in the warm air is being cooled back down into a liquid on the surface of the glass or can.

Instructions:

Cut out both discs. Place top disc over bottom disc and fix together. Line up the images and text on the bottom disc with the cut out window on the top disc to create your water cycle wheel.



Top disc


Collection
The water from rain, ______ and snow falls back into rivers, lakes and oceans. This allows the cycle to ______ all over again.
Evaporation
The ______ heats up rivers, lakes and even the ocean, turning the water in to ______. The water vapour rises into the air.
Condensation
Water vapour in the air becomes ______ and changes into forming drops of water.
Precipitation
So much water collects in the air that the air cannot hold it anymore. The clouds get ______ and water falls as rain, sleet or ______.

Bottom disc

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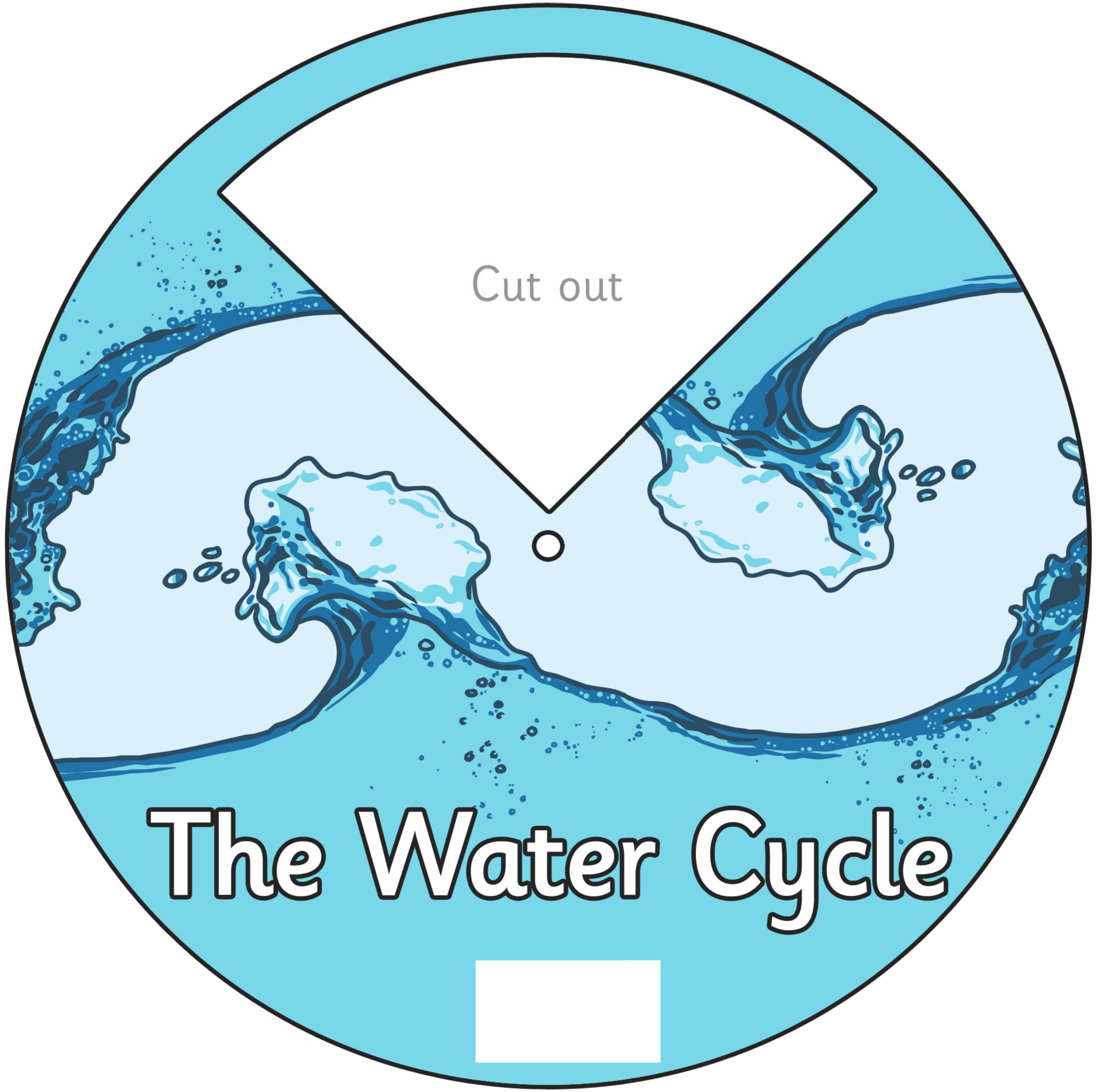
Instructions:

