National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Exemplar for Internal Achievement Standard

Technology Level 1

This exemplar supports assessment against:

Achievement Standard 92013

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

An annotated exemplar is a sample of student evidence, with a commentary, to explain key aspects of the standard. It assists teachers to make assessment judgements at the grade.

New Zealand Qualifications Authority

To support internal assessment

	Grade: Low Excellence
1	For Excellence, the standard requires the student to evaluate different materials to develop a Materials and Processing Technology outcome. This involves analysing the properties of different materials and justifying the use of those materials for the creation of a purposeful outcome. The student has created an innovative textiles outcome to be used in a State of Emergency. The evidence reveals the student has initially explored through experimentation (and research) the performance properties of different, often unfamiliar, materials. Further investigation of the performance properties of those materials includes experimenting with a variety of transformation, manipulation, forming, and combining techniques. The student has clearly refined their selection of materials based on the results of the experiments. The students' investigations have informed the development of two conceptual designs for a purposeful outcome. Feedback has been gathered at several stages during the investigations, and is incorporated into the development of the outcome. The feedback has guided ongoing investigation or confirmed the ultimate selection of materials. Analysis of the properties of the different materials is evident throughout the testing and trialling, revealing that the combination of vinyl and velvet textiles were a reasonable and justifiable choice for the creation of the purposeful outcome. The final brief, conceptual design, and specifications also justify the use of the chosen materials. To secure the grade, the student should have delved deeper into the performance properties of the initially selected materials. Further evaluation of these materials would provide a clearer justification for choosing vinyl and velvet. Focusing more on the materials performance properties when manipulated and combined and less on the technical feasibility of the methods used would also strengthen the evidence.

Needs & Opportunities

Needs and Opportunities Justified: I have the opportunity to possibly save people's lives in the case of State of Emergency.
There is a need for me to design and create a innovative outcome for my family because we would be unprepared if we had to be evacuated from our home.

Needs	Opportunities
Need to create an emergency product for people to use in the state of an emergency.	Opportunity to gain new skills.
Work within an authentic context.	To work with new materials.
Need to use the donated materials.	To create an innovative outcome.
Need to research new skills, materials, and resources.	To save people's lives during a state of emergency.
	To challenge myself.

FABRIC COMPOSITION, STRUCTURE, CHARACTERISTICS, PERFORMANCE PROPERTIES

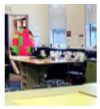
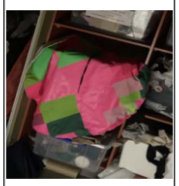
Fabric Composition	Material Structure	Characteristics	Performance properties	Natural or synthetic
-Plastic, foil, and paper that has been laminated together (Aluminium, Propylene) 	Laminated layers of materials.	Shiny, crispy, crinkly, smooth, reflective, thin, opaque, light	Warmth property, waterproof	Synthetic
Double-sided -Stretch spandex -Polyester -Polyurethane 	Woven	Smooth, light, opaque	Waterproof, stretchy	Synthetic
Bark of a Cork Tree 	Bonded+pressed pieces of cork pressed onto a thin material	Smooth, rubbery	Warmth (heat insulation)	Natural

FABRIC COMPOSITION, STRUCTURE, CHARACTERISTICS, PERFORMANCE PROPERTIES

100% cotton 	Woven (weft and warp)	Light, smooth, flexible	Breathable	Natural
Polythene 	Chemicals/oils because it is plastic	Translucent	Waterproof	Synthetic
Layers of paper 	Laminated (pressed down)	Smooth, stiff, light, opaque	Stability, thickness, durability	Natural
Polyamides, made from chemicals found in coal and petroleum 	Woven	Waxy layer	Waterproof	Synthetic

This table gave me a better understanding of the different compositions, structure, characteristics, and performance properties of different fabrics that make them more or less feasible for use in my outcome. After testing and trialling a range of different materials (vinyl, velvet, nylon, etc.), I concluded that vinyl and velvet had characteristics and performance properties that best met the attributes I needed.

IMPACT OF TESTING - RESULTS SUMMARY

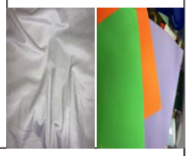
ATTRIBUTE TO MEET	MATERIAL SELECTED	TECHNIQUE TRIALLED	TEST CARRIED OUT	TEST RESULT - DETAILED	PHOTO EVIDENCE
Visible so you can be located by emergency services.	Vinyl (fluro pink and green) 	Tested that the vinyl heat presses securely onto the non-nap side of the colurful velvet that I would be putting it on for my final outcome. 	I made my friend stand at other end of the room and take a photo of my outcome to prove that it was easily visible.	Because I tested the visibility from across the room, it was proven that my fluro pink and green was easily seen. But this outcome was not tested in a dark, outside environment where my outcome could possibly be used in a real life situation so I went into a dark cupboard that imitates the environment and could still see my outcome's bright colours.	 

Stakeholder -

My stakeholder was my friend that I asked to take a photo of my outcome from across the room. We had a conversation after this and she gave me feedback that it my outcome was indeed visible from across the room, meaning I successfully met the attribute.

My response: Thank you. I will use vinyl material for the final outcome - it is visible and can be heat pressed.

IMPACT OF TESTING - RESULTS SUMMARY

ATTRIBUTE TO MEET	MATERIAL SELECTED	TECHNIQUE TRIALLED	TEST CARRIED OUT	TEST RESULT - DETAILED	PHOTO EVIDENCE
Waterproof Keeps items inside the bag dry and protected from water	Vinyl (and velvet) 	Tested both nylon and vinyls supposed waterproofing properties to see which one would be more feasible for my final outcome. I decided that vinyl would better meet the attribute of being waterproof.	I splashed my final outcome (with vinyl on it) with water to imitate the rain that would be in my physical environment of a cyclone.	Because I poured some water on the vinyl protectant on my outcome and because the water ran right off and didn't get into the bag, it was proven that the materials i selected did meet the attribute. But there is a chance that water could get into the bag through the open top so I also tested that the velvet was drop resistant and could reduce the impact of water on my outcome.	 

Stakeholder

I conversed with my end users (my mother) about her opinion of the waterproof attribute. She said it is a great idea for my creation because it would keep everything inside dry. I showed her how the water runs off and she was amazed and thought the vinyl did a great job of keeping water out of my bag

My response: Yes the vinyl does work very well which is why I will use it to meet the waterproof attribute.

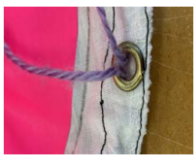
TESTING & TRAILING TECHNIQUES

CLOSURE TECHNIQUES:

Open ends

Button hole

Grommet



The most **feasible** technique for my outcome is the gold metal grommet **because** it is more aesthetically pleasing than the button hole or leaving the ends unfinished and open. **But,** I may need to consider how durable the grommet is when combined with the fabric **so** when the cord is pulled through quickly in an emergency it doesn't fall apart.

Stakeholder feedback: *Test and trial a grommet with iron on interfacing to see if that makes the grommet more durable and stronger when the cord is pulled through the casing quickly. (Teacher)*

Response: *I have tested the suggested technique from the teacher and will use iron on interfacing to make the material thicker and more durable, therefore it won't fall apart if its used roughly/quickly in a state of panic.*

SEAM TECHNIQUES:

Seam Sealant

Overlocking

Because the casing technique I have chosen won't leave exposed edges, it will be bagged out, seam techniques might not be very important aesthetically **But** I do need to consider durability the edges will have the cord rubbing against them quite quickly so they would fray easily **so,** the most **feasible** technique for my outcome is overlocking the fabric edge.

Stakeholder feedback: *Great to see you've investigated different ways to sew your seams and considered functionality. What will you use to thread through the casing? You might need to test what's the most durable option and what material can handle being pulled quickly in the act of an emergency.*

Response: *In my prototypes, I have used yarn and string, and I have also tried one a black cord which is the most durable option.*

TESTING & TRAILING TECHNIQUES

FINISHING TECHNIQUES:

Edge stitching **Bagging out**

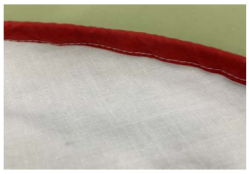

The most **feasible** technique for my outcome is bagging out **because** it creates a better looking finish and looks more aesthetically pleasing and will be more durable than the edge stitching as it does not fray. **But** this technique is a little complicated and I don't have the knowledge of skills to recreate it right now **so** I will ask my teacher for help about how to do this finishing technique.

Stakeholder feedback: *Today we went through the 'bagging out" technique and how to construct it by using an edge foot on the sewing machine*

Response: *Now I have learned how to bag out a circle and I believe I can recreate this on a larger scale for my final outcome. It looks more aesthetically pleasing and will be more durable*

CASING TECHNIQUES:

Fabric donut **Bias tape**

The most **feasible** technique for my outcome is the bias tape **because** it looks much more aesthetically pleasing and will not fall apart and break like the other option. **But** the bias tape is quite thin and might not fit the safety pin and/or cord that I want to use through the casing **so** I will test out whether it fits and then decide if it is a feasible casing technique.

Stakeholder feedback: *The bias binding technique does give a good finish, but yes I do agree that it will be difficult to get a safety pin through the casing. The casing is very small. What would be a better option?*

Response: *A better option would be to use the bagging out as a casing technique by sewing another line of stitching because I can choose how wide the casing would be while still getting a nice looking finish.*

TESTING & TRAILING TECHNIQUES

Drawstring material

Black cord Yarn Twine



The most **feasible** material to use for my outcome is the black cord **because** it is much more durable than the other options and is strong enough to pull my bag closed roughly/quickly in a state of panic. **But** I would need to test out that this cord pulls through the velvet fabric quickly and smoothly **so** that I know this material will be functional in my final outcome.

Stakeholder feedback: *What did you find out after testing the velvet material was there any differences?*

My response: *I did a test to see if the black cord pulled through the velvet using a prototype that I had made and it worked, so I will use it for my outcome. It was strong and easy to use.*

Waterproofing/resisting

Vinyl **Nylon**


Using the vinyl to make my outcome waterproof/resistant is the most **feasible** technique to use **because** I would be able to easily apply it to my velvet fabric once I've bagged it out. **But,** I haven't tried heat pressing the vinyl onto the velvet yet so I need to test that out **so** that I can be sure that this technique works.

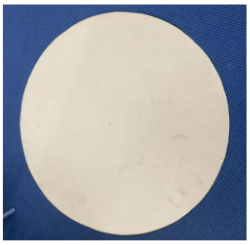
Stakeholder feedback: *What did you find out when you heat pressed the velvet and vinyl. Will it stay set together?*

My response: *I heat pressed the vinyl onto wrong side because in my outcome I will have the vinyl on the outside and the water-resistant side of the velvet on the inside. It worked well and was really secure.*

TESTING & TRAILING TECHNIQUES

CUTTING & SEWING THE FABRIC CIRCLE

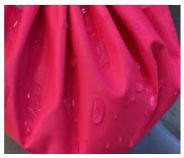
1. Fold (to create casing)
2. Cut (circular shape)
3. Joined materials

I manipulated my material by cutting a circular shape cut from a template. I joined the two materials for the outside and inside by forming a casing and sewing two different materials on top of each other.

