# Learning sequence 3 – Material world

## How do we decide which materials are most suitable for a particular purpose?

**Learning sequence description**

Students investigate how different properties of materials affect their suitability for products. They will develop their knowledge and understanding of the properties and performance of a variety of materials through observation and manipulation. They have the opportunity to design and make an entertaining game.

## Syllabus outcomes and content

**ST2-1WS-S** – questions, plans and conducts scientific investigations, collects and summarises data and communicates using scientific representations

**ST2-2DP-T** – selects and uses materials, tools and equipment to develop solutions for a need or opportunity

* investigate and research materials, components, tools and techniques to produce design solutions
* develop, record and communicate design ideas and decisions using appropriate technical terms
* select and effectively manipulate appropriate materials for a specific purpose

**ST2-7MW-T** –investigates the suitability of natural and processed materials for a range of purposes

* investigate how the properties of natural and processed materials influence their suitability and use in products, services and/or environments
* develop a design solution for an identified need or opportunity, using a variety of tools and materials that considers factors such as sustainability and time

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## Lesson 1 – investigating materials

Students are learning to:

* identify materials as natural or processed materials
* identify and describe observable properties and uses of familiar materials
* justify selection of a material for a particular purpose based on the observable properties of the material.

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 1.1 | Pose the question to students. What is a material? (A substance from which something can be made.) Identify and discuss examples of materials. Ensure students distinguish between objects and the material from which the object is made. For example, window (object) – glass (material); door (object) – wood (material).  Revisit observable properties of materials with students. A property of a material represents the distinctive characteristics that can be identified, tested and used to help people select the most suitable material for a particular use. For example, bendy (flexible), stretchy (flexible), stiff (rigid), brittle (breaks easily), durable (doesn’t break easily) smooth, rough, waterproof, absorbent, transparent, opaque, shiny, dull.  Discuss how some materials are found naturally in the environment, some materials are processed by humans to change their properties to make them suitable for a particular purpose.  Students complete a scavenger hunt to locate different objects. Students have 5 minutes to gather thirteen different objects that relate to each letter of the words ‘material world’. For example, ‘m’ (marble), ‘a’ (adapter) and so on.  Choose an object and model how to describe it (material, properties, natural or man-made, uses).  Allow time for students to explore the observable properties of their objects. For each of the objects selected, students identify the material(s), properties and whether they are natural or processed materials and complete the table in the student workbook. |  | Student workbook – activity 1.1  Home or classroom with a variety of objects made of different materials. |
| 1.2 | After students have completed activity 1.1, ask questions, such as: Could you tell me more about this? What do you mean by that? Could you explain what you did? I wonder what would happen if…?  The properties of different materials make them suitable for specific purposes. For example, glass is transparent and useful for windows, wood is strong, heavy and opaque, it is useful for doors and tables. Ask students to predict what might happen if materials are used for different purposes. For example: What if bed sheets were made of aluminium foil? What if pillows were made of gold? Why are bricks used to make houses? Why are windows made of glass? What if plastic had never been invented?  Students respond in their student workbook. |  | Student workbook – activity 1.2 |
| 1.3 | How do we use materials for a purpose?  Discuss how Aboriginal and Torres Strait Islander peoples use natural and processed materials for specific purposes. They use natural materials for specific purposes in their daily life such as minerals for painting, wood for tools and plant materials for shelter. They also process natural materials to change the properties to make the material more suited to another purpose such as woven fibres for bags. Knowledge of the natural properties of the various plants in a given place helps with selection of materials needed for a specific purpose, such as in the making of cooking tools and weapons. For example, dense woods are used to construct tools for striking and digging that need to be hard, heavy and durable, whereas tools, such as boomerangs, are constructed from material that is strong but not heavy.  Students list the materials they use in everyday life in their student workbook such as, fibres for clothing, steel and plastic for eating utensils, canvas school bag, wood for desks and paper manufacture. |  | Student workbook – Activity 1.3 |
| 1.4 | **Opportunity for monitoring student learning**  Scavenger hunt – collection of student work  Students select objects, identify the material(s) each one is made from and describe the properties and possible uses of the material. Students justify the use of the material based on its properties.  **What to look for:**   * identifies materials and their observable properties. * distinguishes between materials and the objects themselves. * identifies natural and processed materials. * describes properties of materials using technical language * describes and justifies the use of materials for specific purposes. |  |  |

## Lesson 2 – using materials for a purpose

Students are learning to:

* design a game used for entertainment
* understand the role of testing and use of sustainable (recycled) materials as part of the design process
* select and effectively manipulate appropriate materials for a specific purpose using safe work practices.

