Student's Name:

Student ID Number:

Technological University of Dublin

Dublin School of Architecture

Bachelor of Technology

In

Timber Product Technology

Course Code:	TU732
Academic Year:	2020/2021
Semester:	1
Module Title:	Principles of Furniture and Joinery Design
Lecturer:	Jennifer Byrne
Year:	2020

I declare that the work contained in this submission is my own work and has not been taken from the work of others save to the extent that such work has been cited within the text of this submission.

Student Signature: _____

Date: _____

Principles of Furniture and Joinery Design

Half sheet MDF table

Word count: 1600

Table of Contents

Introduction

As part of the Principles of Furniture & Joinery Design module I was tasked with the challenge of designing a table which would be constructed with no more than a half sheet of MDF. In the assignment brief it is stated that the table must contain curved elements. The following report outlines the research process, design selection and thought process behind the manufacturing methods of the chosen design.

I first began the research process by looking at examples of tables that I liked. The first table that I found, figure 1, is a coffee table by Shaun Boyd. The reason this table stood out to me was the shape of the top. I find the elliptical shape to be more aesthetically pleasing than a simple round top and it would satisfy the design brief as it is a curved element. Secondly, I liked the cantilever style base of the table as it isn't a typical style we see or think of when we think of a traditional coffee table.

Figure 1. Photo courtesy of Shaun Boyd.

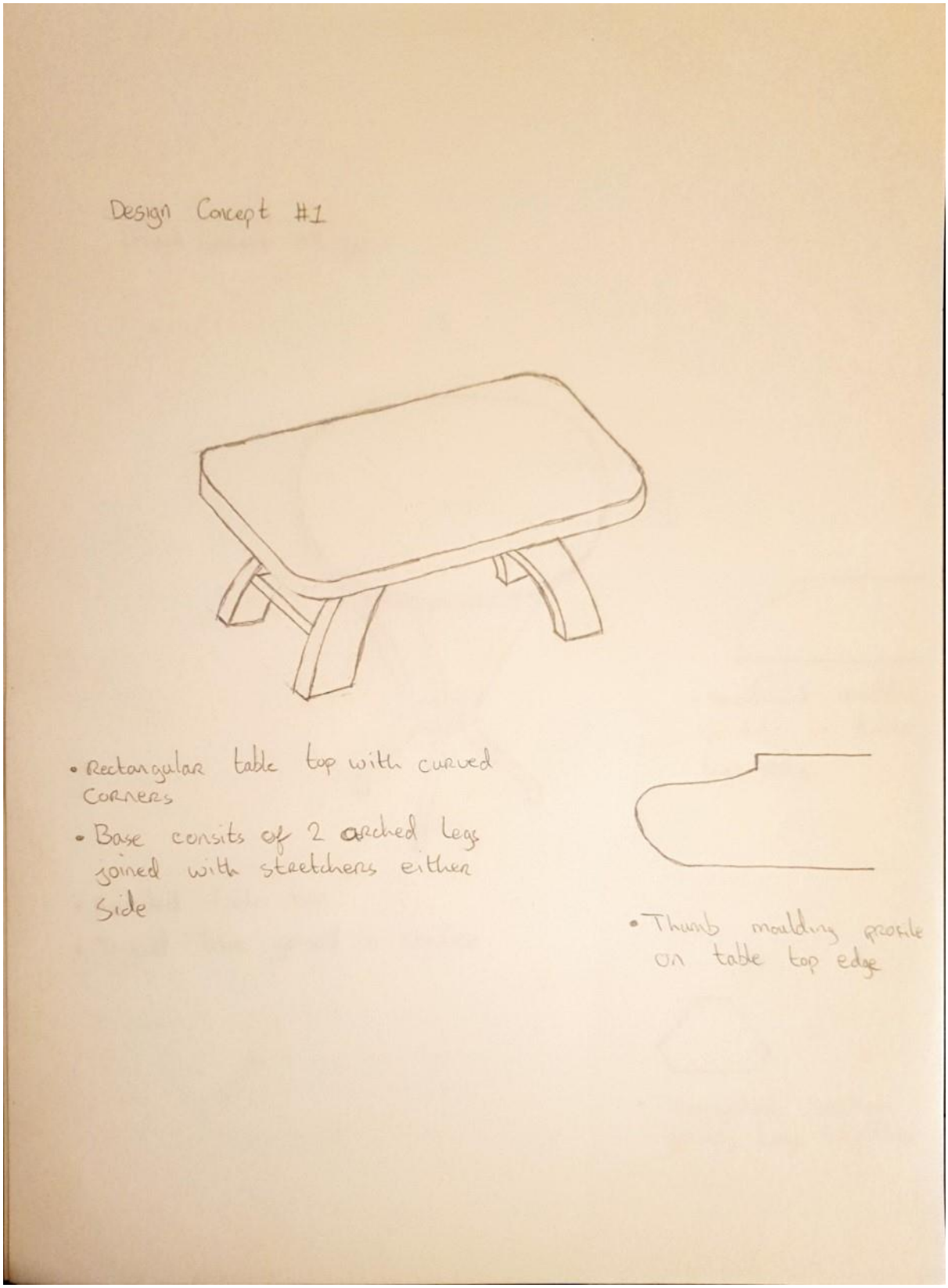
The second table I came across, shown in figure 2, is a table made by Architonic. I found this style table to be appealing because of the tripod base. The three legs are manufactured in a way that they create an upwards slope from the ground before joining to the top. Although I like the simplicity of the design, I feel it could have benefited from having a profiled or stepped edge to the top.

