

# archipendant – Student Notes

## Architecturally inspired pendant

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Name: \_\_\_\_\_ Class: \_\_\_\_\_

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### contents

- 1. Contents
- 2. Sydney Opera House Information sheet
- 3. Sydney Opera House Homework question sheet
- 5. Copper and Brass information sheet
- 6. Copper and Brass Homework question sheet
- 8. Inserting a Jewellery Blade information sheet
- 10. Soldering and Safety information sheet
- 13. Soldering Safety test
- 14. Working with Copper and Brass
- 15. Practice samples
- 16. Design Brief
- 17. Project Overview
- 18. Image Brainstorm
- 19. Concept Sketching
- 20. Design Templates
- 21. Design Prototypes
- 22. Flow Diagram
- 23. Design development - final design
- 24. Product Reference Homework sheet
- 25. Class test
- 27. Evaluation

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□ Denotes work sheet

■ Denotes information sheet

Collate all sheets according to this contents page and place this page on the front for presentation.

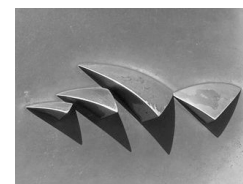
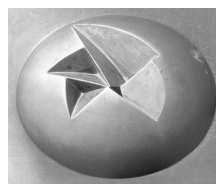
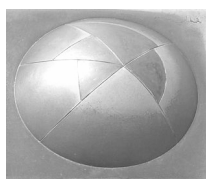
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### assessment

In 1957 a design competition was run by the NSW Government for an Opera House to be designed at Bennelong Point in Sydney Harbour. Out of over 230 entries from over 30 countries, Jorn Utzon's design was selected. Jorn Utzon was a Danish Architect who was born in 1918. He studied Architecture in Copenhagen, and then went travelling through Europe, Mexico and the United States. Upon his return he set up his own practice in Copenhagen in 1950. Utzon had completed only a limited number of houses by this stage of his career so was unexpectedly surprised when his design was chosen. His designs are said to be poetically sculptural whilst maintaining structural integrity.



The dramatic design of the roof section of The Sydney Opera House people often think was inspired by a pile of dried orange peels or waves, or even a pile of overlapping shells from the ocean, but the original design was actually inspired by a ship at full sail. The roof design however was said to be too technologically advanced for its time. Three years later when the construction had already begun and problems associated with the structural model of the roof were obstructing progress, Utzon discovered the solution in an orange. He cut spherical triangles into an orange peel thus giving him the complex structural calculations from which to work from (see below). In this way he had successfully overcome engineering problems associated with the futuristic appearance of the 'sails' or the roof.



The degree of difficulty in the design of the building made the cost of construction go beyond the allowed budget. The final cost of construction was A\$102 000 000, which in the 60's and 70's, and indeed today, was and is, a lot of money. After budget blowouts, disagreements about the interior design and Jorn Utzon resigning from the project, The Sydney Opera House wasn't officially opened until 1973.

Today The Sydney Opera House is used as a multi-purpose performance venue with over 3000 events being conducted at the venue each year.

1. Name the architect and nationality of the person who designed The Sydney Opera House?

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2. In what year was The Sydney Opera House design chosen?

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3. In what year was The Sydney Opera House officially opened?

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4. Why did the construction of the Opera House take so long to be completed?

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5. Complete a quick sketch of a detailed section of the Sydney Opera House.

6. What was the original Sydney Opera House's roof design inspired by?

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7. The term 'icon' of Australian architecture is often used to talk about the Sydney Opera House. What is meant by this term? Do you agree with this term?

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8. Name two other buildings in Australia that might be considered icons of Australian architecture.

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## Copper

It is believed that copper was most likely the first metal to be used in ancient times dating back as far as 4000 – 6000 BC. The first known tools, implements and weapons were made from copper. Copper rings, bracelets and chisels were found in the Nile Valley indicating that the ancient Egyptians were using copper, however it is thought that this copper was brought to Egypt by the Gerzeans and copper was first used in Western Asia.

