# Lesson One

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| **Years 3-4** | **Design and Technologies** | **1 Hour** | **Date** |
| **Design and Technologies Knowledge and Understanding**Investigate the suitability of materials, systems, components, tools and equipment for a range of purposes (ACTDEK013)**Design and Technologies Processes and Production Skills**Evaluate design ideas, processes and solutions based on criteria for success developed with guidance and including care for the environment (ACTDEP017) |
| **Overview** This is the first lesson in the unit “Interesting Inventions”. Students are beginning to learn about the suitability of materials of inventions and technologies through their characteristics.  | **Objectives**By the end of the lesson, the students should be able to identify a range of materials by their characteristics, and be beginning to link this knowledge with suitable and unsuitable uses for the materials.  |
| **Formative assessment**At the end of this lesson, student understanding will be monitored through the completion of *Worksheet 1*, with questioning and discussion to also monitor verbal knowledge.  | **Summative assessment**Students will be given a basic invention. Students will evaluate the invention, using a basic evaluation sheet. The students will then circle elements and materials that should be improved to benefit the invention. Students will be required to write notes about how each element can be improved, to adhere to the evaluation sheet (such as changing the material used, removing unnecessary features, make the invention more sustainable, and improving the quality). Students should then perform another evaluation, based on their changes.  |
| **Resources needed**Glass facts: <http://www.bottlesupglass.com/wp-content/uploads/2011/08/Facts-About-Glass.pdf>Wood facts:<https://www.wood-finishes-direct.com/blog/weird-wonderful-facts-about-wood/>Cardboard facts:<http://tenrandomfacts.com/cardboard-box/>Metal facts:<http://www.encyclopedia.com/topic/Metals.aspx>Plastics facts:<http://your.caerphilly.gov.uk/kidsgogreen/fact-zone/plastic-facts>Paper facts:<http://your.caerphilly.gov.uk/kidsgogreen/fact-zone/paper-facts>Class Set of *worksheet 1*IWB A range of example materials that students are learning about (more than 1 example for each):* Glass
* Wood
* Cardboard
* Metal
* Plastic
* Fabric
* Paper

Touchy feely box – students can feel an object, but not see it  |
| **Ascertaining prior knowledge (Warm up activity)**Have a variety of materials (listed in the resources section). Students can feel the object, and try to guess what the item is, and what it is made out of. This leads into the main part of the lesson where the students identify features of the materials, facts, and their strengths, weaknesses, and suitability to types of inventions.  |
| Pedagogical practices and strategies**WALT**: We Are Learning To: recognise different materials, and how suitable they are for use in different inventions**WILF**What I'm Looking For: looking for connections between materials, and how they could be effectively used**TIB**This Is Because: if you use cardboard to hold jam, it wouldn’t be effective. We need to learn how to make good choices |
| **Overview of differentiation and individual learner attributes**For higher achieving students, setting tasks in which they must link this knowledge with practical uses – theorise how each material could be used, and justify why this is a good optionFor lower achieving students, scaffolding, questioning, and support to strengthen and support learning and understanding. |

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| **Stage** | **Time** |
| Warm up | 10 minutes |
| **Questioning and activities** |
| Put one of the objects (materials) in the feely box, and a student must identify either what the object is, or what the object is made out of. Repeat using all materials, ensuring all students have the chance to participate.  |
| **Stage** | **Time** |
| Main | 45 minutes |
| **Questioning and activities** |
| * Look on the above websites on the classroom IWB, identify relevant and interesting facts about the materials being analysed. Discuss information with students, extending knowledge and consolidating new learning.
* Discuss the strengths, weaknesses, facts, and features about each material.
* Begin linking these strengths and weaknesses with practical uses in technologies, products and inventions.
* Introduce worksheet 1 to the students (materials and their facts), reading through the facts, and explaining the task to students – cut out each box ad match the facts and information with the material.
* Students sort information
* Discuss answers, giving students the chance to correct their choices if needed
* Students glue the boxes into their books, making sure it is correctly sorted
* As a class, list strengths and weaknesses for each material in their books
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| **Stage** | **Time** |
| End/Review | 5 minutes |
| **Questioning and activities** |
| * Discuss reasonable and unreasonable uses for each material in everyday life, focusing on the characteristics, strengths, and weaknesses of each material, and how this is indicative of the use of the material.
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# Lesson Two