COMBINING THE TWO MATERIALS

1. Vinyl (used the left overs from the bin)
2. Velvet curtain (used the donated materials to upcycle)


The most **feasible combination** of materials is the velvet curtain **because** it is shower resistant, meaning it could keep out small amounts of rainwater. **But** my design would need to be more water resistant **so** I am heat pressing an outside layer of vinyl onto the curtain to achieve a waterproof material.

Stakeholder feedback: *What a great way to combine two different materials to ensure it is a more water resistant material.*

Response: *Combining these materials means my outcome will meet the requirement of combining materials and being waterproof/water resistant.*

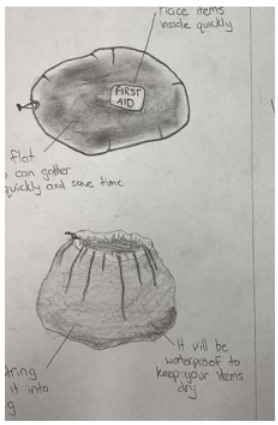
Concept Development

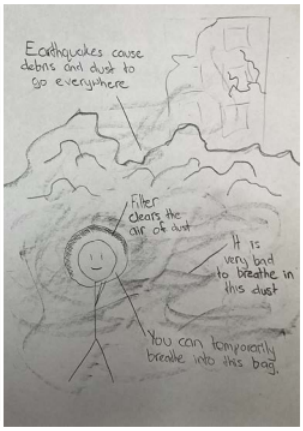
Stakeholder Feedback: *"I would potentially have it made out of a reflective material so you could use it for other things like be easily found if you were lost or some sort of bright colour so you could lay it out of there was a helicopter looking for you."*

"One of the problems is how much can i carry in it. If its a first aidy type emergency exit then id probably want to out in as much as I can so it'd need to be pretty big but then you gotta be able to carry a lot so you'd want a way to carry it. Preferably hand-free."

"Materials is dry bag material cause it's quite light and really tough. Not the super thin nylon stuff the sort of rubberised canvas stuff."

"If it was waterproof on one side a fluffily lined on the other side that would be a really good blanket."



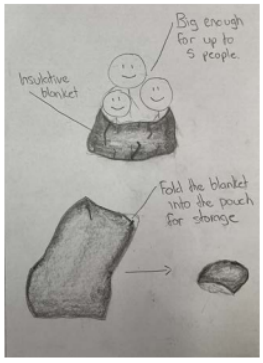


My Response: *Okay I will definitely implement the bright colours into my final design. I think backpack straps are a good way to carry it while being hands-free so I will add that to my design. I will think about what you said about the material and I think using vinyl is a great material because it is waterproof AND can be visible. The multifunction as a blanket is a great idea. I'll have to consider what materials to use.*

Stakeholder Feedback: *"Could covering your mouth and nose only be sufficient that way it can be a smaller thing?" "It would be impossible to make though with the materials that you have available."*

My response: *I agree that the constraint of only being able to use the donated materials means that I will not be able to create this product so i will not develop it further.*

Concept Development



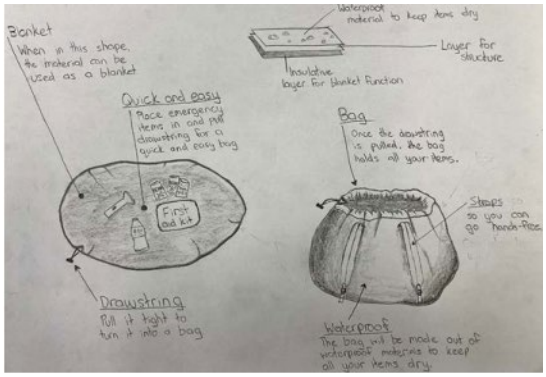
Stakeholder Feedback: *"My change to the concept would be one sleeping bag each because i don't know if everybody would want to be in one big sleeping bag. I would have individual sleeping bags that you can zip together so instead of one big one you can make it little normal sized ones or one big one depending on what you want."*

The best stuff i'd make it out of would be rip-stop nylon with goose feather."

"Depending on the situation you'd want it reasonably bright coloured. If it's just a waterproof bag that would be more important."

My Response: *My time restraint makes it unreasonable to try to create 5 different sleeping bags for my 5 end users and it would also use an unnecessary amount of materials. Goose feather is definitely not available for me as I can only use the donated materials.*
Both these restraints make this concept a bad choice so I will not develop this idea.

Stakeholder Feedback: *"You'd want waterproof (materials), probably something plastic and non-ripping. Probably pretty thin if you're only putting documents in there–thin but solid enough that it doesn't rip easily. I think this is a good design and would work pretty well."*
My Response: Yes the attributes of the materials would need to be similar to those and I believe there are materials in the pile of donated goods that could be used to meet those attributes.



Stakeholder feedback | Whānau
"Looks like it would hold a lot of stuff and does that in a smart way. Easy to carry -hands free which is good if there are children that need to be held, phones for navigation, etc. Vinyl is a good choice for waterproofing were we to be stuck outside in the rain."

PROPERTIES
Insulative
Waterproof
Multi Purpose
Durable

CHARACTERISTICS
Bright
Round
Large

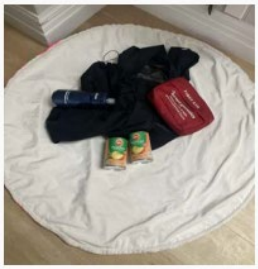
OVERALL DECISION

After investigating materials and techniques I have refined my idea and decided the most feasible design idea is Concept 1 because it solves the issue of my end users. I have a family of 5 and with concept 1 it is more fit for purpose because it can hold larger and more items for everyone to keep safe in comparison to concept 2 which is much small and fiddly to use.
I used my investigations and feedback to decide that I will combine off cuts of vinyl and scrap velvet material from the donated goods pile to ensure I am being sustainable in class.

I will manipulate my materials by cutting, joining and shaping two materials by bagging out or creating a casing.

The performance properties of the chosen materials are water resistant (vinyl) and insulating (velvet).The composition of my material is made up of a combination of brightly coloured vinyl and velvet which is heat set together and to change the structure making it thicker and durable. The outcome will be suitable for the physical environment because it will be easy to access for all members of my family hanging by the drawstring by the door.

The characteristics of concept 1 is more visible because of the bright pink and green colours which could be identified easier by a rescue team.




Outcome justification

Specification	Met Y/N	Explanation/Justification
Round (*A circular shape is the most feasible shape to pull a drawstring)*	Yes	My outcome is as circular as possible (1 metre diameter all the way round)
Bright / Visible (*so you can be located by emergency services)*	Yes	Fluro pink and green pieces of vinyl heat pressed in a patchwork on the outside of my bag
Waterproof (*Keeps items inside the bag dry and protected from water)*	Yes	I combined the materials of velvet and vinyl to make my outcome drop resistant on the inside (velvet nap) and waterproof on the outside (vinyl)
Size (*Must be large enough to hold all the emergency items for a family of 5 and to be functional as a blanket)*	Yes	1 metre in diameter. 0.8 m^2 area of blanket. Will be large enough to fit emergency items (tested for proof). Circumference= 3.14m
Recycled materials (*To reduce waste of materials in the hope to show kaitiakitanga and preserve the environment for future generations)*	Yes	All materials used to create my outcome were recycled/donated materials by teachers at for example an old velvet curtain. Also used vinyl from the scrap bin that would have been thrown out otherwise.
CPR instructions (*to inform people in case they need that knowledge in an emergency situation)*	Yes	Vinyl pressed CPR instructions for adults, children, and infants on the white vinyl on the inside of my bag so it can be read.

Outcome justification Continued

Casing *(must be wide enough for my cord to pull through+must be functional in the environment)*	Yes	My casing is 1.5cm wide and I have tested to prove that it is functional.
Grommets (*must be functional to allow the cord to pull through+be durable)*	Yes	2 gold grommets with a hole that is 0.8cm wide. Tested to ensure that the cord pulls through quickly and easily.
Cord (*must be long enough to be feasible in my outcome)*	Yes	Round black cord 5mm wide + 4.43 metres of cord total.
Must be fit for purpose (*must be durable+large enough and fit the required attributes that would make it suitable)*	Yes	Cannot test it in the physical environment of a cyclone but have tried splashing water on it to ensure it is suitable enough. See above for other attributes that would make it suitable.
Finished in allocated time (*done by the due date)*	Yes	1 term allocated to finish outcome and I finished in 8 weeks.
Completed to the best of my abilities (*ensures the outcome is finished as well as I can make it)*	Yes	Unpicked a stitch when I wasn't satisfied with it. Used a walking foot to stop fabric bunching.
Suitable for end users (*users can use my outcome)*	Yes	Let my end users (immediate family) try out my outcome and they can use it well.
Must combine materials (*brings two or more materials together to form a new material)*	Yes	I combined the materials velvet and vinyl using a heat press. The new materials has a different composition and structure.

Final Brief

I had the opportunity to design and create an emergency drawstring bag that will allow them to quickly and easily gather important items if we were to go into a state of emergency during a natural disaster. The bag is circular 1 metre in diameter. It is covered in fluro pink and green vinyl to make it visible and waterproof at the same time. I designed it to combine the vinyl with a velvet lining so my outcome has a multifunction to be used as a blanket for my immediate family (Mum, Dad, Sister, Brother).

My emergency drawstring bag will be stored in an easily accessible location in my house so my family members could grab the bag and fill it quickly. It could be used during multiple natural disasters but specifically a cyclone would be the most likely for where I live.

An emergency bag would be useful because you could quickly gather your necessary survival items and get to a safe place.

	Grade: High Merit
2	For Merit, the standard requires the student to examine different materials to develop a Materials and Processing Technology outcome. This involves investigating the performance properties of different materials through ongoing experimentation. The ongoing experimentation will incorporate feedback and guide refinement of the selection and use of materials in the creation of purposeful outcome. The student has created a jewellery item for a family member within a multi-materials Technology context by combining different materials. The evidence reveals the student has experimented with and examined a range a materials to ascertain their suitability for the outcome. The initial experiments using paper mâché, clay, wood and acrylic have explored how to form shapes to ensure they are sturdy and durable. Ongoing investigation into how to combine resin with wood, acrylic, gold flakes, and paint chips has guided refinement. Further testing investigated the performance properties of transparency, weight, and aesthetics and resulted in a selection of resin, silver flakes, and acrylic for the creation of the purposeful outcome. Stakeholder feedback is incorporated during the development of the outcome and has been documented at several stages. A key and wider stakeholder has been consulted and the feedback informs the investigation of the properties of the different materials. For Excellence, additional analysis of the material properties is needed. This would likely show or prove the resin, silver flakes, and acrylic materials used were fully explored before being determined reasonable and therefore a justifiable choice for the creation of the purposeful outcome.

My stakeholder is my Mum. She has expressed interest in cats, flowers, and she also enjoys reading. Her favourite colour is green. She has some jewellery, and enjoys wearing it, and has mentioned that she would appreciate some form of pendant. This is an opportunity for me to create something that involves the attributes she has talked about. Based on these attributes, I have decided to make a necklace pendant that features a cat in some way. If possible, I will also try to incorporate the colour green.