Copper is still commonly used today in a variety of industries. It is easily mined and easily found. Due to its ability to conduct heat and electricity, it is often used for this purpose.

Copper can be joined and formed easily and is often combined with other metals to create a range of alloys.

The symbol for copper is Cu. This symbol originates from the Latin word cuprum meaning from the island of Cyprus. Copper's melting point is 1083°C. Copper is reddish - brown in colour and is available in many different forms depending on the desired use. Most commonly it is found in sheet form and also a range of wire forms.

## Brass

Brass is made up of a mixture of copper and zinc creating an alloy.

Historically brass has been used in metal craft for nearly as long as copper. The Greeks referred to brass as 'oreichalcos', meaning a brilliant and white copper. However brass was originally used only when a golden colour was needed. Ancient Romans used brass in the manufacturing of golden coloured helmets, ornamental jewellery and sculptures. In Medieval times brass was a common metal used in church monuments, plaques to commemorate the dead and moving parts. Only relatively recently brass has been recognised for its engineering possibilities. Because brass is easy to manufacture and because of its high resistance to corrosion it is commonly used to make household fixtures, and appliances, accurate instruments such as clocks, watches and navigational aids, musical instruments and even jewellery. There are many clocks, watches and pieces of jewellery made in the 17<sup>th</sup> and 18<sup>th</sup> centuries consisting of brass parts that are still in good working order today.

Brass is extremely malleable and ductile. The symbol for Brass is Cu + Zn and its melting point is 954°C. Brass is yellow in colour and has a high resistance to corrosion. Because of brass's high ductility it is often confused for gold.

Brass can be purchased in similar forms to copper such as sheet and wire forms.

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## Homework questions - Copper and Brass

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1. What is the periodic symbol for copper?

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2. Where, and in what historical period were the first copper rings, bracelets, and chisels found?

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3. What is the melting point of copper?

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4. What is the melting temperature of brass?

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5. What is an alloy?

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6. Highly polished brass is often confused for which other precious metal?

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7. Can you name at least three contemporary items that do not appear in the information provided that are predominantly made from brass?

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8. True or false? Copper and brass can rust.

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### Inserting a jewellery blade

**Detailed video instruction of inserting a blade is included in the DVD chapter 2, however this is for revision in case you need extra practice.**

