

ENQUIRE	Using the criteria above, what do you think the following materials would be classified as? Solid, liquid or gas? Why do you think this?						
RECORD REPORT CONCLUDE	Bread flour Bread flour	Black treacle	Cornflour powder	Cornflour mixture	Shaving foam		
EXS: 1. What are th one another	e three 'states of matter' and ?	how are they different from	GDS: 1. John explains liquid: It can b difficult to hol Explain why Jo	that sand must be a liquid l be poured; it fills the space i d without it escaping. ohn is incorrect.	because it fits the criteria of a it has been poured in to; it is		



YEAR 4: SUMMER 1 – SCRUMDIDDLYUMPTIOUS **SCIENCE: STATES OF MATTER**

UNDERSTAND,	DESCRIBE AND EXPI	LAIN: HEATIN	G AND COOLING					
To compare and	Solid	Liquid	Gas	Materials	Changing state	Heating		
group materials	Cooling		Melting	Freezing	De	grees Celsius °c		
together, according								
to whether they are	Changing state:							
solids, liquids				· .· <i>•</i>				
or gases	Solids, liquids and gases cal	n be changed from (one state to another by I	heating or cooling.				
To observe that	Cooling freezes a liquid into	s it into a liquid .						
some materials		d 3011 .						
change state when	Heating:							
they are heated or	If ice (solid) is <i>heated</i> , it <i>cha</i>	anges to water (liqu	ıid).					
cooled, and measure	This change is called <i>meltin</i>	g .						
<mark>or research the</mark>	Different solids melt at diff	erent temperatures				139 40		
temperature at	Ice melts at 0 degrees Celci	us (0°C).						
which this happens	Chocolate melts at about 3.	5°C.						
in degrees Ceisius	Therefore, we say that choc	colate has a higher i	<i>melting point</i> than ice.					
To identify the part	Cooling:							
played by	If water (liquid) is <i>cooled to</i>	it's freezing point ((0°c) , it changes to ice		A COLORADO	(solid).		
evaporation and	This change is called <i>freezin</i>	ig.		at the		· · ·		
condensation in the	Different liquids freeze at d	ifferent temperatu	res.	- Cillia	E.C. Market			
water cycle and	Water freezes at 0°c.				A AND ST			
associate the rate of								
evaporation with			THINKI	NG POINT:				
temperature.			Do all materi	als freeze at 0°c?	<u>ζ</u>			
	Do all materials freeze at 0°C?							
	Changing State							
				-				
			meits	evaporal	.05			
			beating					
			nearing	neating				
			cooling					
			coomig					
			Second Freezes	Conden	888			
		L						
	Ννεστιζατεί μεατι							
	Investigating the impact of	heating and cooling	g on different substance	AC'				
ENOLUEE	Test 1. Heating	neating and coolin	g on unterent substance	<u></u>				
TEST	Place the following items in	a saucepan and on	the hob at a low heat					
RECORD	Observe what happens, and	time how long eac	h solid takes to change t	o a liquid.				
REPORT	Butter		Chocolate	Ice Cream		lce		

Test 2: Cooling

CONCLUDE

	Place the following items on a saucer and in the freezer. Observe what happens, and check at regular intervals to observe how long each liquid takes to change to a liquid.						
	Melted butter	Melted butter Melted chocolate Cream					
	Test 3: Room temperature (control) Place the following items on a saucer and in the same place of a chosen room. Observe what happens, and check at regular intervals to observe what happens to each substance.						
	Butter	Butter Chocolate Ice Cream Ice					
KEY ASSESSME	NT AND APPLICATION OPE	PORTUNITIES:					
<u>EXS:</u>		GDS	<u>6:</u>				
1. What is the d	ifference between heating and coo	ling?	 Using the words b 	elow, explain this c	diagram:		
What effect c	an they have on different substanc	es?	Heat	Cool	Changing State		
			Evaporates	Condenses			
			Freeze	Melt			
			Evaporation	Condensation			
					Prestee		



an Aspirations Academy

YEAR 4: SUMMER 1 – SCRUMDIDDLYUMPTIOUS Ocean Academy Poole **SCIENCE: STATES OF MATTER**