Material 1: Paper mâché

- Paper mâché can be used in many different ways to form shapes.
- Potential ways to explore include using a mould, using a wire frame, and turning into a paper clay to shape.

Material 2: Timber

- Timber is very versatile and will be sturdy even in a small form like a pendent for a necklace. It is durable if treated right.
- Potential ways to explore include etched and cut using the laser cutter, carved with chisels, and covered using resin.

Material 3: Resin

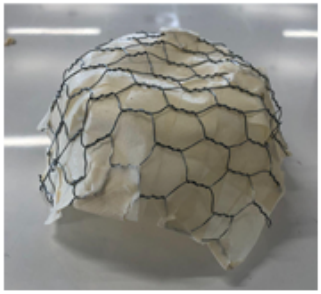
- Because it starts as a liquid, it can be shaped very easily. While in liquid form, things can be placed in it that will be displayed once set
- Potential ways to explore include using a mould to pour into shapes, using a laser cutter on set resin, covering other materials with resin

The three main concept designs were just different positions the pendant could have. Here is the feedback for each design:

1. She liked the emotional connection that came with having the cat's actual paw print. She also liked that it was personalised, and it would be a lasting memento after our cat passes away. However, she felt that because it would be realistic it would look messy and unrefined (a true cat paw isn't tidy) and was concerned about the logistics and ethics of how I would be able to get the print in the first place.
2. This design has the potential to get large and chunky due to the size. My mum does not like that type of jewellery and would prefer something more refined. However, she did like the concept of the idea (cat in a heart shape). She also liked the position of the cat itself. Not her overall preferred design.
3. The design of this pendent is reminiscent of a necklace she has had previously, so there is a nostalgic element for her. She also likes how it is just a silhouette and simple compared to of the other designs. However, she also said that the tail has the potential to get caught on things because it sticks out so much. This can be easily changed. She also mentioned how it doesn't have a face, which is neither positive nor negative but could get included in future versions.

Material 1: Paper mâché

Process 1: using a mould. I used a jar as a base, covered it with cling wrap and then wrapped pieces of paper dipped in glue around it.
Process 2: Using wire. I combined the paper mâché with wire to mould it into a bowl shape.

Pros: After the materials set, the paper mâché was quite solid and didn't feel like it would rip. It has a unique look due to the paper and can be easily personalised by using different magazines and pieces of paper.
Cons: Considering my outcome is a necklace pendant, I would have to create something quite small. Paper mâché doesn't seem like the best medium for this. If I want to use this material (paper and glue) I will probably have to get a more liquid state and then pour it into a small mould. I need to be able to create something precise, so while this material has some good qualities, it isn't a good match and other explorations are required.

Material 1 comments: My key stakeholder believes that the paper mâché looks flimsy and that it would be difficult to get a nice finish on it. However, she did admit that it would be cost effective and that it would make use of old paper and materials.

Material 2: Clay
Process 1: I shaped the clay in a different form.
Process 2: I combined the clay with chicken wire to give it more structure.



Pros: There weren't many pros for this material in relation to what I want to make.
Cons: To properly utilise clay you need to have the skills to make it look good. Clay is also extremely bulky, especially considering I'm trying to make something small. It could potentially be made into a small pendent if I had the skills to, but I don't, so this material won't work for me. Clay can also break fairly easily once it's dry, which isn't good for my pendant as it needs to be something that can be worn all day without issue.

Material 2 comments: My key staeholder said that the clay looked too bulky to make a small and refined pendant like the type she wants. I agree with this.

Material 3: Wood

Process 1: Laser cutting. I created a file online and then exported it to the laser cutter.
Process 2: I used the laser to etch a pattern onto the cut out shape.

Pros: Once I figured out how to use the computer and program, it was very easy to get carved. It is also very easy to etch patterns onto the product once the files have been converted.
Cons: You have to be careful that the edges don't burn. The burnt edges meant that the legs and tail of the cat turned completely dark, which just made the entire thing look burnt. If the outcome is going to be small, I need to be careful that the tail and legs aren't too thin otherwise they will snap off. The wood is also a lot more fragile than other materials I have tried and likely won't be as durable. If I want to use this material, I need to find a way to solve the issue of its fragility.

Material 3 comments: My key stakeholder said that this material would be easy to wear because it's nice and light. However, she did say that it needs a varnish or lacquer finish because it looks a bit plain by itself. She liked the etching and the design.

Material 4: Acrylic

I did the same processes I did with the wood to the acrylic.

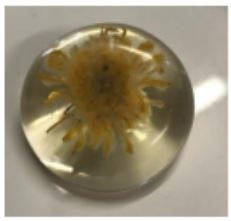
Pros: Very solid and durable. The thinner parts of the design aren't likely to break off. This makes it good for a piece of jewellery, which would be worn for a long period of time. I will likely use either this or wood for my final material.
Cons: The etching is barely noticeable on this colour of acrylic. If I wanted to incorporate that method into the final design, I would have to experiment with making it deeper or adding something on top to make it more prominent. Ideally, if I were to use this material and wanted to have the pattern as well, I would have to make sure the pattern is visible enough on the colour of acrylic my stakeholder decides on. Because my stakeholder said that she liked the pattern design, it is necessary that I use a colour of acrylic that makes it visible for my final outcome.

Material 4 comments: My key stakeholder liked this material because of the finish on the product. She also mentioned that it would be light as well and not annoying to wear. However, she did say that she would like to see the etching on it made more prominent and to look into the possibility of combining colours.

Material 5: Resin

Process 1: I combined a two part resin with flowers in a mould.



Pros: The resin set extremely solid. It is very sturdy and durable and did not shatter or scratch when I dropped it on the ground. It also dried extremely clear. The properties of this material make it perfect for what I am creating. This exploration was extremely beneficial towards the creation of my final pendant, and I definitely plan to use it. Using resin has also opened up the possibility of adding more to my pendant such as glitter or backgrounds. This can be done by placing it in the resin while it's still wet.
Cons: Care needs to be taken to ensure that the resin does not become cloudy. I also had difficulty stopping the flowers from floating to the surface. I also had to make sure that the mould was completely clean before I poured the resin, otherwise pieces of dust and other things could get trapped and ruin the final result.

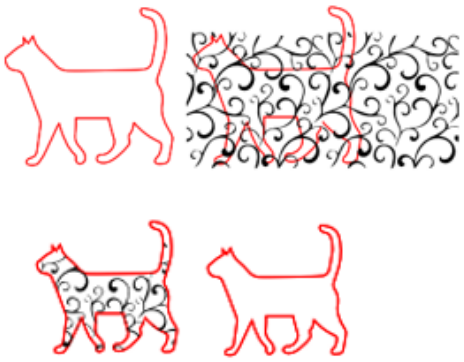
Material 3 comments: My key stakeholder saw the things I created for exploration and said that she quite liked it. She asked if one of the acrylic cats I laser cut into a small disk of resin because it is transparent and strong and then use that as my pendent. This is a great idea, and I will try to combine materials.

Refinement

To create my pendant, I have decided to combine the explorations I did for acrylic and resin. I can create a cat out of acrylic in a colour chosen by my stakeholder which can then be set in a disk of resin to create a pendant. One of the main pieces of feedback I got on the wood and acrylic explorations was that she didn't really like the finish on the wood and acrylic, so by combining it with resin I can change what it looks like. Resin is also extremely solid, which solved the concerns both me and my stakeholder had regarding the fragility of the cat.

Wider stakeholder feedback: My wider stakeholder feedback (teacher) agreed that I should do different combination with resin such as wood. This is easily doable and would also be a good exploration. As I learnt from laser cutting wood, the pattern shows up a lot more than acrylic, so the design would look clearer. One of the issues with wood was that the tail was very flimsy, so setting it in resin would solve that issue. I have explored this process in the production of my outcome.

More investigations. I started by creating my file for the laser cutter. I edited this file multiple times. The result of my first file was too small, which meant I had to go back and increase the size while keeping the pattern the same. Then I struggled to get the pattern matching the outline of the cat to avoid wasting any material but managed to get it sorted. I then cut out of different materials. When I went to the laser cutter, I only planned to use green acrylic, as that was one of the colour options my stakeholder had chosen. However, I got feedback from my wider stakeholder (teacher) that I should try using wood and clear acrylic. They thought the clear acrylic would make interesting dimensions when set in resin, and the wood would be an interesting exploration.



I then cut some cats using the laser cut. When I was setting them in resin, I saw other materials I could involve such as the gold flakes and paint chips. These materials added more depth to the resin and made the cat stand out more. The clear cats couldn't really be seen unless you were looking really closely, even with the gold flakes behind it, so it wasn't something I used again. I showed these to my key stakeholder, who said that she liked the green cat with the paint chips, but though it looked a little busy. She suggested I try the green with other backgrounds. She also said that she really liked the gold flakes but would prefer it with a different colour cat.

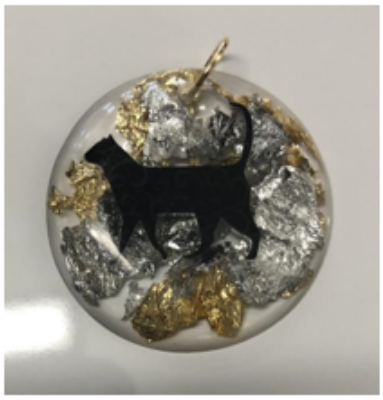
Using the things I learnt from the previous exploration and trial, I then made another six cats. I did green again, as this is what my stakeholder suggested, however I used a different shade of green acrylic that's slightly more transparent. I made this change because I thought that this shade of green was slightly transparent and added more dimension without making it see-through. I also chose to try black acrylic, as well as wood again. When I explored wood earlier, I got feedback from my key stakeholder saying that she didn't like the finish on it. By combining it with resin, I am changing the finish on it while making the original cat sturdier. I trialled adding the pattern to all of the cats because my stakeholder liked it and I think it adds character.

Then my focus was on trying the different types of things I could add to the background. I did gold flakes again, because my stakeholder responded positively to it, as well as silver flakes and paint chips using different colours of cat.

My key stakeholder said that the paint chips looked too busy last time, I feel like one of the problems was that the green clashed with the colour of the paint chips.

Final outcomes

After the resin set, I took them out of the moulds and drilled a hole through them. I then added a ring through the hole so that a chain could be tied. I chose the top three and showed them to my stakeholder. She chose her favourite and that then became my final taonga.



Final Evaluation

My stakeholder identified that she like both cats and jewellery, which gave me an opportunity to create a piece of jewellery. My final outcome incorporates both of these elements effectively, as the pendant has a green cat as the focus (although it might not look fully green due to the lighting of the photo).

The silver flakes in the background were not part of the original specifications, however my stakeholder liked them and appreciates the addition of it.

A way for this outcome to be improved would be to use a different circle mould for the resin. The one used was the only one available and it has a somewhat steep curve on the edges. This isn't necessarily a bad thing; however it was something I had to be cautious of when making the pendant and meant it was more 3-dimensional than originally intended.

