

**This is a resource for AS92013. It is a generic template that should be edited to best fit your students. It is designed to make sure your students have meet all the criteria. Parts of this template are not assessed but are essential learning.**



NEW ZEALAND GRAPHICS AND  
TECHNOLOGY TEACHERS ASSOCIATION  
NGA POUAKO TOI O AOTEAROA

# AS92013

Experiment with different materials to develop a Materials and Processing Technology outcome

Internal

6 Credits

This is an example of a unit that leads to the assessment for AS92013. This is not the only way to deliver the unit; as a teacher, you can adapt the unit to your environment, context, teaching and students.

## Purpose Statement

Students are able to experiment with different materials to develop a Materials and Processing Technology outcome.

<b>Achievement</b>	<b>Achievement with Merit</b>	<b>Achievement with Excellence</b>
• Experiment with different materials to develop a Materials and Processing Technology outcome	• Examine different materials to develop a Materials and Processing Technology outcome	• Evaluate different materials to develop a Materials and Processing Technology outcome

## Explanatory Notes

1 *Experiment with different materials to develop a Materials and Processing Technology outcome* involves:

- exploring the properties of different materials through experimentation
- creating a purposeful outcome informed by the exploration.

*Examine different materials to develop a Materials and Processing Technology outcome* involves:

- investigating the properties of different materials through ongoing experimentation incorporating stakeholder feedback
- refining the use of materials in the creation of the purposeful outcome informed by the investigation.

*Evaluate different materials to develop a Materials and Processing Technology outcome* involves:

- analysing the properties of different materials for the creation of the purposeful outcome
- justifying the use of materials in the creation of the purposeful outcome.

2 The term *materials* encompasses all items, ingredients, and components that a Materials and Processing Technology outcome could be made from.

## Explanatory Notes

3 In Materials and Processing Technology, *experimentation* refers to trying out new ideas or methods for the purpose of discovery.

Examples of experimentation with different materials include:

- transforming by altering the structure
- combining by mixing materials
- manipulating materials without changing their structure or composition
- forming to create a new material.

4 For the purpose of this achievement standard, *stakeholder feedback* is used to inform the exploration and selection of materials for a purposeful outcome.

Stakeholder feedback is documented verbal or written information sourced first-hand. Sources of stakeholder feedback could include the end user, or people or groups that have expertise, experience, or a combination of both in this area. More than one stakeholder must be consulted.

5 A *purposeful outcome* has to meet a need or opportunity identified for a person, whānau, or community.

6 Refer to the NCEA [glossary](#) for Māori, Pacific, and further subject-specific terms and concepts.

7 This achievement standard is derived from the Technology Learning Area at Level 6 of *The New Zealand Curriculum*: Learning Media, Ministry of Education, 2007.

**“ASK ME QUESTIONS”**

**Materials:** The stuff/things you use to make your outcome (e.g. fabric, timber, metal, food ingredients, plastic).

**Techniques:** The methods or processes you use when working with materials (e.g. cutting, sanding, sewing, gluing, welding).

**Appropriate Techniques:** Choosing the right methods that suit the material and outcome (e.g. using wood glue for timber, not fabric glue).

**Physical Attributes:** What the material looks and feels like (e.g. colour, texture, weight, hardness).

**Functional Attributes:** How the material behaves or performs when used (e.g. strong, flexible, waterproof, heat resistant).

**Trialling:** Testing materials or trying out different techniques to see what works best.

**Feasibility:** Whether the outcome is realistic to make with the time, skills, and resources available.

**Feasible Outcome:** A design or product that you *can actually make* and that works for its intended use and location.

**Functional:** How well something does the job it was designed for (e.g. a chair is functional if it can safely be sat on).

**Intended Environment:** The place or situation where the outcome will be used (e.g. indoors, outdoors, kitchen, classroom).

**Stakeholder Feedback:** Comments or advice from the people who will use or are interested in your outcome.

**Functional Modelling:** Trying out materials and techniques (e.g. samples, mock-ups, tests) to check what works before making the final product.

**MATERIALS:**

The term materials encompasses all items, ingredients and components that a Materials and Processing Technology outcome could be made from.

**EXPERIMENTATION:**

The term experimentation refers to trying out new ideas or methods for the purpose of discovery. Examples of experimentation with different materials include:

- Transforming by altering the structure
- Combining by mixing materials
- Manipulating materials without changing their structure or composition
- Forming to create a new material.

**STAKEHOLDER FEEDBACK:**

For the purpose of this achievement standard, stakeholder feedback is used to inform the exploration and selection of materials for a purposeful outcome.

- Primary Stakeholder: The person you are making the garment for
- Secondary Stakeholder: Other people that may be interested/impacted by the garment - Friend, teacher, parent, partner, people attending event with primary stakeholder
- Tertiary Stakeholder: Other people at the event that will be exposed to your garment

Stakeholder feedback is documented verbal or written information sourced first-hand. Sources of stakeholder feedback could include:

- The end user
- People or groups that have expertise, experience, or a combination of both in this area.

**More than one stakeholder must be consulted.**

Materials can be formed, manipulated, transformed and/or combined to enhance the fitness for purpose of a technological product.

