

Criterion 1 Mark Band	Investigating the Design Context
7–8	<ul style="list-style-type: none"> <li>• Discrimination shown when selecting and acquiring relevant research that will promote originality in designing</li> <li>• Excellent understanding and analysis of the design context</li> <li>• Detailed analysis of relevant existing products or systems undertaken related to design intentions</li> <li>• Comprehensive analysis of relevant and focused research undertaken</li> <li>• Clear and specific design criteria identified, reflecting the analysis undertaken</li> <li>• Target market identified and the intended consumer/user profiled</li> </ul>
5–6	<ul style="list-style-type: none"> <li>• Good understanding and analysis of the design context</li> <li>• Good analysis of relevant products or systems undertaken</li> <li>• Good analysis of relevant research and context</li> <li>• Design criteria which reflects the analysis undertaken</li> <li>• Target market for product has been identified</li> </ul>
3–4	<ul style="list-style-type: none"> <li>• Basic understanding and analysis of the design context</li> <li>• Some analysis of related products or systems undertaken</li> <li>• Made a superficial analysis of most of the research material and the context</li> <li>• Design criteria reflects most of the analysis undertaken</li> <li>• Some consideration has been taken of the likely consumer/user</li> </ul>
0–2	<ul style="list-style-type: none"> <li>• Limited understanding or analysis of design context</li> <li>• Minimal analysis of other products or systems undertaken</li> <li>• Provided little evidence of research and analysis of context</li> <li>• Design criteria is very general and lacking in any detail</li> <li>• Limited understanding of the target market/user evident</li> </ul>

This guide contains the guidance needed to complete the minimum amount for the research section of your design project.

Copy the design brief onto this page.

Add your name and the title '*GCSE Resistant Materials Coursework*'

## **Context**

Our Lifestyles are changing rapidly. Our homes contain an ever-lasting range of gadgets and equipment. It is fashionable to have multi-functional living spaces. We need creative, innovative products to help us organise our lives.