	Grade: Low Merit
3	For Merit, the standard requires the student to examine different materials to develop a Materials and Processing Technology outcome. This involves investigating the performance properties of different materials through ongoing experimentation. The ongoing experimentation will incorporate feedback and guide refinement of the selection and use of materials in the creation of purposeful outcome. The student has created a quilted bag for a family member by combining and manipulating different textile materials. The evidence reveals the initial experiments combining satin, cotton, cotton knit, and chiffon broadly explored the performance properties of weight, workability, texture, and transparency. Further research and experimentation is completed and a cotton fabric chosen as suitable. A decision is made to investigate the stability and visual appeal of quilting with sewing thread using different stitches and stitch patterns. The ongoing investigation into quilting has guided refinement. Stakeholder feedback is incorporated during throughout the development of the outcome, and key and wider stakeholder opinions guide the student to further explore the performance properties. A more secure Merit requires the student to demonstrate they have refined their material choice through more in-depth exploration. For example, examination of options for wadding to explore cushioning when combined/layered with the cotton fabric.

Student 3: Low Merit
NZQA Intended for teacher use only

Conceptual Statement

I will be designing a product for my sister to fit all of her books and supplies she needs for a full day of learning and lectures. She is attending the university of Waikato so it will be worn there. It is needed because she has to go back to her hostel and switch out her books after most lectures before she goes to her next ones. It will need to be completed by the 21st of June 2024.

Specification

- Durable
- Comfortable
- Has pockets
- Handles/straps
- Rainproof
- Looks pretty/nice

Concept Development

Green material - Satin polyester

Floral material - Cotton

White soft material - Cotton knit

White transparent material - Chiffon polyester

Satin - characteristically glossy, smooth or lustrous material, typically with a glossy top surface and a dull back.

Cotton - relatively high tensile strength, and its natural coloring is white or slightly yellowish.

Cotton Knit - a soft knit which commonly comes in jersey, rib and interlock weaves.

Chiffon Polyester - a very light, transparent fabric in canvas weave and produced with crepe twist yarns.

Stakeholder Feedback:
Sister:
I don't want the satin material because its Slippery. I like the cotton because it is durable And a high strength rate. Cotton knit is nice but Don't think it would be good for a tote bag though. Don't like the chiffon polyester as it does not look Durable and it is transparent.

[redacted] (mum):
While silk looks pretty, I feel that the cotton and Cotton knit would be the strongest materials to use

My Response:
The satin was too slippery when I was trying to Sew it. The cotton was definitely the easiest to Sew and is a nice thick/durable material. The Cotton knit is a very thin material and I have Found that it bunches quite a bit when trying To sew. The chiffon polyester material does not Look very clean (you can see the seams quite Easily). From my feedback I think I will most Likely use cotton for my project I make.

Material Investigation – Possible Materials I Could Use

FABRIC COMPOSITION	MATERIAL STRUCTURE	CHARACTERISTICS	PERFORMANCE PROPERTIES	NATURAL OR SYNTHETIC
100% Cotton fabric 	Woven	It feels durable and not stretchy and not very soft.	• It is slow to dry • Can be damaged by mildew • Comfortable to wear • Wrinkle easily	Natural
100% wool fabric 	Woven	It feels soft and warm and can be a little stretchy but not a lot.	• Flexable • Elastically • Wrinkle resistant	Natural
Denim 	Woven	It is a lot like cotton since it is made out of it just has a bit of a different feeling to it.	The same as cotton	Natural
Polyester 	Woven	It is very light weight and flowy	• Quick drying • Durable • Moisture resistant • Retains shape	Synthetic

My findings:
I have found out that cotton can be comfortable to wear and that you have to wash it before using it which means it will be nice to carry around on your shoulder around campus and is durable and string enough to hold everything.

ATTRIBUTE TO MEET	MATERIAL SELECTED	TRIAL / TEST	TEST RESULT - DETAILED	PHOTO EVIDENCE
Durable and Strong	Cotton	I will swipe a piece of sandpaper across some cotton fabric and see how many swipes it takes before it breaks/rips a hole.	It took me 28 swipes with sandpaper before the cotton ripped and got a hole in it	
Durable, strong and protective	Wool blanket	I will swipe a piece of sandpaper across some cotton fabric and see how many swipes it takes before it breaks/rips a hole.	It took me 58 swipes with the sandpaper before the wool ripped and got a hole in it	
Protective	Polyester blanket and cotton material	I will sew the polyester between the cotton material then place a glass jar inside then drop it of a ledge onto concrete and see if there is any damage to the jar.	After dropping it and opening the cotton and polyester there was no damage to the jar (did not crack).	 

Stakeholder Feedback:
Sister:
I like the idea of the protective test as I need my laptop in my tote bag and don't want it to be damaged. I would prefer the cotton material over the wool as I don't want it to be itchy when I grab things out of it.

[redacted]
All of the fabric looks well tested but I think the cotton, or the cotton blend fabric would be best for the bag itself.

My Response:
I will add a laptop case into the tote bag using the protective layer technique and will use cotton to quilt the outside of the tote bag and line the inside of it with cotton as well. I will use the polyester blanket because it is very cushioning. I will use cotton because it is durable, and it will not rip easily.

(Pocket protection)

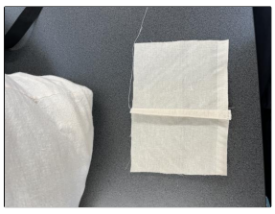
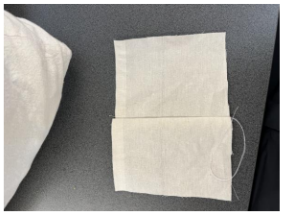

FEASIBILITY:
This technique is very good with the sewed lines forming Squares on the fabric which holds the blanket together so it Wont all fall to the bottom of the two fabrics when sewen into The bag to protect her laptop

STAKEHOLDER FEEDBACK:
Sister - I like the idea of being able to put my laptop in the bag without having to worry about it breaking at all.

[redacted] - Seems to look secure and will protect whatever's inside

MY RESPONSE:
I will keep this idea and make two then sew them together Around all side apart from the top so you can slide the Laptop straight into it.

(Seams)

FEASIBILITY:
This technique Is very good with leaving a clean seam once Sewen forming a good look when put together. I will use this technique for sewing the whole bag together.

STAKEHOLDER FEEDBACK:
Sister - I like that there will be clean seams when carrying the Bag around as I want it to look as nice as possible when Wearing it around my University.

[redacted] - The seams will look tidy and be hardly visible, Good idea.

MY RESPONSE:
This gives me a good idea of how she wants the seams to Look And I will try make them look as clean as possible. The French seam will be most suitable because it will leave the bag Looking nice and tidy.

(Top stitching)

FEASIBILITY:
By doing the top stitching it will give a clean look on the cotton Material so that the lining (dots) won't come up and overlap on The quilted material.

STAKEHOLDER FEEDBACK:
Sister:
I like that she has tested this because I don't think it would look Nice and tidy if the top of the bad wasn't top stitched.
[redacted] (mum):
The top stitch gives a lovely clean look.

MY RESPONSE:
My next steps will be to add this to the bag when it is completed So that the lining does not come up past the outside material and Overlap it in some way.

(Quilting lines)

FEASIBILITY:
By doing these lines it has helped me choose which ones I would/ should use for the quilting the outside of the bag.

STAKEHOLDER FEEDBACK:
Sister:
I only like the straight lines and no others. I just do not Think they look as tidy.

[redacted] (Mum):
The straight stitch crossing into diamonds gives a very tidy Appearance and helps hold multiple materials together

MY RESPONSE:
My next steps will be to do the quilting with a straight line Stitch. I think that a straight line stich will be most suitable Because it does not make the material bunch up and is a lot Easier to sew.

(Quilting lines template)

FEASIBILITY:
This test is very good because it will give me an idea of what Quilting on the bag will look like and how the shapes will turn Out when the lines are sewen.

STAKEHOLDER FEEDBACK:
I like the lines that you have done I think it will add a nice pop To the design of the bag when it is done.
[redacted] (mum):
The quilting lines give a lovely finished look to the tote.

MY RESPONSE:
My next step is to include this into my final outcome when Making the bag because the material did not seem to bunch up When I was sewing it and it leaves a nice design.

(Straps)

FEASIBILITY: This is a good test because it gives a visual Of the how the straps will look and how durable they will be Because I folded the material so that it is layered and back Stitched at each end so the stitching does not fray or break.

STAKEHOLDER FEEDBACK:
Sister:
I like how the straps look, and they are not too thick or thin In width. The stitching along the side of the straps look clean And tidy.
[redacted]
Good width and looks like a tidy finish.

MY RESPONSE:
I will keep this design on the bag because of the feedback I Have received. The cotton material keeps the straps nice and Strong.

Concept Refinement

Stakeholder Feedback:
Sister -
I like the size of the bag and how she has Chosen to sew it together.

[redacted] - Sizing's suitable for an everyday bag, Straps seem a little thin and flimsy though.

My Response:
I won't change any sizing of the pattern and how I sew it together. I will sew it together a bit Tidier when I make the bag. The size is big enough That it can fit a laptop, books, stationary, air pods, lunch/lunchbox

Outcome

Stakeholder Feedback:

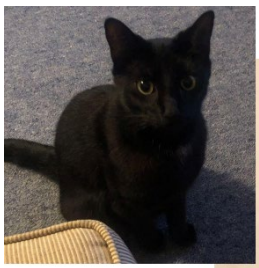
Sister - Very happy with the outcome and proud of what you've accomplished.

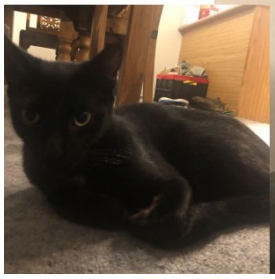
[redacted]
Its neat and tidy, seems like the bag itself has enough space to hold everything. Its quite stable but also is soft enough to fold without creases or damage which seems important. Overall, it looks really good and is well Thought out

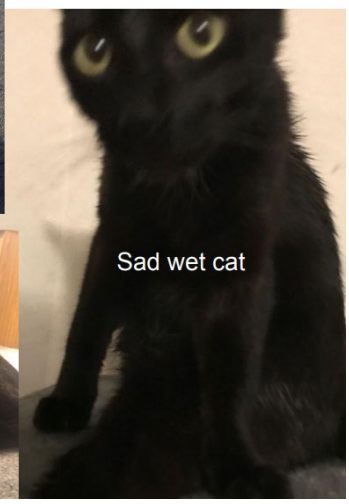
	Grade: High Achieved
4	For Achieved, the standard requires the student to experiment with different materials to develop a Materials and Processing Technology outcome. This involves exploring the performance properties of different materials through experimentation and then creating a purposeful outcome informed by the exploration. These examples are partial extracts from two student folios. Both students have thoroughly explored the performance properties of their chosen materials and ingredients through experimentation, ultimately creating purposeful outcomes using Technological Practice. The first extract demonstrates a student's experimentation with manipulating PVC and fleece materials using different stitch patterns. These techniques explore the performance properties of stretch, colour, flexibility, and rigidity. There is clear evidence that the student understands how manipulating and combining the materials altered their performance. Ultimately, the student created a purposeful weatherproof jacket for a cat. The second extract shows a student's experimentation with combining and transforming ingredients to explore and confirm the performance properties of texture, flavour, viscosity, and structure of the pastry, pie filling, and finished pie. There is clear evidence that the student understands how combining and transforming the ingredients altered their performance, ultimately creating a purposeful morning tea snack. To reach Merit, the standard requires students to undertake ongoing investigation of the performance properties to refine their outcomes. This involves additional exploration guided by their own curiosity and stakeholder feedback to inform the refinement of the developing outcome.

