GCSE Design and Technology
2017 Specification - NEA Guidance

wjec cbac

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- NEA – Non Examined Assessment – 50% of the qualification
- Approximately 35 hrs of candidate work
- Design & Make task from a contextual challenge set by WJEC
- Worth 100 raw marks
- Internally assessed and externally moderated

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Assessment Criteria		Marks	Assessment objective
(a)	Identifying and investigating design possibilities.	10	AO 1
(b)	Developing a design brief and specification.	10	
(c)	Generating and developing design ideas.	30	AO 2
(d)	Manufacturing a prototype.	30	
(e)	Analysing and evaluating design decisions and prototypes.	20	AO 3
	Total	100	

- The design context must be analysed critically.
- There will be a number of possible design tasks identified.
- Detailed and relevant research will be evident
- Consider the users
- Analysis of existing products
- Research into past / present professionals

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	Total	100	

- Opportunities are carefully considered before final brief.
- Understand the task and the needs and wants of users.
- A clearly defined design brief is evident.
- A detailed Specification is generated to drive designing.
- Measurable criteria included.
- The Spec is used throughout the designing process.

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(e)	Analysing and evaluating design decisions and prototypes.	20	AO 3
	Total	100	

- 30% of the NEA!
- An iterative approach is required.
- A range of design strategies.
- Clear and effective testing.
- Analysis against Spec identifies further refinements.
- Testing and selection of :
  - Materials
  - Components
  - Dimensions
  - Manufacturing / production
  - Finishing
- High level skills evident

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(e)	Analysing and evaluating design decisions and prototypes.	20	AO 3
	Total	100	

- Another 30% of the NEA!
- Stages of production timeline.
- Completed prototype to schedule.
- Successful high level making skills.
- Excellent appreciation of materials and components.
- High levels of accuracy in outcome.
- Prototype functions perfectly
- Meeting the user needs and wants.

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	Total	100	

- 20 Marks available.
- On-going evaluation and analysis of ideas as they develop.
- Appraising concepts through the iterative process.
- A critical analysis and evaluation of the FINAL prototype.
- User trials / testing and opinions of potential users.
- Reflection on feedback and further development issues identified.
- Detailed suggestions for modifications.

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- Summary of NEA changes against current CAT.
- 35hr Design & Make v 30hr Controlled Task
- 5 Assessment Criteria v 20 Assessment Criteria
- 100 Raw Mark Total v 180 Raw Mark Total
- 50% of Qualification v 60% of Qualification
- No prescribed format v CAT workbook
- Iterative Design Process v Linear Design Process
- Development bias v Very structured developments
- Contextual Challenge v Defined Briefs
- Very testing focussed v structured approach

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- 35hr Design & Make v 30hr Controlled Task
- 3 Contextual Challenges available June 1st
- Candidates choose to tackle 1 challenge
- No CAT Workbook – no pre-printed sheets
- Eased up controlled conditions
- Full understanding of the context leads to various design problems identified
- Supplementary design work will be submitted
- Far more focus on development / testing
- More analysis and decision making required

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- 5 Assessment Criteria v 20 Assessment Criteria
- Marks are in banded descriptors
- Total mark reduced to 100
- Smaller margin of tolerance
- Descriptors are very clear
- Less small mark allocations
- No easy marks given to candidates
- Less structure given to candidates
- More freedom but less guidance

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- 100 Raw Mark Total v 180 Raw Mark Total
- Tolerance will move from +/-11 to +/-6
- AO1 – setting the scene 20 marks
- AO2 – designing, testing, analysing, evaluating and reflecting in an iterative approach – 80 marks.

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- 50% of Qualification v 60% of Qualification
- Exam becomes more important
- Candidates cannot ‘ride’ on the practical unit
- NEA is completed in terminal year of award
- Equal emphasis must be placed on teaching the Specification, skills, knowledge and understanding
- NEA is not less important
- Onus is very candidate based
- More time available to complete NEA

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- No prescribed format v CAT workbook
- There will be NO SET FORMAT for the NEA
- Candidates / centres will need to adopt a successful approach
- Informal ‘sketchbook’ and Formal ‘portfolio’
- More guidance on this, with exemplars
- We cannot provide too much structure – this is against the Regulatory Protocol.
- Candidates will need to be trained in a particular style to complete the NEA.

