Materials

Science Topic

SECOND LEVEL

CONTENTS

BLURB

Materials are all around us. Find out about the common materials we use every day. Learn how materials can change. Discover the materials that make up Earth and how we use them. Explore the materials we use for items inside and outside. Find out about materials in the environment.

FIND US ON SOCIAL MEDIA

OUTCOMES

TOPIC OR THEME	LEVEL	CURRICULUM AREA	TEACHERS
MATERIALS	2nd	Science	

CURRICULUM FOR EXCELLENCE OUTCOMES

ART AND DESIGN

Through observing and recording from my experiences across the curriculum, I can create images and objects which show my awareness and recognition of detail.
EXA 2-04a

HEALTH AND WELLBEING

I make full use of and value the opportunities I am given to improve an manage my learning and, in turn, I can help to encourage learning and confidence in others.
HWB 2-11a
I value the opportunities I am given to make friends and be part of a group in a range of situations.
HWB 2-14a
Opportunities to carry out different activities and roles in a variety of settings have enabled me to identify my achievements, skills and areas for development. This will help me to prepare for the next stage in my life and learning.
HWB 2-19a

LITERACY

When I engage with others, I can respond in ways appropriate to my role, show that value others' contributions and use these to build on thinking.

LIT 2-02a

I can select ideas and relevant information, organise these in an appropriate way for my purpose and use suitable vocabulary for my audience.

LIT 2-06a

I am developing confidence when engaging with others within and beyond my place of learning. I can communicate in a clear, expressive way and I am learning to select and organise resources independently.

LIT 2-10a

I can make notes, organise them under suitable headings and use them to understand information, develop my thinking, explore problems and create new texts, using my own words as appropriate.

LIT 2-15a

Throughout the writing process, I can check that my writing makes sense and meets its purpose.

LIT 2-23a

By considering the type of text I am creating, I can select ideas and relevant information, organise these in an appropriate way for my purpose and use suitable vocabulary for my audience.

LIT 2-26a

SCIENCE

By contributing to investigations into familiar changes in substances to produce other substances, I can describe how their characteristics have changed.

SCN 2-15a

I have participated in practical activities to separate simple mixtures of substances and can relate my findings to my everyday experience.

SCN 2-16a

By investigating common conditions that increase the amount of substance that will dissolve or the speed of dissolving, I can relate my findings to the world around me.

SCN 2-16b

Having explored the substances that make up Earth's surface, I can compare some of their characteristics and uses.

SCN 2-17a

I have collaborated in activities which safely demonstrate simple chemical reactions using everyday chemicals. I can show an appreciation of a chemical reaction as being a change in which different materials are made.

SCN 2-19a

Through research and discussion I have an appreciation of the contribution that individuals are making to scientific discovery and invention and the impact this has made on society.

SCN 2-20a

I can report and comment on current scientific news items to develop my knowledge and understanding of topical science.

SCN 2-20b

SOCIAL STUDIES

I can describe the major characteristic features of Scotland's landscape and explain how these were formed.
SOC 2-07a
I can discuss the environmental impact of human activity and suggest ways in which we can live in a more environmentally-responsible way.
SOC 2-08a

TECHNOLOGIES

Having analysed how lifestyle can impact on the environment and Earth's resources, I can make suggestions about how to live in a more sustainable way.
TCH 2-02a
As I extend and enhance my knowledge of features of various types of software including those which help find, organise manage and access information, I can apply what I learn in different situations.
TCH 2-03a
Throughout all my learning I can use search facilities of electronic sources to access and retrieve information, recognising the importance this has in my place of learning, at home and in the workplace.
TCH 2-03b
I explore and experiment with the features and functions of computer technology and I can use what I learn to support and enhance my learning in different contexts.
TCH 2-04a
I can create, capture and manipulate sounds, text and images to communicate experiences, ideas and information in creative and engaging ways.
TCH 2-04b