Brief

To design a coat suitable for a cat to wear in the rain. After owning a cat for most of my life I have discovered that they don't like getting wet in the rain but they love being outside, for this project I will make a raincoat for my cat made out of his favourite materials to ensure that it would be comfortable and suitable for him. This coat will have to keep him safe from cars outside with its bright colour, and keep him dry with water proof fabric and a hood as well as being comfortable.







Main material i have chosen to explore and experiment with for this project:

What Are Inflatable Pools Made Of? Floats, Toys, And Pools

Before getting an inflatable pool, you might want to consider what it's made out of before you pick one. We have some allergies in our family to latex, and were worried about harmful chemicals in the plastic affecting our youngest. After hours of research, I have an answer.

Inflatable pools and floats are typically made of polyvinyl chloride, a widely produced synthetic plastic polymer that has been made softer with the addition of plasticizers like phthalates. This form of polyvinyl chloride is commonly referred to as PVC or vinyl by inflatable pool manufacturers.

There are other materials being used, though they aren't very common. The added chemicals to make the PVC more flexible could be dangerous or cause allergies to some people. It's important to know what chemicals your inflatable pool are made out of before purchasing or using it.

This PVC pool toy had reached the end of its life as an inflatable duck after many years of fun and use. I deconstructed the duck , keeping all of the parts so they could be reused again. I plan to experiment with the yellow pieces for this project as the PVC is waterproof and will provide the right properties and attributes for this project.

Initial Experimentation

MATERIALS	EXPERIMENTATION	OUTCOME	DISCOVERY
Waterproof PVC Fleece thread	I combined these materials by stitching them together using parallel straight lines like you would on a quilt but straight across instead of diagonally.		I discovered that this was very difficult and it didnt go to plan. The sewing machine foot couldnt slide ontop of the yellow PVC because i needed to use a teflon or walking foot which we didnt have. The finished outcome became warped and bunched up which wouldnt be suitable for my design. I think i needed to sew the lines starting from the same end each time and maybe try it with the PVC underneath so the foot could slide on the fleece more easily. I'm also not happy that the colour of the dark fleece comes through the yellow PVC making it not so bright and vibrant anymore.

Further Experimentation

MATERIALS	EXPERIMENTATION	OUTCOME	DISCOVERY
Waterproof fabric Fleece Thread	Sewing them together with a cross quilt like pattern to combine the materials and make a combined strong fabric that is warm and suitable for the purpose of a cat raincoat.		I discovered that this made the finished product a combined material that is very suitable for a rain coat, if you take away the aesthetics part of it in terms of the dull colour. The outcome is a waterproof exterior with a soft and warm fleece interior. Changing the stitching pattern and sewing the layers upside down gave a much better finish that is flat and well held together. This would be suitable for the design but im still not happy about the dull colour.

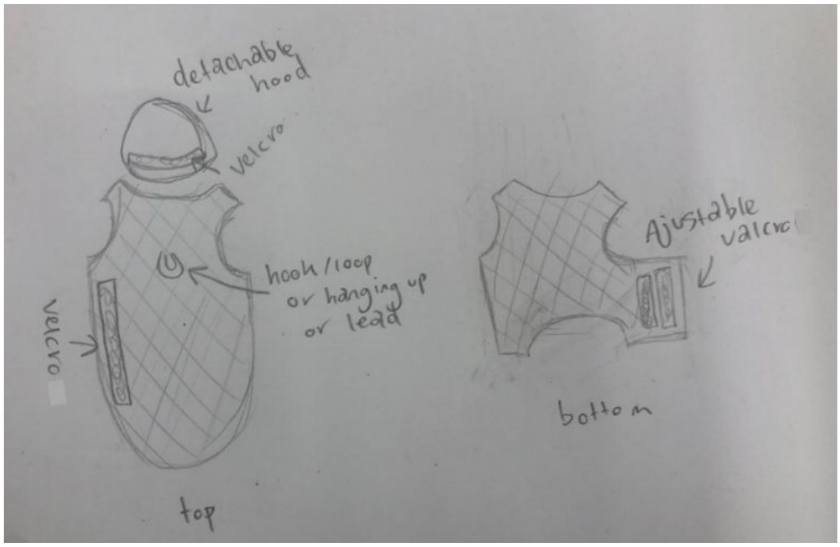
Final Experimentation

MATERIALS	EXPERIMENTATION	OUTCOME	DISCOVERY
Waterproof fabric Fleece fabric Stabilizer Thread	Sewing them together to create a quilt like material using a cross method, with the stabilizer in the middle of the water proof fabric and the fleece fabric to make the yellow of the water proof material more vibrant.		I discovered that using a white stabilizer in the middle of the two fabrics separated the dark blue from the opaque yellow and made the yellow colour look so much more vibrant. I did still need to sew it upside down with the yellow PVC layer on the bottom but that didn't seem to affect the properties at all. The thickness of the layered fabrics provides a nice rigid but still flexible material to work with for the design. I happies with this outcome and don't feel any further experiments are required.

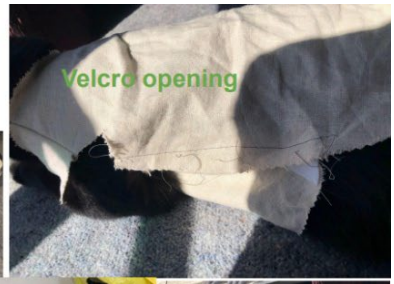
Improvements that I made as a result of feedback and experimentation:

I agreed with the feedback i received there were some good ideas i hadn't considered so I have improved the design based on the feedback i received by changing the shape of the underbody piece to have a curve so it won't cut into the cats stomach. I have added a hook/look to the centre back so a lead can be attached but it can also be used to hang up the coat when it's not being used. To make the coat fit a variety of cat sizes i included more velcro strips on the size so the fit can be adjusted. I also decided to make the hood detachable that way if a certain cat doesn't like their ears covered there is an option to remove it.

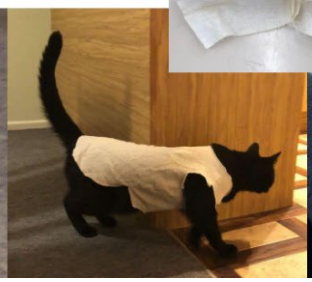
Feed back: "I can see in this design that my feedback has been taken onboard, I like the velcro use and how it makes the coat adjustable and i love the idea of a removable/detachable hood. I also really like the loop on the coat that will be used to hang the coat up on a hood and to attach a lead.



Making the pattern and mock-up of raincoat to check sizing



Feedback from end user: "I really like how the coat sits on the cat and covers majority of their body without look uncomfortable. The hood also looks very nice. I also like how the raincoat can fit on different types of cats"

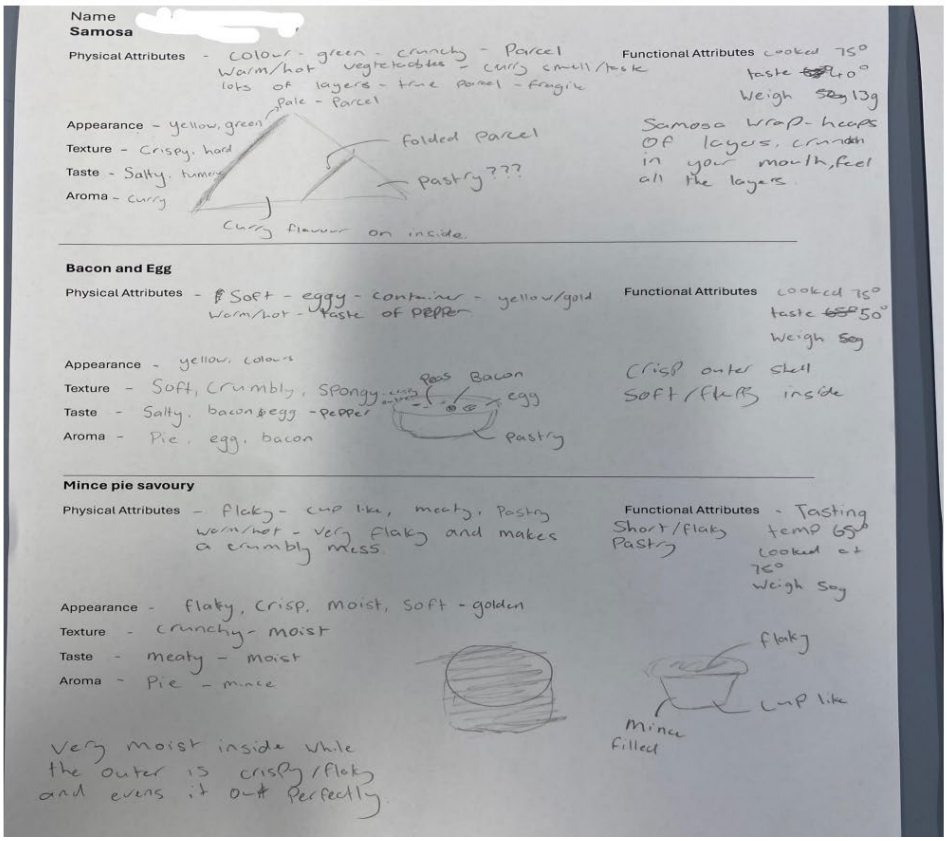


Attributes and how i achieved them…

Brightly coloured	I achieved this by using white stabilizer in the middle of the two fabrics to create a more vibrant yellow colour.
Not to bulky	By drafting a custom pattern i was able to create the perfect jacket suitable for any cat also including the adjustable velcro means it can be fitted to all cats.
Covers cats full body/back	Since i created my own pattern i was able to customize it directly to the length of my cats average size.
Keeps cat dry	Because the material is PVC and used to be a pool floatie it was made for water, so I was sure that it would be a great material for a raincoat.
Is easy to take on and off with velcro fastenings	The velcro on the sides means it is quick and easy to take on and off without having to put the cats legs through the holes..
Does Not irritate cats fur	I chose the fleece fabric as the lining that will sit against the cats fur because it is warm and soft.
Has a velcro detachable hood	The hood can be taken on and off, it is attached with velcro because some cats don't like things over their ears.
Has a small loop on back for leash.	I included a small loop to the back for a leash attachment or to hang it up.
Is the correct size	Because I made the raincoat adjustable it will easily fit many different types of cats. I made the coat adjustable so as your cat grows it will still fit, aswells as fitting different types of cats.
Use waterproof fabric	I used PVC for the outer layer which i know is waterproof after doing research.
3 layers of fabric quilted together (PVC, stabiliser and fleece)	After experimenting with my fabrics and found this was the best method of combining materials to achieve the attributes i needed for this project.

