

Family Learning

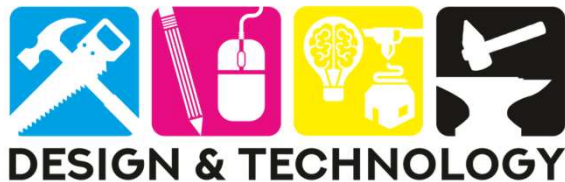
DESIGN & MANUFACTURE

National 5

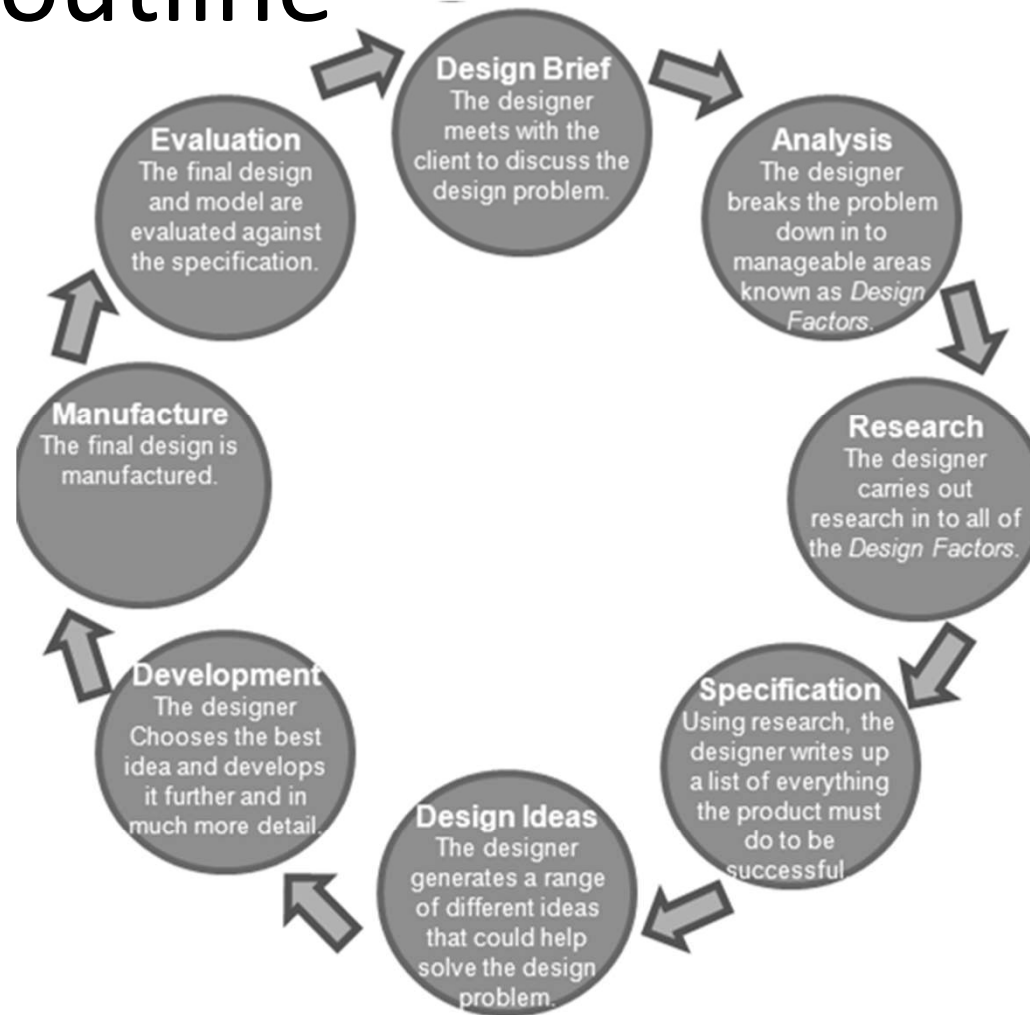


National 5 v's Higher

- **National 5** – Designing to manufacture in a school workshop
- **Higher** – Designing for commercial manufacture



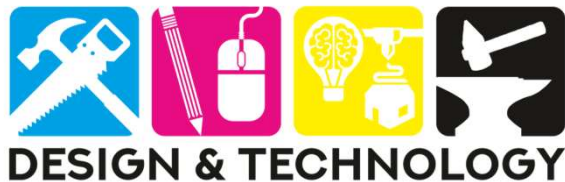
Course outline



Assessment Arrangements

National 5

Assignment 1 (<i>design</i>)	30%	externally assessed
Assignment 2 (<i>manufacture</i>)	25%	internally assessed
Question paper	45%	externally assessed



Assignment N5

Assignment - Design: 30%

Choice of three design briefs

Research pro forma

Planning for manufacture pro forma

Marks for:

Analysing the brief / research

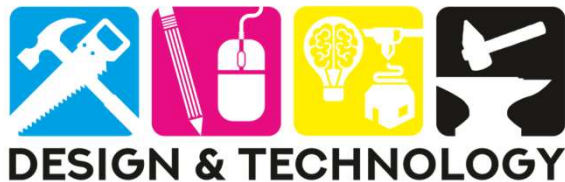
Generating design ideas

Developing ideas

Use of models

Use of graphics

Planning for manufacture



N5

Design and Manufacture
Research pro forma
Design brief 1: a small shelf



Notes to candidates

Before you start the research you should have read the instructions for candidates and be familiar with:

- the brief
- the skills you have to demonstrate
- the type of evidence you have to provide

You should speak to your teacher or lecturer if you are unsure about the areas above.