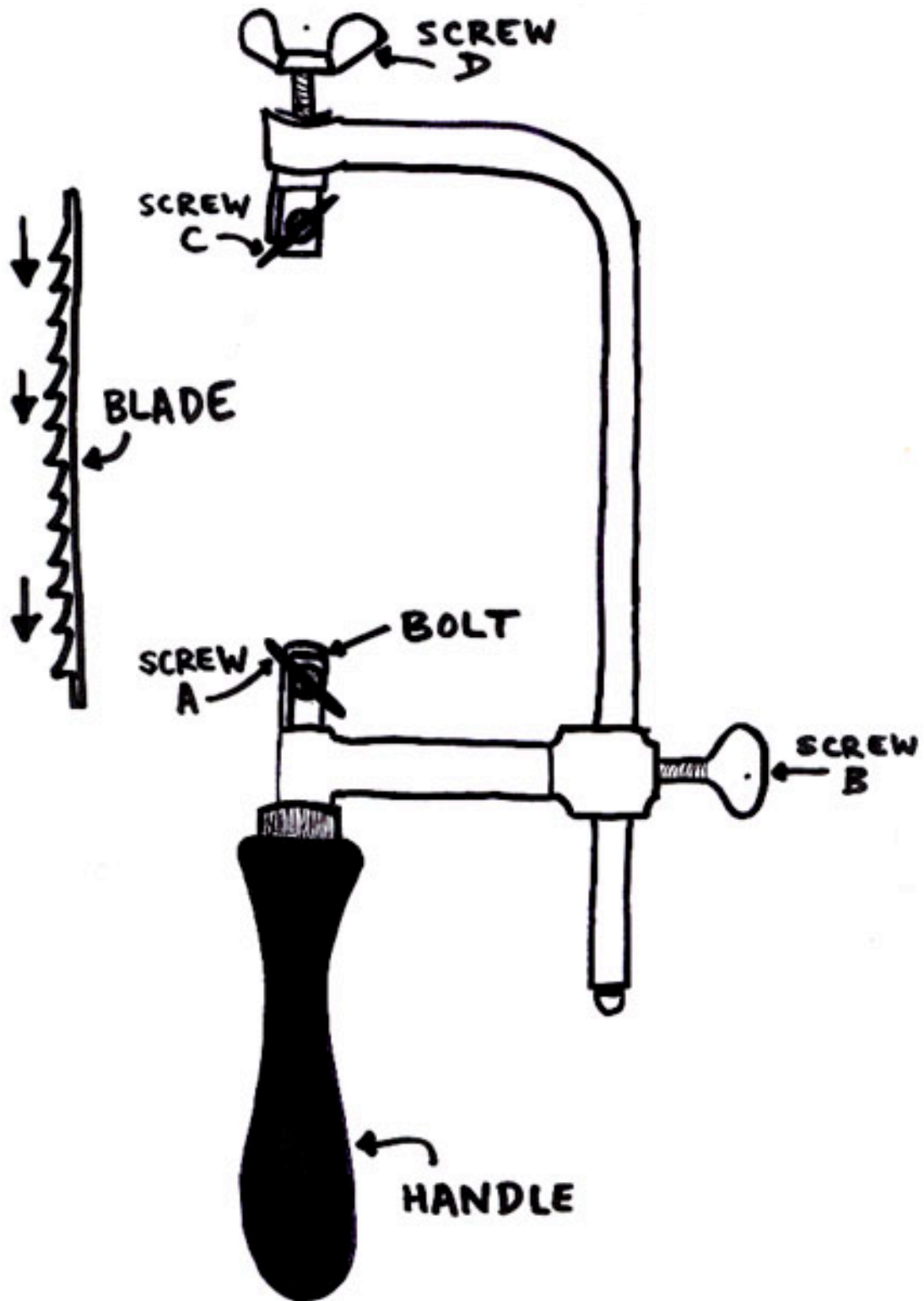
**These instructions are for a right-handed person. If you are left-handed simply swap hands.**

1. Sit down with a stable bench in front of you.
2. Loosen all the screws on the saw frame. Undo screw D until you can't see any more thread, but don't undo it entirely.
3. Hold the blade between the thumb and forefinger of your right hand, pointing the teeth of the blade to the floor or towards you. (Hold the blade in front of a white page for better visual contrast, or run your fingers along the blade and if it is smooth you are holding it correctly)
4. With your left hand gently hold the handle of the saw frame horizontally, resting the other end of the saw frame on the edge of your bench. (With the 'handle end' of your saw frame you can rest the handle on your chest or stomach freeing your left hand to hold the blade in place.)
5. Insert the end of the blade that is closest to you into the bolt. Firmly tighten the screw labelled A until you can tighten it no more. (Please note: rest the other end of the blade on the screw labelled C. This frees up your right hand to tighten the screw.)
6. Sliding the saw frame up or down you must establish the correct length of the saw frame to fit the blade. Making sure that you are resting the other end of the saw frame against the bench thus pushing the screw labelled D towards you, line up the other end of the blade so it is sitting roughly halfway in the bolt labelled C.
7. When you have established the correct length of the saw frame, tighten the screw labelled B
8. Making sure the blade is inserted into bolt C tighten the screw labelled C.
9. Double check that you have tightened screws A, B and C sufficiently before continuing.
10. Tighten the screw labelled D until no thread is visible. This is the tensioning thread that will give your blade the necessary tautness in order to cut metal.
11. When you have completed the above steps pluck the blade, if you hear a 'twang' sound you have correctly inserted the blade.



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Inserting a jewellery blade



Detailed video instruction on soldering is shown in the Archipendant DVD chapters 4 and 8.