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- Iterative Design Process v Linear Design Process
- No sequential CAT pages – open book approach
- Informal sketchbook to cater for an iterative approach to design and development
- Multiple starting points for project work
- Think – test – reflect
- Trialling and evaluating / risk reward
- https://www.youtube.com/watch?v=16rGwTX4NcM
- https://www.youtube.com/watch?v=WcFSZGvXtjA

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Interaction of Mind and Hand

Imaging and thinking inside the head

Confronting reality Outside the head

First Impressions

Exploring

Speculating

Taking Risks

Clarifying

Validating

Consolidating

Critical Appraisal

Discussion

Sketching

Diagrams

Graphs

Data

Modelling

Testing

Reflecting

Prototyping

Provisional Solution

Potential of more developed thinking

Potential of more developed solutions

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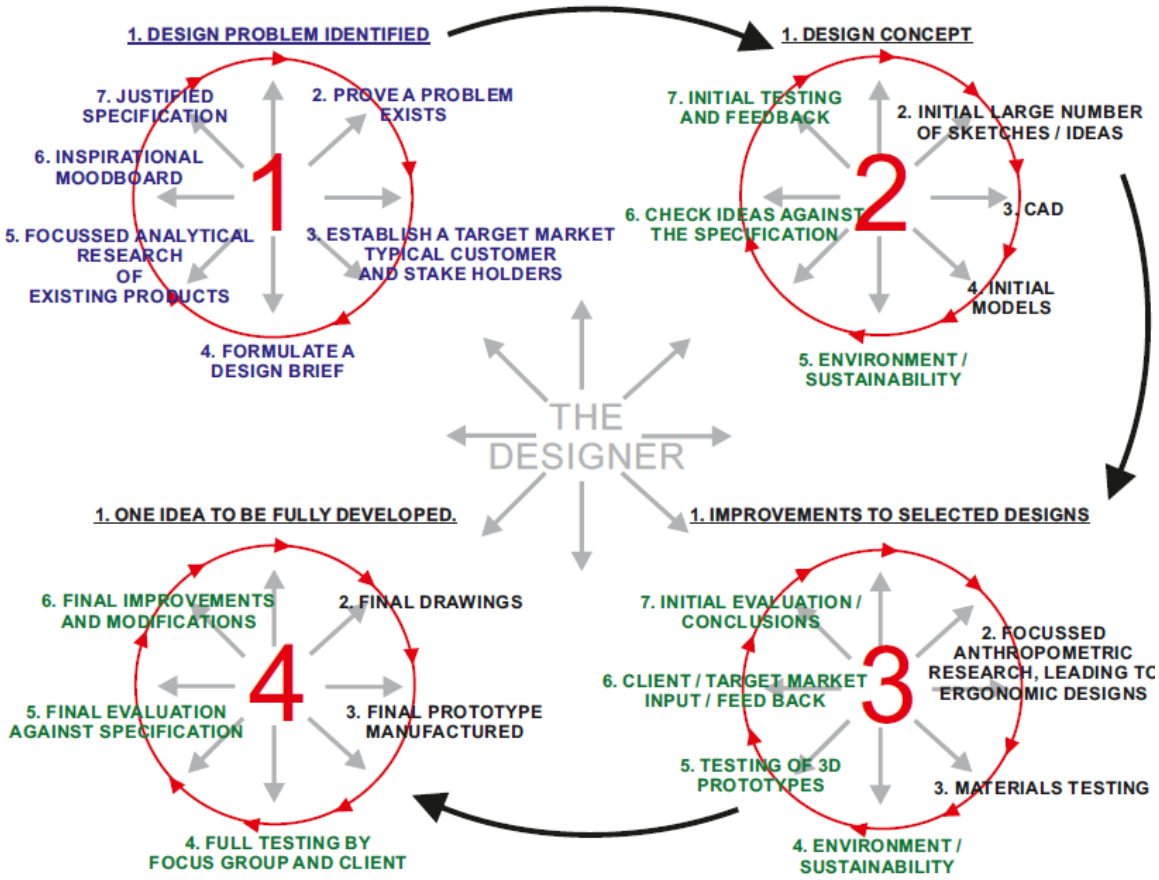

