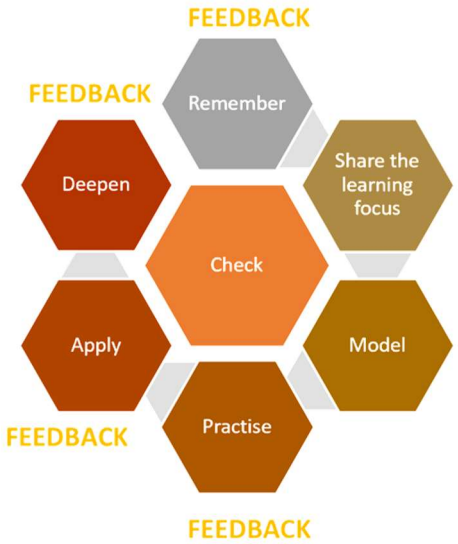
Year Two Science: Materials

Scientific enquiry types covered in this topic
Classifying, identifying and grouping
Comparing and Fair Testing
Pattern Seeking
Research
Observing over time

Knowledge of working scientifically covered in this topic	
Making predictions	Children consider in advance what might happen or what they might find
Asking and answering questions	Raise questions about the world around them and begin to recognise that they can be answered in different ways
Observing	Use simple equipment to observe closely
Measuring	Make simple measurements using non-standard units (big, small, bigger, smaller, louder, faster, steps etc)
Recording data	Gather data to help answer questions
Performing simple tests	Perform simple tests
Presenting results	*Not covered in Year One*
Drawing conclusions	Tell others what they did and what they found out

Lesson Structure

- Build on **prior learning**
- Encourage students to **recall** that prior learning
- **Make** the new **learning** in each lesson succinct, **clear** and meaningful
- **Share/model/instruct** the new knowledge to students in small manageable steps
- **Check** they are with you throughout and are grasping the knowledge
- Provide opportunity to recall and **practise** the knowledge
- Provide live **feedback** during practise
- Provide opportunity to **apply** that new knowledge in a slightly different context
- Encourage students to **deepen** their understanding with challenging tasks that requires thinking, reasoning and explaining.
- **Check** students have secured the new knowledge with a quiz



Knowledge Organiser: Year Two Science | How do brilliant scientists understand the properties and uses of everyday materials?

Prior learning: In Year One, children learnt what different materials objects were made of, describing and grouping them by their properties

Meet some brilliant scientists who have investigated materials…

John Dunlop was a scientist who invented inflated tyres made out of rubber.

Charles Macintosh was a Scottish scientist who invented a waterproof rubber fabric.

How does a material's properties make it suitable for its use?

We will learn that objects are made out of different materials to make them suitable for a purpose.


Soft


transparent


stretchy


hard


waterproof

sticky knowledge

I know that materials can be suitable for particular uses

What are materials?

We will read the 'Five Little Pigs' story to learn about materials

We will learn that objects can be made out of different materials:


metal


wood


glass


brick


plastic


cardboard

sticky knowledge

Brilliant scientists know that objects can be made from different materials

How can objects be changed?

We will learn about how we can change objects in different ways


twisting


squashing


stretching

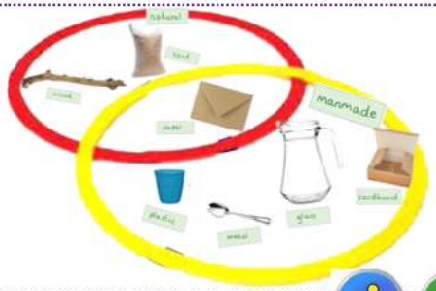

bending

sticky knowledge

I *know that some objects can be changed by twisting, squashing, stretching and bending*

Where do materials come from?

We will learn that objects can be made out of different materials. Some materials can be found naturally, such as sand, logs and stone. Some objects are made by people, such as plastic– these are called man-made objects.



sticky knowledge

Brilliant scientists know that objects can be natural or manmade

What is the best material to make an umbrella?