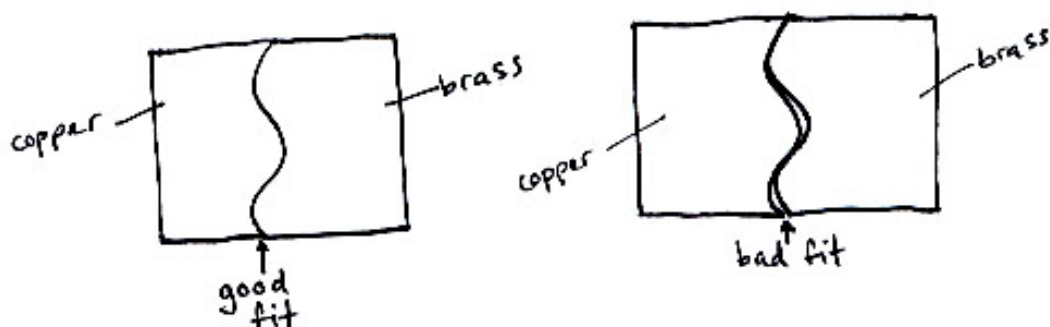
The soldering process is used to join 2 or more metals together. In order to do this successfully, the 2 surfaces of the metals that are going to be joined must be clean and clear of any dirt or grease, if not, the 2 pieces of metal you are trying to solder together will not join or will break later. An alloy called solder is used as a type of glue when soldering. You can buy silver solder or even gold solder. For this project we are going to use silver solder wire.

There are three main types of solder: easy, medium and hard. Easy solder melts at the lowest temperature – its the easiest to melt at 711 degrees Celsius. Hard solder melts at the highest temperature – it's the hardest to melt at 773 degrees Celsius. And of course medium solder, melts at a temperature between easy and hard at 747 degrees Celsius.

What this means, is that when you are soldering a piece of jewellery with more than one soldering join (like you are being asked to do in this project) you must use hard solder first, followed by medium solder and finally easy solder. This prevents any joins that you have previously soldered from melting again and coming apart.

Before you do any soldering you must prepare the solder wire by cutting it into 2mm lengths using a pair of side cutting pliers.

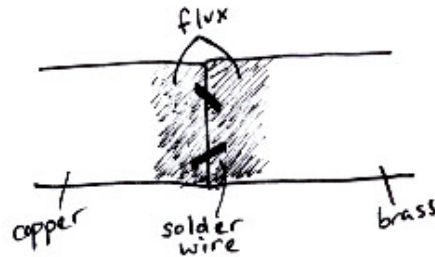
When soldering metal you must ensure there is only a very small gap between the pieces that are to be soldered, as the solder is not used to fill gaps, but is used to bond 2 or more finely aligned pieces together.



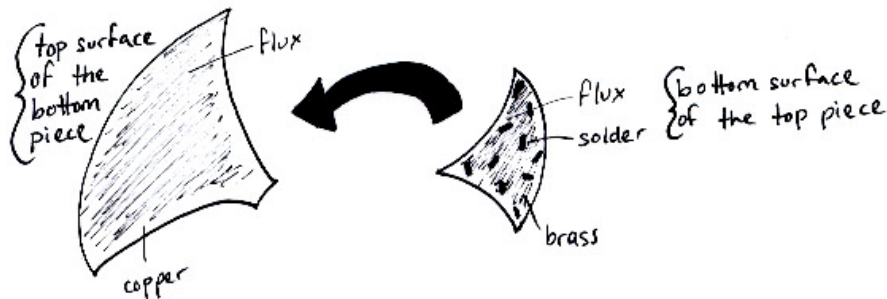
Where the metals are to be joined, the area is coated with flux, a product that assists in the flow of solder by preventing oxides from forming. Depending on the type of join, solder is placed either between or on top of the join using fine tweezers.

In this project you will perhaps use 2 different types of soldering joints.

The first soldering method is called **chip soldering**. This method is used to join 2 (or more) ends / edges of metal together. The 2 ends are fluxed and placed together. Prepared solder wire is then dropped along the joint, roughly spaced every 4mm. The pieces of metal are then soldered together.