Figure 2. Photo courtesy of Architonic.

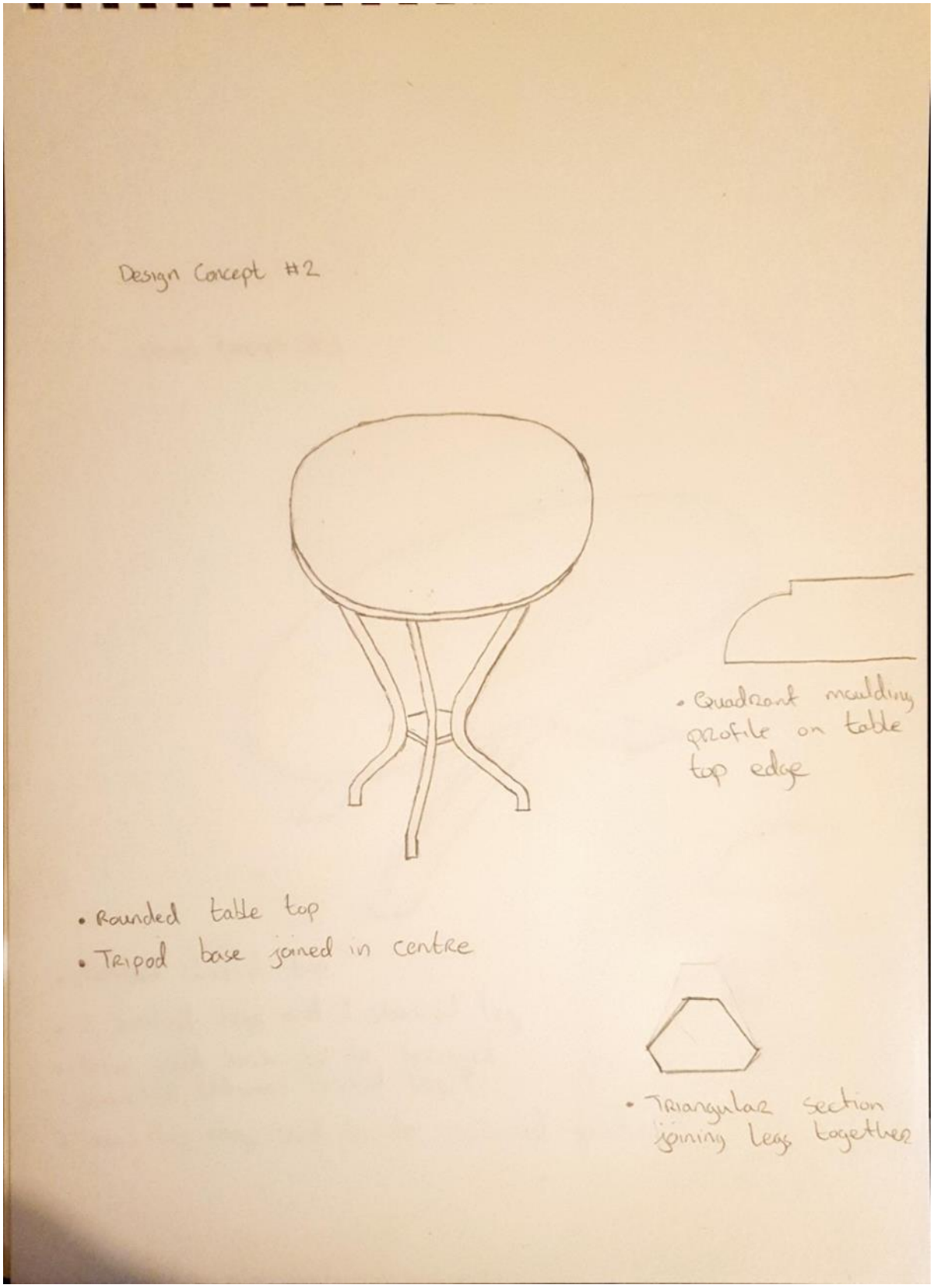
The final table I looked at was a design by John Lomas. Again, the elliptical shape of the top was what first appealed to me. I also found the twin pedestal style base an appealing feature. The style of the base was an interesting one because of the symmetry between the two pedestals and how they both represented two halves of the same pedestal.