We will carry out a comparison investigation to find out which materials are Waterproof, making predictions and drawing conclusions about our findings

sticky knowledge

I know how to make predictions and conclusions to carry out a comparative investigation

Key vocabulary: Glossary

absorbent	Able to soak up easily.	manmade	Not natural. Created by people	rigid	Does not bend easily.	stretchy	Can be made bigger when pulled.
bendy	Can be bent into a curved shape.	materials	The substance that things are made of.	rough	Uneven. Not smooth.	suitability	How right somethings is for a purpose.
change	To make or become different.	natural	Found in nature - not made by people.	shiny	Something that is bright and reflects light.	translucent	A material which allows some light to pass through it.
dull	Not shiny or bright	opaque	Not able to see through, not transparent.	smooth	Not rough. Does not have lumps or holes.	transparent	A material which allows light to pass through it.
flexible	Can be bend without breaking.	permeable	A material that water or gas can pass through.	soft	Feels gentle to touch. Not hard.	unabsorbent	Does not soak up easily.
hard	Solid. Not easily broken or bent.	properties	The features of an object.	stiff	Does not bend easily.	waterproof	Does not let water through.

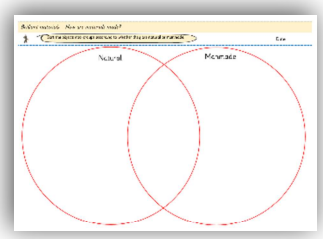
	Year Two Science: Materials	Session 1: What are materials?	

Learning Objective		Brilliant scientists can carry out a comparative investigation into the properties of materials
	'Sticky' Substantive Knowledge	I know that objects are made of different materials and I can name some
	'Sticky' Disciplinary Knowledge	Raise questions about the world around them and begin to recognise that they can be answered in different ways
	Scientific Enquiry Type	Classifying, identifying and grouping

Recap / Retrieval	Recap what children learned about materials in year one.
Share knowledge and vocabulary	*Key language:* ***materials***  Explain that we are going to be scientists. Ask children what are scientists? What do they do? Can they name any? Explain that we are scientists because we are asking questions and investigating to find out about the world around us. Ask children if they know what materials are. Agree on a definition that it is what an object is made of. Can the children name some different materials that objects are made of? Compile a list on the anchor chart. Explain that humans have been using materials for thousands of years to make objects. Stone age man (2.5 million years ago) made tools out of wood and stone In the Bronze age, (5000 years ago), people made tools out of metal. In the modern age, scientists are making new materials, such as Charles Macintosh (1766–1843).  Introduce the 'Five Little Pigs' video https://youtu.be/ZqkpRysQn-w, explaining that the pigs are thinking about different materials to build their houses. Following the video, recap / chat about the different materials that they used to make their houses.
Model	Model completing table for 'cardboard'. Find things in classroom made of cardboard. Model completing table for three items.
Do and Check Including scaffolding	 Children to complete first part of table collectively for objects in the classroom made of metal.
Apply in context Including scaffolding	Explain that we are going to go on a hunt around school to find objects made of different materials. We want to find at least 3 items made of glass, wood, metal, plastic, paper, cardboard and brick. Children to explore school looking for objects made of different materials, completing the table as modelled.
Reflect and review	Discuss what objects you found. Did they find any objects that were the same, but made of different materials? (e.g. a cupboard made out of wood, or a cupboard made out of metal). Recap learning question – What are materials? Can we answer that now? Ensure that the key knowledge is embedded.

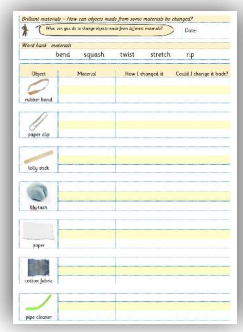
	Year Two Science: Materials	Session 2: Where do materials come from?	

Learning Objective		Brilliant scientists can carry out a comparative investigation into the properties of materials
	'Sticky' Substantive Knowledge	I know that some objects and materials occur naturally and some are manmade.
	'Sticky' Disciplinary Knowledge	Gather data and record in a Venn diagram to help answer questions
	Scientific Enquiry Type	Classifying, identifying and grouping