Cut out both discs and labels. Glue labels in to the correct position on the bottom disc. Place top disc over bottom disc and fix together. Line up the images and text on the bottom disc with the cut out window on the top disc to create your water cycle wheel.



Top disc

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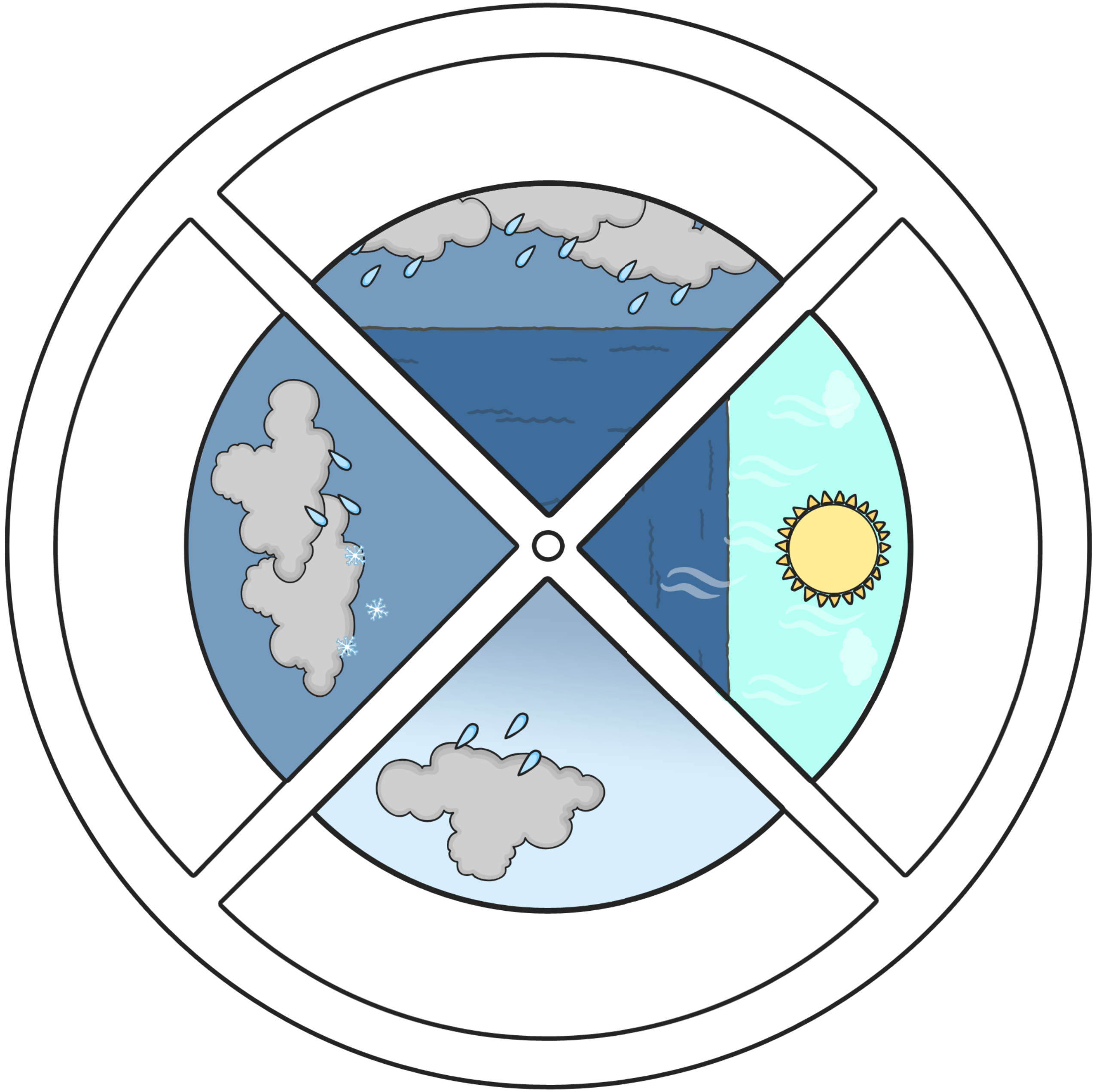