UNDERSTAND, DESCRIBE AND EXPLAIN: ONDESING AND EVAPORATION To compare and Solid Liquid Gas Materials Changing state Evaporation group materials Condensation Water cycle Precipitation Temperature together, according to whether they are Liquids and gases can be changed from one state to another by heating or cooling. solids, liquids or gases **Heating water - evaporation:** If water (liquid) is heated, it changes to water vapour or steam, which is a gas. To observe that This change is called *evaporation*. some materials This can happen at any temperature above freezing point (0°c), but is most obvious change state when when water reaches its **boiling point** (100°c). they are heated or Evaporation happens at a faster rate and is more obvious to observe, when the temperature is higher. cooled, and measure or research the <u>Cooling water – condensation:</u> temperature at If water vapour or steam (gas) is cooled down, it changes into water, which is a liquid. which this happens This *change* is called *condensation*. in degrees Celsius You can often see *condensation* happening on a *cold morning*. When the *moisture* (water vapour) in the *air* (°C) touches the *cold* glass on the windows, it *condenses* back in to *liquid water*. **THINKING POINT:** To identify the part played by Can you think of any times when you have observed evaporation or condensation? evaporation and condensation in the Evaporation and condensation in the water cycle: water cycle and associate the rate of Earth has been recycling water for over 4 billion years! evaporation with The world's water moves between *lakes, rivers, oceans*, the *atmosphere* and the *land* in an *ongoing cycle* called the *water cycle*. As it goes through temperature. this continuous system, it can be a liquid (water), a gas (vapour) or a solid (ice). There are 4 stages of the water cycle which continuously repeats: **Evaporation:** Energy from the Sun heats up the surface of the Earth, causing the temperature of the water in our rivers, lakes and oceans to rise. When this happens, some of the water evaporates into the air/atmosphere, turning into a gas called vapour. Plants and trees Condensatio also lose water to the atmosphere through their leaves: Evapotranspiration. Animals (inc. humans) also lose water to the atmosphere through their skin: perspiration. **Condensation:** As water vapour rises up high into the sky, it cools and turns back into a liquid, forming *clouds*. This process is called *condensation*. *Air currents* high up in the air *move* these *clouds* around the globe. Evaporatio Depending on the *temperature* and how *quickly* the *vapour condenses* or sometimes freezes, the vapour can turn to rain, sleet, hail or snow. Precipitation: Streamflor water When too much water has condensed, the water droplets in the clouds become too big and heavy for the air to hold them. They fall back down to Earth as rain, snow, hail or sleet, a process known as precipitation. **EXPLORE AND INVESTIGATE: EVAPORATION AND CONDENSATION** HYPOTHESISE To observe evaporation over time: ENQUIRE Leave an equal amount of water in the same type and size of container in different places. For example: TEST

At the same time each day, measure the amount of water remaining in each container. What do you observe? How many days will it take for the water in each location to completely evaporate?

Inside a dark cupboard

CONCLUDE

RECORD

REPORT

KEY ASSESSMENT AND APPLICATION OPPORTUNITIES:

EXS:

1. When thinking about the water cycle, what do these words mean?

Inside, on a windowsill

- Condensation
- Evaporation

GDS:

- 1. Using the following as subheadings, write a paragraph to explain this diagram:
 - Condensation ٠