Recap / Retrieval	Recap materials. Have the picture of a material and the word on cards. Take it in turns to take a card and name an object made from that material. Then take another card and repeat. How many different objects we name?  Recap on the learning from the last session, recapping on stone age, bronze age and materials created by scientists. Children to complete 'Quick Check 1': Objects can be made of different materials. What material are these chairs made of?
Share knowledge and vocabulary	*Key language:* ***materials, natural, manmade*** Introduce words *manmade* and *natural* and explain what they mean. Discuss some objects that could be natural or manmade.
Model	 Sit in a circle and share some objects (see illustration for examples). Model placing objects in the correct circle. Explain that we call this method of sorting data a Venn diagram. Model adding the correct label to objects to show the material they are made of? (wood, brick, stone, sand, glass, plastic, cardboard, metal, paper, cotton) Discuss how the items were created. Are they manmade or natural? What does this mean?
Do and Check Including scaffolding	 Children to have a range of items (Paper clip, aluminium foil, lolly stick, plastic bag, sand, fabric, twig, paper, little bits of slate) and PVA glue / glue sticks. Together discuss one of the objects, what it is made of and if it is natural or man-made. Together, place object in correct set on own Venn diagram. Add the correct label to them to show the material they are made of? (wood, brick, stone, sand, glass, plastic, cardboard, metal, paper, cotton)
Apply in context Including scaffolding	Children to sort items into two sets according to whether they are natural or manmade. There may be some debate over some items, for example a piece of wood which is natural but shaped by man. Agree that you can overlap the sets and place such items in the middle. Provide word bank to support.
Reflect and review	Discuss how the items were created. Are they manmade or natural? What does this mean?

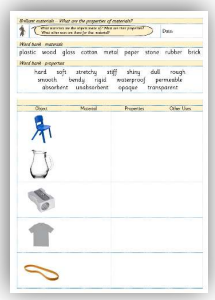
	Year Two Science: Materials	Session 3: How can objects be changed?	

Learning Objective		Brilliant scientists can carry out a comparative investigation into the properties of materials
	'Sticky' Substantive Knowledge	I know that some materials can be changed in different ways
	'Sticky' Disciplinary Knowledge	Perform simple tests
	Scientific Enquiry Type	Classifying, identifying and grouping

Recap / Retrieval	Recap on previous learning on materials. Children to explore the objects in their tables. What material do they think they are made of. (HA & MA children to complete the first column of their tables. Teacher to work with LA to discuss the objects and the materials they are made of.
Share knowledge and vocabulary	*Key language:* ***twist, bend, squash, stretch, rip*** Explain that we are going to change objects today – introduce the key vocabulary.
Model	Sit in circle with some objects in the middle (play-doh, stick, cardboard, a balloon, plastic bag, felt). Discuss the objects, the materials they are made of, describing their appearance and properties. Model possible ways that the materials could be changed. Take one of the objects and change it, taking suggestions from the children. Was it reversible? Model completing this on the table.
Do and Check Including scaffolding	Give children chance to explore their objects and consider how to change them. Get some feedback. Together, take the first object and try to change it in different ways. Together, children complete their sheets.
Apply in context Including scaffolding	  Children complete tables for how to change the objects. Scaffold - HA & MA writing notes using word bank, LA ticking the box as to how they changed the object.
Reflect and review	Review objects and how they were changed. Were the changes reversible? Why? Why not?

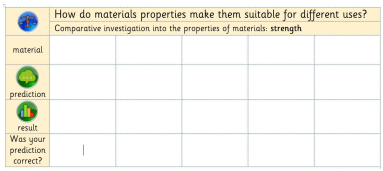
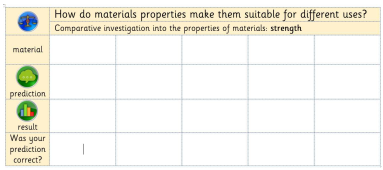
	Year Two Science: Materials	Session 4: How does a material's properties make it suitable for its use?	

Learning Objective		Brilliant scientists can carry out a comparative investigation into the properties of materials
	'Sticky' Substantive Knowledge	I know that different materials have different properties which make them suitable for different uses
	'Sticky' Disciplinary Knowledge	Use simple equipment to observe closely
	Scientific Enquiry Type	Research

Recap / Retrieval	 Recap on previous learning from last session. Children to complete Quick Check about changing materials Use to assist in completing assessment on Knowledge Organiser.
Share knowledge and vocabulary	*Key language:* ***Properties, hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy, rigid, waterproof, permeable, absorbent, unabsorbent, opaque, transparent*** rough / smooth opaque / transparent absorbent / unabsorbent waterproof / permeable bendy / rigid shiny / dull stretchy / stiff Discuss properties of materials. Use vocabulary cards to introduce key vocabulary. Play game to find matching pairs: Place one half the words on the carpet. Put the opposite words in a pile, face down Turn over the first word. Read and discuss. Who thinks they can see the opposite property? Create word bank.
Model	Have some objects on the carpet. Discuss the item, what material it is made of and ask for suggestions of other materials made of the same material. Model describing the properties of the material. Use the words to match to the objects on the carpet?
Do and Check Including scaffolding	Together, complete first item in table.
Apply in context Including scaffolding	 Children to complete their activity sheet.
Reflect and review	Once completed, children can complete materials properties wordsearch.