Figure 3. Photo courtesy of John Lomas.

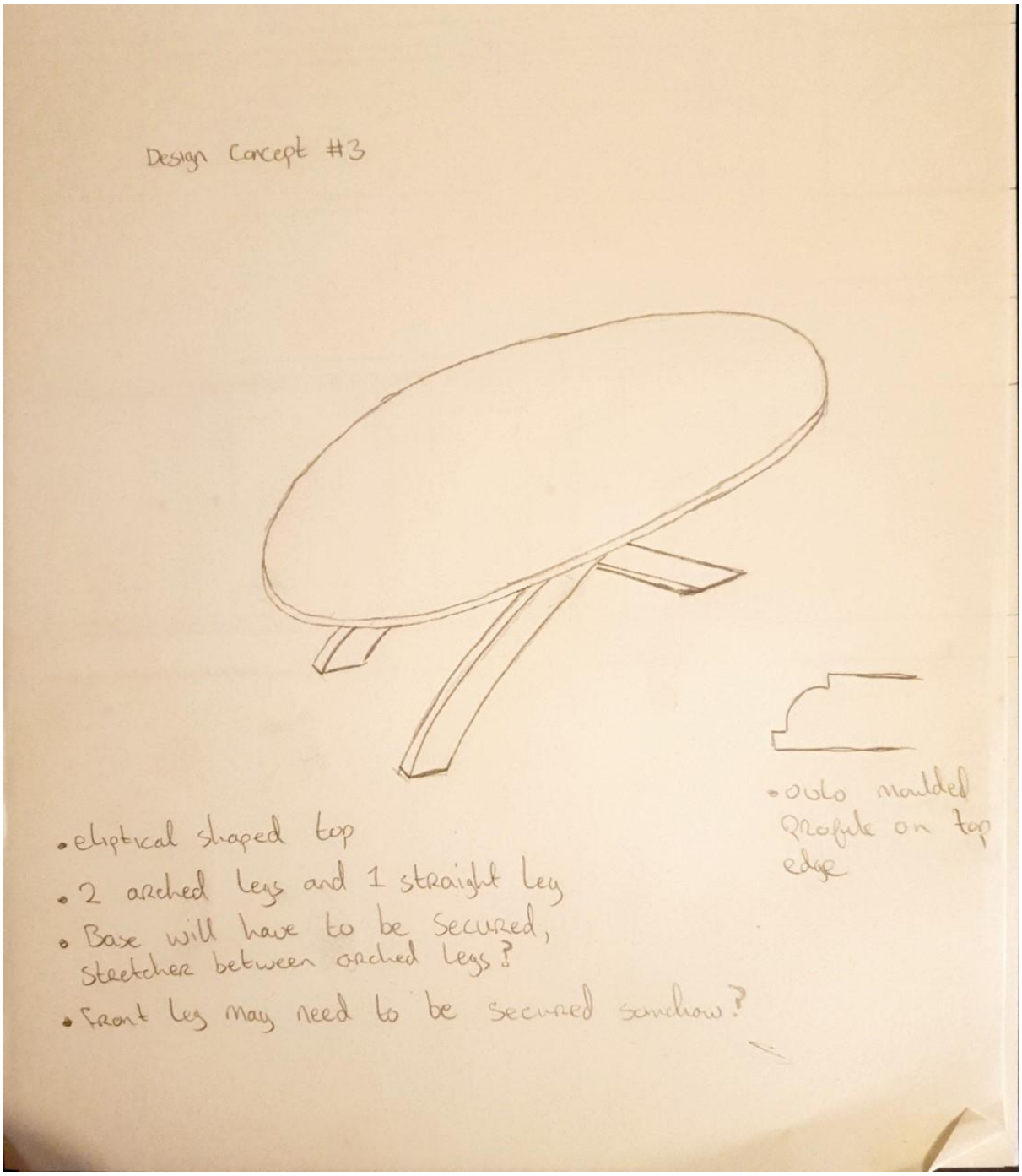
Frome my design research I was then able to come up with three design concepts. The three design concepts shown below are all quite different, but each has elements that I like. The design that I chose to go with is concept #3. I chose this design as firstly; it meets the design brief. Secondly, because the manufacturing process with its elliptical top and two curved legs will be a challenging one as it isn't one I have undertaken before.