Research

The company has carried out research and identified a few requirements for the shelf. You should gather further information to ensure the proposal is suitable for the company and the teenagers you know.

You should record your research information on this sheet (you can use both sides).

You should use findings from your research to complete the specification below.

A small shelf – specification

The shelf must:

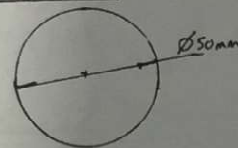
- demonstrate a high level of craftsmanship
- cost no more than £5 to make
- hold deodorant cans of 165mm height
- hold deodorant cans of 50mm diameter
- hold 3 deodorant cans
- be wall mounted
- be no bigger than 500mm x 400mm x 15mm
- use music as a theme
- feature contrasting colour
- have a simple design
- use mostly straight lines

RESEARCH FINDINGS – You may use the other side of this sheet

Things I need to research:

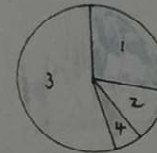
- The sizes of the object (deodorant cans) that my shelf design will hold. → measure
- The number of items it will hold. → ask questions
- Where it is likely to be used by teenagers. → ask questions
- If teenagers have any preferences about how it looks. → ask questions
- If it should have any secondary functions. → ask questions
- What performance requirements should the shelf have? (what is most likely to break it?) → observations
- How much teenagers would pay for something like this? → ask questions

MEASURING



ASKING QUESTIONS

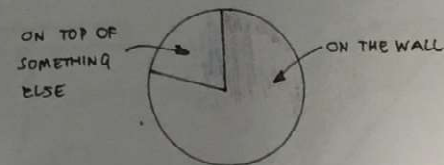
HOW MANY DIFFERENT VARIETIES OF DEODORANT DO YOU NORMALLY HAVE AT THE ONE TIME?



The majority of people I asked usually have 3 different varieties of deodorant that they use.

I will design the shelf to hold at least 3 cans.

WHERE WOULD YOU PREFER THE SHELF TO BE KEPT/STORED?



I asked where the shelf would be best stored.

The most popular response I mounted on the wall. This wasn't the majority though I am still going to wall mount so it is out of the way.

More questions and answers on the back of this sheet.

Most cans that I measured were less than 50mm diameter. Since this is the type I use then I will design it for this and most cans will fit.

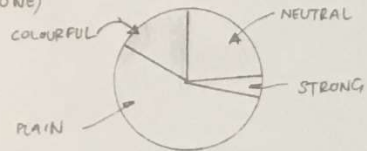
NAME

CANDIDATE G - 1a

ASKING QUESTIONS (cont.)

I tried to ask some questions to see if there was a preferred style amongst teenagers.

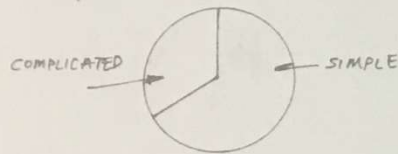
WHICH TYPE OF COLOUR COMBINATIONS DO YOU PREFER? (YOU CAN CHOOSE MORE THAN ONE)



The teenagers I asked seemed to prefer contrasting colours.

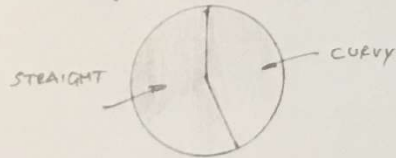
My design should therefore feature some contrast.

DO YOU PREFER SIMPLE OR COMPLICATED DESIGN?



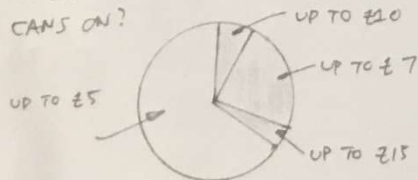
The look of the design should be simple.

WOULD YOU PREFER CURVY OR STRAIGHT DESIGN?



I asked if teenagers would like to see curvy or straight lines/shapes in the design. Most said straight which fits in with the answers to the previous question.

HOW MUCH WOULD YOU PAY FOR A SHELF TO STORE YOUR DEODORANT CANS ON?

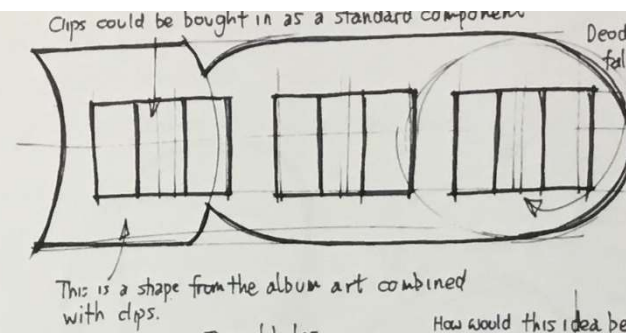
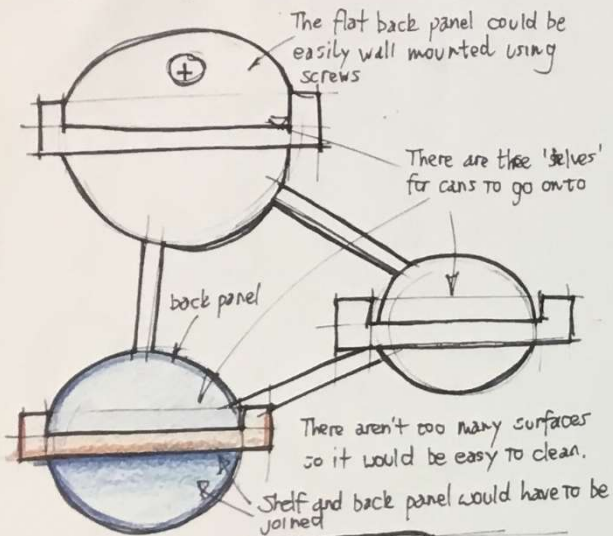


It is clear from this question that very few people wanted to spend more than £5 on a product like this.