Context: As an act of manaakitanga (gratitude,kindness) our Year 11 Food Technology classes have the opportunity to put on a morning tea for the construction workers that are currently working on the Stakeholder suggested that hot, finger food sized savoury pies could be served. The pies need to be finger-food size and easy to eat in one hand. Stakeholder (Project Manager) said there will be about 100 workers to cater for and we will allow 3 pies per person. That means each student will make four pies. 90% of the workers like meat pies and 10% are vegetarian. The pies will need to be tasty. The pies need to be well constructed to hold the filling inside. The filling should contain a sauce with the correct viscosity. The pies will be made in and served in They can be stored in the freezer or fridge until needed. We intend to hold the morning tea during Week 6 of term 3.

Components of a pie



Physical attributes
(the physical characteristics of a pie)

Flaky, crunchy, golden, cup like, soft on the inside, warm/hot, texture

In the bacon and egg pie it had a more soft top on the pie and with the mince one it had a crispy top and was flaky.

Functional attributes
(what a pie does and how its form helps it do its job)

Weight, temp, short/flaky pastry,

The samosa had a large number of layers on it and it was very crunchy.

Experimenting with materials
FATS

	no fat	oil	butter	margarine
ingredients:	water, flour	oil, flour, water	butter, flour, water	margarine, flour, water
appearance:	dry, white, bland	very greasy, was bubbling In the oven and left a grease mark on tray	golden, crispy and moist on inside	yellow
texture:	dry, crumbly	greasy	crunch and soft on inside	soft with a little crunch
flavor:	none at all very bland	very slippery/greasy	very yum and almost sweet like	a tiny bit sweet and tastes alright
Good for a pie? (fit for purpose)	no, way to dry/crunchy has no flavour	mid/low it would work but there are better options	perfect Butter can be expensive	good It will work but it is cheaper than butter so will probs be the best bet.

What would be the best to use?

The best pastry to use would be butter or margarine because it bought it flavor, was smooth and had a good puff factor to it. Margarine is a lot cheaper than butter, but you get what you pay for. So, in food tech class I think margarine would be the best bet and it is very easy to make.

Experimenting with ingredients
FLOURS

BUTTER:
When using butter as out fat what we did is we cut the butter into the flour and then we used our fingers to pinch it into small bread crumby bits and

	self raising flour	whole meal flour	strong flour
ingredients	¼ cup flour 30 grams butter few teaspoons of water	¼ cup whole meal 30grams butter	¼ cup strong flour 30 grams butter
appearance	golden, more puffed up that the others, flaky	darker, more texture to it,	golden, same a normal flour but just a little more raised
texture	normal pastry feeling	a bit seedy, rough	normal pastry feeling
flavor	flaky golden	seedy, more texture	golden flaky
evaluation	When used it got risen in the oven more and had more flakiness to it	I wouldn't use this on a meat pie as the whole meal would not be a meat pie pastry	was just like normal flour we used but was just a bit stronger than normal flour and rose more.

What we did: We made the pastry from scratch and then rolled it out until it was fit for the pie tins and then we scooped blueberries into the pies and then used the pastry to make lids and then we used an egg wash to make it go its golden color.

What we learnt: the self raising flour rose more than the others because it has more ingredients to make it rise and puff up more. The whole meal one was more of a sweet pastry to use in pies and would not go well with the mince pie.

The best flour to use: The best flour to use would be the normal flour as it rises just enough and doesn't over rise. It is easy to make and has a good texture about it.

Work with your group to design an experiment showing **how time and different glazes** influence the Maillard reaction.

Limitations:
Use 200c as a constant heat
Use milk or egg wash to glaze your pastry/or don't glaze?
You will be given 1 sheet of pastry per group.
Cut your pastry into regular shapes

Practical
Create a 'colour-chart' of Maillard reactions by cooking the pastry for different lengths of time.
What is an acceptable colour range which is appealing to stakeholders? Ask your classmates.
Photograph your results.

Evaluate your experiment
What did you do? We cut the pastry into 12 pieces and then used different egg washes to coat them in and then we cooked them all for different amount of times.
What did you learn? The longer you cooked the drier they go and when it is undercooked, they are quite flourier. And with different washes they go different colours and go golden.
Why did this happen? When they are cooked for longer the moisture gets taken out of them and makes them dry and when they are coated In a wash they turn into a golden pastry and then go to the golden colour a pie should be.
What will you do now with your pies? I will not overcook it and make sure I use a egg wash to give it that golden colour.
Why will you do this? So it turn out the best possible way and it will not be a dry pie. I will cook the pie for about 10-15 mins so it gives it the best possible golden crispy ness and so it also isn't going to be undercooked and fall out the bottom.

Evaluation of the pie, how did it taste, structure (pastry), how was the mince filling viscosity?

The pie was a great success and help its shape well. The viscosity of the mince was great and help its shape when eaten. It had a good taste and had a great pop of flavor.

After experimenting with a variety of different pastry making techniques

I have learnt that **i could** use the food processor and it would be much more efficient than using my hands. For one it is much quicker and time efficient so I can get my pies in on time and not have to come back after class to pick it up.

However, **I should** use this **because** it makes a smooth dough and is super easy to do. If you don't overdo it you can see the butter streaks in it and then it will become a nice puff pastry.

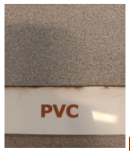
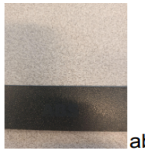
One experiment I undertook was using more beef stock to get that gravy like consistency. When I didn't use enough beef stock the mince filling went dry and crumbly.	The amount of beef stock made the consistency of the mince inside the pie. With not enough it was dry and crumbly. With enough it was like a gravy and had a lot more flavour.	I learnt that it is better to use more beef stock than not enough. We applied this method into my final pie designs and made the final product so much better in taste and looks.
Another experiment I undertook was mixing the butter and flour together into a ball/pastry after it had been broken down in the food processor. This made my pastry not over mixed, and I could really see the butter shards clearly. With an over mixed pastry, the pies didn't puff up like a pie should. It would be flat.	I explored the attributes of the pastry. I made an increase in flour and butter just so we could get enough pies made and I wasn't stretching the pastry to thin. We used different methods of mixing. The food processor and our hands. I found that the food processor did a lot better and was much more time efficient.	In myfinal pie I used the food processor to made the pastry, but we only combined the butter and flour to a breadcrumb texture and not into a moist ball of dough. I mixed it into a ball with our hands to make sure it was not over mixed. I found when I did this, I got a lot more puff in our pastry.

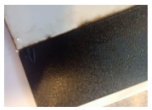
	Grade: Low Achieved
5	For Achieved, the standard requires the student to experiment with different materials to develop a Materials and Processing Technology outcome. This involves exploring the performance properties of different materials through experimentation and creating a purposeful outcome informed by the exploration. These examples are partial extracts taken from two student folios. Both students have sufficiently explored the performance properties of the chosen materials through experimentation. They have both developed and ultimately created purposeful outcomes using Technological Practice. The first extract shows the student has experimented with combining laser cut MDF (using different joining techniques), LED's with different frosted or coloured acrylics, and different combinations of circuitry components. The performance properties explored include thermal conductivity, strength, appearance, luminosity, durability, and flexibility. The second student crafted a chopping board, broadly exploring the performance properties of rimu and macrocarpa. Their evidence primarily focuses on the testing and manufacturing processes, but they also noted the absorbency, softness, and density of these materials when laminated, shaped, and oiled. For a secure Achieved, more detailed observations of the performance properties of materials and components are required. Choosing experiments that specifically involve transforming, manipulating, combining, or forming materials will likely ensure this evidence is clearly demonstrated.

Material Experimentation 1

Materials physical properties testing

Test 3 different materials and some of its properties.

Material & Photo	Structure	Properties	Common uses	Sustainability Y/N
1.  birch plywood	The panels are not made from one solid piece of wood, but rather multiple layers, or plies of veneer. The number of layers depends on the thickness of the panel,	Very stable in all directions due to alternate layering at 90o, with outside layers running in the same direction. Thin flexible versions available (flexiply)	Furniture,shelving, toys and construction.	Yes, it's one that won't send out a poisonous gas
2.  pvc	The electrolysis of salt water produces chlorine, which is combined with ethylene (obtained from oil) to form vinyl chloride monomer (VCM). Molecules of VCM are polymerised to form PVC resin, to which appropriate additives are incorporated to make a customised PVC compound .	Flexible,chemical resistant,tough, unstabled to uvc light	Pipes,tape ,clothes	No, when pvc is burns it produces pure chlorine gases that can lead to death
3.  abs	ABS is a terpolymer made by polymerizing styrene and acrylonitrile in the presence of polybutadiene. The proportions can vary from 15% to 35% acrylonitrile, 5% to 30% butadiene and 40% to 60% styrene.	Impact,strength, tough,high surface, chemical resistant	Lego, helmets	No, abs tends to emit a cyanide gas that is deadly

Material Property Tested	Definition of the property	Material 1 Evidence of testing & results	Material 2 Evidence of testing & results	Material 3 Evidence of testing & results
Thermal conductivity	The ability to conduct heat	 The plywood doesn't burn as much as the others	 Abs does melt but doesn't melt and produces toxic gas	 Pvc left a black burnt area and didn't melt but produced a toxic chemical
toughness	The ability to absorb shock/impacts without breaking	 The birch plywood snapped under 90 degree	 The abs only had a slight bend but still resisted the toughness test	 The pvc did not bend or snap at all during this test
hardness	The ability to resist abrasive wear and indentation through impact	 The birch plywood was the deepest punched	 The abs didn't went far but still left a solid hole	 The pvc resisted slightly better but lefted a outline on the hole
Looks	How cool does it look	 has a dark outline but doesn't outline well	 has a scaly texture can't see any burns but can't see the outline	 shows where its cut but a dark colour and outlines well

Conclusion

Birch plywood snaps easily and seem be worst then the other two but it the only material useable as plywood doesn't release poisonous gas

Material Experimentation 3

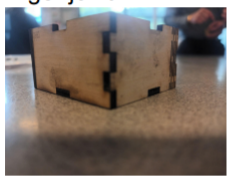
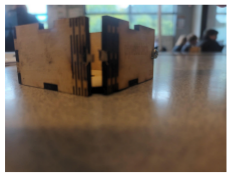
Light Conductivity of material

Material	Photo of test	Conclusion	Stakeholder Comments
Acrylic fluro	 	You can see the outline and its a yellow tint that can suit the crown	1. 2.
Acrylic frosted	 	You could barley see the outline when lighted up	1. 2.
acrylic clear		Doesn't really work well unless shine threw form the bottom	1. 2.
			