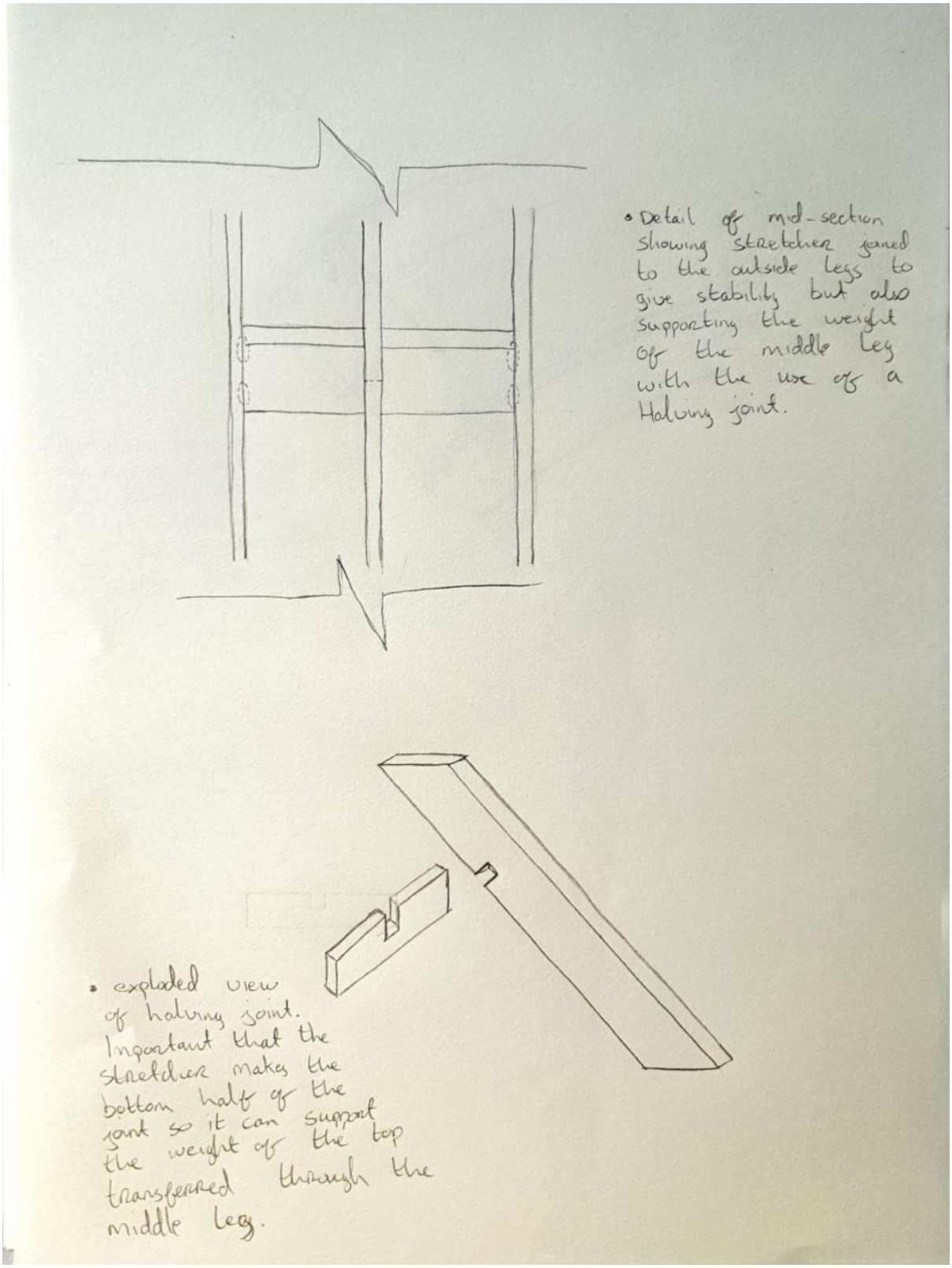
Sketch 1 By Daniel Cash



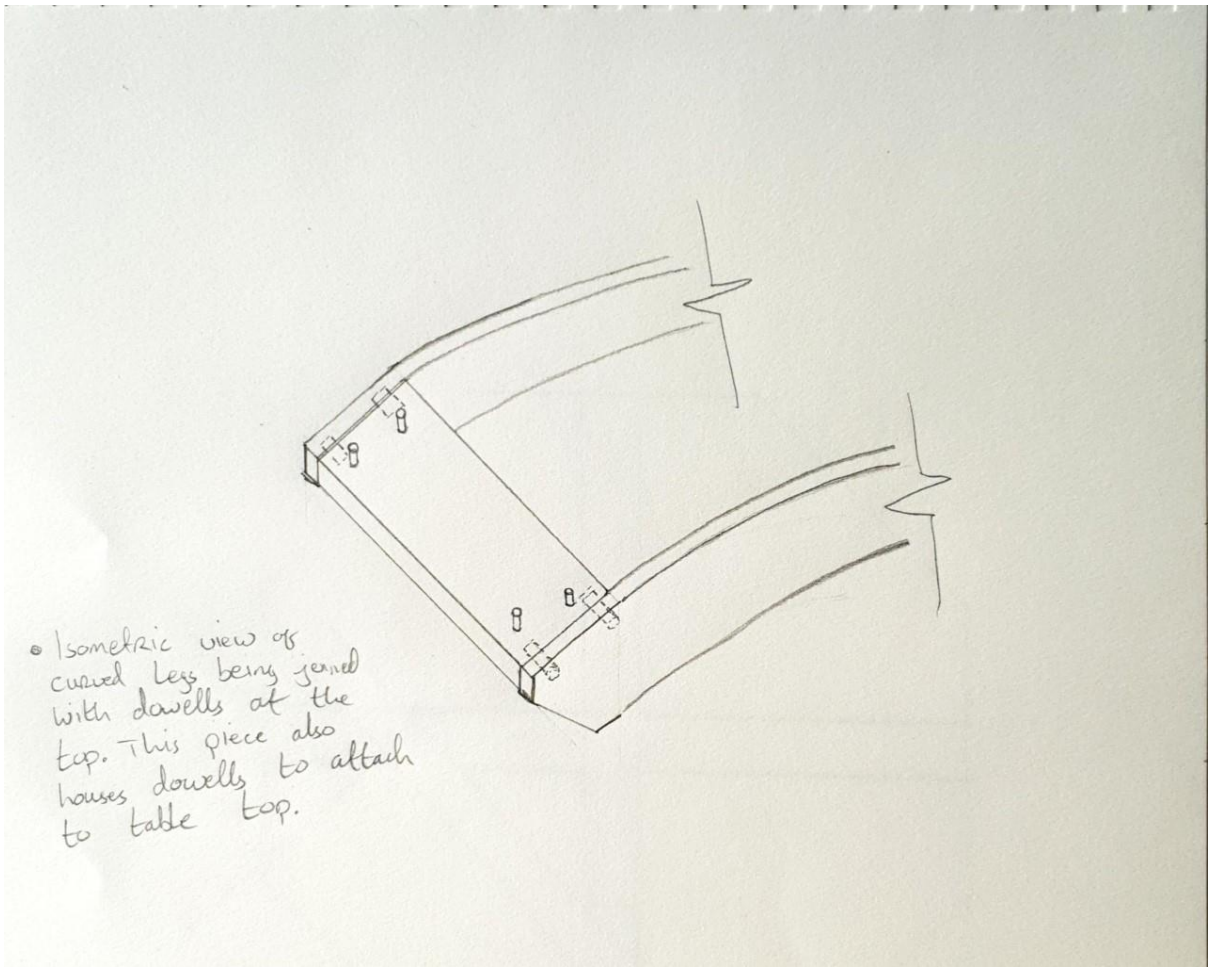
Sketch 2 By Daniel Cash



Sketch 3 By Daniel Cash



Sketch 4 By Daniel Cash



Sketch 5 By Daniel Cash

Figure 4 Cardboard model of table

Figure 5 Cardboard model of table

Figure 6 Cardboard model of table

Design objectives

When designing the coffee table, I had to take into consideration the function of it as well as the environment in which it will be used. The table is to be a centre piece in a living room and the reasoning behind its curved elliptical top is that young children are sometimes present

within the house and sharp corners are a hazard. The table will be a place where family and friends can gather around and have a cup of tea. The contemporary style of the table compliments the modern style that's already present within the house.

When considering the size of the table and its proportions, the ergonomics of a coffee table had to be considered. Ideally it is best when determining the size of a coffee table, it should be scaled to the furniture that is already present within the room, so the sizes and ergonomics complement each other.

