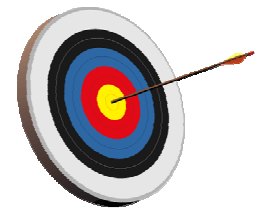


GCSE PRODUCT DESIGN



What do I need to aim for....?

**A guide to the successful completion of
the coursework component**



Task analysis & research phase

What I need to have (target):

Target	DRAFT	HIT?
Initial thoughts on the theme or task		
Identified a user group for the product		
Referred to / analysed some existing products		
Identified some problems & possible solutions		
Referred to how I will research the theme or task		
Written a design brief		
Used a wide variety of sources to gather my research (see table below)		
Summarised my research and made conclusions		
Explained the relevance of the research methods I have used		
Carried out user group investigation and made conclusions from this		
Written a clear and concise specification		

Ask analysis & research explained:

- Initial thoughts can take the form of a brainstorm, mind-map or spider diagram showing that you have thought about the task or theme you are about to embark on.
- Look at some examples of existing products (*both successful and unsuccessful*) to give you an idea of what's out there already. Are you going to compete with these products, improve upon these products or design something new and innovative?
- Try to identify some problems or challenges that you think you could encounter or face. These can range from specific problems with a theme i.e. products for the blind or, the suitability of the material i.e. waterproof. Ask yourself "How could I try and overcome these difficulties or problems?"
- Establish what research you will need to embark on. The list below illustrates some possible routes:

Image board	A day in the life of exercise	Product analysis
Mood board	Manufacturing methods	Product disassembly
Client board	Testing programs – control	Product comparison
User group survey	Building circuits – electronics	Looking at familiar products
Appropriate internet research	Material investigation	Impact on the environment
Software packages	Packaging analysis	Sustainable design
E-mail	Instructions investigation	External components
Visit / tour / trip	Logo's and information	Knock down fittings
Telephone conversation	Making models & mock-ups	Volume production
Interview	Ergonomics / anthropometrics	Health & safety / BS

It's important to note that you do not need to do everything on the list. Choose the methods of research that are best suited to your chosen task or theme. The generic ones you must cover have been highlighted.

- Write a clear and concise design brief.
- Now carry out the research you have specified (relevant to your task or theme) and make sure that you summarise your findings regularly rather than just at the end of the research phase.
- Write a clear and concise specification (**see support sheet 1a for details**)

Now move on to sheet 2: Product development phase



Product development phase

What I need to have (target):

Target	DRAFT	HIT?
A wide range of different design ideas or solutions		
Ideas or solutions are annotated and are evaluated against the specification		
Used a range of different designing & graphical techniques		
Incorporated CAD work		
Developed the capability to be batch / mass produced within my design work		
Used models and mock-ups to develop my ideas or solutions in 3D		
Tested my models and mock-ups to help modify and improve my design/s		
Drafted an order / plan of making highlighting key manufacturing processes		
Carried out trial runs of the key manufacturing stages		
Documented key changes, modifications and amendments that I have made		
Drawn plans to support the making stages		
Produced an amended product specification		
Produced a final product drawing		

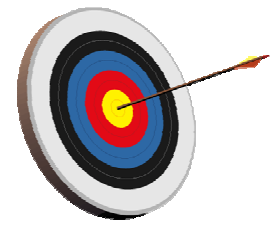
Product development explained:

- Initial thoughts should be in rough sketch format.
- Look at your ideas and evaluate them against your specification. Which ones match, which ones don't?
- Develop these ideas through further sketching and modelling work. Make rough models using paper and card or even junk or recycled materials. This will help you to visualise your ideas in 3D a lot easier.
- Photograph and record the modelling stage and use it to inform further development of your ideas.
- Develop the product solutions ability to be batch or massed produced. This will involve making mock-ups of jigs, moulds, sawing/drilling/supporting & holding aids, templates and so on. These will need to be tested and amended where applicable until the desired effect is achieved.
- Go through the manufacturing stages for example using CAD/CAM, the steam chest, the vacuum former, hand tools, wood turning, using adhesives, joining materials etc and test and trial some of these processes. Remember all of this will support the products ability to be produced in volume.
- Develop the product packaging – make mock-ups and test, trial and evaluate.
- Test and record any pre-manufactured items (or pre-bought items) such as nuts, bolts, screws, hinges, KD fittings, electronic components, rods, handles and so on.
- Highlight how the product would be manufactured in an industrial context. Do the processes you have highlighted during the product development correspond, are they done on a larger scale, is specific tooling or machinery used?
- It is helpful to use sequence diagrams (storyboards) to help illustrate how the product will be manufactured.
- The table below illustrates the key components of the product development stage. Remember, not all of them need to be covered as some will not be relevant to your task or theme!