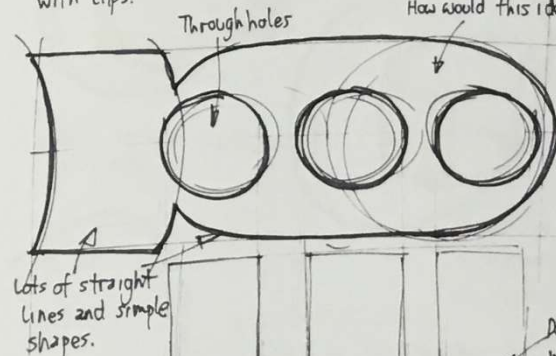
It should cost less than £5 to make so a profit can be made.

INITIAL IDEAS

From my morphological analysis table (separate)

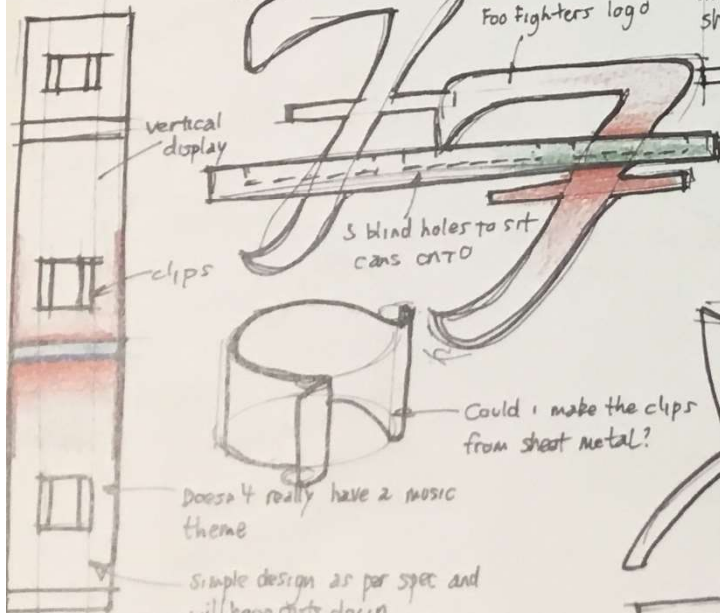


Deodorant cans might fall through



slots at top and bottom make this secure

Slots for deodorant cans to slide into



could be folded any way?

shape from album art.

Deodorant can has hole and base to hold it in place

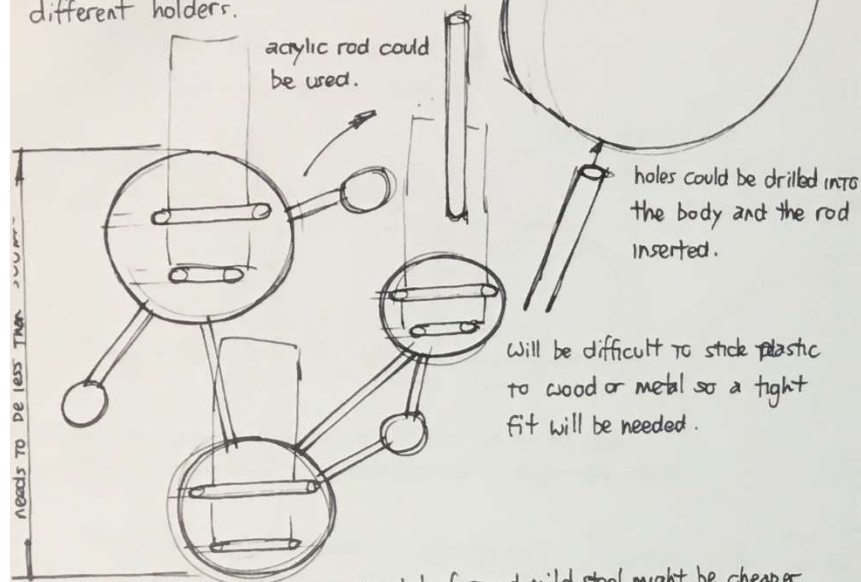
are there shapes too curvy

could use the shape of the logo to hold deodorant cans on.

CANDIDATE C-2

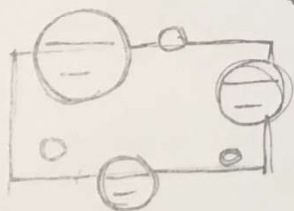
MUSIC THEMED SHELF

Explore ways to 'connect' the different holders.



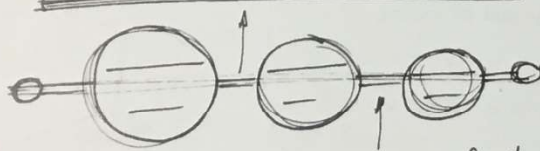
one bit of round mild steel might be cheaper

other ways.

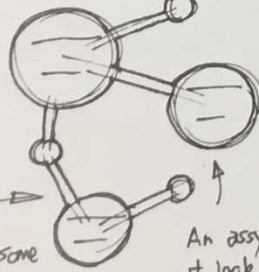


have everything stuck to a backboard (possibly hardboard).

