# ACET Junior Academies'

## Scheme of Work for Science

# Big Idea - Materials

## Year 1 – Everyday Materials

**About this unit:**
**PoS – Everyday materials**
At some point the students should add information to the year book – particularly photos of trees, bushes and hedges.

Students should have an awareness of different materials, but during this unit they should learn to differentiate between an object and the material from which it is made. They should develop an awareness of scientific terms, and begin to use those terms appropriately. There will be opportunities to develop their investigative skills, with an emphasis on developing their curiosity, and asking questions. All the investigations should lead to the students becoming more confident in using key terms appropriately, and they should be encouraged to do so at every opportunity. By the end of the unit, they should be familiar with the term 'properties of a material', and be able to suggest the properties of a material which they are shown.

This unit is linked to History – Changes in living memory, with an opportunity to compare toys of the present with those of the past, looking at the different materials which are used.

A list of definitions of key terms is found on Enquiry 5.

**Unit structure**
This unit is structured around seven science enquiries:

1. What are materials?
2. What makes materials different?
3. What materials are toys made from?
4. Can you design an object?
5. Can you compare like a scientist?
6. Do we use different materials for different jobs?
7. Should we treat all materials the same?

**Links to previous and future National Curriculum units**
History – Changes in living memory

- Y2 – Uses of everyday materials
- Y5 – Properties and changes of materials

<table>
<tr><td colspan="4">Enquiry 1: What are materials?</td></tr>
<tr><td>Links to previous learning</td><td>Scientific skills</td><td>Assessment criteria</td><td>Curricular links</td></tr>
<tr><td rowspan="3">Discuss the things they have observed such as natural and found objects.</td><td>EA – Identifying, grouping and classifying<br><br>Asking questions<br>Making predictions<br>Observing and measuring</td><td rowspan="3">Can your children:<br>- Name a range of different materials<br>- Name the material an object is made from</td><td rowspan="3">Horizontal:<br><br>Vertical:<br>Y2 – Uses of everyday materials<br>Y5 – Properties and changes of materials</td></tr>
<tr><td>Key concepts:</td></tr>
<tr><td>Distinguish between an object and the material it is made from<br>Identify a range of materials</td></tr>
<tr><td colspan="2">Key terms</td><td colspan="2">Common misconceptions</td></tr>
<tr><td colspan="2">Wood, metal, ceramic, plastic, rock, glass</td><td colspan="2"></td></tr>
<tr><td colspan="2">Suggested activities</td><td>Resources</td><td>Useful links</td></tr>
<tr><td colspan="2">Introduce ‘materials’ as a concept. A ‘material’ is what something is made of. Fabric is a good place to start, as some students may associate the words material and fabric together. Show wood, metal, ceramic, plastic, rock and glass. Show that there can be different types of plastic.<br><br>Once all the main materials have been named, they can then try and find objects made from those materials.<br><br>Students could have colour-coded stickers – red for plastic, blue for glass etc. They sticker everything they can find. Find pictures in books, on a display etc.<br><br>Group similar materials together – students to describe what they have in common. They come up with words that describe them. Priority in this lesson is to be able to recognise the materials when they are relatively obvious. Greater depth students can begin to discuss how they know something is a particular material, or to identify materials that do not have obvious characteristics, like a metal that may be painted over and looks plastic.</td><td>A range of objects made from wood, metal, ceramic, plastic, rock, glass<br>Don’t use brick or a man made object instead of rock<br><br>Colour coded stickers</td><td></td></tr>
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<table>
<tr><th colspan="4">Enquiry 2: What makes materials different?</th></tr>
<tr><th>Links to previous learning</th><th>Scientific skills</th><th>Assessment criteria</th><th>Curricular links</th></tr>
<tr><td rowspan="2">Discuss the things they have observed such as natural and found objects.<br>Manipulate materials to achieve a planned effect.</td><td>EA – Comparative/fair testing<br><br>Asking questions<br>Observing and measuring<br>Recording data</td><td rowspan="2">Can your children:<br>- Measure length and mass accurately<br>- Record data in a table<br>- Recognise that different materials have different masses<br><br>GD – discuss the relative mass of different materials, considering their different sizes</td><td rowspan="2">Horizontal:<br><br>Vertical:<br>Y2 – Uses of everyday materials<br>Y5 – Properties and changes of materials</td></tr>