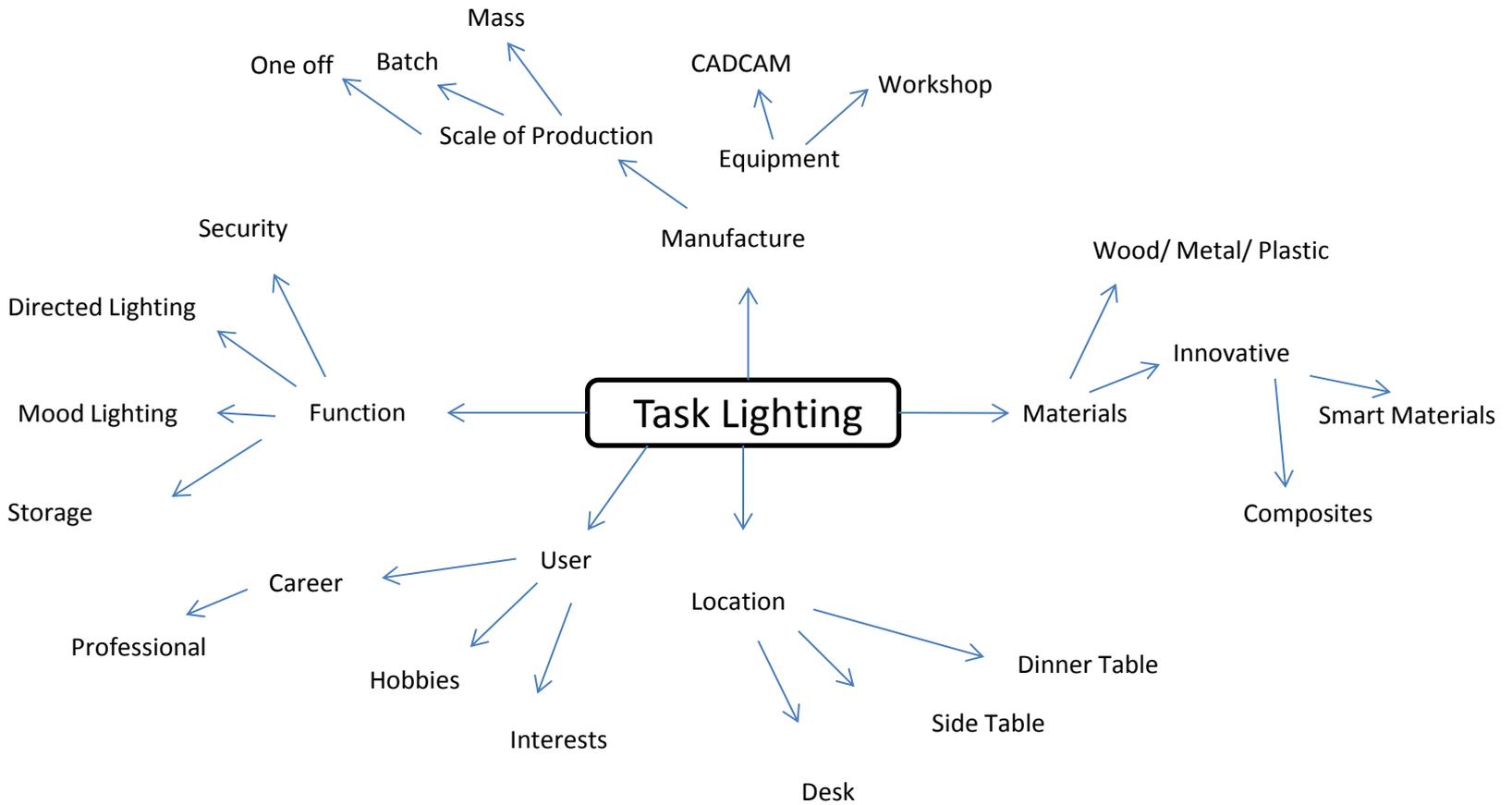
## **Design Task 11**

Recent research suggests that the size of new housing in Britain is decreasing. There is a need for modern looking, compact, multi-functional furniture (possibly that comes flat packed, or can fold down). Design a product for this market, that could be sold at a chain of out of town retailers. You may wish to consider designing jigs or templates that aid its construction.

Mr Lowe

GCSE Resistant Materials Coursework

How: Identify all the different things you need to consider, everything you need to find out and every thing your product could do/be during the project.  
Why: This gives you the opportunity to analyse your brief. You should break down the challenge into different parts to work out how to approach it.



How: Add images of products that are already available that meet the design brief you have chosen. Try to find interesting products so you can use them for inspiration.

Why: This provides a chance to get inspiration for your own design ideas. It also gives you an idea of your competition, you need to make your product better than these so people buy it.

**Try to add at least 10 images of interesting products....**

# User Research

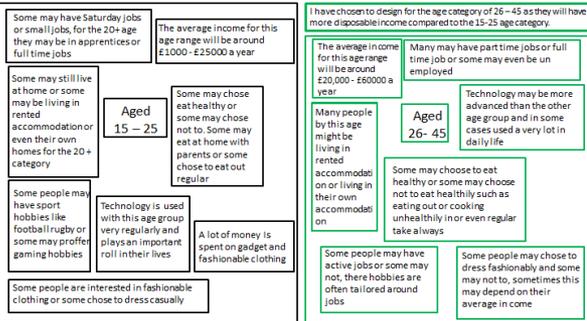
**How:** Build an image of the group of people who will buy your product. You should find out as much as possible about the generic group of people you will, or could, design for.

**Why:** The reason for doing this is to help inspire the rest of your research and design ideas target market are :

- Age.
- Gender.
- Career.
- Salary.
- Interests
- Hobbies.
- Clothes.
- Music.

You can use images to help provide a visual representation of your target Market.