	Year Two Science: Materials	Session 5: How do materials properties make them suitable for different uses?	

Learning Objective		Brilliant scientists can carry out a comparative investigation into the properties of materials
	'Sticky' Substantive Knowledge	I know that materials can be suitable for different uses
	'Sticky' Disciplinary Knowledge	I can make predictions and draw conclusions
	Scientific Enquiry Type	Comparing and Fair Testing

Recap / Retrieval	Ask children to work in partners to 'talk like an expert' recalling key knowledge and vocabulary (materials / objects / change / natural / manmade / Charles Macintosh)
Share knowledge and vocabulary	Explain that today we are going to carry out a comparative investigation, examining the properties of different materials. Introduce key words: properties (something about an object that we can measure, see or feel) prediction (something about an object that we can measure, see or feel) table (something about an object that we can measure, see or feel)
Model	Ask for some words to describe the properties of materials. Explain that we are going to start off comparing the strength of different objects. Use some different materials to model: (hessian / cling film / cloth / toilet paper) Model making a prediction if the material is strong enough to hold a kg weight, then test the Complete the table each time, adding the picture, prediction (strong / weak), the result (strong / weak) and a tick or cross as to whether your prediction was correct. 
Do and Check Including scaffolding	 Teacher to test other materials, children completing their own tables, guided by teacher Children to put stickers in material section, make a prediction then record result and whether their prediction was right. Check children can complete table correctly.
Apply in context Including scaffolding	 Show video of the Five Pigs and the Gingerbread man. Children to work in groups of 3 or 4 to test whether materials are waterproof. Children to make predictions then carry out their test, using measuring cylinders to poor the same quantity each time. Record the result in their tables.
Reflect and review	Recap what they have learnt. What is a prediction? How can we use a table to record our results? Which materials were waterproof?

	Year Two Science: Materials	Session 6: What do I know about materials?	

Learning Objective	
 ‘Sticky’ Substantive Knowledge	
 ‘Sticky’ Disciplinary Knowledge	
 Scientific Enquiry Type	

Recap / Retrieval	
Share knowledge and vocabulary	If time allows, complete poster about materials
Model	
Do and Check Including scaffolding	
Apply in context Including scaffolding	
Reflect and review	

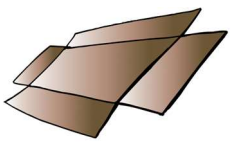
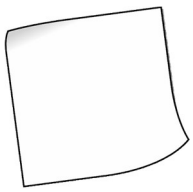
natural	materials
manmade	change
properties	suitability
rough	smooth
opaque	transparent
absorbent	unabsorbent
waterproof	permeable
bendy	rigid
shiny	dull
stretchy	stiff

Brilliant materials – What are materials?

(know that objects can be made of different materials / know that materials can have many uses)

Objects I found made of this material

Date:

	List the objects you found around school made of this material		
	1	2	3
			
			
			
			
			
			
			

Brilliant materials – What are the properties of materials?

(know that objects can be made of different materials / know that materials can have many uses)

What materials are the objects made of? What are their properties? What other uses are there for that material?

Date:

Word bank - materials

plastic wood glass cotton metal paper stone rubber brick

Word bank - properties

hard soft stretchy stiff shiny dull rough smooth bendy rigid waterproof permeable absorbent unabsorbent opaque transparent

Object	Material	Properties	Other Uses
			
			
			
			
			

Brilliant materials – How can objects made from some materials be changed? *(MA / HA)*

(find out how the shape of solid objects made from some materials can be changed by squishing, bending, twisting and stretching)

What can you do to change objects made from different materials?

Date:

Word bank - materials

bend squash twist stretch rip

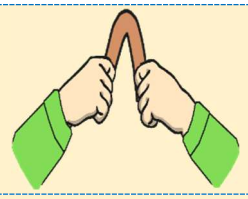
Object	Material	How I changed it	Could I change it back?
 rubber band			
 paper clip			
 lolly stick			
 blu-tack			
 paper			
 cotton fabric			
 pipe cleaner			

Brilliant materials – How can objects made from some materials be changed? *(LA)*

(find out how the shape of solid objects made from some materials can be changed by squishing, bending, twisting and stretching)

What can you do to change objects made from different materials?