The second soldering method is called **sweat soldering**. This method is used to join 2 pieces of metal, one on top of the other (called overlay). The top surface of the bottom piece and the bottom surface of the top piece are coated in flux. The solder is then placed on the bottom of the top piece only, and spaced approximately every 5mm square. The solder is then melted using the soldering torch, placed on top of the bottom piece of metal and soldered again.



When the solder is heated to its melting point, it will run into the closest gap and attach the pieces of metal.

Once the metal has cooled it is placed in a mild acid solution called Pickle. This pickle eats away the flux and any other solutions that have formed on the metal. After about 5 minutes the metal is removed from the pickle using plastic or copper tongs and placed in a bowl of water (when working with silver you can put a teaspoon of bi-carbonate in the water to neutralise the acid)

Note: if you are soldering a piece that will have a hollow inside i.e.: a hollow sphere, make sure you drill a hole for air to escape.

**If all safety precautions are observed correctly, soldering is no more dangerous than boiling a pot of water on a stove.**

1. Only one student is to be in the soldering area at any one time.
2. Tie your hair back and don't wear any loose fitting clothing as this could get in the way of the flame
3. Use the copper tongs provided to pick up any metals and never use your hands to pick the metal out of the pickle or the water. If you do get pickle on your skin, just rinse under water
4. Under no circumstances is anyone else to light the soldering torch for you.
5. Make sure there is adequate ventilation.
6. Wear fully enclosed shoes
7. Make sure there is nothing flammable left on the soldering bench
8. Don't move around whilst holding the soldering torch.
9. Always ensure you have turned the torch off before putting it down.
10. Stand in an upright position when soldering – do not lean over your work
11. Always listen to what your teacher is saying as they may be saying something important. If you are not listening you may miss an important safety instruction and do the wrong thing and either hurt yourself or somebody else, or even damage equipment.

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**Soldering Safety Test**

**Insert Soldering Safety Test here**

Using the information from the demonstrations fill in the following table.

	<b>Equipment</b>	<b>Use</b>	<b>Safety</b>
<b>Marking out</b>			
<b>Cutting / piercing</b>			
<b>Filing</b>			
<b>Joining</b>			
<b>Finishing</b>			

Using clear tape, stick in the practice samples. Add texture to at least one sample piece of metal.

1. A straight line cut
  
2. Two different shapes (E.g.: A circle and square)
  
3. A sample of metal that has been filed with at least two different needle files to obtain different profiles
  
4. A negative shape (if you have access to a drill press)
  
5. Two sample soldering joins

**Design situation**

Many materials can be manipulated to make an attractive pendant. Some people wear jewellery to display their wealth or beliefs and some people wear jewellery to decorate their appearance. Many jewellers design their jewellery based on certain architectural styles or particular buildings.

**Brief**

Design and make a decorative pendant from copper and brass. You must base your design on a detailed section of a selected Australian building.

**Parameters:**

- There must be at least 3 soldering joins on your pendant
- Your pendant will be no larger than 50mm x 50mm.
- There will be no sharp edges / points that could injure the wearer or viewer.
- Your pendant must be satisfactorily filed and polished
- Avoid copying the exact outline / shape of your building. Instead, try manipulating one particular shape to come up with your design that will not bear any resemblance to your original building.
- No lettering, shapes such as hearts, stars, footballs will be included in the design