At this stage you may want to identify more than one target market. You can select the most appropriate one later on.



You can write a paragraph at the bottom of the page summarising your target market. If you have identified and represented more than one target market then you need to make it clear which one you will go onto to design your product for.

CW Page 4

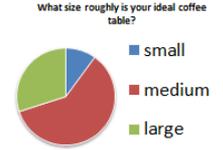
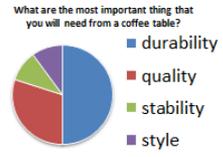
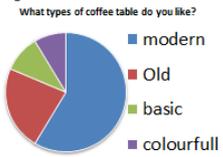
**How:** Ask your target market a series of questions about their needs and wants of the product you are designing. You should try to be specific with your questions and there must be a reason for each question. You will only get useful answers if you ask sensible questions. For every question you should consider what you want to find out as a result before asking the interviewee.

**Why:** This is a quick way of gathering specific information from a large group of people within your target market. It can provide a large amount of quantitative data to influence or support your design ideas.

# Market Research

Here I have produced a simple questionnaire, why I have asked these questions and the result/answers of them. I have also chosen the 3 most important questions and graphically shown this to help me get a clear understanding of the results.

Question	Why	Results
Do you already have a coffee table?	This will help us determine how many people already have a coffee table	50/50
What are the most important things that you will need from a coffee table ?	This will determine what the public feel is the most important thing they look for when buying a coffee table	The most important things people feel is needed from there is durability, style and quality
What types of coffee tables do you like?	To help you determine what people want there coffee table to look like	The types of coffee table people like are mainly modern
How old are you?	This will help me work out the average age of my target market and what age category my product will need to be tailored around	15-20
Where would you buy your coffee table from?	This will help me to look at what type? The price they would have paid? What features they would have paid? Etc.	Many people said a furniture shop or on the internet
Would you buy it flat packed?	This will help determine if I should produce my product flat packed for them to assemble them selves or to have it ready built	50/50
What materials would you coffee table be made from?	This will help me decide what materials I may possibly use	Wood was the main type of material people said they would prefer for their coffee table
Where would your coffee table be situated in your house?	This will help me with my designing of the product to again tailor my work around the surroundings it will be situated in	Front room/lounge is where most people said they would have their coffee situated in
What are your hobbies?	By asking this question it again help me tailor my designs around the persons hobbies	Now I know what my target market hobbies I am able to design my product around it
What size roughly is your ideal coffee table?	This will help me produce a coffee table that is in a suitable size for what my be necessary	Many people proffered their coffee table to be a medium size compared to the room size it is situated in



The results should be clearly presented. Use graphs and charts to help provide a visual representation of your results.