PURPOSE	ACTIVITIES	CRITERIA	EVIDENCE
• I am learning about materials. • I am finding out where materials come from. • I am finding out about natural and artificial materials. • I am discovering that materials have different properties. • I am learning that materials can change state. • I am learning new scientific words. • I am discovering some changes are permanent and some are not. • I am finding out about different Earth materials. • I am learning to recognise materials in the world. • I am learning about materials that we use inside. • I am learning that items can be made from two or more materials. • I am finding out about materials we use outside. • I am discovering that materials must be fit for purpose. • I am learning about recycling materials. • I am discovering what happens to materials in landfill. • I am learning that experiments can prove or disprove a hypothesis. • I am learning how to record the results of an experiment.	1. Identify materials that are used to make items. 2. Worksheet on materials. 3. EXPERIMENT: test if materials are fit for purpose. 4. Worksheet on changing materials. 5. Examine the changes that happen during baking. 6. EXPERIMENT: use evaporation to separate materials. 7. Worksheet on Earth's materials. 8. Investigate diamonds. 9. Investigate Earth materials found near your school. 10. Worksheet on materials inside. 11. Write down items made from common materials. 12. Write down items made from a combination of materials. 13. Complete a WHAT AM I? worksheet for inside materials. 14. Draw an outdoor item made from a combination of materials. 15. Identify two materials that make various items. 16. Worksheet on materials in the environment. 17. Design a recycling poster. 18. EXPERIMENT: test which materials decompose in landfill.	• I can identify and explain common materials. • I can differentiate between natural and artificial materials. • I can talk about different properties of materials. • I can use scientific words to explain ways in which materials change state. • I can talk about materials that are found on Earth. • I can explain where materials come from. • I can explain and give examples of materials that are used inside. • I can explain and give examples of materials that are used outside. • I explain that we select materials that are fit or purpose. • I can differentiate between and explain recycling and landfill for waste disposal. • I can work in a group to carry our experiments. • I can participate in the completion of a lab report. • I can explain what hypothesis means.	**MAKE** Draw an outdoor item. Design a recycling poster. **SAY** Report findings from various experiments. Report research on diamonds. **DO** Identify materials that are used to make items. Carry out research using a variety of resources. Carry out experiments and record results in a lab report. Examine that changes that happen during baking. Investigate Earth materials near your school Identify materials that are used outdoors and indoors. **WRITE** Complete worksheets on materials, changing materials, Earth materials, materials inside, materials in the environment.

Materials – Introductory Lesson

The purpose of this lesson is to get an idea of what the children already know about the subject. It is a co-operative lesson for the whole class to get involved. Spelling and handwriting are not important.

At the end of the topic it will be useful to re-visit the results of this lesson and hold a class Q&A to discuss what they have found out and any unanswered questions they still have. The Q&A could be part of an ICT lesson where the children research their unanswered questions.

SPLIT THE GROUPS

In order to get randomly selected groups ask the children to sort themselves into date of birth order. Then split the children into groups of 4 i.e. the first 4 children are one group etc.

Once in their groups the following jobs should be randomly allocated:

1. Group Leader (who is wearing blue?)
2. Writer (who has M in their name?)
3. Reporter (who like science?)
4. Timer (who has a packed lunch?)

Sheets of A2 paper are laid out on the desks each sheet should be labelled with one of these titles:

1. What are Materials?
2. Changing Materials
3. Earth Materials
4. Materials Inside
5. Materials Outside
6. Environment

Then split the sheet into two columns:

1. What do I know?
2. What do I want to find out?

The groups then rotate around each sheet. A time limit should be given.

PART ONE

What are Materials?

What are Materials?
TEACHER'S NOTES

Materials are all around us. We use materials for many purposes including: the clothes we wear, the devices we use, the buildings we live in and the cars we drive. In this section we will find out more about materials, their properties and their states.

WHAT IS A MATERIAL?

A material is a substance or a mixture of substances that is used to make something.

NATURAL MATERIALS

Natural materials come from animals, plants or the ground. Natural materials include: cotton, stone, gems and wood.

ARTIFICIAL MATERIALS

Artificial materials are created by humans. Artificial materials include: plastics, some fabrics.

STATES OF MATERIALS

Materials exist in one of three states: SOLID, LIQUID or GAS. In a solid particles are closely packed together which makes the material rigid and difficult to alter the shape. In a liquid the particles slip and slide over one another which means a liquid can flow and can take the shape of a container. In a gas the particles and random and spaced out which means a gas can fill a space. We will find out about changing states in Part 2.