<tr><td>Key concepts:<br>We can put things which have similar properties into groups.<br>Materials that have similar properties are grouped into metals, rocks, fabrics, wood, plastics and ceramics (including glass)<br>Measuring and weighing - students should work towards doing this accurately<br><br>Greater depth – where will you measure, if you are comparing two objects?</td></tr>
<tr><th colspan="2">Key terms</th><th colspan="2">Common misconceptions</th></tr>
<tr><td colspan="2">Wood, metal, ceramic, plastic, rock, fabric, glass, weigh, mass, length</td><td colspan="2">Try and avoid using ‘weight’ – when you weigh something, you’re finding out its mass.</td></tr>
<tr><th>Suggested activities</th><th>Resources</th><th colspan="2">Useful links</th></tr>
<tr><td>Weigh objects of different sizes to find out their mass in grams. There should be a ranges of comparable things for the students to choose from. E.g. does a wooden spoon weigh the same as a metal spoon of the same size?<br>The students should have the opportunity to measure the dimensions (length/width) of the objects – maths.<br><br>Students should be given a table outline in which to record their data.<br>They could produce a simple bar chart (x axis – name of material, y axis – mass in g)<br><br>Can some of the students work towards the idea that some types of material are generally heavier than others?<br><br>Be aware that the properties of a material can be different depending on the object it makes. E.g. metal in a block has different properties to when it has been stretched into a wire. If the students notice this, it’s good to discuss it, but there is no need to explain why, just make the observation.</td><td>A range of objects made from wood, metal, ceramic, plastic, rock, fabric, glass<br>Don’t use brick or a man made object instead of rock<br><br>Scales<br>30cm rulers<br><br>The objects should be of a comparable size, where possible.</td><td colspan="2"></td></tr>
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<table>
<tr><th colspan="4">Enquiry 3: What materials are toys made from?</th></tr>
<tr><th>Links to previous learning</th><th>Scientific skills</th><th>Assessment criteria</th><th>Curricular links</th></tr>
<tr><td rowspan="2">Children should ask questions about the place they live, and talk about why things happen and how things work.</td><td>EA – Research<br><br>Asking questions<br>Observing and measuring</td><td rowspan="2">Can your children:<br>- Describe differences in toys from different eras<br>- Recognise the different materials that were used in different eras<br><br>GD – discuss reasons why different materials may have been used</td><td rowspan="2">Horizontal:<br>History – toys in different eras<br><br>Vertical:<br>Y2 – Uses of everyday materials<br>Y5 – Properties and changes of materials</td></tr>
<tr><td>Key concepts:<br>Using words to describe the properties of materials.<br>Recognising that there has been a change in the materials we use over time</td></tr>
<tr><th colspan="2">Key terms</th><th colspan="2">Common misconceptions</th></tr>
<tr><td colspan="2">Wood, metal, ceramic, plastic, rock, fabric, glass, hard, soft, shiny, waterproof, strong, flexible/bendy</td><td colspan="2"></td></tr>
<tr><th colspan="2">Suggested activities</th><th>Resources</th><th>Useful links</th></tr>
<tr><td colspan="2">What materials were toys made from in different eras? Investigate what different toys were used over the years. What materials were they made from? What properties did that give the toys?</td><td>Examples of toys from eras within living memory</td><td></td></tr>
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<table>
<tr><th colspan="4">Enquiry 4: Can you design an object?</th></tr>
<tr><th>Links to previous learning</th><th>Scientific skills</th><th>Assessment criteria</th><th>Curricular links</th></tr>
<tr><td rowspan="3">Children should be able to ask questions about the place they live.<br>Manipulate materials to have a planned effect.</td><td>EA – Comparative/fair testing<br><br>Asking questions<br>Making predictions<br>Setting up tests<br>Observing and measuring</td><td rowspan="3">Can your children:<br>- Carry out a simple investigation<br>- Recognise the need to do the same things each time</td><td rowspan="3">Horizontal:<br>D&T<br><br>Vertical:<br>Y2 – Uses of everyday materials<br>Y5 – Properties and changes of materials<br>Investigative skills – all years</td></tr>
<tr><td>Key concepts:</td></tr>
<tr><td>We can find out about a material's properties by testing it.</td></tr>
<tr><th colspan="2">Key terms</th><th colspan="2">Common misconceptions</th></tr>