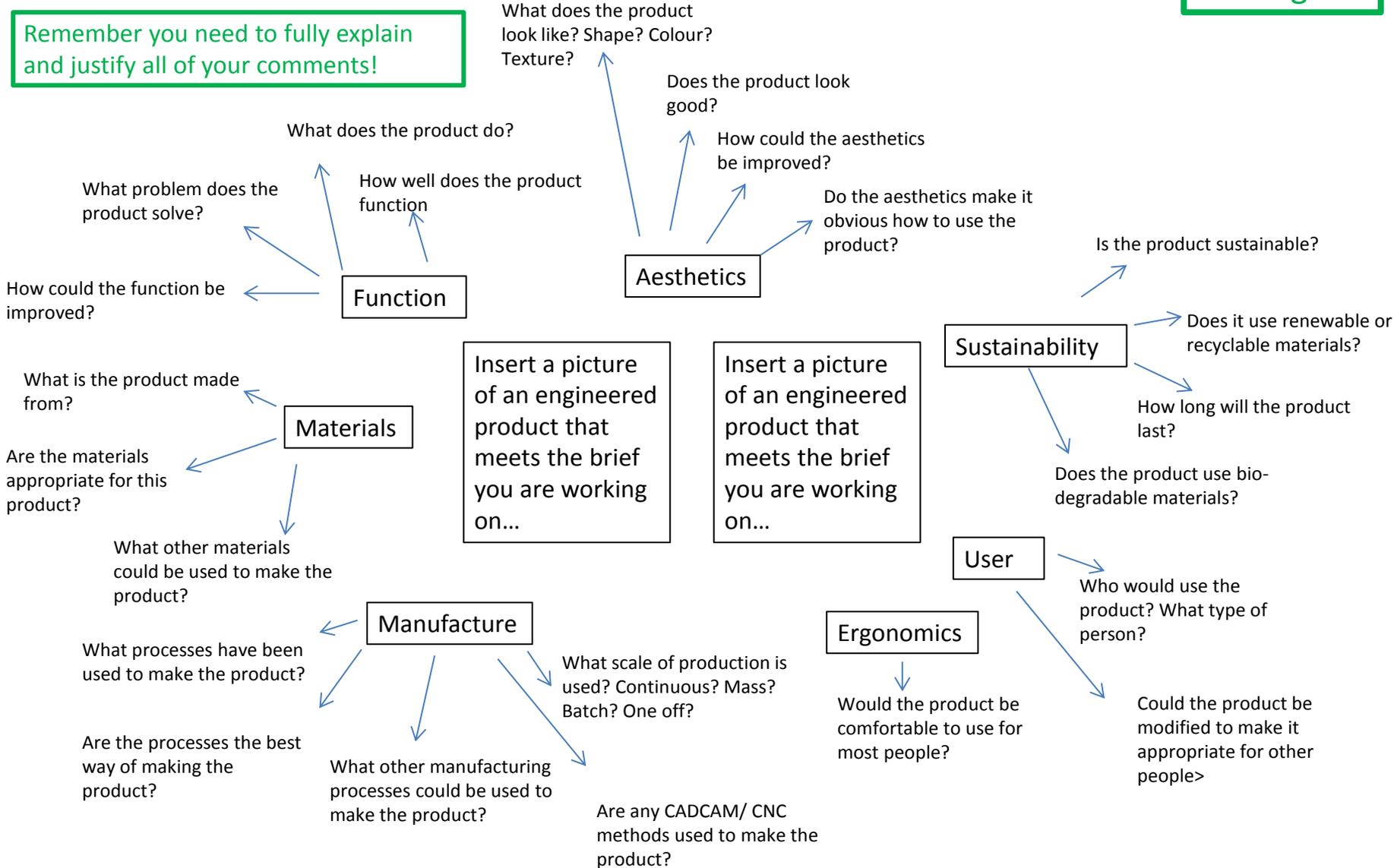
You should also analyse your results. What do they tell you? How will you use them during the rest of your project? How will they help make your product better?

Consider how you are going to carry out your questionnaire. Different ways include:

- Interviews in person.
- Paper forms.
- Internet (survey monkey).

	Advantage	Disadvantage
Interview in person...	It allows the chance to add to the questionnaire as you go. You can make the questionnaire specific to the person you are interviewing. If you want to find out more regarding an answer you can ask them to expand on it. They will complete the questionnaire.	Your presence can cause the interviewee to change or limit their answer. This is called interviewer bias and is a big problem when collecting research. You can end up with a lot of data to analyse.
Questionnaire handout...	It is easier to produce high quantities of questionnaires. Less interviewer bias. Interviewee can complete the questionnaire in their own time.	It is more likely that the interviewee will not bother to complete the questionnaire. The cost of printing the forms can add up. You can end up with a lot of data to analyse.
Online survey	It is very easy to get a large amount of questionnaires completed. It can be convenient for the interviewee to complete. Specialist websites such as survey monkey often have the ability to help process and analyse the results.	No use if your target market are not likely to own a computer. It is hard to control who completes your questionnaire.

Remember you need to fully explain and justify all of your comments!