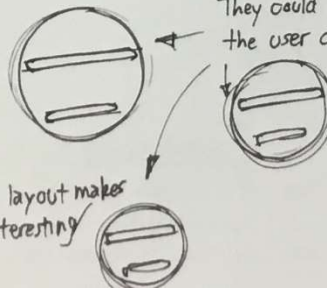
cut out one piece from some hardboard, plywood or acrylic.



Could pass one piece of rod through all of the holders



An asymmetric layout makes it look more interesting less boring

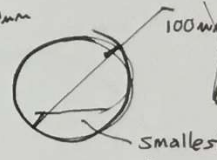
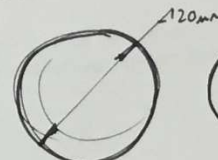
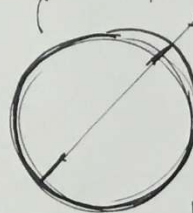


They could all be separate and the user could wall mount them.



I made a model of the base using my suggested sizes. it was too big and the can fell through
NEED TO CHANGE MY SIZES!

work out where the support and holder will be placed

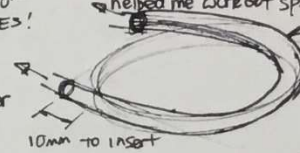


I want three different size holders for contrast.

I'm going to model to work out the sizes of the holders then decide how they will connect.

Changed the size of the base to a 40mm diameter

These models are to scale and helped me work out spacing



Going to use the same spacing for all sizes of holders

Smallest has have space for 50mm base part.



100mm diameter looks like there is enough room for the holder parts to attach.

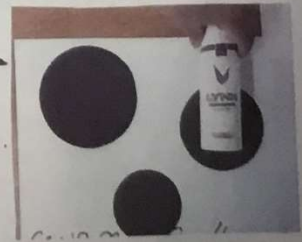
50mm diameter was also too small.

60mm diameter was too small



100mm 120mm 140mm

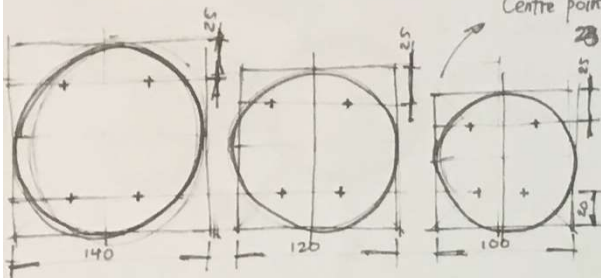
I tried different increases. I prefer the right sizes for the holders.



MUSIC THEMED SHELF

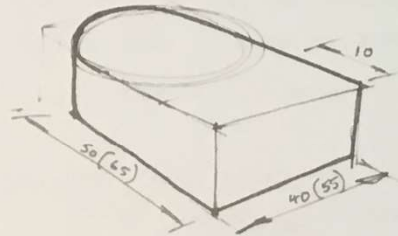
Going to finalise sizes and positioning of holders on holder circles.

Best to start with a square which has the same length sides as the diameter.

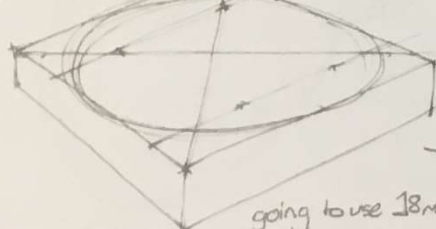


Using 6mm acrylic rod because it can be heated and bent easily. Would also be strong enough to support the weight

This former will be needed to bend the rod.



All the holes and circle will need marked onto the square piece of wood before shaping it.



going to use 18mm MDF.

Centre points will be 28mm & 30mm either side of the vertical centre.

To 1/2 scale.

Going to try and use the angles of a 30/60 set square to position the main holders.

I like the random positioning of these parts but they will be very difficult to connect with rods because of the angle.

MATERIAL FOR CIRCLE PIECES?

To create the colour contrast in the spec I am going to paint the circle. I am going to use 18mm MDF. This will be thick enough to insert the rod.

I will have to explore the best way to have each of the circle parts connected

- acrylic rod?
- plywood/pieces of plywood?

mark drilling angle onto the raw material at the very start.

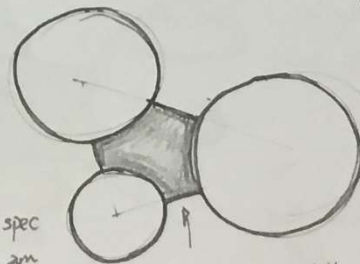


could the wood be put in a bench vice and drilled at an angle?

Wouldn't be very accurate.

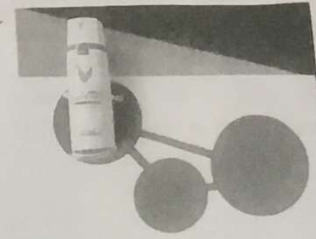
This could be too close or would force the smaller one further away.

Can't have too many parts cause the spec says it has to be simple

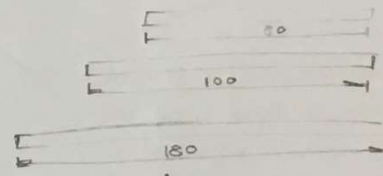


could cut a piece of thin plywood and paint it and stick the other bits on with PVA

This is the scale model with the ply strips added in. I think I would them to be longer.

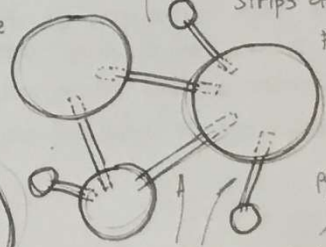


going to try 10mm strip of ply those lengths.