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| **Year 3-4** | **Design and Technologies**  | **1 hour** | **Date** |
| **Design and Technologies Knowledge and Understanding**Investigate the suitability of materials, systems, components, tools and equipment for a range of purposes (ACTDEK013)**Design and Technologies Processes and Production Skills**Evaluate design ideas, processes and solutions based on criteria for success developed with guidance and including care for the environment (ACTDEP017) |
| **Overview** This is the second lesson within the unit. Students have a thorough knowledge about materials used in different technologies, and can evaluate their suitability. This lesson will introduce students to the different components of technologies/inventions, and how to recognise components, tools, equipment, and systems. Students will be expected to connect their knowledge learnt in the last lesson to the learning within this lesson. | **Objectives**By the end of the lesson, students should be able to describe tools, components, systems, and equipment, identifying elements in pictures, and hypothesizing the roles and relationships of these elements in a range of technologies. Students should be able to look at a technology or invention, and make a reasonable guess about how it can be used, and why it is needed.  |
| **Formative assessment**By the end of this lesson, students should be able to label a technology, identifying what it might be used for and why, how it can be used, the components of the technology. This will be assessed through a group work task.Students will demonstrate their ability to identify systems, components, and recognise tools and equipment.  | **Summative assessment**Students will be given a basic invention. Students will evaluate the invention, using a basic evaluation sheet. The students will then circle elements and materials that should be improved to benefit the invention. Students will be required to write notes about how each element can be improved, to adhere to the evaluation sheet (such as changing the material used, removing unnecessary features, make the invention more sustainable, and improving the quality). Students should then perform another evaluation, based on their changes.  |
| **Resources needed**Teamwork worksheet at the end of the lesson (class set)Prior knowledge worksheet (Worksheet 2)A selection of inventions/technologies with clear components, systems, and tools, in which students can identify the elements, and purposes of inventions. IWB to display the inventions/technologies.  |
| **Ascertaining prior knowledge (Warm up activity)**Playing ‘around the word’. A student stands behind the desk of another student. The teacher names a material studied in the previous lesson. The first student to name either a strength, weakness, or use for that material in technologies progresses to the next seat. Repeat until all students have had the chance to participate and answer. Repeating materials, asking for more information, and requesting the specific response (weakness, for example) will challenge students and assess the knowledge and understanding of students.  |
| **Overview of differentiation and individual learner attributes**Developing higher order thinking and challenging questions for students during discussions. Scaffold responses for lower-level students, emphasising the content of systems, components, tools, and equipment. Carefully creating groups based on ability level and understanding to ensure students are equally contributing and learning.  |

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| **Stage** | **Time** |
| Warm up | 10 Minutes |
| **Questioning and activities** |
| Begin playing “around the world” with students. State a material, and students can either state (and clarify which) a strength, weakness, or use for that material. To challenge students, allocate whether they should state a strength, weakness, or use. The first student to answer correctly moves on. Students count how many desks they moved (answers were quickest and correct). The student who moved the furthest “wins”.  |
| **Stage** | **Time** |
| Main | 45 minutes |
| **Questioning and activities** |
| Using class discussion, complete worksheet “materials and their uses” about the possible materials used in technologies and their effectiveness. Introduce the concept of a ‘component’ to students, using a picture of a seesaw. Identify the components, and how they affect the use. If they were dramatically changed, would it be as effective?Introduce “systems” to students, with how the components work together to achieve a goal, and this is a system. Use the seesaw as an example. Introduce “tools” and “equipment” to students, as how the technology/contraption can be used to achieve a goal. Link this back with the components and systems, and how the components and system enable the device to be a tool, used, and effective. With students, create a flow chart of the learning, identifying how each new concept is connected. (Components form a system, creating an effective tool, which is used as a tool, or equipment – collate this within a graphic organizer, timeline, or directional arrows). Students form groups, and identify the components and systems of an item, and make a reasonable hypothesis on how the item is used, as a tool or piece of equipment. Using the worksheet “elements of an object”. This work is completed as a group, on individual sheets of paper which is marked to assess student understanding.  |
| **Stage** | **Time** |
| End/Review | 5 Minutes |
| **Questioning and activities** |
| Students present their item to the class, simply identifying the components, systems, tools, and equipment.  |