COMMON MATERIALS

wood		metal
glass	fabric	stone
plastic		ceramic

PROPERTIES

The property of a material is a distinct characteristic. We use these properties to pick a material that is fit for purpose, for example we would use fabric to make clothes or stone to build a building. Knowing the properties of a material help us to understand the purposes for which it can be used.

PROPERTIES OF MATERIALS

hard	soft	opaque
rough	smooth	transparent
shiny	dull	flexible

PURPOSE	MATERIALS	PROPERTIES
CLOTHES	cotton, silk, wool, nylon, elastane	flexible, washable, cuttable, durable
BUILDINGS	concrete, stone, metal, wood	strong, hard, durable
TRANSPORT	metal, plastic, rubber, fabric	strong, flexible, comfortable, durable
TECHNOLOGY	metal, glass, plastic	strong, hard, durable
FURNITURE	fabric, metal, wood, glass	strong, durable, comfortable

MATERIALS SCIENCE

Scientists and engineers work on discovering and designing new materials that are stronger, harder wearing or better for the environment. One example of materials scientists at work is rust on cars. In the past, cars were very prone to rust which ate away at the body of the car, today it is unusual to see a rusty car, this is due to improvements and the materials used to build cars.

HAZARDOUS MATERIALS

Hazardous materials are any object that can cause harm to humans, animals or the environment. There are four categories of hazardous materials: flammable, corrosive, explosive and toxic. One hazardous material you will see at home or in school is bleach, it should always be used carefully.

COMPOSITES

Composites are objects that are made by combining more than one material. Two different materials are combined to create a new material that is better fit for purpose than either of the original materials. For example – reinforced concrete is concrete with steel bars embedded inside to make it stronger.

WHERE DO MATERIALS COME FROM?

WOOD
Wood is a natural material that comes from trees. It is a hard and durable material that is used for buildings, furniture, fences, fuel and paper.

STONE
Stone is a natural material found in the ground. It is very hard and strong. Stone is used as a building material.

PLASTIC
Plastic is a synthetic material. The process of making plastic is complicated. Plastic is flexible and durable and has many uses including: bags, furniture, devices and appliances.

CONCRETE
Concrete is a mixture of cement, sand, gravel and water. It is a strong, durable and hard building material. When concrete is mixed it is a liquid, it is poured and sets into a solid.

GLASS
Glass is a hard material that can be used for many purposes. It is created by heating different chemicals. Glass is used for windows, spectacles and bottles.

METAL
Solid veins of pure metals are found in rocks. Metals are mixed to create new metals. Metal is a strong, hard and durable material. It has many uses including: building, utensils, tools and vehicles.

CERAMIC
A ceramic is a mixture of different materials which are joined together using heat. Ceramics include tiles pottery and bricks.

FABRIC
There are many natural and synthetic fabrics that we use for clothes, curtains and covers. Natural fabrics include: silk, cotton and linen. Synthetic fabrics include polyester, elastane and nylon.

RUBBER
Rubber can be natural or synthetic. Rubber can stretch or shrink. Many items are made from rubber including: tyres, erasers, gloves.

What are Materials?
ACTIVITY 1

Can you identify two materials that are used to make these items?

The table show some items that we use every day.

Identify two materials that are used to make each item.

Working with a partner:

1. Discuss each of the items.
2. Write down two materials that are used to make each item.
3. Answer the additional questions.
4. Report to the class.

ITEM	MATERIAL	MATERIAL
dishwasher	metal	plastic
pencil case		
school desk		
bicycle		
kettle		
paintbrush		
window		
microwave		
drawing pin		
phone		
toaster		

EXTRA QUESTIONS
1. Name one item made from glass.
2. Name one item made from wood.
3. Name one item made from metal.
4. Name one item made from stone.
5. Name one item made from fabric.

What are Materials?
ACTIVITY 1 - ANSWERS

Can you identify two materials that are used to make these items?

The table show some items that we use every day.

Identify two materials that are used to make each item.

Working with a partner:

1. Discuss each of the items.
2. Write down two materials that are used to make each item.
3. Answer the additional questions.
4. Report to the class.