<tr><td colspan="2">Wood, metal, ceramic, plastic, rock, glass, hard, soft, shiny, waterproof, strong, flexible/bendy</td><td colspan="2"></td></tr>
<tr><th>Suggested activities</th><th>Resources</th><th colspan="2">Useful links</th></tr>
<tr><td>Doll in a 'waterproof coat' sitting in a tray. Sprinkle the doll with water – do the students think the doll has got wet? Why/why not?<br><br>Produce different materials. The students need to test whether they are waterproof or not. They could be designing a tent/fishing shelter if they are not motivated by making a waterproof coat for a doll.<br><br>How will you decide if the material is waterproof or not?<br>How will you be fair to all the materials?<br><br>The material does not need to be tested on the doll! Good methods would be to stretch it over the top of a beaker, and see how many drops/cm$^3$ of water can be added before it goes through. Or cover your hand with it, and put your hand in water – how long before it feels wet?<br>Engage the students in deciding how they will test the material.<br><br>Greater depth – did you prove which was the most waterproof material? Are you completely sure? Was your way of testing fair? Could you have done anything differently?</td><td>4 different materials of comparable sizes.<br><br>Beakers/containers that the material can be stretched over<br>Elastic bands to secure the material<br>Containers for holding/pouring water<br>Measuring cylinders or similar for measuring small volumes of liquid<br><br>Doll wearing some kind of coat, in a tray, and a watering can</td><td colspan="2"></td></tr>
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<table>
<tr><td colspan="4">Enquiry 5: Can you compare like a scientist?</td></tr>
<tr><td>Links to previous learning</td><td>Scientific skills</td><td>Assessment criteria</td><td>Curricular links</td></tr>
<tr><td rowspan="3">Children should manipulate materials to achieve a planned effect</td><td>EA – Pattern Seeking<br><br>Setting up tests<br>Observing and measuring<br>Recording data</td><td rowspan="3">Can your children:<br>- Use some of the words for describing properties<br>- Describe how to test for different properties</td><td rowspan="3">Horizontal:<br><br>Vertical: Y2 – Uses of everyday materials<br>Y5 – Properties and changes of materials<br>Investigative skills – all years</td></tr>
<tr><td>Key concepts:</td></tr>
<tr><td>Scientists know about the different properties of materials because they test them. When we test things, it tells us something about them.</td></tr>
<tr><td colspan="2">Key terms</td><td colspan="2">Common misconceptions</td></tr>
<tr><td colspan="2">Rust, magnetic, hard, strong, heat, electricity, shiny, heavy, malleable</td><td colspan="2">Students are often unclear on the definitions of ‘hard’ and ‘strong’</td></tr>
<tr><td>Suggested activities</td><td>Resources</td><td colspan="2">Useful links</td></tr>
<tr><td>Remind students that scientists always collect data in order to make comparisons – they don’t ‘just’ look at things.<br><br>Compare iron (e.g a nail), brass or copper, and wood. Circus of activities. Terms in bold are the ones that students would be expected to use.<br><br>Rusting – set up in advance with the materials sitting in water for a week. Students observe what is different.<br>Magnetism – students use a magnet to test<br>*Thermal conductivity – put one end of the material in hot water – what does the other end feel like? Does the material pass heat along it? This works best with hot water, and will need adult supervision – best as a demonstration.<br>**Electrical conductivity – Make a circuit with a cell and a bulb, leaving two crocodile clips to complete the circuit. Students attach the crocodile clips to the materials to see whether they pass electricity along it. As students have no experience with circuits, this will need adult supervision and explanation<br>Shiny – observation<br>Heavy – weigh comparable volumes<br>Hard – is it easy to scratch?<br>Strong – look at pictures of the material in use. Strong means that it can withstand forces well – e.g. it can hold things up without being squashed.<br>Malleable – it can be stretched into a wire, or bent into new shapes – look at pictures of the material in use – GD only. Best demonstrated by pictures of the materials being used in different ways, although the students can try stretching them.</td><td>3 different materials (e.g. iron nail, brass drawing pin, small piece of wood) which have been left in a container of water (with the lid off) for a week.<br><br>The same 3 materials available for the following tests set up as a circus:<br><br>Magnets<br>*A container of warm/hot water<br>A simple electrical circuit<br><br>Results table</td><td colspan="2"></td></tr>
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**Enquiry 6: Do we use different materials for different jobs?**