Conclusion

I will be using the acrylic fluro for my light display for the nice effect

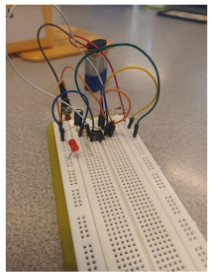
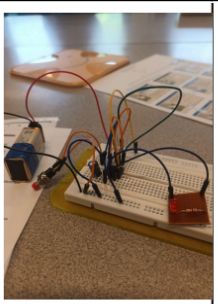
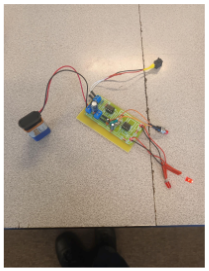
Joint method

Method & Photo	Description	Advantages	Disadvantages
finger joint 	The fingers are glued with each other making the joints more stronger	Hold strong together and one of the toughness joint	Ridges get burnt easily
curb 	Curb was meant to be a smooth surface with small rectangles cutted out	Curb is aesthetics base joint	Lot of holes in the curb making it extremely weak
flat 	Glue together but not supported	Look aesthetic pleasing	Extremely weak and break easily
Bolt and nut 	A bolt locking the pieces together	holds strong good door	Look ugly,isn't glued in

Conclusion

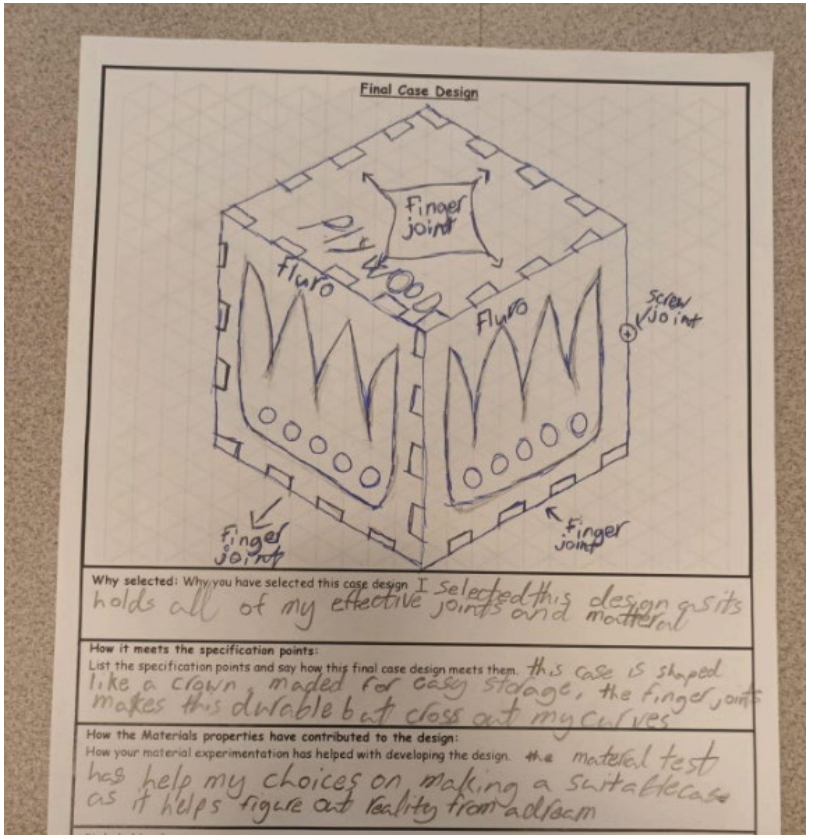
I am going to use finger joint screw joints, to use for the design as the kerfing joints are fragile and broken when I try to use it.

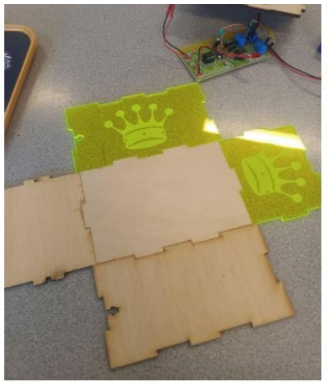
Material Experimentation 5
Circuits board methods

Method & Photo	Description	Advantages	Disadvantages
 Breadboard	Breadboard, a board where you can swap circuits out to replace and it able to be reuse at anytime	easy Simple You can swap circuits out fast	Not permanent Breaks easily then other methods.
 Matrix board	Matrix board, a board is where you solder your circuits in and they can't be moved.	Permanent Stays in place Durable	Can't do difficult circuits Difficult to swap and change circuits
Circuit board 	Circuit board is a board where you soldier the circuits in and you can do harder circuits	Permanent stays in place durable can do diffucit circuits	Difficult to swap out circuits

Conclusion

I'll will be using the third option as it is a combination of the breadboard and the matrix





Brief

Context

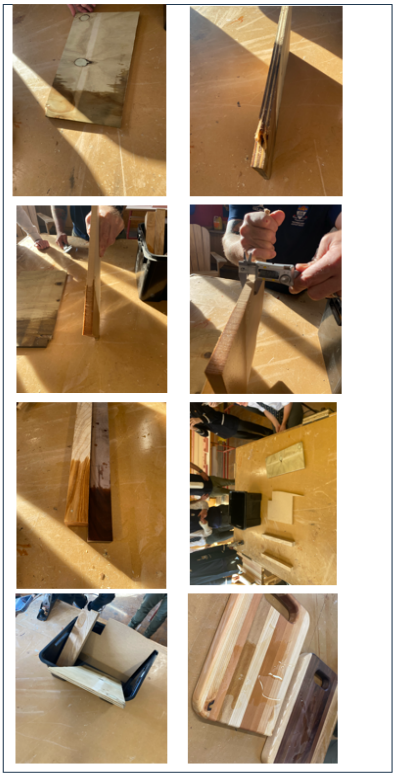
Wooden chopping boards are essential in any kitchen, serving a wide range of purposes from food preparation to presentation. They make ideal gifts for family members and can be treasured for years. This project involves creating a chopping board that can be used at home or given as a gift. The chopping board must meet the following specifications and constraints to ensure it is fit for purpose:

Specifications

- Exactly match the size and shape of your MDF or Fusion 360 model.
- Be no less than 35mm thick.
- Durable and resistant to knife marks
- Made from high-quality, food-safe wood
- Easy to clean and maintain
- Aesthetically pleasing and suitable for display
- Appropriately sized for various kitchen tasks
- Have at least one ergonomic handle

2 - Water absorption

Does it change shape / stretch / distort



Expert stakeholders feedback: Selection

- Less dense wood will soak up more moisture, because of open cells in the structure.
- MDF will swell and de-laminate because it's basically cardboard (wood pulp, glue).

My Feedback
What was the feedback?
To choose soft wood materials. Rimu, and Macrocarpa. This being chosen due to the fact soft wood is easier to work with, and because water will absorb, but only if it's left soaking in a pool of water.

Was the test a success or failure ? Why ?
Success. The test were successful as we'd seen the obvious reasons of why natural woods are more recommended. Some reasons being they mostly aren't poisonous, don't decay with minimal water, uphold structure for long period of time.

What I Learned ?
plywood and MDF is not a suitable a chopping board

3 - Timber Lamination

Gluing the same or different Materials together to make a more stable piece of material to work with.

Expert stakeholders feedback: Clamps
-It's important to dry fit before glueing. This making sure that all pieces of wood align nicely and won't leave gaps between the joined pieces.
-Its important to have multiple clamps pressing between each other, to make sure that the glue spread evenly throughout the board.

My Feedback
Made sure I had at least 8 pieces of wood, with two sides being completely flat. And exceeding past 300mm in length, (this being so you won't have to worry about the template not fitting, leading to yourself shortening the board). After that making sure you use a minimum of 3 vices to clamp shut the board, to ensure to air bubbles can form.

Was the test a success or failure ? Why ?
Success. I glued all the pieces together, without any visible gaps that mattered. And the only downside being I had to add 20mm worth of wood to the, to make the template fit along the top.

What I Learned ?
Make sure you have enough wood, as well as it all being to an acceptable length. Making sure that all individual pieces have flat end facing each other. And not to glue a soft wood next to a hard wood, (they expand and contract at different rates).

4- Stress testing

Stress-graded timber is assessed by its load-bearing capacity and is primarily used for building applications that are non-visible and structurally vital

Expert stakeholders feedback:Density
-Strength is important.
-For chopping board timber to maintain its shape & flatness, stronger timber will do this over a longer period.
-Density is important so the chopping board can withstand knife cuts and everyday use.

My Feedback
What was the feedback?
I wasn't overly worried about density of my wood, but rather appearance. I choose rimu and Macrocarpa as they looked rather nice together and wouldn't chip easily when in use.

Was the test a success or failure ? Why ?
Yes. We were able to choose from a selection of 4 types of wood, 2 soft, 2 hard (focusing mainly on density). By learning of the pressure that each piece could take meant the we could choose a type of wood to create a durable chopping board.

What I Learned ?
White ash - 9 pumps
Purple heart - 9 pumps
Rimu - 6 pumps
Macrocarpa - 7 pumps

5 - Shaping Process

Shaping is used to change the size and shape of a workpiece







What not to do:
When using the jigsaw and cutting the handles from hole to hole, make sure the board is clamped down. This allows for the board to have zero movement when cutting, allowing the person to cut freely without the jigsaw cutting up and down, moving the board with each stroke.

Expert stakeholders feedback: Shaping
After shaping/drilling/cutting has finished, it's important to have the whole board sanded smooth. This leaving the board with minimal scratch marks, and scuffs/dents.

My Feedback
When drilling the two holes for the handle, make sure that the chopping board is clamped down to the board underneath. While also making sure the board underneath, has no previous drilled holes, (drilling through wood with nothing underneath it means that the exit hole will splinter outwards).

Was the test a success or failure ? Why ?
Success. Finished sanding/shaping the board with little to no damages caused, that couldn't be fixed with glue and sawdust.

What I Learned ?
When using the jigsaw, full speed and hold firmly. If not held firmly the vibrations that travel up your arms, can have the tendency to make them go limp. Unableing you from really cutting through anything.

Wood Oiling

Applying oils to timber helps replenish and protect from the inside out, drying, cracking, and weathering



Note: The two boards shown have water placed on top. The white oak board has only 2 coats of water, while the purple heart board has 2 coats of oil plus a coat of wax. The water on the white oak board had separated into individual blobs when moved around, this being because the board didn't have a coat of wax, so said board didn't have any water resistance. While the purple heart board having a coat of water-resistant wax on it meant that the water swayed around in a singular large drop and stayed together when moved.

Expert stakeholders feedback: Oiling
When oiling, don't soak the entire cloth with oil. Just get a teaspoon or so onto the rag, and wipe in a circular motion, up and over the entire board, (repeat process once more, plus once again with wax).

My Feedback
Don't coat the entire thing with so much oil, that the board won't even be able to soak it up. As well as only a small amount of wax to be placed on at a time, used in a circular motion as well, wipe excess wax of after 10 minutes.

Was the test a success or failure ? Why ?
Success. Didn't muck up, used the right amount of oil, completed the suggested coats of oil/wax, ripped excess wax off on time.

What I Learned ?
Excess wood wax also must be wiped off.

Material Selection

Wood 1: Rimu

Rimu wood is a soft native wood. They reach up to heights of 45 meters and live for about 16-17 years. When cut open, rimu is a red to yellowish brown, with distinct marking of either light or dark streaks. I choose this wood because it's easy to work with and is a great looking wood.



Wood 2: Macrocarpa

Macrocarpa is a coniferous tree, being from the central coast of California, United states of America. It that was introduced to New Zealand during the early 1860's. With 1 metre of growth a year, it's typically farmed for clear wood production when it is aged from 35-40 years. I choose to use Macrocarpa as it's a great looking wood, dense, and it's a wood that grown up using to fix buildings when they've broken down back home.



Glue:

PVA glue. The reason I chose to use this type of wood glue is because it's a NZ made company, fast setting, non-toxic, ideal for face edge joinery, and was mainly chosen as its heat/water resistant. We also chose this because we know it works, it was trialled and tested during our lamination test, held together when placed in water as well as placed through the planning machine, which all boards held together.