Inside a fridge

- Evaporation
- Precipitation



In a shady part of the classroom



YEAR 5: SUMMER 1 – WATER-AID SCIENCE: PROPERTIES AND CHANGES OF MATERIALS

UNDERSTAND, DESCRIBE AND EXPLAIN: PROPERTIES OF MATERIALS

To compare and	Properties	Materials	Metal	Wood	Plastic	Glass	Fabric	
group together	Conductor	Insulator	Magnetic	Transparent	Insulating	Absorb	pent	
everyday materials	Properties of materials:							
<mark>on the basis of their</mark>	Materials have different	properties that make the	em useful for different job	DS.				
properties, including	This will depend on what they are made from.							
their hardness,	Here are some examples of different materials and what they are useful for depending on their properties:							
solubility,								
transparency,	Metals:							
conductivity	Most metals are strong, hard and shiny materials that can be hammered into different shapes without							
(electrical and	breaking. They are good conductors of heat and electricity and some are magnetic (do you remember what							
thermal), and	It must contain to be magnetic from Year 3?)							
response to magnets	Their properties make th	nem <i>useful</i> for objects su	ch as cutlery , saucepans ,	cars and coins.		000		
	Plastics:							
To give reasons	Plastics are materials m	ade from chamicals and	are not found in nature	boy are strong and wate	rproof	3 130	1991	
based on evidence	They can be made into c	ade from <i>chemicuis</i> and a	at Plastics are not maan	etic They are good insult	ntors and			
from comparative	do not conduct heat or 6	electricity. They're used to	o make things like hags h	ottles and toys		NO7	0	
and fair tests, for the		ficelineity. They ie used to	o make times like bags, b	ottles and toys.				
particular uses of	Glass:				1 and		-	
everyday materials,	Glass is made by melting	g sand and other minera	ls together at very high te	emperatures. It is normal	<i>ly transparent</i> and can			
including metals,	be made into <i>different s</i>	, hapes. Thick glass can be	e strong, but thin glass br	eaks easily. It is used for	objects that need to be	e	241	
wood and plastic	transparent, such as wir	ndows and glasses.	5. 5	,				
		0				111	sel de	
	Wood:							
	Wood comes from trees	. It is strong , flexible and	long-lasting. Because the	ere are <i>many variations d</i>	of tree, there are also		IIIII IIII	
	many variations of woo	d.				In		
	The most common wood	d is from the Spruce Pine	tree. Wood is an insulate	r of heat and electricity.	It is used to make thing	ιs 🔰 🔙		
	such as furniture .							
	<u>Fabric:</u>							
	Fabrics are made from t	hin fibres woven togethe	er. Different fabrics have o	lifferent properties. They	can be stretchy (a pair	bb bb	220	
	of tights), insulating (a woollen coat) or absorbent (a towel). Fabrics are used to make clothes as they are flexible, warm							
	and <i>ao not wear out easily</i> .							
	Can you find an example of all of these materials around you? Why is it made from that material? Could it be made from a different material?							
	Grouping and comparin	g:						
	We can group and comp	are materials on the basi	s of their properties.					
	We can compare their:		1 I · · · · · · · · ·					
	Hardness (how	hard or soft it is)						
	Solubility (whet	her it dissolves in water)						
	• Transparency (v	, whether light can pass th	rough it)					
	• Conductivity of	heat or electricity (whet	her it allows heat or elect	ricity to travel through it)				
	• Response to ma	agnets (whether it is attra	acted or not)					
	-							
	Have a go at the 'Explore	e and Investigate' below t	to group and compare dif	ferent materials.				
			TUN					
			<u>1 HIN</u>		<u>ک</u>			
		If you did not v	vant an ice cube to me	t, what material could	you wrap it in to slo	w		
		d	own the process? Why	do you think this wou	ld work?			
		-	. ,					
EXPLORE AND I	NVESTIGATE: GRO	DUPING AND COM	MPARING MATER	IALS				
HYPOTHESISE	Material:	Is it transparent?	Is it magnetic?	Does it conduct	Is it rigid or flexible?	Does it d	issolve in	
ENQUIRE	Aluminium foil			electricity?		wat	lerr	

ENQUIRE TEST RECORD						electricity?		water?
	Alumin	ium foil						
	Plastic	counter						
	Pencil							
	Tupper	ware lid						
CONCLODE	Paperc	ір						
	Glass (j	ar)						
KEY ASSESSMENT AND APPLICATION OPPORTUNITIES:								
EXS:					GDS:			
Using the following	g as sub-hea	dings, explain t	he properties	of each material	If you did not want an ice cube to melt, what material could you wrap it in to			
and how they coul	d be useful	n everyday life			slow down	the process?		, ,
Metals Pl	astics	Glass	Wood	Fabric	Why do yo	u think this would work	?	
			-					