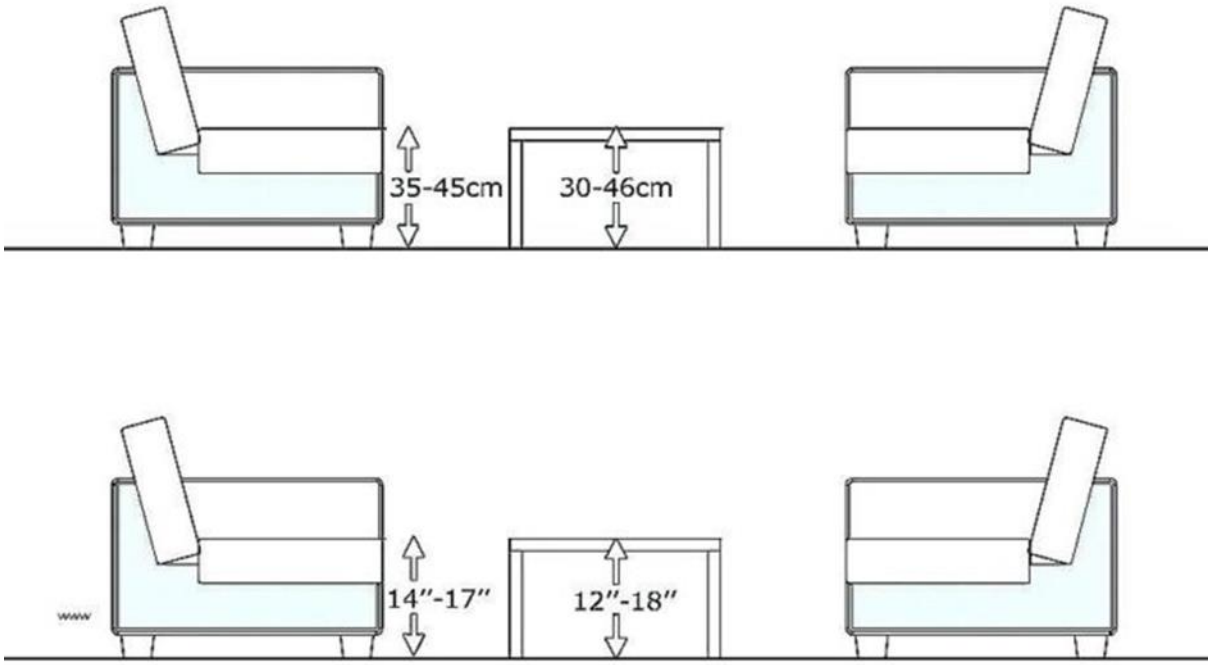


Figure 7 Image courtesy of Nord Collective

With that in mind and referring to the measurements of furniture existing in the room already, it was determined that for a person to be able to be seated comfortably on the sofa or armchair and be able to reach with ease to place an item on the table that it should be no less than 400mm in height and no more than 450mm in height.

With the height of the table determined the width of the top then had to be decided. To help with this, the golden ratio of 1.618 was considered. After deciding that the preferable length of the table was to be 800mm, it was divided by 1.618 to give a width of 494.4mm but just to make it more manageable 500mm was settled on.

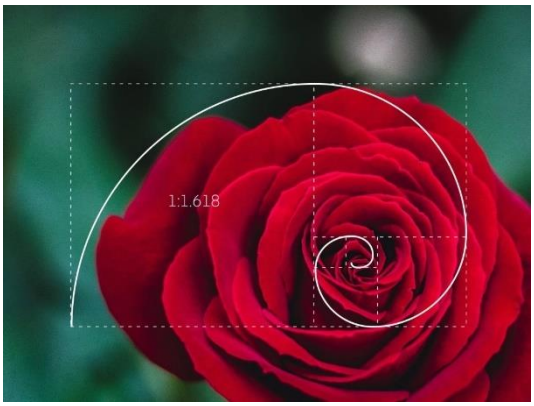


Figure 8 Image courtesy of Inside Design