Oil:

The oils/wax we had chosen to use since they are non-toxic, food friendly, and work well together to help protect the board. They also allow the board to be water resistant.


FINAL OUTCOME




The outcome of my year 11 chopping board consisted of some minor cracks, and some natural occurred knots scattered through the board. (Note) The bottom right picture indicates myself using the board to chop up some mushrooms to fry up for breakfast.

	Grade: High Not Achieved
6	For Achieved, the standard requires the student to experiment with different materials to develop a Materials and Processing Technology outcome. This involves exploring the performance properties of different materials through experimentation and creating a purposeful outcome informed by the exploration. An increased focus on Explanatory Note 3 and the creation of a purposeful outcome which meets a need or opportunity identified for a specific person, whānau, or community is needed to attain the standard. The students project focuses heavily on measuring objectively the inherent performance properties of a range of timbers. While soaking, burning, dropping, and applying weight to timber can reveal performance properties such as water resistance, flammability, impact, or pressure resistance, the experiments do not employ the methods from Explanatory Note 3. For Achieved, the student must explicitly show what was discovered about how the timbers performed when transformed, manipulated, combined, or formed. For example, combining the timbers and components using joining methods (to explore strength when combined), transforming timber by steaming (to explore flexibility when shaped), or treating and polishing the surface (to explore sheen or moisture resistance). A purposeful outcome is also required to attain the standard. To determine if an outcome is purposeful, it must address the need or opportunity identified. While the purpose of the testing is clear, the purpose of the final outcome remains uncertain.

Student 6: High Not Achieved
NZQA Intended for teacher use only

Experimentation Ideas to Determine Material Properties in relation to building a bridge

Flexibility

We set up 5 weights on each wood material balanced across 2 chairs. to see how much weight they could withstand before snapping. We made sure to keep the wood at least the same width to keep the test fair. We did this test to see which material would be best for prolonged pressure.

Fire test

We used a blow torch to burn the wood and see which one took the most damage. After we torched the wood we checked if it was just external damage or if the inner structure was ruined. We did this test to see which material would be best in a fire.

Water test

We submerged each wood type in a bucket of water for roughly 48 hours. We then took the wood out and observed which one soaked up the most water and which one was the least soaked. Some pieces of wood were bendy after taking them out of the water. Before the experiment we weighed the wood then after the experiment we weighed it again. We did this test to see which material would be best in a wet environment.

Impact resistance test

We held a cylindrical weight 5 meters off the ground and dropped it onto each type of wood then checked how well the wood withstand the impact. We did this test to see what material would be best for sudden impact.

(All materials are same size and shape)

Impact resistance test

- Explain the results of your experimentations for each material.
- Identify which material you've chosen to build your bridge with and why you think it's the most suitable.

Macrocarpa: The macrocarpa Wood receive the most external damage. The weight left a large dent in the wood. This would not make an ideal bridge material for sudden impacts. The macrocarpa didn't perform well in any of tests so we will not be using it.

Kwila: The kwila wood didn't receive much external damage. There was little to no external damage after the weight was dropped onto it. This would make a good material for sudden impacts. We have decided to use kwila wood as it fits all requirements for our bridge design.

MDF: The MDF wood performed well for the impact resistance test. Much like the Kwila wood there was little external damage. But the MDF wood didn't perform as well for the other tests.

Flexibility test

- Explain the results of your experimentations for each material.
- Identify which material you've chosen to build your bridge with and why you think it's the most suitable.

Macrocarpa: The macrocarpa held up well but had a small amount of bend under the weights, the small amount of bend could be prevent the bridge from suddenly snapping, but long term tension would break the bridge. This would not make an ideal bridge material.

Kwila: The Kwila wood bent the least and held shape very well with the same 5 weights. This would make kwila ideal for holding heavy weights. Because it wouldn't suffer long term damage after having prolonged weight.

MDF: The MDF bent the most and would not make an ideal bridge for heavy objects. It also snapped in two after a certain weight threshold. MDF wouldn't be an ideal bridge material because of its weakness compared to the other two materials.

Fire resistance test.

- Explain the results of your experimentations for each material.
- Identify which material you've chosen to build your bridge with and why you think it's the most suitable.

Macrocarpa: The macrocarpa wood received a fair amount of damage from the blow torch. This damage caused external damage as well as internal damage making it very easy to break snap the wood. This would not make an ideal fire resistant material.

Kwila: The kwila wood received little external and internal damage. The Fire didn't cause much damage other than charring the the top layer of wood. This would make an ideal material for short bursts of fire.

MDF: After doing external research into MDF wood and burning we can see that it releases toxic gasses when burnt. Didn't know that when we were burning it. This would be a bad bridge material…

Water soak test

- Explain the results of your experimentations for each material.
- Identify which material you've chosen to build your bridge with and why you think it's the most suitable.

Macrocarpa: The Macrocarpa held an average amount of water, it didn't flex as easily but still soaked up a large amount of water which weakened it. Before getting wet it weighed: 138g. And after getting wet: 162g

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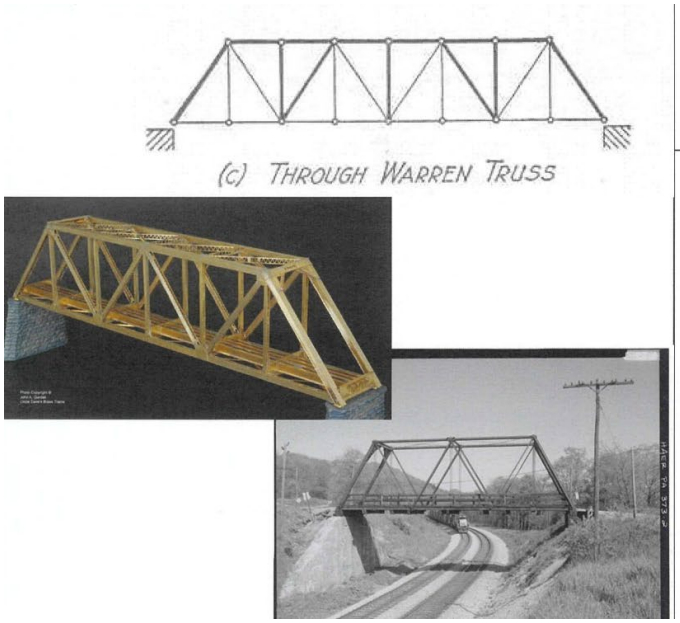
Kwila: The Kwila wood soaked up a very little amount of water even after soaking for 48 hours. It was also inflexible after taking it out of the water. This would make an ideal bridge material based on this test since it would be ideal for a wet environment. Before getting wet it weighed: 310. And after getting wet it weighed: 318

This numbers further back up the conclusion met. The weight also helps us determine other properties like weight density. This information will help us come to a conclusion for our other experiments like impact resistance because we want a more dense material.

MDF: The MDF wood Soaked up the most amount of water and became very flimsy and weak. It was so weak that I could flex it. This would make a bridge material because as soon as its exposed to water it would cripple under any weight. Before getting wet it weighed: 164. And after getting wet it weighed: 224.

. Experiment Photos (we dunked the wood for about a minute then were received feedback that we should do it for 48 hours to see better results, so the result are not 100% accurate but they wouldn't of gained any meaningful weight after being dunked ford for 1 minute)

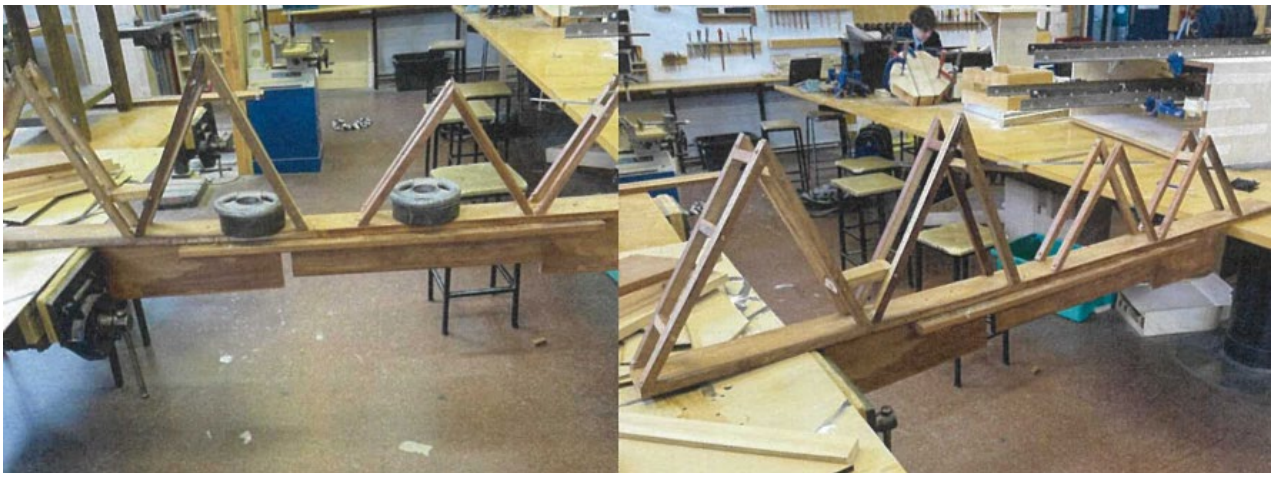


Why have you chosen this design? We chose this design because its inline with the requirements we want our bridge to meet and works with the wood material we chose, Kwila. We needed a bridge that was made out of straight lines like through warren truss. This was because the kwila wood was unable to flex after being soaked in water and didn't bend and could support a lot of weight. It also received the least external damage from the the impact resistance test and received little amount of damage from the fire.

Feedback on your decision to build your chosen bridge with your chosen material: (Written or photos).

matthew : using your chosen bridge design will be a complex task as there is heaps of trusses to measure and fit against one another a support idea would be to add a thicker base so you don't have to rely so heavily on the trusses.

Explain any decisions you might make to the design or material now that you have received feedback? My group will implement a thicker base and rely less on trusses because the measuring cutting, building and adding them takes up alot of time, when a lot of the strength will come from the base which will be easier to strengthen.



Explain the success or failure of your bridge: The trusses were quite hard to incorporate because they took a lot of time to build and attach, so we decided to strengthen the base which was suggested during the feedback, this overall helped our bridge and I think the strong base was where most of the strength came from. The biggest failure for our bridge came from the time constraint we couldn't fully implement the amount of trusses we originally wanted. To compensate for this we added more support to the base. In retrospect the best design would be a bunch of planks stacked ontop of each other. Overall our bridge performed averagely and was semi successful but more steps could of been taken such as implementing more trusses if we had more time. If we could redo the bridge and had more time possibly wood glue or a nail gun would of been ideal.

Was your chosen material the right material for your bridge - why/why not? The kwila wood was definitely the best material because its versatility and high performance during the tests it underwent. But it was also a root of many problems it being a very hard wood make it harder to construct because it gave more resistance during drilling. I also think our strips of kwila were too thin and split quite easily. If we had more time I think maybe wood glue would also work or we could of relied on a nail gun to speed up the construction process.