Sketching / drawing	Sketch modelling	Working drawing
Use of photographs	Scale mock-ups	Making plan
Annotating / labelling	Jig	Production plan / order
CAD	Template	Modifications shown
2D & 3D drawing	Former	Manufacturing processes
Rendering & shading	Mould	Volume capability illustrated
ICT / DTP	Pattern	Tested and trialled
Inspirational material	Stencil	Industrial practices
Material manipulation	CAM	Sequence diagram
Context testing	Drilling / sawing / support aids	Flow chart / diagram

- Write a final product specification and include a final product drawing.

Now move on to sheet 3: Planning & manufacturing



Planning & making phase

What I need to have (target):

Target	DRAFT	HIT?
A detailed plan/order of making		
I have used working drawings, exploded diagrams, cutting lists to support making		
Used tools, equipment and machinery safely & correctly		
Kept a detailed making log with reference to changes & modifications I have made		
I have highlighted H&S as well as risk assessment and procedures		
Used QA and QC throughout the making stage		
The product demonstrates a high level of accuracy		
The product is complete and has an appropriate finish applied		
The product is appropriately packaged with instructions / information		

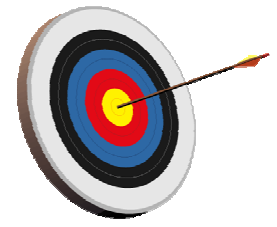
Planning & making explained:

- All of your making should be pre-planned. This enables you to follow your instructions or an order of work in an appropriate sequence. These should take the form of time plans such as a gantt chart, flow charts, written order of work, working drawings & exploded diagrams, blue-prints, patterns, cutting lists etc. However, sometimes things don't always go to plan – see next point!
- keep a 'making log' or diary that highlights changes, amendments, problems & difficulties as you progress through the manufacturing stage. You can then refer to this later during your review and evaluation.
- It's important that you use all the tools, equipment and machinery in a safe and correct manner. You will be expected to highlight key health and safety issues as well as identifying risks and how to minimise these risks.
- QA (Quality assurance) and QC (Quality control) are also important aspects of your manufacturing. What checks are need to made to ensure that the product being fabricated to the specified standards. This is useful when considering the product for volume production as these checks take place regularly in industry.
- You must fabricate (make) the final product to the best of your ability. Don't cut corners, be patient, don't expect instance results. A successful product is a well made product.
- Make sure that a suitable finish is applied to the product. Remember, plastics are self-coloured. Woods require varnish, staining, polishing (they can also be painted), metals require polishing or lacquering and so on. Also remember that children's toys require 'child safe paints' applied.
- Package your product remembering to include the appropriate information, instructions and/or logo's such as age range, recyclable and so on. If the product is to be assembled by the customer then clear instructions must be provided either on the packaging itself or by using a separate sheet. Remember simplified images are best for instruction sheets – don't make them too complicated.
- The list below gives you some key examples of what you can/should be doing for this phase of the coursework.

Remember, that not all of them will be applicable to your chosen theme or task but the ones you must include are highlighted in yellow.

Making plan	CAD drawings	Quality control	
Working drawing / blueprint	Reference to CAM tool settings	Quality assurance	
Sequence diagram	Photo record of CAM process	Health & safety / risk / BS	
Cutting list of materials	Making log / diary	Appropriate finish	
Range of hand tools	Instructions / information	Photo record of making	
Range of equipment	Components incorporated	Product packaging	
Range of skills	Costing sheet/s	External / industrial processes	
Competence & confidence	Parts list / breakdown		

Now move on to sheet 4: Testing, reviewing & evaluating



Testing, review & evaluating phase

What I need to have (target):

Target	DRAFT	HIT?
Clear evidence of product testing in the context the product is designed for		
Third party review and analysis of product (the user / user group)		
Review of the manufacturing stages		
Review of time management and pre-planning		
Review of materials and final finish used		
Evaluation of processes used and suitability of these to the task		
Evaluation of control systems to support manufacturing		
Suggestions for further modifications and improvements to the product		
Packaging review		
Evaluation against existing products (product comparison exercise)		
Evaluation against original specification – illustrating main modifications / changes		
Closing statement and photographs of the completed product.		