I think that this could be the most simple and secure method.

strips of ply could be painted.



Plywood can be painted easily get contrasting colour.

Could use thin strips of plywood stuck behind each of the circles. This would allow small circles like the album artwork.

MUSIC THEMED SHELF

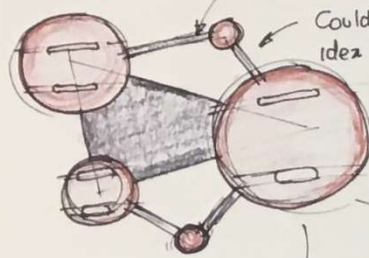
I think better contrast will be created if a simple triangle is used in the background.

I used the sizes of the set square to start with

Black and red provide contrast and link it to the album art.

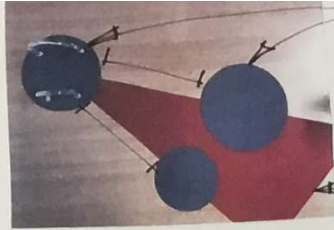
Could use the plywood strips idea to add smaller circles.

This makes it look more like the album artwork.



I think the extra circles make it look too complicated and it won't meet the specification.

I am going to keep the triangle because it will make it easier to assemble and I won't have to set angles.



I think these are too far away. It looks too spaced out.

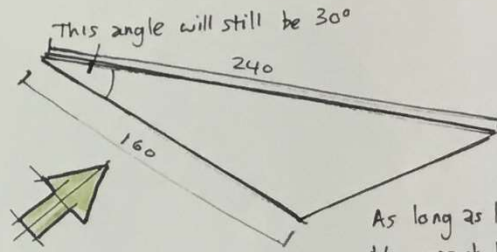
These models helped me to calculate spacings and angles.



there is still clearance and room for the can.



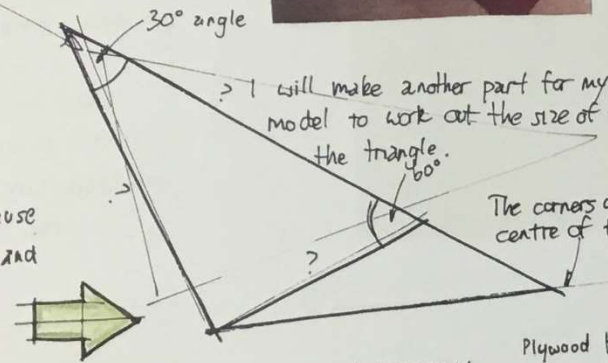
moved the circles closer and checked to see if there was still room to put the can in.



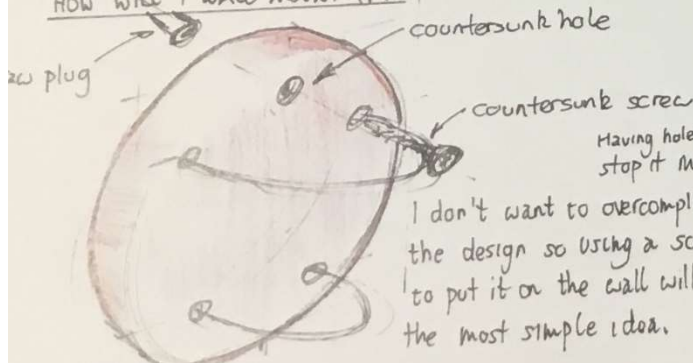
As long as I make the sides the correct length all I need to know is the 30° angle.

I will make another part for my model to work out the size of the triangle.

The corners will line up with the centre of the circles.



HOW WILL I WALL MOUNT IT?

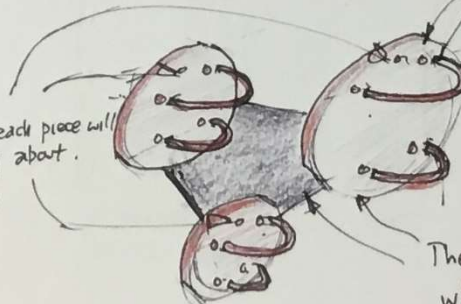


I don't want to overcomplicate the design so using a screw to put it on the wall will be the most simple idea.

ASSEMBLY

Plywood back is too thin to be screwed into

The mdf and acrylic will need stuck together using epoxy resin as they are not similar materials. I am going to try and use contact adhesive as I have used this before to stick wood and plastic.



The mdf and the plywood can be stuck together with PVA. I will need to clamp it in a vice for a strong join.