ITEM	MATERIAL	MATERIAL
dishwasher	metal	plastic
pencil case	fabric	metal
school desk	wood	metal
bicycle	metal	rubber
kettle	metal	plastic
paintbrush	wood	metal
window	glass	plastic
microwave	metal	glass
drawing pin	metal	plastic
phone	metal	glass
toaster	metal	plastic

EXTRA QUESTIONS
1. Name one item made from glass.
tumbler
2. Name one item made from wood.
park bench
3. Name one item made from metal.
fork
4. Name one item made from stone.
pavement
5. Name one item made from fabric.
clothes

What are Materials?
ACTIVITY 2

Can you complete this materials worksheet?

Read each sentence and write TRUE or FALSE in the box.	
Metal, stone and glass are all solid materials.	
Hard, smooth and soft are properties of materials.	
Wood is a type of liquid material.	
We use soft and flexible materials for buildings.	
The best materials for clothes are glass and wood.	
We use materials every day in everything we do.	

MISSING WORDS	
liquid	clothes
purposes	good
properties	materials
buildings	flexible
strong	states

Write a description of natural materials and artificial materials.

Natural materials are _____

_____

Artificial materials are _____

_____

WHAT ARE MATERIALS?

Materials are all around us. We use _____ for many _____ including: the _____ we wear, the devices we use, the _____ we live in and the cars we drive. Materials come in one of three _____ either solid, _____ or gas. The _____ of materials tell us how ____ they are for a certain purpose. We need _____ materials for building and _____ materials for clothes.

What are Materials?
ACTIVITY 2 - ANSWERS

Can you complete this materials worksheet?

Read each sentence and write TRUE or FALSE in the box.	
Metal, stone and glass are all solid materials.	TRUE
Hard, smooth and soft are properties of materials.	TRUE
Wood is a type of liquid material.	FALSE
We use soft and flexible materials for buildings.	FALSE
The best materials for clothes are glass and wood.	FALSE
We use materials every day in everything we do.	TRUE

MISSING WORDS	
liquid	clothes
purposes	good
properties	materials
buildings	flexible
strong	states

Write a description of natural materials and artificial materials.

Natural materials are _____

_____

Artificial materials are _____

_____

WHAT ARE MATERIALS?

Materials are all around us. We use materials for many purposes including: the clothes we wear, the devices we use, the buildings we live in and the cars we drive. Materials come in one of three states either solid, liquid or gas. The properties of materials tell us how good they are for a certain purpose. We need strong materials for building and flexible materials for clothes.

Testing Materials EXPERIMENT

EQUIPMENT			
	3 wooden skewers		tissue paper
	paper	fabric	tape / stapler

Can you test materials to find out if they are fit for purpose?

In this experiment you are going to test which material makes the best flag.

Organise yourselves into groups of four using MAKE A WORD.

Allocate these jobs.

1. The person without a jumper on is the **team leader**.
2. The person with the longest name is the **charger**.
3. The person with a watch on is the **recorder**.
4. The person who is having a packed lunch is the **reporter.**

INSTRUCTIONS

1. In your group, discuss the experiment.
2. Write your hypothesis (prediction) before you begin the experiment. Which material will make the best flag?
3. Gather your equipment.
4. Make rectangles using the tissue paper, paper and fabric. Each rectangle should be exactly the same size.
5. Attach each rectangle to a wooden skewer using tape or a stapler.
6. Write your group name on each flag.
7. You should now have three flags that are identical but made from different materials.
8. Go into the playground and find a good spot to place your flags.
9. Check your flags three times and note on the lab report which flag had survived the wind and weather most successfully.
10. Complete your lab report.

TEAM LEADER	RECORDER	CHARGER	REPORTER
Keeps everyone on task.	Takes notes. Completes the lab report.	Runs the comb through their hair.	Tells the class what you have found out.

Testing Materials
LAB REPORT

EQUIPMENT			
	3 wooden skewers		tissue paper
	paper	fabric	tape / stapler

Check your flags.	ONE DAY	THREE DAYS	ONE WEEK

HYPOTHESIS
(What you think will happen?)