**Submission:**

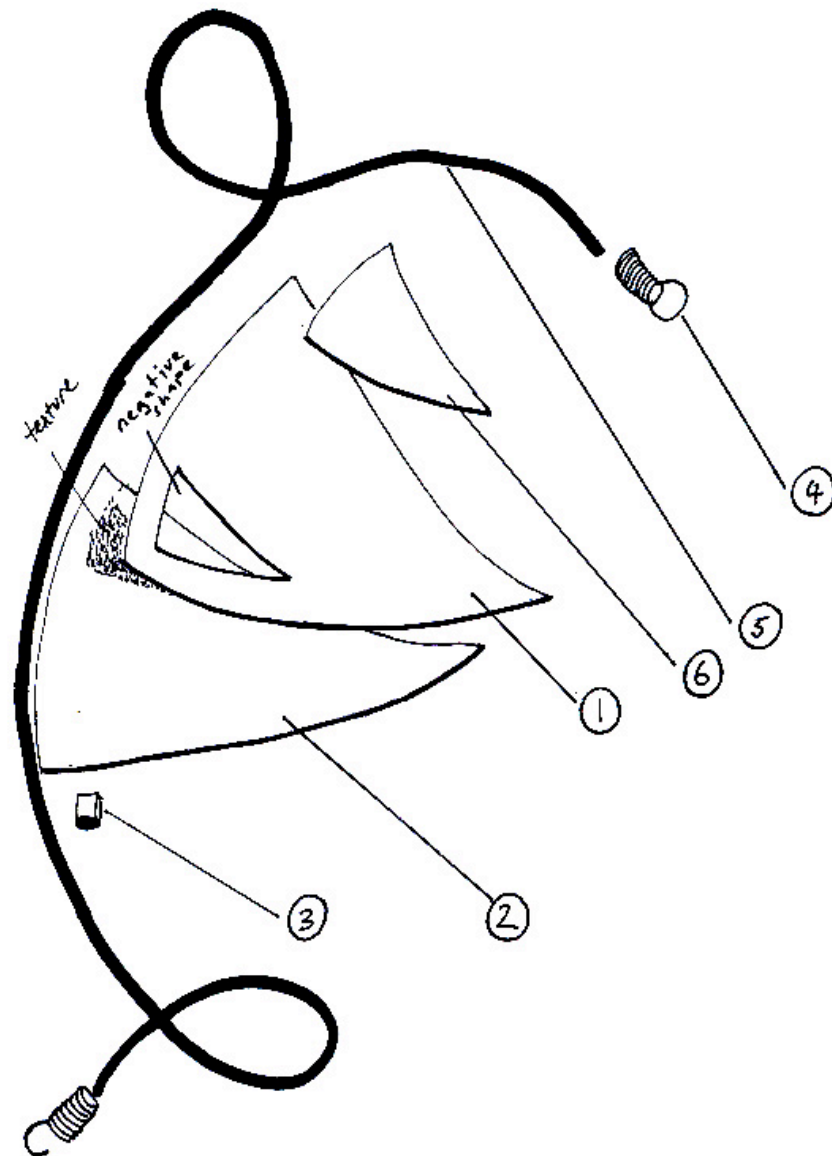
- A set of concept sketches (on design sheets and in fine liner)
- A flow diagram explaining the processes you will need to make your pendant (see flow diagram information sheet).
- A final product.
- An evaluation.

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**Extension:**

- A 1 - 2 minute presentation on the Australian building that inspired your pendant design.
- Design an exhibition invite / poster for a possible exhibition showcasing all the pendants from the archipendant project.
- Make your pendant again, this time including sterling silver in your design.





### Parts list

Part No.	Description	Material	Dimensions	Quantity
1	Top piece	brass	.7mm thickness	1
2	Bottom piece	copper	.7mm thickness	1
3	Backing	Copper or brass tubing	3.18mm diam. x 4mm length	1
4	End caps	Nickel silver	Approx 3mm diam.	2
5	Necklace	leather	Approx 3mm thick	40cm
6	Very top piece (extension activity only)	Nickel silver (3 <sup>rd</sup> piece of metal)	.7mm thickness	1

**archipendant**Image Brainstorm


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Fill this page with quick sketches of detailed sections of your building.  
**DO NOT** attempt to draw the whole building.

# archipendant

## Concept Sketching

Using the images you have sketched on the previous page titled 'Image brainstorm' transfer these sketches to the space below. You may choose to manipulate only one (i.e.: stretch, reverse, overlap, halve) or a series of different shapes and solder them together to create your piece, or a totally different method. At this stage make sure you don't get 'stuck' on just one design idea.