YEAR 5: SUMMER 1 – WATER-AID **SCIENCE: PROPERTIES AND CHANGES OF MATERIALS**

UNDERSTAND, DESCRIBE AND EXPLAIN: CHANGES OF MATERIALS

	Changes	Materials	Reversible	Irreversible	Dissolving	Evaporating		
To know that some	Melting	Freezing	Heating	Cooling	Filtering	Sieving		
materials will								
dissolve in liquid to	Changes of materials:							
form a solution, and	The properties or state of materials can be changed by going through different processes.							
describe now to	Some of these <i>processes</i> are <i>reversible</i> (they can <i>change back again</i>) and some are <i>irreversible</i> (<i>unable to change back</i>).							
from a solution	Dissolving (to dissolve):							
nom a solution	One of these processes	is called dissolving						
To use knowledge of	Dissolving is when a sul	is called <i>dissolving</i> . Istance is mixed with wa	ter and it incorporates to	create a solution .				
solids, liquids and	When a <i>substance dissolves</i> , it might look like it has <i>disappeared</i> , but in fact it has <i>just mixed</i>							
gases to decide how	with the <i>water</i> to make	with the <i>water</i> to make a <i>transparent</i> (see-through) <i>liquid</i> called a <i>solution</i> .						
<mark>mixtures might be</mark>								
separated, including	Substances that dissolv	e in water are called solu	ble substances.					
through filtering,	For example, when you	<i>mix sugar</i> with <i>water,</i> th	e sugar dissolves to make	a transparent solution .	<i>Salt</i> is <i>soluble</i> in wate	er too.		
sieving and								
evaporating	Substances that do not	dissolve in water are call	ed <i>insoluble substances</i> .					
To down owstrate that	For example, when you	mix <i>sand</i> or <i>flour</i> with <i>w</i>	ater, they do not dissolve					
dissolving mixing	Dissolving is a reversible	<i>e</i> cnange.						
and changes of state								
are reversible			<u>THINKIN</u>	<u>G POINT:</u> { ·				
changes		Salt a	and sugar are soluble su	ubstances. Sand is inso	luble.			
To explain that some		Can yo	u think of any other so	uble or insoluble subs	tances?			
changes result in the								
formation of new	Dissolving - a reversible	change:						
materials, and that	Dissolving is an example	e of a <i>reversible change</i> .	· · · · · · · · · · · · · · · · · · ·					
this kind of change is	When a <i>soluble substance</i> (e.g. salt) is added to a <i>liquid</i> (e.g. water), it <i>dissolves</i> to become a <i>solution</i> .							
reversible including	However, these substances can be separated from the liquid and returned to their original state .							
changes associated	salt behind.							
with burning and the	Sun bennu.							
action of acid on	Other <i>reversible changes</i> include <i>evaporating, melting</i> and <i>freezing</i> . For example, <i>heating</i>							
bicarbonate of soda	chocolate slowly will melt the chocolate to a liquid. By placing it back in a cold environment, the							
	chocolate will return to a solid state. Butter and ice cream are other good examples of this reversible							
	change.							
	A <i>reversible change</i> might <i>change</i> how a <i>material looks or feels</i> , but it <i>does not create new materials.</i>							
	Irreversible changes:							
	A change is irreversible	if it cannot be chanaed k	back aaain.					
	In an <i>irreversible chang</i>	e, new materials are for	ned.					
	Here are some example	s of irreversible changes	to materials:					
	• Heating or cook	king can cause an irrever	<i>sible change</i> . For example	e, when you heat a raw e	gg to cook it, it canno	ot return to being a raw		
	egg. When baki	ng bread, it would be imµ	possible to retrieve the ye	ast, flour, water and salt	again.			
	 Mixing substan 	ces can cause an irrevers	i ble change . For example	, when vinegar and bicar	bonate of soda are m	ixed, the mixture changes		
	and lots of bubb	oles of carbon dioxide are	made. These bubbles an	d the liquid mixture left b	ehind, cannot be turr	ned back into vinegar and		
	bicarbonate of s	soda again.						
	Burning is an ex	cample of an irreversible	change. When you burn	wood, you get ash and sn	noke. You cannot cha	nge the ash and smoke		
	back to wood ag	gain.						
EXPLORE AND I	NVESTIGATE: GRO	OUPING AND CO	MPARING MATER	IALS				
HYPOTHESISE	Soluble or insoluble?							
ENQUIRE	Stir the following substa	inces in to warm water fo	or 60 seconds. Once you h	ave done this, pass the w	ater through a filter.			
TEST	If the substance is solub	le, it will have created a	new solution and nothing	or very little, will be left	in the filter.			
RECORD	If the substance is insolu	uble, all of the substance	will get caught in the filte	r.				

REPORT CONCLUDE

Γ

REDORT		Soluble	Insoluble			
CONCLUDE	Sugar					
	Salt					
	Sand					
	Coffee grounds					
	Is dissolving reversible? You should have noticed that the sugar and salt dissolved in to the water creating a new solution. However, we can get the salt back to its original state by heating it and <i>evaporating</i> the water. If we evaporate the water, the salt will be left behind. You can either leave the salt solution (no lid) on the windowsill and observe it evaporating slowly, or put the solution in a saucepan and heat it on the hob (no lid).					
KEY ASSESSME	NT AND APPLICATION OPPORTUNI	TIES:				
EXS:		GDS:				
Dissolving is a revers What does 'irreversil	ible change. What is meant by 'reversible chang ole change' mean? Can you think of an example	ge'? Explain how salt can return to its ? Use diagrams to support your ex	s solid form after being dissolved in water. planation.			