_____

_____

_____

_____

PICTURE OF YOUR EXPERIMENT

WHAT YOU DID

_____

_____

_____

_____

_____

_____

Was your hypothesis correct?	YES	NO

IMPROVEMENTS?_____

_____

_____

RECORD A VIDEO OF YOUR EXPERIMENT AND TWEET US @LittleMooseEd

ACTIVITY HINTS AND TIPS

ACTIVITY 1

Reading / Research

CO-OPERATIVE LEARNING

The children could work with partners or larger groups for this activity.

EXTENSION TASK

The children could discuss items in the classroom and identify the materials.

They could locate items that are made from just one material and items that are made from more than one material. They could discuss whether the material being used is fit for purpose or whether there is a better choice.

ACTIVITY 2

Reading

CO-OPERATIVE LEARNING

The children could work in pairs or as a class to complete this task and encourage discussion about the topic.

EXTENSION TASK

The children could make their own true or false statements to test their classmates.

EXPERIMENT

Testing Materials

CO-OPERATIVE LEARNING

The children could spend some time discussing how well they worked in their groups. Is there anything they could have done differently? Would they have preferred a different role?

EXPERIMENT EXPLANATION

The children should find that the fabric flag is most fit for purpose. The paper and tissue paper are more likely to rip or disintegrate in wind and rain.

Although it is worth noting that fabric flags also have to be replaced because wind can make them rip too!

MAKE A WORD

To make matching easier you could mark the pieces 1-4 so the children know if they have the first, second, third or fourth piece.

MA	TE	RI	ALS	MATERIALS
PRO	PE	RTI	ES	PROPERTIES
ST	R	O	NG	STRONG
HAZ	AR	DO	US	HAZARDOUS
LI	Q	UI	D	LIQUID
AR	TIF	IC	IAL	ARTIFICIAL
NA	TU	R	AL	NATURAL
S	CI	EN	CE	SCIENCE

Assessment 1

By completing these tasks your teacher can see how much you have learned about materials. You can look back in your jotter to help you answer the questions.

Answer these questions in sentences.

1. What are materials?
2. Materials exist in three different states. Name one.
3. What does *fit for purpose* mean?
4. What is a hazardous material?
5. Name one material that is used for furniture.
6. A solid can flow and fill the shape of a container. TRUE of FALSE?
7. Why is concrete a good building material?
8. Name one material that you find in a pencil.
9. Glass is good for windows because it is opaque. TRUE or FALSE?
10. Write down the name of one material that you can touch right now.

Write a list of five different materials that wouldn't usually be used to make clothes.

Draw a picture of something made from metal and plastic.

Assessment 1 - ANSWERS

Answer these questions in sentences.

1. What are materials?
2. Materials exist in three different states. Name one.
3. What does *fit for purpose* mean?
4. What is a hazardous material?
5. Name one material that is used for furniture.
6. A solid can flow and fill the shape of a container. TRUE of FALSE?
7. Why is concrete a good building material?
8. Name one material that you find in a pencil.
9. Glass is good for windows because it is opaque. TRUE or FALSE?
10. Write down the name of one material that you can touch right now.

1. Materials are substances that are used to make an object.
2. Solid, liquid or gas.
3. A material that does the job it is intended for, e.g. strong materials for buildings or soft materials for clothes.
4. A material that is dangerous to people, animals or the environment.
5. Wood, metal, fabric, plastic.
6. FALSE.
7. It is strong and durable.
8. Wood or graphite.
9. FALSE, glass is transparent.
10. Various answers.

Extension Tasks 1

These are internet based tasks for early finishers. They can be done on an iPad or a computer.

Usually clothes are made from fabrics like cotton, silk and polyester. Sometimes people make clothes using unusual materials. Use Google Images to find pictures of clothes made using the materials listed below.

feathers	bin bags
toilet roll	credit cards
paper	carpet

DID YOU KNOW?
In 2010 Lady Gaga wore a dress made from meat to an awards ceremony. Find pictures online.

Visit our Materials board on Pinterest.

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

FIND THESE WORDS IN THE WORD SEARCH.

- materials
- solid
- liquid
- gas
- smooth
- strong
- flexible
- wood
- metal
- fabric

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