## Materials Research

**How:** Decide a category of materials that you might use when making your product. Identify materials within that category that would be best to use. Explain their properties. Get some pictures of products made with each material. Explain the advantages and disadvantages of using the materials for a product like the one you are designing.

**Why:** This gives you a good knowledge of materials you could use when designing your product.

Category of materials you could select:

- Ferrous Metals
- Non Ferrous Metal
- Thermoplastics
- Thermoset Plastics
- Smart Materials
- Composite Materials
- Natural Timber
- Man Made Board (Timber)

Material Properties you could describe:

- Mechanical properties- hardness, toughness, ductility, malleability, tensile strength, density, elasticity, plasticity.
- Electromagnetic properties- electrical conductivity, electrical resistivity, magnetism.
- Thermal properties – thermal conductivity, thermal expansion, melting point.
- Chemical properties- resistance to corrosion, resistance to solvents, environmental degradation, reactivity.

## Non-Ferrous Metal:

### Aluminium



Aluminium is second to steel as the most widely used metal.

Aluminium has a winning combination on strength, low weight, corrosion resistance and it's recyclable.



Aluminium is 100% recyclable and nearly three quarters of all aluminium ever made remains in use today!

Very widely used non-ferrous metal

Malleable

Corrosion resistant

Good heat conductor

Good electrical conductor

Properties can be improved when alloyed with small amounts of other metals

Good strength to weight ratio.

Used for aviation and automotive uses.



Aluminium is extremely energy intensive to produce.

**How:** Identify a method of processing the types of material you have selected. Explain how they are carried out. Use diagrams and pictures to help show the process. Explain any advantages and disadvantages of using them to make your product.

**Why:** This gives you a good knowledge of how you can process the materials used in making your product.

## Image



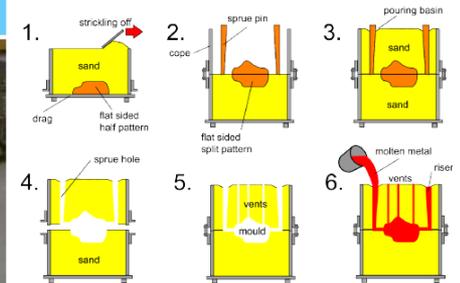
## Step by step

- A pattern is made.
- Each part of the pattern is placed on a base board. A mould box half is placed over it.
- Sand is packed around the pattern forcing it into contact with the pattern.
- The pattern is removed from the mould half.
- The mould halves are fitted together with locating pins ensuring correct alignment.
- Molten metal is poured into the running gate.
- Once the metal has solidified the mould is broken open.

## Materials used in this process

Metals with a low melting point. These include:

- Copper alloys
- Lead
- Zinc
- Aluminium
- Tin
- Certain steels



## Advantages

- Low cost process.
- Easy to operate.
- Advanced sand casting can produce very detailed and intricate parts.
- Flexible levels of production.

## Disadvantages

- Can be labour intensive.
- Unit costs can be high when used for one-off production.
- Parts may require a lot of finishing.



This would be a suitable method of manufacturing for my product because it has a low set up cost. This means that it would be suitable for batch production. Aluminium can be sand cast into complex shapes. However it will also mean that I have to spend a lot of time finishing the parts after I have sand cast them.

# Product Specification

**How:** Create a list of things that your design must do and explain why they must do each one. This must be influenced by your research.

**Why:** This ensures that you use your research to create successful design ideas. You will use it to help judge the success of your design ideas, development and final design.

A specification identifies what your design ideas must do. A specification is produced after the initial research has been carried out and before the design ideas are produced. It is influenced by the research that has been carried out. Specifications are usually split up into different categories such as aesthetics, function, materials, size etc. You must explain specifically what your design must be, do or achieve and justify your suggestions by explaining how your research has proven it.

It is essential to produce a thorough and relevant specification as it has a big impact on your design ideas, the success of your final product and your ability to evaluate your project.

