# How do the properties of materials determine their use?

**Science and technology Stage 1 learning sequence material world**

**Learning sequence description**

Students investigate how properties of materials determine their use. Students identify a range of natural materials used by Aboriginal and Torres Strait Islander Peoples for a specific cultural purpose. There is an optional ‘maker hour’ for students to produce, implement, test and evaluate a shelter built, from natural materials, for their favourite toy.

## Syllabus outcomes and content

**ST1-1WS-S** – observes, questions and collects data to communicate and compare ideas

Students:

* pose questions about familiar objects and events
* respond to questions and make predictions about familiar objects and events
* explore and answer questions through participation in guided scientific investigations
* collect data from observations
* record observations accurately and honestly using observational drawings, labelling, informal measurements and digital technologies.

**ST1-2DP-T** – uses materials, tools and equipment to develop solutions for a need or opportunity

Students:

* effectively manage a variety of tools
* manipulate a range of materials for a purpose
* consider safety, sustainability and time constraints when producing solutions
* segment and sequence steps for making designed solutions
* evaluate the success of design ideas, processes and solutions according to a scale of personal preference
* consider and discuss the impact of a design solution within an environment
* identify the positive and negative impact of a design solution within an environment.

**ST1-7MW-T** – describes how the properties of materials determine their use

Students:

* identify a range of natural materials available locally or through trade used by Aboriginal and/or Torres Strait Islander Peoples for a specific cultural purpose plan
* design and evaluate a product, demonstrating understanding of the suitability of materials for a purpose.

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# Lesson 1 – Identify and investigate a range of natural materials

Students are learning to:

* identify and investigate natural and man-made materials
* identify and compare the properties of natural materials
* investigate natural materials used by Aboriginal and Torres Strait Islander Peoples for a cultural purpose.

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 1.1 | Discuss and investigate with students the meaning of man-made and natural materials.  The simple definition is man-made materials are formed by human technology, tools and resources. Natural materials are formed by nature and have not been changed in anyway.  Students sort the man-made and natural materials into the T-chart in activity 1.1. |  | Student workbook activity 1.1  Title: Man-made or natural? |
| 1.2 | All materials have properties, or words that describe the material. Students choose 4 of the natural materials in the T-chart in activity 1.1 and describe these materials using their senses of touch and sight. Record 4 properties for each natural material in activity 1.2. |  | Student workbook activity 1.2  Title: Natural material properties |
| 1.3 | Properties of natural materials can be compared and contrasted using Venn diagrams. Using the example Venn diagram that compares the natural material properties of wool and cotton, students complete their own Venn diagram in activity 1.3 comparing the material properties of wood and rock. |  | Student workbook activity 1.3  Title: Compare the properties |
| 1.4 | Aboriginal and Torres Strait Islander Peoples have used natural materials from the environment to construct tools, manufacture clothing and construct shelters for thousands of years. Students complete activity 1.4 in the workbook that investigates why Aboriginal and Torres Strait Islander People’s used certain natural materials for a purpose. |  | Student workbook activity 1.4  Title: What’s the reason why? |
| 1.5 | Students investigate and research some different Aboriginal shelters made from natural materials. Students choose 4 shelters they find the most interesting. Students sketch a picture of the shelter, complete a materials description and a short explanation of the structure details in activity 1.5. | Hard copies of the resource links provided for students without digital access. | Student workbook activity 1.5  Title: Materials for shelter  [Aboriginal shelters](https://www.google.com/search?q=aboriginal+shelters&safe=active&rlz=1C1GCEA_enAU820AU820&source=lnms&tbm=isch&sa=X&ved=2ahUKEwi24cuEiMHpAhVWxDgGHeCzDTQQ_AUoAXoECBIQAw&biw=1280&bih=610)  Online pictures |
| 1.6 | **Opportunity for monitoring student learning**  **Man-made or natural activity 1.1 – practical activity**  **Students correctly identify which materials are man-made or natural based on the definition.**  **Compare the properties activity 1.3 – practical activity**  Students use a Venn diagram to compare the natural properties of two materials.  **Materials for shelter activity 1.5 – practical activity**  Students investigate Aboriginal and Torres Strait Islander Peoples shelters to understand cultural structure design and material selections.  **What to look for**   * accurately identifies the differences between man-made and natural materials * identifies and compares natural material properties * investigates and understands how Aboriginal and Torres Strait Islander People’s used natural materials for a purpose. |  | Student workbook activity 1.1  Title: Man-made or natural?  Student workbook activity 1.3  Title: Compare the properties  Student workbook activity 1.5  Title: Materials for shelter |

# Lesson 2 – Plan, design and evaluate a product for a need

Students are learning to:

* plan and design a product for a need – a shelter made from natural materials for their favourite teddy or doll
* investigate materials suitable for a purpose
* meet set task criteria
* predict if the design will work and why.