Method of construction

To begin the process, I would first set out each piece on the sheet of MDF, as shown below in Figure. Using trammel points I would mark out the curved legs and to mark the ellipse I would use the trammel points, set at the lengths of both the minor and major axis from a third point, the pencil, and rotate it around a square that is lined up with both the axes. A similar process is shown in figure 6. This process will have to be repeated in all four quadrants to get the full shape of the ellipse. The rest of the components in the chair consist of straight lines so shouldn't be a problem to mark out. After breaking out all the individual pieces from the sheet of MDF, I could then begin shaping each one.

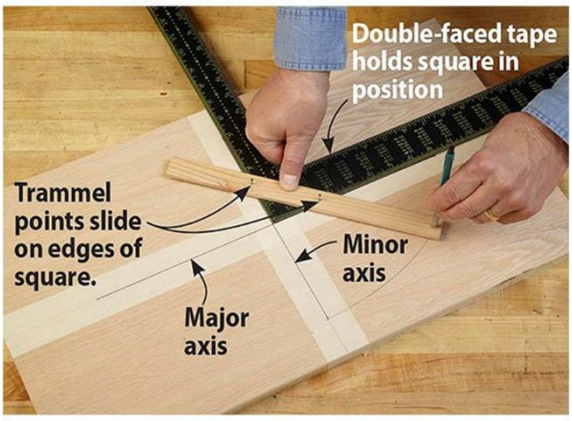
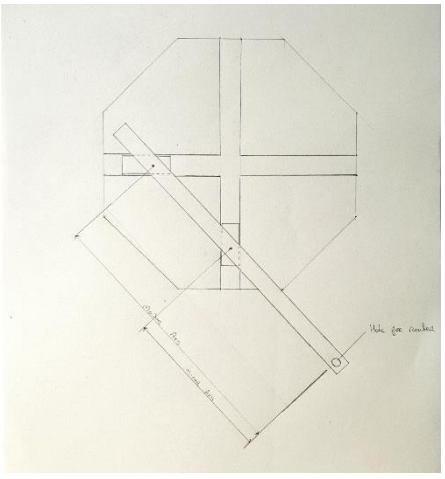