Testing, review & evaluation explained:

Don't just explain what you did! Write a critical review of the assignment but focus on the making aspects rather than the research and designing stages.

- You have to show clear evidence that you have tested the product you have manufactured in the context that you originally specified. For example, if you have designed a children's toy – give it to a child to play with. If you have designed a device for the blind – ask someone that is visually impaired to test the product for you. It's essential that you record the results of your testing and present these.
- Ask the user's to comment on the product and present their views and opinions.
- Review and reflect on the manufacturing stages, your pre-planning and time management (this can include organisation), the materials you selected and the type of finish you applied.
- Review and reflect on the control systems you produced to help and support you with your making. How efficient were they, did they function as intended, did you have to change and amend them and so on.
- Now that the product is complete, how could it be improved. Suggest some modifications and changes that could be made to push your product further. This could be in terms of mass marketing, industrial manufacture or the market place that you are aiming at.
- How successful is the product packaging? How could this be improved?
- Find some existing products and compare your product with them – how do they compare?
- Have you met your original specification? Explain what changes took place and give a reason why aspects of this weren't met.
- It's important to finish with a closing personal statement on how you feel the assignment went. You should also include plenty of photographs of the finished item.
- The list below gives you an idea of all the activities that take place during this final phase. Remember that some will not be applicable to your chosen task or theme. The essentials are highlighted for you.

Product testing	Review of planning	Further improvements
Third party review	Review of manufacturing	Review of packaging
Survey / questionnaire	Review of materials	Existing product comparison
Other peoples comments	Review of control systems	Specification evaluation
Visit to relevant company	Review of final finish	Photographs of product

A sheet with all four of the checklists can be found on the back of this booklet.



Final checklist

Target	HIT?
Task analysis & research phase:	
Initial thoughts on the theme or task	
Identified a user group for the product	
Referred to / analysed some existing products	
Identified some problems & possible solutions	
Referred to how I will research the theme or task	
Written a design brief	
Used a wide variety of sources to gather my research	
Summarised my research and made conclusions	
Explained the relevance of the research methods I have used	
Carried out user group investigation and made conclusions from this	
Written a clear and concise specification	
Product development phase:	
A wide range of different design ideas or solutions	
Ideas or solutions are annotated and are evaluated against the specification	
Used a range of different designing & graphical techniques	
Incorporated CAD work	
Developed the capability to be batch / mass produced within my design work	
Used models and mock-ups to develop my ideas or solutions in 3D	
Tested my models and mock-ups to help modify and improve my design/s	
Drafted an order / plan of making highlighting key manufacturing processes	
Carried out trial runs of the key manufacturing stages	
Documented key changes, modifications and amendments that I have made	
Drawn plans to support the making stages	
Produced an amended product specification	
Produced a final product drawing	
Planning & making phase:	
A detailed plan/order of making	
I have used working drawings, exploded diagrams, cutting lists to support making	
Used tools, equipment and machinery safely & correctly	
Kept a detailed making log with reference to changes & modifications I have made	
I have highlighted H&S as well as risk assessment and procedures	
Used QA and QC throughout the making stage	
The product demonstrates a high level of accuracy	
The product is complete and has an appropriate finish applied	
The product is appropriately packaged with instructions / information	
Testing, review & evaluation phase:	
Clear evidence of product testing in the context the product is designed for	
Third party review and analysis of product (the user / user group)	
Review of the manufacturing stages	
Review of time management and pre-planning	
Review of materials and final finish used	
Evaluation of processes used and suitability of these to the task	
Evaluation of control systems to support manufacturing	
Suggestions for further modifications and improvements to the product	
Packaging review	
Evaluation against existing products (product comparison exercise)	
Evaluation against original specification – illustrating main modifications / changes	
Closing statement and photographs of the completed product.	

Please note: Coursework should not exceed 25 sides of A3. It should however, clearly document the process of product development from conception to completion.