CANDIDATE: - 6

N5

Design and Manufacture DESIGN

TASK 1: A small shelf

PLANNING FOR MANUFACTURE SHEET



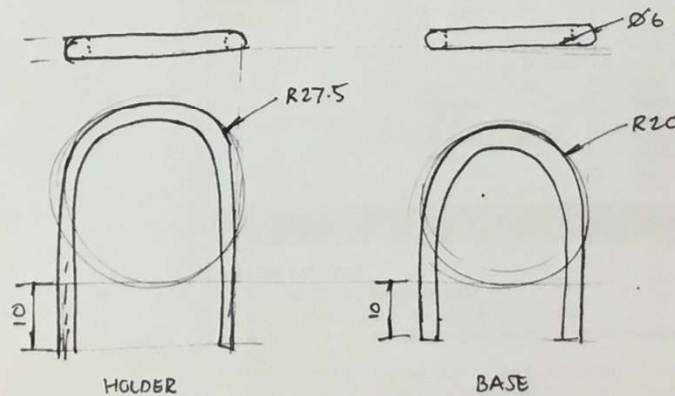
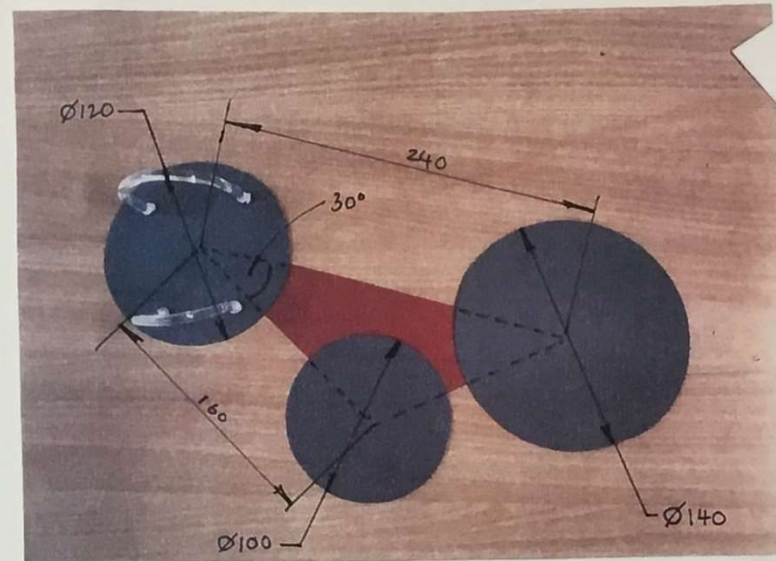
WORKING DRAWING/SKETCH

SEQUENCE OF OPERATIONS

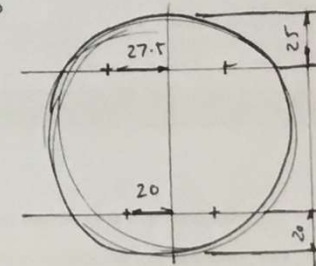
STAGE	OPERATION	TOOLS/EQUIPMENT
1.	mark out circles	steel rule, compass
2.	mark out centres to be drilled	try square, rule, marking gauge
3.	mark out triangle	rule
4.	cut corners off of circles	scroll saw/tenon saw
5.	drill holes	pillar drill, $\varnothing 6$ drill bit
6.	sand circles round	bandfacer, goggles
7.	form rods	oven, former, gloves
8.	cut plywood	scroll saw
9.	prep wood for finish	abrasive paper
10.	paint ply and mdf (3 coats)	paint, brushes, abrasives
11.	assemble wooden parts	PVA, vice, quick clamp
12.	assemble acrylic parts	contact adhesive.

CUTTING LIST

PART	MATERIAL	QNTY	LENGTH(mm)	BREADTH(mm)	THICKNESS (mm)
CIRCLES					
BIG	MDP	1	140	140	18
MED	MDP	1	120	120	18
SMALL	MDP	1	100	100	18
TRIANGLE	PLYWOOD	1	220	130	3
HOLDER	RED ACRYLIC	1	150	—	$\varnothing 6$
BASE	RED ACRYLIC	1	140	—	$\varnothing 6$



* MDF IS 20mm thick
* PLYWOOD IS 3mm thick



same for all circles

NAME

CANDIDATE G - 7

Assignment N5

Assignment – Practical: 25%

Product to be manufactured set by SQA

Marks for:

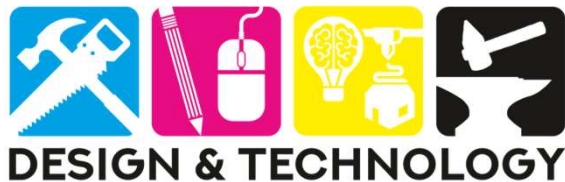
Measuring and Marking out

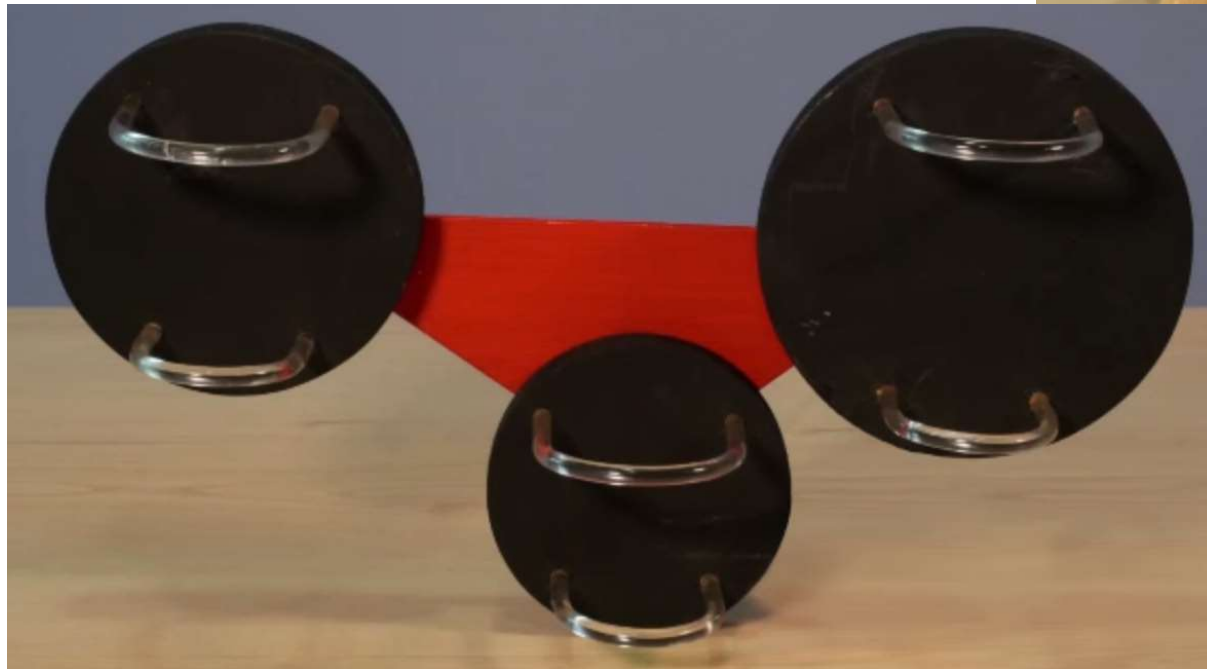
Using hand and machine tools

Assembling components

Finishing

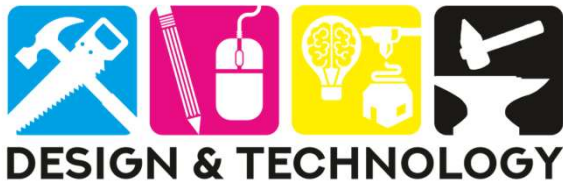
Evaluating





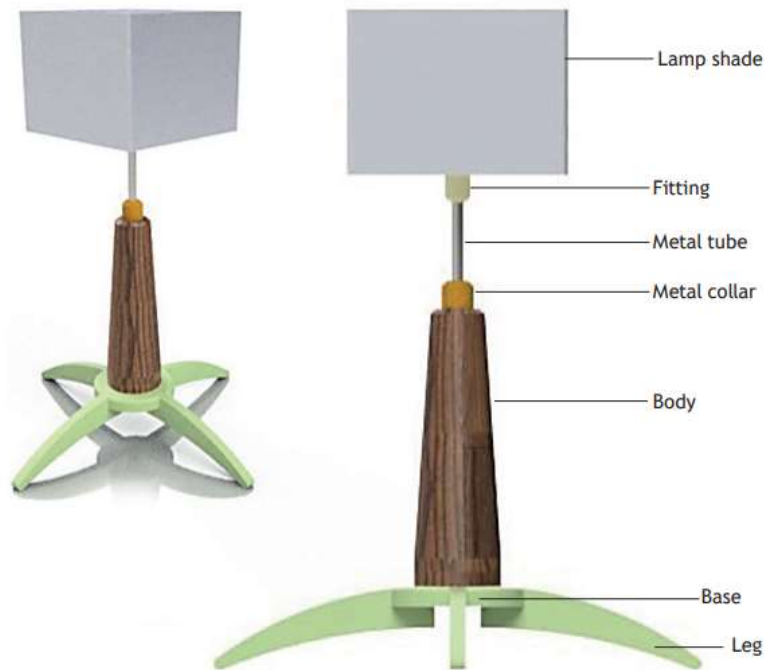
Assignment pitfalls

- **Time management**
- **Exploration and refinement of ideas**
- **Ensuring a range of techniques used**
- **Covering all components of design when discussing materials and processes**



Question Paper

1. A design proposal for a table lamp is shown below.



(a) The lamp is made from different materials.

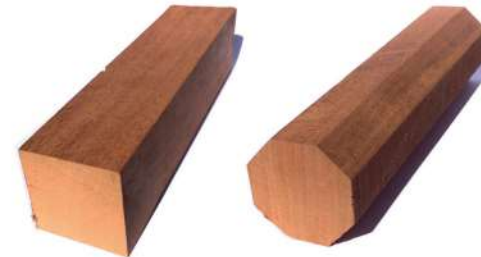
(i) Name a suitable dark coloured hardwood for the body of the lamp. 1

(ii) Name a suitable yellow-coloured alloy for the metal collar. 1

MARKS

1. (continued)

(c) A wood turning blank is required for the body of the lamp.

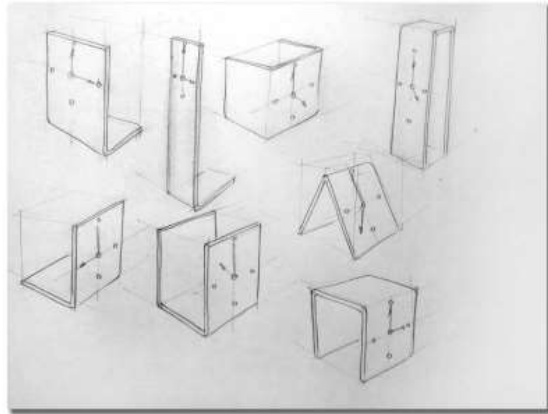


(i) Describe how to mark out **and** remove the corners of the blank in preparation for turning. You must refer to workshop tools in your answer.

(Sketches may be used to illustrate your answer.)

4

3. A page of initial ideas for a clock design is shown below.



The designer could have used morphological analysis or brainstorming to generate a range of ideas.

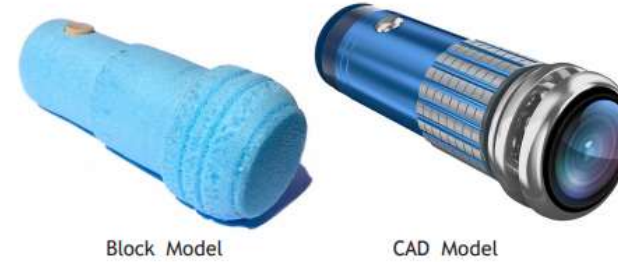
Select **one** of the idea generation techniques from the options below. Tick the box (✓).