| **Links to previous learning** | **Scientific skills** | **Assessment criteria** | **Curricular links** |
|---|---|---|---|
| Ask questions about the place where they live.<br>Talk about why things happen and why they work. | EA – Identifying, grouping and classifying<br><br>Asking questions<br>Making predictions<br>Observing and measuring<br>**Recording data**<br>**Key concepts:**<br>Reinforcing the difference between objects and the materials from which they are made.<br>Some materials have a wider range of uses than others. | **Can your children:**<br>- Differentiate between an object and the material from which it is made<br>- Recognise that materials can be used in different ways | **Horizontal:**<br><br>**Vertical:**<br>Y2 – Uses of everyday materials<br>Y5 – Properties and changes of materials<br>Investigative skills – all years |

| **Key terms** | **Common misconceptions** |
|---|---|
| Wood, metal, ceramic, plastic, rock, glass, hard, soft, waterproof, strong, flexible/bendy, rust, magnetic, hard, strong, heat, electricity, shiny, heavy, *malleable* | |

| **Suggested activities** | **Resources** | **Useful links** |
|---|---|---|
| Doing a survey of useful materials – e.g. wood, metal, glass<br><br>How many objects made from each material can you find?<br><br>Are the objects made from each material all the same?<br><br>Some materials can be used in lots of different ways. Others have fewer uses. Which material is the most useful in this classroom?<br><br>*GD – compare the properties of the 'most useful' materials with the 'least useful'.* | | |

| Material | What is is used for |
|---|---|
| | |

<table>
<tr><th colspan="4">Enquiry 7: Should we treat all materials the same?</th></tr>
<tr><th>Links to previous learning</th><th>Scientific skills</th><th>Assessment criteria</th><th>Curricular links</th></tr>
<tr><td rowspan="2">Children should ask questions about the place in which they live, and talk about why things happen and how they work.</td><td>EA – Comparative/fair testing<br><br>Asking questions<br>Making predictions<br>Setting up tests</td><td rowspan="2">Can your children:<br>- Identify properties which make materials suitable to be used outside<br>- Explain, in terms of properties of a material, why certain materials and objects can't be left outside</td><td rowspan="2">Horizontal:<br>History<br><br>Vertical:<br>Y2 – Uses of everyday materials<br>Y5 – Properties and changes of materials<br>Investigative skills – all years</td></tr>
<tr><td>Key concepts:<br>We need to understand the properties of different materials in order to know how to use them and treat them.<br>Before we start an investigation, we need to consider what data (answers) we are going to collect.</td></tr>
<tr><th colspan="2">Key terms</th><th colspan="2">Common misconceptions</th></tr>
<tr><td colspan="2">Wood, metal, ceramic, plastic, rock, glass, hard, soft, waterproof, strong, flexible/bendy, rust, magnetic, hard, strong, heat, electricity, shiny, heavy, malleable</td><td colspan="2"></td></tr>
<tr><th>Suggested activities</th><th>Resources</th><th colspan="2">Useful links</th></tr>
<tr><td>Which toys can be left outside? What are they made of?<br><br>Look at a range of toys – including playground equipment if possible.<br>Historical toys – how were they used? How were they cared for? Could you leave them out in the garden? What would happen?<br><br>Look at playground items, toys that they might have outside school or in their gardens, and toys which are inside.<br>Are all toys going to be ok if we leave them outside?<br><br>Get the students to make predictions.<br><br>Choose a range of toys. Leave outside for a week to see the effect of the weather. If it's particularly dry, perhaps you may need to simulate normal rain levels!<br><br>What's important is what information the students will gather. What effect does rain have on the toys? How quickly do they dry out? Is the material affected?</td><td>A range of different toys to be left outside (some will get damaged)</td><td colspan="2"></td></tr>
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|---|---|---|
| *Greater depth could consider longer term effects, and perhaps plan how they might investigate and collect data in the long term.* | | |