Bottom disc

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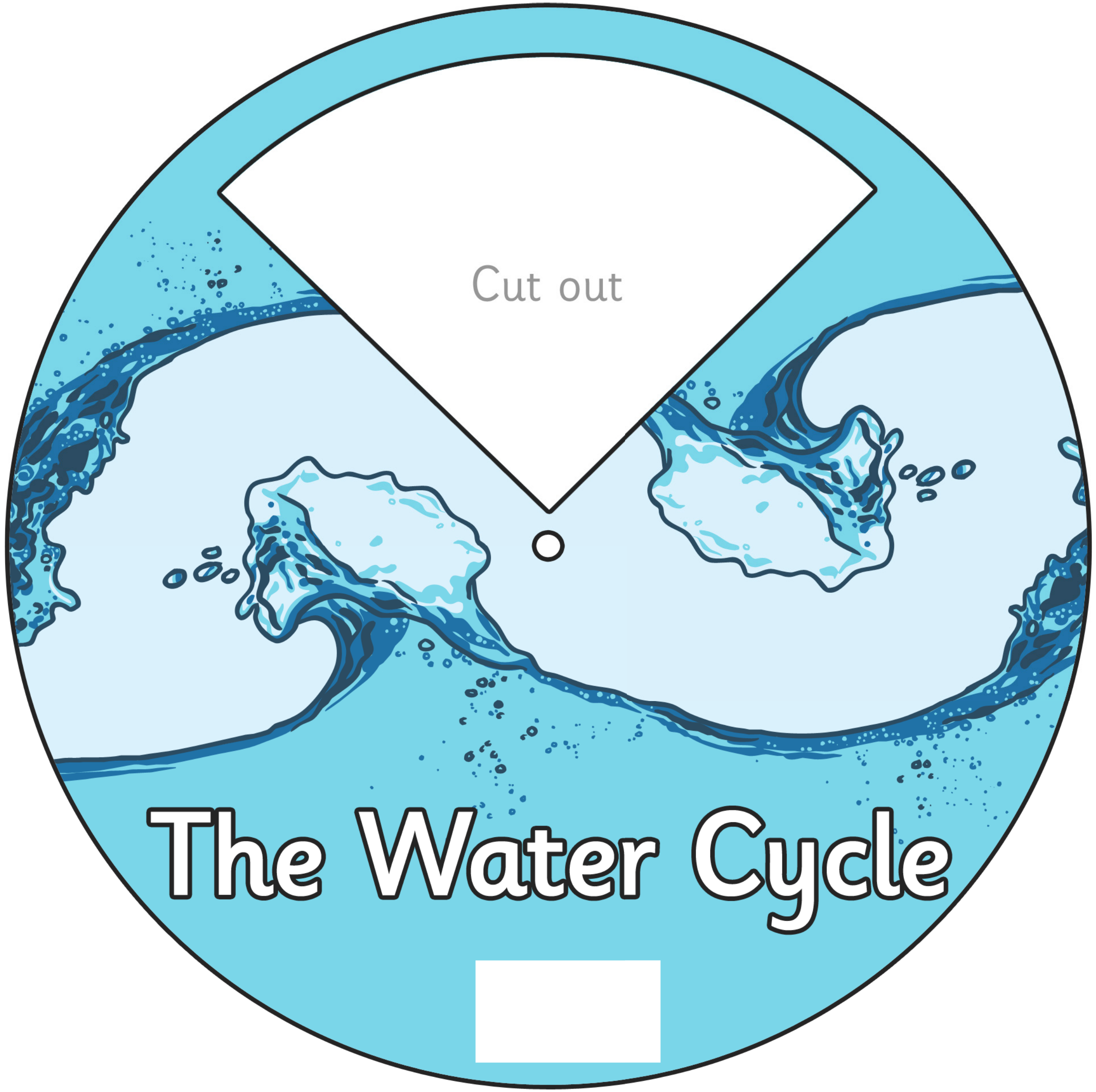
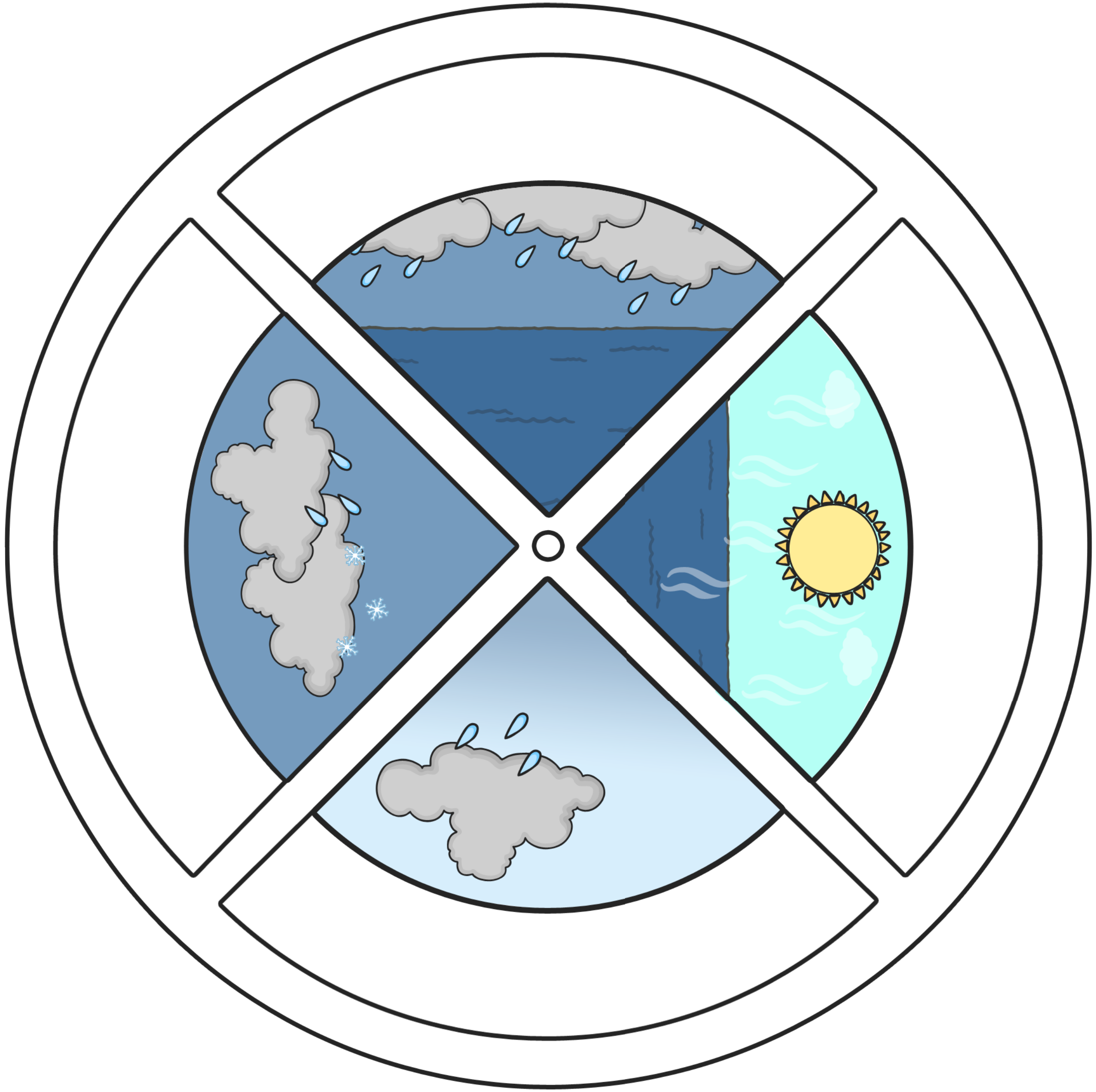
Instructions:

Cut out both discs. Write a short description for each part of the water cycle in the white spaces. Place top disc over bottom disc and fix together. Line up the images and text on the bottom disc with the cut out window on the top disc to create your water cycle wheel.



Top disc



Bottom disc

States of Matter | The Water Cycle

I can identify and describe the different stages of the water cycle.		
I can describe the different stages of the water cycle.		
I can explain the role of evaporation and condensation in the water cycle.		

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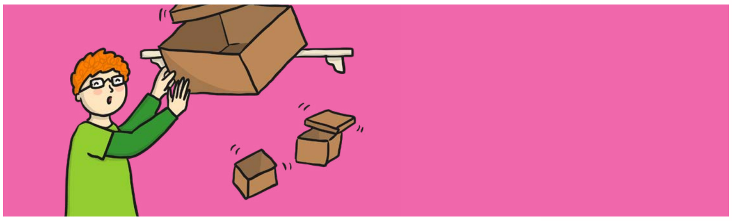
States of Matter

Science | Year 4 | Unit Overview

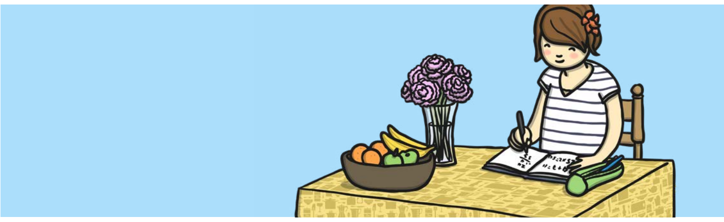
Introduction

This 'States of Matter' unit will teach your class about the differences between solids, liquids and gases, classifying objects and identifying their properties. The children will work scientifically and collaboratively to investigate the weight of a gas. Furthermore, they will have chance to find the ideal temperature to melt chocolate. They will explore in-depth how water changes state, exploring melting, freezing, condensing as well as a particular focus on evaporation. Finally, they will learn about the stages of the water cycle, creating mini water worlds and an interactive water wheel to represent the different stages.



Health & Safety

Ensure that children are aware that they should not drink the fizzy drinks in lesson 2, or eat the chocolate in lesson 3. Check any food allergies when selecting the fizzy drinks and type of chocolate to use. Ensure that any water used by the children is only warm, not hot, and is always 45°C or less. When demonstrating boiling water in lesson 4, ensure that this is only carried out by an adult and that children remain seated at all times. Make sure that the children do not place the salt and ice on their skin in lesson 4. When carrying out investigations ensure children are aware of how to use the equipment safely.



Home Learning

Crossword: Children have the opportunity to use their knowledge of states of matter to solve a fun crossword puzzle.

Water Cycle Game: Children are challenged to use their understanding of the water cycle to play an exciting board game.

To look at all the resources in the States of Matter unit

To find out more about PlanIt download our

Assessment Statements

By the end of this unit...