- ☐ Morphological analysis
- ☐ Brainstorming

Describe the key stages of **one** of these idea generation techniques.

3

5. Different types of models can be used throughout the design process.



- (a) Outline **two** reasons for using block models during the design process.

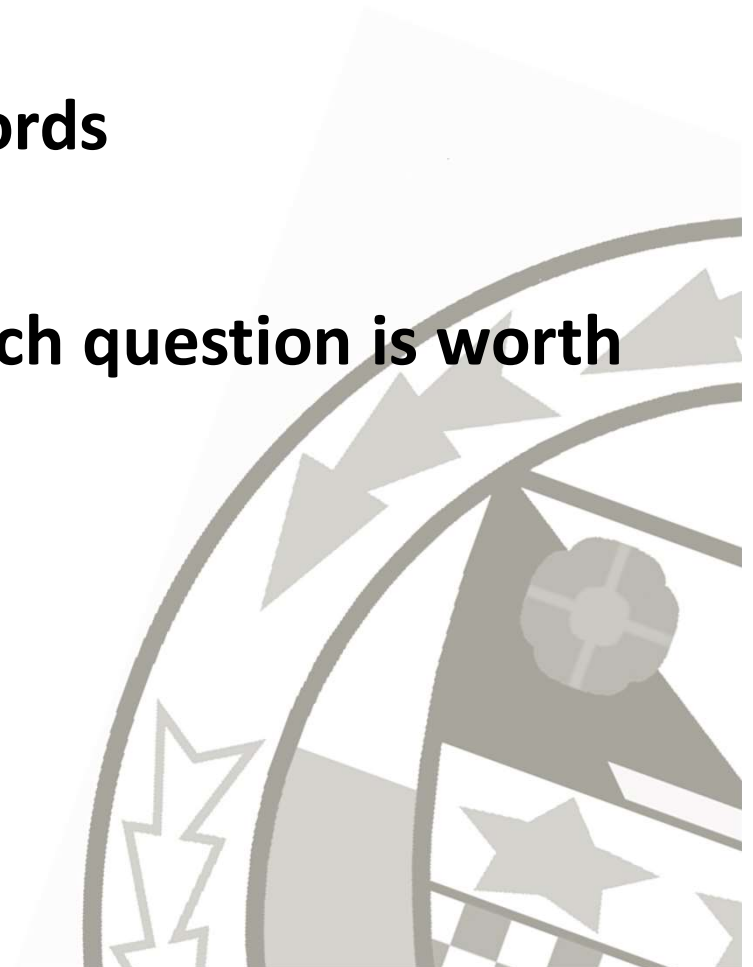
2

- (b) Outline **two** reasons for using CAD models when presenting ideas to the client.

2

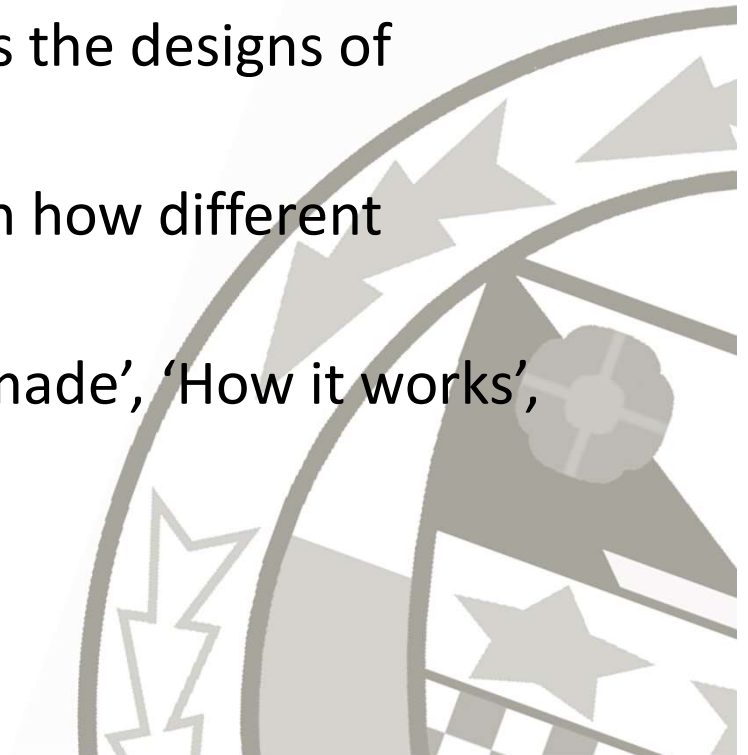
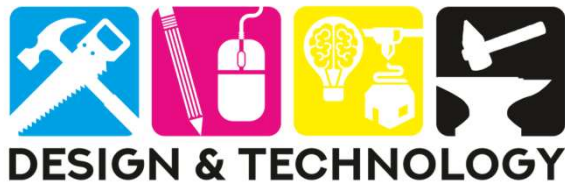
Question Paper pitfalls

- **Not writing enough detail**
- **Not taking note of command words**
- **Not taking note of the marks each question is worth**



Preparation and support

- Encourage supported study or lunch time drop in
- Communication - Ask if there is homework due, ask how their folio work is coming on, ask if they have been meeting their course deadlines.
- Allow pupils the opportunity to discuss the designs of products
- Allow pupils the opportunity to explain how different products were manufactured
- Watch programmes such as 'How it's made', 'How it works', 'Grand Designs', 'The Apprentice'.....



Resources

SQA Website -

<http://www.sqa.org.uk/sqa/47927.html>

Social media