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 2.1 | Students plan and design a shelter made from natural materials for their favourite toy. The criteria for the task is:  1. The shelter is big enough to fit their chosen teddy or doll.  2. The shelter must be made only from natural materials.  3. The shelter must be free standing (without leaning on something else).  4. The shelter must keep its shape.  Students consider the natural materials they can use in their shelter design by completing the materials hunt in the student workbook, activity 2.1, assisted by an adult. |  | Student workbook activity 2.1  Title: Materials for my toy’s shelter |
| 2.2 | Using the planning template in activity 2.2, students draw the shelter design, with their toy sitting under it, in the centre space. Around the drawing students label, use arrows, words and identify the materials used for the different parts of the shelter, as well consider how the materials will hold together. |  | Student workbook activity 2.2  Title: Time to plan |
| 2.3 | Students answer the yes/no questions about their design plan in the student workbook activity 2.3. This helps students predict if their design meets the set criteria of purpose and if they are ready to build. |  | Student workbook activity 2.3  Title: Questioning and predicting |
| 2.4 | **Opportunity for monitoring student learning**  Time to plan activity 2.2 – practical activity  Questioning and predicting activity 2.3 – practical activity  Students use the information and knowledge they have gathered about properties, materials and their purpose to design a shelter for their favourite teddy or doll. The plan identifies and represents chosen materials, and interesting features of the shelter design, while considering techniques to hold the materials together. Students question and predict if the following criteria has been met:  1. The shelter is big enough to fit their chosen teddy or doll.  2. The shelter must be made only from natural materials.  3. The shelter must be free standing (without leaning on something else).  4. The shelter must keep its shape.  **What to look for**   * a completed, clear and detailed drawing of the student’s favourite teddy or doll under the shelter. * descriptive details of the plan organised by labels, arrows, words and ideas linking the drawing to materials, design features and fastenings * prediction of the success of the student’s plan through the consideration of criteria questions |  | Student workbook activity 2.2  Title: Time to plan  Student workbook activity 2.3  Title: Questioning and predicting |

# Lesson 3 – Optional maker hour

Students are learning to:

* produce and implement a design that has a purpose – a shelter made from natural materials for a favourite teddy or doll
* test and evaluate the design
* communicate and share results about the design success and challenges.

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 3.1 | Students use the material list and their plan to begin making the natural shelter for their favourite teddy or doll. |  | Student workbook activity 2.1  Title: Materials for my toy’s shelter  Student workbook activity 2.2  Title: Time to plan |
| 3.2 | After the shelter has been completed, students test if the shelter can fit their toy and if the shelter’s natural materials can successfully keep the shelter’s free standing shape. Students reflect on the materials they chose and consider and analyse if these materials have met their purpose. Students record their reflections in the student workbook, activity 3.2, by answering yes/no and short answer question prompts. |  | Student workbook activity 3.2  Title: Testing and evaluating |
| 3.3 | Students take a picture or video of their toy and shelter and send it to their teacher as part of an online student/teacher conference. Alternatively, or in addition, students can take their shelter and toy into school to share their plan and reflections with their teacher and classmates. A picture can be taken at school of their final product and glued into their student workbook in activity 3.3. Teachers have a space in the booklet for written feedback after the verbal conference. |  | Student workbook activity 3.3  Title: Communicating and sharing |
| 3.4 | **Opportunity for monitoring student learning**  Communicating and sharing activity 3.3 – presentation and/or conference  Students present their completed product to their teacher in an online conference and/or during a news item, or small group share, with their teacher and class. Students verbally identify, describe and discuss details of the production process and their reflections.  **What to look for**   * presents a completed shelter for their favourite teddy or doll * describes the making and testing process with detail * justifies what materials and techniques worked well, what needed to be changed or altered from the plan and why. |  | Student workbook activity 3.2  Title: Testing and evaluating  Student workbook activity 3.3  Title: Communicating and sharing |

**Reflection and evaluation**

These simple questions may help you reflect on your students’ learning and plan for next steps.

What worked well and why?

What didn’t work and why?

What might I do differently next time?

What are the next steps for student learning based on the evidence gathered?