**FORMING** refers to bringing two or more materials together to formulate a new material resulting in a different overall composition and structure to that of the original materials. This results in different performance properties. For example, mixing flour, water, and salt to make dough; mixing wood fibres, resin, and wax to make MDF; combining glass fibre and a polymer resin to form fibreglass or fibre reinforced polymer (FRP).

**MANIPULATING** materials refers to “working” existing materials in ways that do not change their properties as their composition and structure is not altered. Instead the manipulation allows the material to be incorporated into a product in ways that will maximise the performance of the material individually and/or collectively to enhance the overall performance of the product. Manipulating often involves changing the shape, laminating materials, and/or joining them with other materials. Manipulation techniques and operations include such things as cutting, moulding, bending, jointing, gluing, painting, etc.

**TRANSFORMING** refers to changing the structure or particle alignment within an existing material to change some of its properties, but, in terms of its composition, it remains the same material. For example, felting; beating an egg white; heat treating metals to harden or anneal them; steaming timber to soften its fibres so that it can be manipulated (bent). Techniques and operations used when developing products often result in a combination of forming, manipulation, and/or transformation. For example, sanding may both shape (manipulation) and add sheen (transform) to materials such as bone and wood.

**COMBINING** refers to the mixing of materials (two or more materials). Refers to incorporating at least one material with another to maximise product performance. Two or more materials would be united and therefore used together to function as needed. For example, applying a varnish to timber, seaming textile materials, adhering interfacing to stabilise a fabric or prevent stretch, folding dry ingredients into wet ingredients, laminating timbers, soldering a resistor to a PCB, applique, screen printing.

# CHECKLIST

TASK	EVIDENCE	COMPLETED
ACHIEVED		
<b>Identified a Need/Opportunity:</b> Defined a purposeful outcome (a product) that meets a need for a person, whānau, or community.	Project proposal/brief.	
<b>Exploration of Properties:</b> Carried out initial experimentation to explore the properties of different materials you could use for the outcome.	Photos, notes, data tables showing initial material tests.	
<b>Documented Exploration:</b> Recorded the results of your exploration (what the materials did, how they changed).	Logbook entries, before-and-after descriptions.	
<b>Outcome Informed by Exploration:</b> Created the final purposeful outcome, showing that your initial material tests <b>informed</b> the choices you made (e.g., you chose Material A because your test showed it was strong enough).	Final product photos, statement linking choice to test result.	

# CHECKLIST

TASK	EVIDENCE	COMPLETED
MERIT		
Ongoing Investigation: Conducted ongoing experimentation and investigation (more than just one set of initial tests). This means testing, adjusting, and re-testing.	Multiple rounds of testing/data, showing refinement over time.	
Consulted Stakeholders: Sourced and documented first-hand verbal or written feedback from more than one stakeholder (e.g., the end-user <i>and</i> a materials expert).	Signed notes, meeting minutes, emails, or documented recordings of feedback.	
Incorporated Feedback: Used the stakeholder feedback to inform your ongoing investigation and further material choices.	Logbook notes showing <i>how</i> you changed your experiment or material choice based on the feedback.	
Refined Material Use: Demonstrated how your ongoing investigation led to the refinement (improvement) of the materials used in the creation of the final outcome.	Comparison showing Material A was initially chosen, but refined to Material B after testing and feedback.	

# CHECKLIST

TASK	EVIDENCE	COMPLETED
EXCELLENCE		
<b>Analysed Properties:</b> Analysed the properties of your different materials. This means explaining why the materials performed as they did and what the data <i>means</i> for the final outcome.	A detailed discussion/report section that interprets all data and explains cause-and-effect (e.g., why 400-grit gave a uniform finish).	
<b>Justified Final Materials:</b> Clearly justified the use of the chosen materials in the creation of the purposeful outcome. This means arguing why your final choice was the best possible option to meet the identified need and stakeholder requirements	A concluding statement that argues <i>against</i> the materials you didn't choose and <i>for</i> the final material based on your analysis.	
<b>Coherent Evaluation:</b> Ensured the entire process (from exploration to justification) is logical, thorough, and clearly documented.	A well-structured report linking the initial need, experiments, feedback, analysis, and final choice.	

## BRIEF:

What are you making?

Who are you making it for? (Primary stakeholder)

Where will it be located?

What is its purpose(s)?

Who will use it?

What are the users needs?

*I am making....*

*Example:*

*I am designing a coffee table for my parents who are interested in natural products. It will be located in the living room. It needs to be able to store magazines and books on a shelf or rack below the table top. The table will be in a high use area so will need to be durable. There are young children in the house so the table will need to be safe for them. The coffee table needs to tie into the colour scheme of the lounge. The table needs to be easy to clean, around and under.*

**STAKEHOLDER**  
WHO ARE THEY IN DETAIL?

STAKEHOLDER ONE

STAKEHOLDER TWO

**ATTRIBUTES**

What does it need to do or be?

**SPECIFICATIONS**

What are the outcomes details?