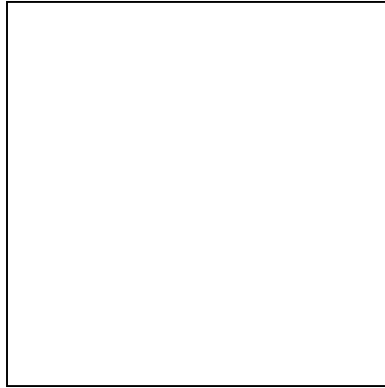
					
				design & technology	
ARCHIPENDANT		PROJECT N		THIS SHEET	
CLASS:		DESIGN STAGE:		DESIGN CONCEPTS	
NAME:		DATE:			

# archipendant

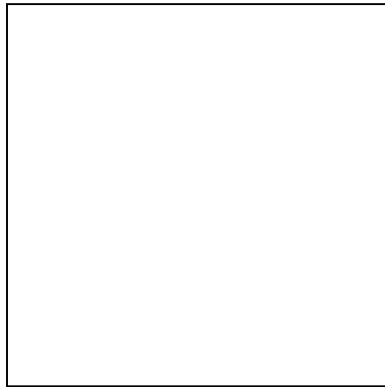
## Design Templates

Using the images you have drawn on the 'image brainstorm' page and 'design concepts' page, transfer your 3 favourite designs onto the design templates below. Remember to clearly label the dimensions and materials.

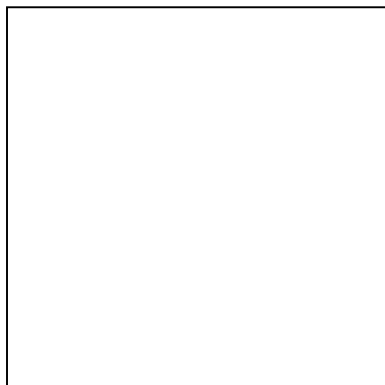
1



2



3



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### Design Prototypes

Using the design template page as a guide, make your three designs to scale using 2 different coloured pieces of card (one colour represents brass and the other, copper) Paste them below when you have selected which one you are going to make out of brass and copper.

# Flow diagram

Number	Name of making stage
Illustration showing all equipment you will use. Label all equipment.	
Draw what your object looks like at each stage.	
Use fineliner and colour	
Explanation of making stage	

Designed by Suzy Manning for designability group pty ltd 2007

1	
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2	
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5	
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4	
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3	
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- Draw an accurate front view of your chosen design.
- Show all dimensions.
- Label the shapes A, B, C and so on to show the order of soldering.
- Photocopy this page and use it as a workshop copy to assist you in the making process and communicating your ideas to your teacher.

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Homework

## Product Reference

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Find pictures of five different architecturally designed buildings in Australia. Photocopy them and cut and paste them below. Indicate what they are and who designed them and in what year they were designed and completed. Next to each one draw a pendant design that could be inspired by that building.



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**Final Class test**

**Insert Final Class Test here**

**archipendant**

**Final Class test**

**Final Class test page 2.**

**archipendant****Evaluation**

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Upon completion of your product, answer the following questions:

1. Below, draw the section of your building (or the shape) that most inspired your design. Explain the process you used to manipulate the original shape. (E.g.; divided the shape in two and overlapped them.)

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2. What were the main challenges/difficulties you faced when trying to achieve your design?

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3. What changes would you make if you had to make your archipendant again?

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4. What was the most enjoyable aspect of the 'Archipendant Project'? Why?

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5. Did you enjoy the soldering process? How did you feel when you first had to practice soldering, compared to how you feel now about soldering?

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6. Using the skills you have learnt making the Archipendant, what other metals could you confidently use? And what other pieces of jewellery would you like to make?

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7. Are you proud of your Archipendant? Will you wear it, or give it to someone as a gift?

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8. Explain to two other people the brief for the Archipendant and ask them to evaluate your work. Ask them to write their evaluations below.

PERSON 1:

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PERSON 2:

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