# Lesson Three

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| **Year 3-4** | **Design and Technologies**  | **1 hour** | **Date** |
| **Design and Technologies Knowledge and Understanding**Investigate the suitability of materials, systems, components, tools and equipment for a range of purposes (ACTDEK013)**Design and Technologies Processes and Production Skills**Evaluate design ideas, processes and solutions based on criteria for success developed with guidance and including care for the environment (ACTDEP017) |
| **Overview** This is the final lesson in this unit. Students will use their knowledge learnt in the previous lessons to evaluate technologies and inventions, based on their characteristics (materials, systems, components, tools, and equipment). | **Objectives**By the end of the lesson, students should be able to demonstrate understanding about how to evaluate an item, using the knowledge learnt in the previous lessons. Students should be able to apply their knowledge about materials, systems, components, tools, and equipment, and make judgments about appropriateness and effectiveness. Students should be beginning to make hypotheses about how an item could be changed to make it more effective.  |
| **Formative assessment**Students will complete evaluation sheets on a range of materials. These evaluation sheets can be used as they are, or changed, by the class, or by the teacher. Students will be expected to complete simple evaluations about a range of technologies/items. As an extension, students can comment on the specific materials, function, and parts of the technology, their effectiveness, and hypothesise how the item could be improved (efficiency, sustainability).  | **Summative assessment**Students will be given a basic invention. Students will evaluate the invention, using a basic evaluation sheet. The students will then circle elements and materials that should be improved to benefit the invention. Students will be required to write notes about how each element can be improved, to adhere to the evaluation sheet (such as changing the material used, removing unnecessary features, make the invention more sustainable, and improving the quality). Students should then perform another evaluation, based on their changes.  |
| **Resources needed**Class set of evaluation sheets x2 (each student requires 2 evaluation sheets)IWBA wide range of technologies to evaluate, both as a class, and individually.  |
| **Ascertaining prior knowledge (Warm up activity)**Students are given a phrase studied previously (materials, systems, components, tool, or equipment) on a small card. A range of items/ technologies are displayed on the IWB, and students must identify the phrase on their card with the items/ technology on the IWB.  |
| **Overview of differentiation and individual learner attributes**Scaffolding learning for students, repeating information and strengthening knowledge with practical examples and active participation and discussions in class. Support learners in the activities, and work in an explicit teaching model with a gradual release of responsibility, so students can develop confidence and independence in this task. The assessment task is similar to this lesson, so it is imperative that students have sufficient knowledge to work independently. For higher achieving students, encourage independent thought, and hypothesising about effectiveness. Encourage higher order thinking, in which students can design alternative technologies to achieve the same purpose, with effective and appropriate elements incorporated.  |

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| **Stage** | **Time** |
| Warm up | 10 Minutes |
| **Questioning and activities** |
| Each student is given a card with one of the previously learnt elements on it. Individually, students identify their element on one of the items/technologies displayed on the board. Students may be asked to justify their response, and may be asked further questions to elaborate on their knowledge. |
| **Stage** | **Time** |
| Main | 45 minutes |
| **Questioning and activities** |
| Introduce the evaluation template *Optional-* With students, alter the evaluation sheet to fit with the focuses and knowledges of the students within the class. Explicitly investigate the evaluation sheet. Discuss what each criterion is, and answer questions that students may have. Demonstrate completing the evaluation to students, discussing thinking and reasoning. As a class, complete another evaluation on an item, discussing the elements, hypothesizing the use and purpose, sustainability, and the reasonableness/effectiveness. In buddies, students complete another evaluation, and the results are discussed as a class. Students complete an evaluation individually, which is checked by the teacher. Students identify elements of the technology (systems, components, materials, tools, equipment), and comment on the effectiveness/sustainability/reasonableness. As a class, discuss what changes could be made to make the technology fit to the evaluation effectively.  |
| **Stage** | **Time** |
| End/Review | 5 minutes |
| **Questioning and activities** |
| Continue the discussion about the possible changes that could be made, constantly scaffolding and linking the ideas and discussion back to the sustainability, materials, components, systems, tools, and equipment.  |