RESEARCH

# MOODBOARD

# YOU WILL HAVE MULTIPLE EXPERIMENTS

*“OPEN YOUR MIND TO POSSIBILITIES”*

# EXPERIMENT 1:

<b>What am I trying to achieve?</b> <i>You need to use specific language: Forming, transforming, manipulation or combining. (Look at slide 9)</i>	
Technique & Performance Properties.	
STAKEHOLDER ONE:	
STAKEHOLDER TWO:	

Evidence	Completed	Evidence	Completed
Stated technique.		Visual evidence of experiment(s)	
Stated performance properties.		Conclusion of experiment. (Written, verbal, video)	
Used stakeholder feedback.		Where to next.	
Detailed experiment process and materials. (Method)		At least two materials have been experimented with.	

# EXPERIMENT 1

EVIDENCE OF MATERIAL ONE

**METHOD**

**VISUAL EVIDENCE**

**CONCLUSION OF EXPERIMENT 1:**

# EXPERIMENT 1

## EVIDENCE OF MATERIAL TWO

**METHOD**

**VISUAL EVIDENCE**

**CONCLUSION OF EXPERIMENT 1:**

# EXPERIMENT 1:

EXAMPLE

<b>What am I trying to achieve?</b> <i>You need to use specific language: Forming, transforming, manipulation or combining. (Look at slide 9)</i>	<i>Through <b>manipulation</b> I want to explore how pine and chestnut timber react to the ebonising process. I will be comparing the attributes of the two timbers, such as grain pattern and tannin content, like how well the timber <b>absorbs</b> the ebonizing solution and the change in colour. The finish needs to be <b>durable</b> smooth and not too shiny this is transformation.</i>
<b>Technique &amp; Performance Properties.</b>	<i>Manipulation through dyeing timber. Performance property in this experiment is how well the timbers absorb the dye.</i>
<b>STAKEHOLDER ONE:</b>	<i>Teacher: "You should try sanding across the grain to see if that will let the dye absorb better". I tried this but it left scratch marks over the timber and once dyed I am unable to do any sanding as it will get rid of the dye.</i>
<b>STAKEHOLDER TWO:</b>	<i>Mum: "I like the dye but it seems to rub off and leave black marks". I did notice this and once finishing this experiment I will look into sealing the dye by oil or varnish and making it more durable.</i>

Evidence	Completed	Evidence	Completed
Stated technique.	Yes	Visual evidence of experiment(s)	Yes
Stated performance properties.	Yes	Conclusion of experiment. (Written, verbal, video)	Yes
Used stakeholder feedback.	Yes	Where to next.	Yes
Detailed experiment process and materials. (Method)	Yes	At least two materials have been experimented with.	No

# EXPERIMENT 1 EVIDENCE

EXAMPLE

SAMPLE 1

SAMPLE 2

SAMPLE 3

## METHOD

*Material: Chestnut*

*Dye: Oxide - 5ml*

*Application: Brush*

*Sandpaper: 80 / 220 / 400 grit*

*Square size 100 x 100mm*

*Use a range of sandpaper grits to open up the grain of the timber to see how much the dye absorbs. Sand with the grain.*

*Observations:*

*Visually the colour and evenness.*

*Cut timber in half to measure absorption.*

*Time how quickly dye absorbs.*



### 80 grit sandpaper.

*Grain textured and rough to touch. Has absorbed unevenly leaving dark and light areas due to different rates of absorption. 5 minutes to be touch dry. 1.2mm absorption.*



### 220 grit sandpaper.

*Grain smooth to touch. Dye seemed to pool in some areas as the 200 grit has sealed off some the grain. Dye has absorbed relatively evenly. 8 minutes to be touch dry. 0.5mm absorption.*



### 400 grit sandpaper.

*Grain very smooth to touch. Dye seemed to sit on top and not absorb for 10 minutes touch dry. Once dry absorption was even and colour was consistent. 0.2 mm absorption.*

**CONCLUSION OF EXPERIMENT 1:** *The rough 80-grit sandpaper basically tore open the wood cells and pores (like making a million tiny holes), letting the stain absorb in super deep and fast. This high porosity is why I got deep absorption but also the crazy dark and light blotches because some parts of the wood (earlywood) are naturally softer and soaked up way more stain than the dense parts (latewood). When I moved to the fine 400-grit, the paper didn't just smooth the surface, it actually squished and compressed those open cells at the top layer. This reduced the porosity right at the surface, kind of sealing it off. This meant the stain couldn't penetrate very deep, forcing it to sit on top and then absorb slowly and evenly across the whole surface, which is why the color looked so consistent. My next step is to try pine as this is the other timber I have access to in the workshop. This is a lot more knotty and sappy than the chestnut which will have a different absorption rate and aesthetic.*

# EXPERIMENT 1 COMPARISON

**VISUAL EVIDENCE**

COMPARE THE TWO MATERIALS AGAINST THE PERFORMANCE PROPERTY:

# EVALUATION / JUSTIFICATION

How have you met your attributes and specifications in this outcome?

How did stakeholder feedback influence your decision making in the construction of the outcome?

What did you learn throughout your experiments relating to the performance properties of the materials used?

**EVIDENCE OF OUTCOME**