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 2.1 | Some materials can be recycled through waste management systems such as cardboard, glass, paper, metal cans and some plastics. Some materials cannot be recycled using the recycling bin. For example, some plastics and packaging materials such as Gladwrap and Styrofoam.  Discuss some examples of materials that can be recycled through waste management systems? Why can’t some materials be put in the recycling bin? Identify examples of objects that might be made from recycled materials around home or school.  Pose these questions to students. Why do you think it is important to recycle materials? What might happen if materials aren’t recycled? Students record responses in the student workbook.  Brainstorm with students new ways we might be able to use recycled materials. Students sketch their ideas in the student workbook. |  | Student workbook – activity 2.1 |
| 2.2 | Identify and define  Discuss common games with students. For example, ten pin bowling, arcade games, mazes, throw the ball, ring toss. Using what students know about games, brainstorm possible extensions to existing games, or the development of a new game, to entertain family and friends. This will assist in the ‘identify and define’ step of the design and production process. Students identify an idea for the game they will design and define the need they will meet with this game. For example, entertain their younger sibling. |  | Student workbook – activity 2.2 |
| 2.3 | Research and plan  Students could research additional information to inform the planning of their game design. Students develop a labelled, annotated drawing to describe how their game will work. They list the materials needed to develop the game and possible recycled materials that could be used to create it. They plan a sequence of steps needed to produce their game. |  | Student workbook – activity 2.3 |
| 2.4 | Produce and implement  Students explore and select appropriate tools and recycled materials for the task. They may need to investigate the properties of individual materials to assess the suitability of the material for its intended purpose. Students could investigate how cardboard can be manipulated by joining, cutting, scoring, folding and layering. Students consider sustainability of materials and aesthetic features of their final product.  Students draw, or take photos, of their sample (prototype) design in their student workbook. Showcase the prototypes in the classroom to allow peers to provide feedback. |  | Student workbook – activity 2.4  Recycled cardboard |
| 2.5 | **Opportunity for monitoring student learning**  Design and produce a game – practical activity  Students develop a design idea for a game to entertain family and/or friends. They produce an annotated drawing, collect suitable materials, build and test a sample model (prototype) of their game.  **What to look for:**   * annotates drawing of game design * lists materials and identifies recycled materials * builds a sample model (prototype). * reflects on the design process and the success of their game. |  |  |

## Lesson 3 – optional

Students are learning to:

* design a game used for entertainment
* understand the role of testing and use of sustainable (recycled) materials as part of the design process
* select and effectively manipulate appropriate materials for a specific purpose using safe work practices.

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 3.1 | Test and evaluate  Students develop the whole game, test and refine it as a result of feedback, and play their game with family and friends.  Students communicate their design choices, justify their selection of materials and the suitability of their game in entertaining their audience.  A classroom games day could be held where students showcase their games and present to the class.  Use of question stems: Which materials did you chose and why? How does your game work? What did other people think of your game? Did they have fun playing it? What would you do differently if you could make another game? Could you use other materials to make your game last longer? What would they be? Could you adjust this game to create another new game? |  | Student workbook – activity 3.2  Variety of recycled materials to create their game. |
| 3.2 | Students complete a written reflection using the table in the student workbook with question stems such as, I really enjoyed...;I learned a lot about..; I could improve...; I’m still wondering about... |  | Student workbook – activity 3.3 |
| 3.3 | **Opportunity for monitoring student learning**  Design and produce a game – practical activity  Students develop a design idea for a game to entertain family and/or friends. They produce the final product and receive feedback from family members and/or peers.  **What to look for**   * modifies existing game or creates new game. * selects appropriate materials * presents ideas using technical language * explains and justifies design solution * applies feedback to modify and/or improve design choices. |  |  |

**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?