Figure 9 Image courtesy of Wood Magazine

To cut the shape of the top I would first use the bandsaw to cut roughly a few mm away from the marked line. I would then use a jig like the one shown in sketch 5 to accurately cut out the elliptical shape using a router. Using a router, I would then make a profiled edge all around the tabletop.



Sketch 6 By Daniel Cash

The next step would be to cut the curved legs. I would again use the bandsaw to cut roughly a few mm away from the marked lines. I would then take one of the legs

and using a spokeshave and sandpaper I would take away the waste material until I was left with a single, smooth curve on each side of the leg. I would then carefully place this finished leg on top of the other one and use it as a template for the router bearing to run along and remove the rest of the waste on the second leg.

To cut the angle on the top and bottom of the third leg I would simply measure the angle using a protractor and set the arm of the table saw to match it. When cutting out the halving joint between the leg and the stretcher I would use the bandsaw to rough cut the waste and finish to the marked lines using a coping saw as accurately as I can. I chose to use a halving joint here as the stretcher will be secured to both the outside legs using dowels and a halving joint allows the weight that's being transferred from the top of the table through the middle leg to be distributed evenly between the three legs. I think if this table were to be made from solid wood the halving joint would still be a suitable option, but I would replace the dowels for mortice and tenon joints as they would provide more sheer strength than the dowels.

With all the pieces cut to shape and size, I would then need to join them. Where dowels are to be used, I would use dowel markers to be as accurate as possible as there isn't much room for error with dowels.

Sequence of cuts and working drawing

To minimise time spent at the wall saw cutting the sheet into smaller, more manageable pieces, the parts are marked on the sheet and are organised in a way that will try and reduce waste. The image below shows the 1220mm x 1220mm x 18mm sheet marked out with all the components of the table. In each picture below, the component parts are marked in green whilst the saw cuts are marked in red and numbered in sequence.

Cutting List

Piece	Length	Width	Thickness	Material	Quantity
Top	800mm	500mm	18mm	MDF	1
Curved leg	700mm	170mm	18mm	MDF	2
Straight leg	700mm	40mm	18mm	MDF	1
Stretcher	244mm	40mm	18mm	MDF	1
Top rail	244mm	70mm	18mm	MDF	1
Bottom leg	150mm	70mm	18mm	MDF	1

Time scale of events

Process	Estimated time (Minutes)
Mark out sheet	120
Cut on wall saw	20
Cut pieces to length	20
Bandsaw all pieces	40
Shape first curved leg	45
Use router for second curved leg	20
Coping saw halving joint	10
Router tabletop to size	60
Profile tabletop edge	10
Dowell leg components	40
Biscuit leg components and top	20
Dry fit	20
Glue up	20
Prepare for finishing	40
Total time	485

The total estimated time for the manufacturing of the table is approximately 8 hours. This does not include the time during class in which demonstrations are made on different processes and setting up jigs or power tools.

Image citations

Figure 1 - https://www.shaunboydmadethis.com/cantilever-coffee-table

Figure 2 - https://www.architonic.com/en/product/ethnicraft-oak-tripod-coffee-table/1383509

Figure 3 - https://www.johnlomascustomfurniture.com/furniture/products/tables/dining-tables/product/elliptical-dining-table

Figure 4 – Own work

Figure 5 – Own work

Figure 6 – Own work

Figure 7 - https://www.nordcollective.com/o7w2us319/gC13928iS/

Figure 8 - https://www.invisionapp.com/inside-design/golden-ratio-designers/

Figure 9 - https://www.woodmagazine.com/woodworking-tips/techniques/layout-measuring-marking/ellipse

Figure 10 – Own work