Date:

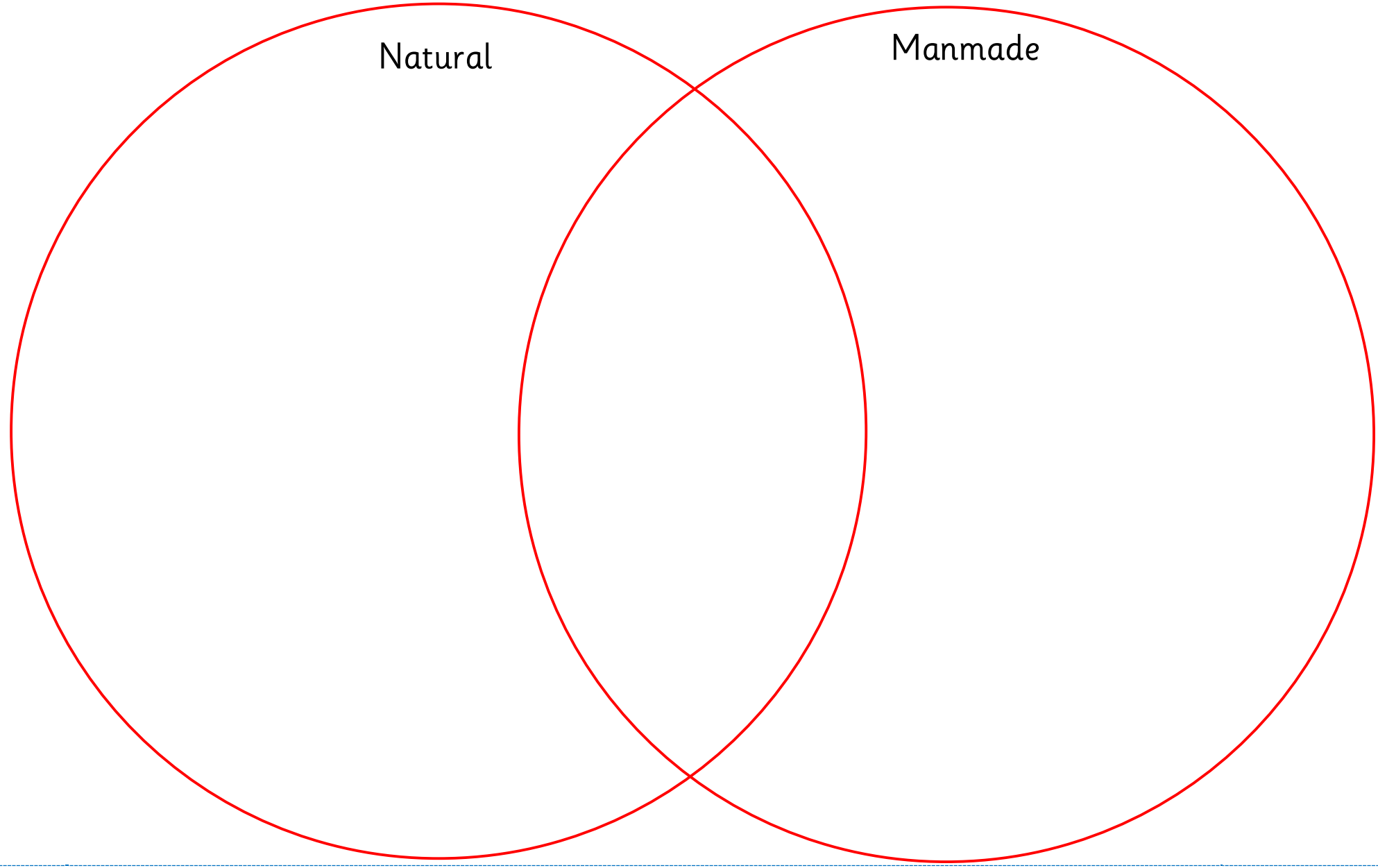
	 Could I **twist** it?	 Could I **squash** it?	 Could I **stretch** it?	 Could I **bend** it?
 rubber band				
 paper clip				
 lolly stick				
 blu-tack				
 paper				
 cotton fabric				
 pipe cleaner				

Brilliant materials – How are materials made?

know that objects can be made of different materials

Sort the objects into groups according to whether they are natural or manmade.

Date:



Brilliant materials – Which materials are waterproof? Science Investigation

(plan & carry out a fair test to investigate suitability of materials / gather & record data to answer questions / use observations & ideas to suggest answers to questions)

Which material will keep the gingerbread man dry?