See example on next page...

Some different formats that your specification can use...

Your specification must be specific!

**Function:** My product should play music and smoothly from all types of iPod. My product should also keep the iPod stable to avoid damage to the iPod product. Another rather popular feature is an external port to allow other mp3 players with a headphone jack to play through the speakers. Although this is a popular feature it is unnecessary if the product or parts cannot accommodate it.

**Target Market:** My product should appeal to the groups of people who go to art galleries and also enjoy a professional modern art look, this will range from students, teachers and professionals through the primary audience are teenagers due to their high ownership of iPod style phones.

**Social Issues:** My product should appeal to both genders as the modern art theme and sale locations severely decrease the market that my product would be available too, therefore limiting the target market to a specific gender would greatly decrease the sales of my product. I am keen that through the products design, people are exposed to and inspired by and educated by the influencing art movement.

**Style Features (Aesthetics):** My product should be influenced by the Cubist art movement, as this is energetic, vibrant and familiar to a lot of people, therefore it should follow the style principle in having a variety of simple shapes to form a collage, similar to that of the Cubist paintings. By using these features the product would appeal greatly to a professional modern art lover and teenagers alike.

**Moral Issues:** My product should be in some way educational, be it by showing younger or older people the themes and features of the cubist art movement. It would do this by showing this on the packaging and by demonstrating how cubism works through the design of the docking station. My design also has the responsibility to be environmentally sensitive.

**Material:** My materials should be sturdy and easy to clean as an iPod docking station would receive a lot of physical contact and would need to be cleaned easily so the original look is not diminished. However it is important that the base is hardwearing to avoid damage to the integrity and edges of my product. The materials would need to be too heavy as to allow easy transport and movement, however the materials need to have some weight to keep it stable. And also aesthetically the materials need to be colourful to meet the criteria of a cubist art work, but also strong to last a long time and not break easily if used wrongly. From an environmental perspective the material should be hard wearing and be either recyclable, or from a sustainable source or use a reclaimed material.

**Manufacture:** My product will initially be manufactured as a 'one off' product or prototype but have the potential to be batch produced if successful. I shall look to employ techniques that use minimal energy and create minimal waste for environmental purposes.

**Laws and Regulations:** My product should not have wires and electronics visible through the casing and should not be able to be tampered with. The product needs to be stable to avoid accidental harm. I would do this by performing multiple checks during production and design, it should run off a battery or 12v for safety.

**Environmental Impact:** My product should be made from materials that can be or have been recycled, apart from the electronic components as these are hard to recycle. These measures are important as due to increasing fears about the environment an environmentally friendly product would sell better.

**Ergonomics:** The final product should be easily accessible in terms of the buttons and port locations, if my product is designed to be used on a bed side table then the buttons need to be pointed upwards so you can see them while standing up. Alternatively they need to be pointed down or horizontal with the front edge, only if the docking station is used above shoulder height on a shelf etc.

**Size:** I have decided that most people do not buy a docking station to move around, and simply use it as stationary music centre for their room or living room. The only restrictions in terms of the iPod are the size of the hole that the iPod adapter will fit into, other than this a lot can be changed. I will base the size around need and will look to keep it relatively compact so it is easy to transport from the shop and also too keep costs down.

Spec Point; What your product must do...	Justification; Why it needs to do this...
Aesthetics;	
Function;	
Materials;	
Sustainability;	
Size;	
Ergonomics;	
Manufacture;	
Moral/social/ ethical issues;	

**Function**  
My Table should hold mugs and store news papers and TV remotes

**Sustainability**  
The table should be made from materials that can easily be re-cycled. I should design the table so it produces as little waste as possible