Iterative Designing

- Explore
- Create
- Evaluate

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- Development bias v Very structured developments
- Candidates need to test ideas!
- Analyse the results
- Refine the concept
- Test the next Iteration!
- Evidence of this informal process is critical
- No more one A3 page by page approach
- Too contrived! One size does not fit all!
- A* candidates will be pleased
- C/D candidates will need training

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- Contextual Challenge v Defined Briefs
- 3 very short ‘contexts’ will be provided
- Much less detail – more like titles
- Broad topics, no structure or guidance
- Candidates must do ‘more’ relevant ‘digging’
- They must identify multiple design possibilities
- To do this they must understand the context
- User needs and wants are critical
- Selection of the chosen design task to tackle

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- Very testing focussed v structured approach
- Candidates can start the process by modelling
- Testing ideas to evaluate their success
- How many pages do I need?
- As many as it takes!
- A much more practical ‘hands on’ approach
- This will suit candidates
- Introduction of rapid prototyping
- Candidates will understand ‘issues’ more clearly
- Lean design – cut away the less important aspects

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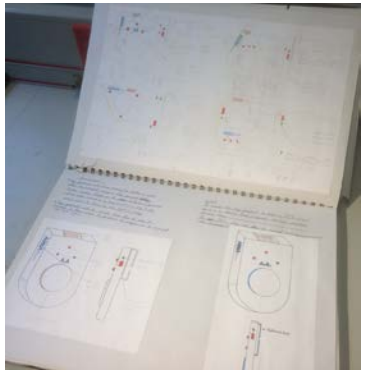

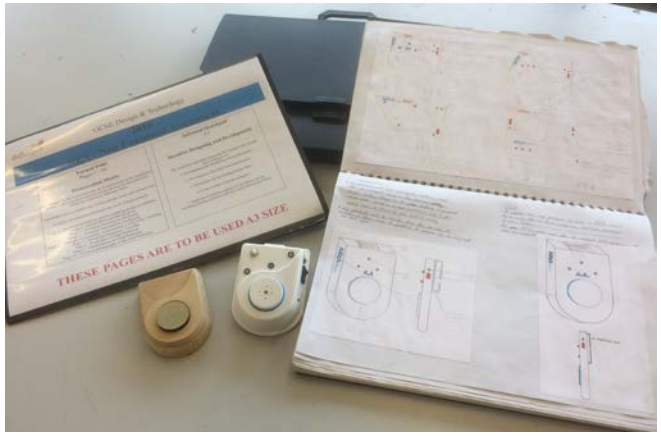

What will the NEA task Look like?

- A3 Formal Presentation Folio
- A3 Informal Sketchpad Folio
- A fully functioning Final Prototype
- Supporting models, prototypes, tests and iterations.

Where do I start?

- Analyse the 3 contexts
- Focus on user requirements
- Evaluate existing products
- Research new materials / processes / techniques
- Focus on the problem
- Look at designers / other practitioners

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INFORMAL Sketchpad

- Identifying and investigating design possibilities.
- Generating and Developing Design Ideas.

Practical outcomes

- Final Prototype (Fully functioning high quality product)
- Any supporting practical pieces including models, jigs, formers, patterns, tests, trials, iterations.

FORMAL Presentation Folio

- Final Brief and Specification
- Final Prototype – Pictorial details
- Final Prototype – Technical details
- Final Prototype – Production details
- Sequence of Production
- Evaluation of Final Prototype
- Modifications and further developments
- Photographs of Final Prototype