Date:

Prediction

We will test these materials. I think these materials will be waterproof: (tick)

									
Cotton fabric		Paper towel		Plastic bag		Aluminium foil		Writing paper	

Planning

What are you going to change?	
What are you going to keep the same?	
How will you make it a fair test?	

Results

Material		Did it let any water in?	Is it waterproof?
Cotton fabric			
Paper towel			
Plastic bag			
Aluminium foil			
Writing paper			

Conclusion

These materials are waterproof:

These materials are NOT waterproof:

The best material for the Gingerbread Man's umbrella would be

I think this because

We are Brilliant Scientists QUICK CHECK

1 Objects can be made of different materials. What material are these chairs made of?

(know that objects can be made of different materials / know that materials can have many uses)




Word bank: metal plastic glass paper cardboard wood stone sand brick

2 The shape of objects can be changed in different ways. How could you change these?

(find out how the shape of solid objects made from some materials can be changed by squishing, bending, twisting and stretching)

play-doh

twig

drinking straw

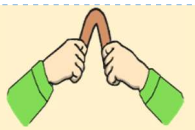
rubber band

Ideas bank:

twist

squash

stretch

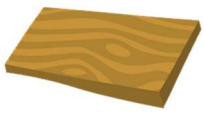


bend

3 Tick which material would be best to build a boat

(identify & compare the suitability of a variety of everyday materials including wood, metal, plastic, glass, brick, rock, paper & cardboard for particular uses / know that the materials are chosen for a particular purpose)

glass Why? Why not?



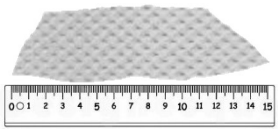
wood Why? Why not?

cardboard Why? Why not?

brick Why? Why not?

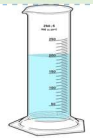
4 Tick which variables did you keep the same during your investigation?

(plan & carry out a fair test to investigate suitability of materials)



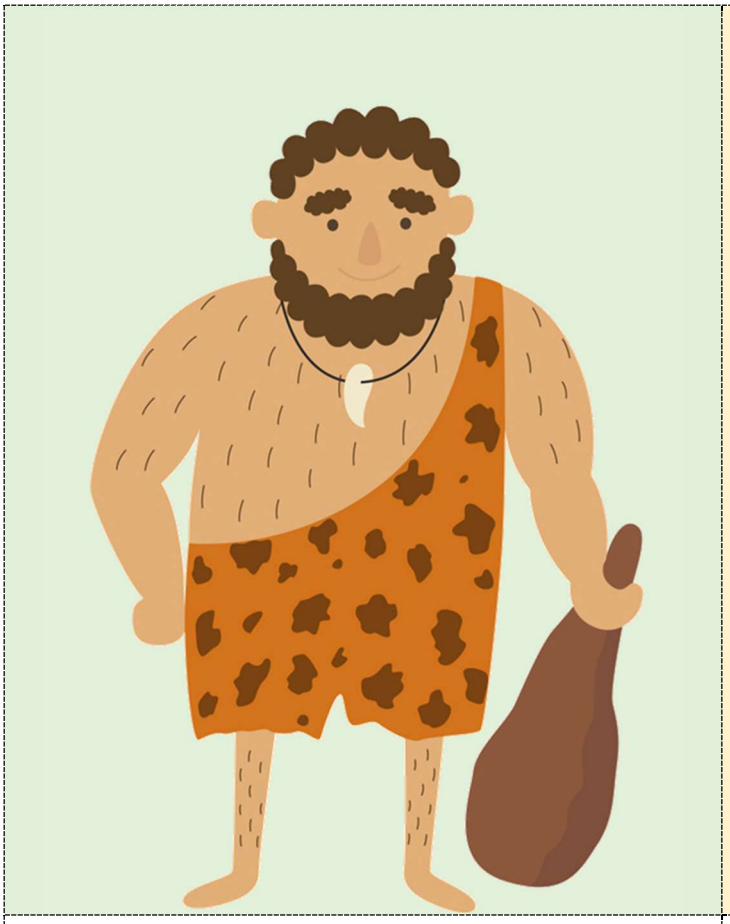
Size of material


Type of material



Quantity of water

Why did you keep them the same?



Stone age man (2.5 million years ago) made tools out of wood and stone

Bronze age man (5000 years age) made tools out of metal.

John Dunlop invented inflated tyres made out of rubber.

Charles Macintosh invented a waterproof rubber fabric