...all children should be able to:

- Sort materials into solids, liquids and gases.
- Explain that heating causes melting, and cooling causes freezing.
- Identify the melting and freezing point of water.
- Describe evaporation and condensation using practical examples.
- Describe the effect of temperature on evaporation referring to their investigation.
- Identify the stages of the water cycle.
- Predict what will happen in an investigation.
- Make observations.

...most children will be able to:

- Describe the properties of solids, liquids and gases.
- Explain that melting and freezing are opposite processes that change the state of a material.
- Identify the melting and freezing point of several different materials.
- Explain that heating causes evaporation and cooling causes condensation.
- Explain that evaporation and condensation are opposite processes that change the state of a material.
- Explain that the higher the temperature, the quicker water evaporates.
- Explain what happens to water at the different stages of the water cycle.
- Make observations and conclusions.
- Be able to answer questions based on their learning.

...some children will be able to:

- Explain the behaviour of the particles in solids, liquids and gases.
- Explain how heating and cooling causes materials to melt and freeze.
- Explain why a material's melting and freezing point is the same temperature.
- Explain how heating and cooling can cause materials to evaporate and condense.
- Explain why a higher temperature will speed up evaporation.
- Use the water cycle to explain why the water we have on Earth today is the same water that has been here for millions of years.
- Set up reliable and accurate investigations.
- Make and explain predictions.
- Make and record accurate observations.
- Use scientific language to explain their findings.
- Be able to ask and answer questions based on their learning using scientific language.

Lesson Breakdown

Resources

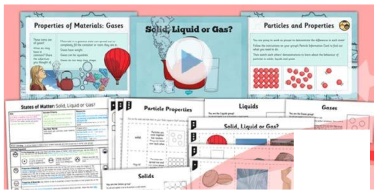
1. Solid, Liquid or Gas?

To compare and group materials together, according to whether they are solids, liquids or gases by sorting and describing materials into solids, liquids and gases.

- I can sort and describe materials.

Resources

- Access to the Hall or an outside space



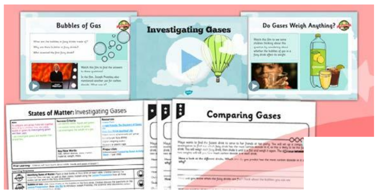
2. Investigating Gases

To compare and group materials together, according to whether they are solids, liquids or gases by investigating gases and their uses.

- I can investigate gases and explain their properties.

Resources

- Plastic bottle of lemonade - 1 per group
- 3-5 different fizzy drinks
- Digital weighing scales
- Beakers or plastic cups



3. Heating and Cooling

To observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) by investigating how heating and cooling can change a material's state.

- I can investigate materials as they change state.

Resources

- Thermometers
- Foil pie tins
- Chocolate broken into equal sized squares
- Trays - 3 per group, each tray filled with a different temperature of water
- Stopwatches

4. Wonderful Water

To observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) by exploring how water can change its state to a solid, liquid or a gas.

- I can explore how water changes state.

Resources

- Container of warm water with cling film stretched over it
- Ice cubes
- Kettle
- Plate
- Beakers
- Teaspoon
- Salt

5. Evaporation Investigation

To associate the rate of evaporation with temperature by investigating the effect of temperature on drying washing.

To make systematic, careful and accurate observations and measurements and report on findings from enquiries by displaying results and conclusions by investigating the effect of temperature on drying washing.

- I can investigate how water evaporates.

Resources

- Tea towels - 3 per group
- Water
- Measuring jugs - 1 per group
- Weighing scales - 1 set per group
- Three washing lines in places in different temperatures
- Pegs
- Thermometers - 1 per group
- Clock

6. The Water Cycle

To identify the part played by evaporation and condensation in the water cycle by creating a model of the water cycle.

- I can identify and describe the different stages of the water cycle.

Resources

- Clear plastic cups - 1 per pair
- Compost
- Cress seeds
- Cling film