**Aesthetics**  
It should be modern, be made of 2 colours and be minimalistic

**Target Market**  
The table should appeal to 1<sup>st</sup> time buyers, mainly couples who are aged 25-30 years old

**Material**  
The material should be cheap, rigid, and easy to paint

**User Needs The**  
Table should be compact, cheap, suitable for storing a range of items on and easy to move around

**Size**  
The table should be no more than 1 meter long, 800mm wide and 800mm tall

PRODUCT: EASY / ROCKING CHAIR

**MY SPECIFICATION**

V/Ryan © 2010 World Association of Technology Teachers

My Product Specification is written below. It is a check list that will help me develop my product. It has been checked and agreed with my client / customer

MY SIGNATURE: \_\_\_\_\_

CLIENT SIGNATURE: \_\_\_\_\_

**TARGET MARKET:** The target market will be the customers of my client's furniture company. The customers are mainly home/flat owners.

**FUNCTIONS:** The chair will be simple, effective and modern looking. It will create a sense of rest and comfort which will enable the user to relax. The chair will be supplied as a flat pack, for ease of distribution and to reduce transport/distribution costs. It will be an interesting piece of furniture.

**MATERIALS:** The 'rocker rails' will be manufactured from AeroPLY which can be formed easily into a variety of shapes. The rest of the chair will be manufactured from beech, which can be machined effectively. Also, beech is quite easy to cut and shape by hand. It is an attractive natural wood.

**ERGONOMICS / OVERALL SIZES:** I will use measurements derived from my ergonomics research. The chair will be comfortable to use as it will be designed to support the lower back. The overall sizes will be approximately Height 750mm, Width 550mm, depth 650mm.

**MANUFACTURING PROCESSES AND QUANTITY:** The chair will be manufactured as a prototype. This means it will be manufactured largely by hand. Manufacturing processes including using CAD/CAM will be applied to engravings/carvings to the back. A former will be developed to aid the manufacture of the rockers.

**EQUIPMENT / TOOLS - REQUIREMENTS:** Hand tools - firmer chisels, mallet, hand files, hand drill, woodworkers try square and marking knife. Machines - drilling machine, fretsaw, CNC router, sanding disc, hand power sander.

**MAINTENANCE REQUIREMENTS:** The chair will need regular polishing to protect the varnished finish. Occasionally, the chair will need a safety check to ensure that the joints are not damaged and that the rockers move smoothly, allowing the chair to rock forwards and backwards with ease.

**PRODUCT LIFE SPAN AND LIFE CYCLE:** The chair will be designed to last a life time and with proper care, longer still. When the chair eventually reaches the end of its useful life, it will be possible to reuse or recycle the wood. Quality natural wood is to be used with this purpose in mind. All other components will be manufactured from quality materials or recycled/reclaimed materials.

**AESTHETIC APPEARANCE (SHAPE, COLOUR, TEXTURE):** The chair will be designed with aesthetics in mind. The shapes will flow, following smooth lines and curves. Natural beech will be used as it has a light brown colour and will fit in with the modern surroundings found in the home of my client. Natural wood is to be used as this will be a quality one off piece of commissioned furniture.

**QUALITY ASSURANCE:** Quality assurance will be carried out to ensure that all the systems and procedures are in place to ensure that a quality piece of furniture is manufactured. The client will be constantly updated and consulted on all aspects of design and manufacture.

**QUALITY CONTROL:** The chair will be checked for quality and imperfections/damage at every stage of manufacture. Corrections/repairs will be made so that the chair is manufactured to the highest possible quality. A final quality check will take place before the chair is given to my client.

**COST:** The chair will be manufactured for a total of £120. This price includes materials only and does not include labour costs, tools and equipment requirements. These are currently available in school.

**TIME SCALE AND PLANNING:** The chair will not exceed 45 hours to design and manufacture. I estimate that approximately half the time will be spent on design work and half on manufacturing, which will include model making.

**HEALTH AND SAFETY:** Health and Safety regulations will be adhered to during the manufacturing process. When designing, the chair will be rigorously tested for stability and strength. Every effort will be made to ensure that the client or his customers cannot be harmed when using the chair.