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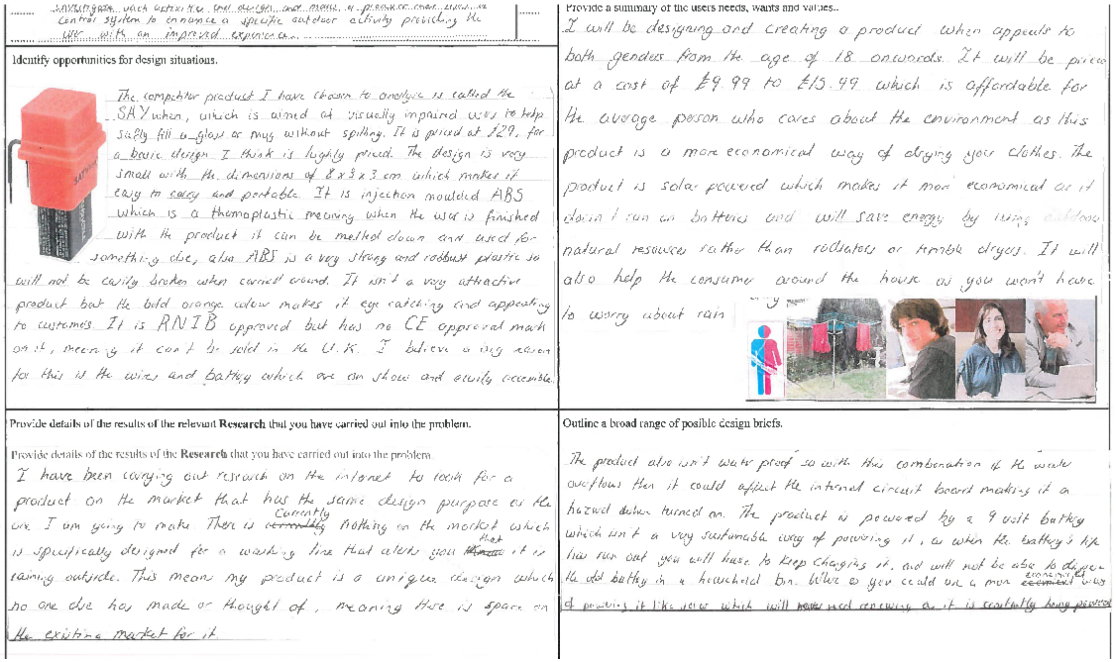
Assessment Criteria		Marks	Assessment objective
(a)	Identifying and investigating design possibilities.	10	AO1


[illegible] control system to enhance a specific outdoor activity providing the user with an improved experience.

Identify opportunities for design situations.

The competitor product I have chosen to analyse is called the SAY when, which is aimed at visually impaired users to help safely fill a glass or mug without spilling. It is priced at £29. for a basic design I think is highly priced. The design is very small with the dimensions of 8 x 3 x 3 cm which makes it easy to carry and portable. It is injection moulded ABS which is a thermoplastic meaning when the user is finished with the product it can be melted down and used for something else, also ABS is a very strong and robust plastic so will not be easily broken when carried around. It isn't a very attractive product but the bold orange colour makes it eye catching and appealing to customers. It is RNIB approved but has no CE approval mark on it, meaning it can't be sold in the U.K. I believe a big reason for this is the wires and battery which are on show and easily accessible.

Provide a summary of the users needs, wants and values..

I will be designing and creating a product which appeals to both genders from the age of 18 onwards. It will be priced at a cost of £9.99 to £15.99 which is affordable for the average person who cares about the environment as this product is a more economical way of drying your clothes. The product is solar powered which makes it more economical as it doesn't run on batteries and will save energy by using outdoor natural resources rather than radiators or tumble dryers. It will also help the consumer around the house as you won't have to worry about rain

Provide details of the results of the relevant **Research** that you have carried out into the problem.

Provide details of the results of the **Research** that you have carried out into the problem.

I have been carrying out research on the internet to look for a product on the market that has the same design purpose as the one I am going to make. There is ~~currently~~ currently nothing on the market which is specifically designed for a washing line that alerts you ~~[illegible]~~ that it is raining outside. This means my product is a unique design which no one else has made or thought of, meaning there is space on the existing market for it.

Outline a broad range of posible design briefs.

The product also isn't water proof so with this combination if the water overflows then it could affect the internal circuit board making it a hazard when turned on. The product is powered by a 9 volt battery which isn't a very sustainable way of powering it, as when the battery's life has run out you will have to keep changing it, and will not be able to dispose the old battery in a household bin. Where as you could use a more ~~economical~~ economically way of powering it like solar which will never need renewing as it is constantly being powered

INFORMAL Sketchpad

- The design context must be analysed critically.
- There will be a number of possible design tasks identified.
- Detailed and relevant research will be evident
- Consider the needs and wants of users
- Analysis of existing products
- Research into past / present professionals

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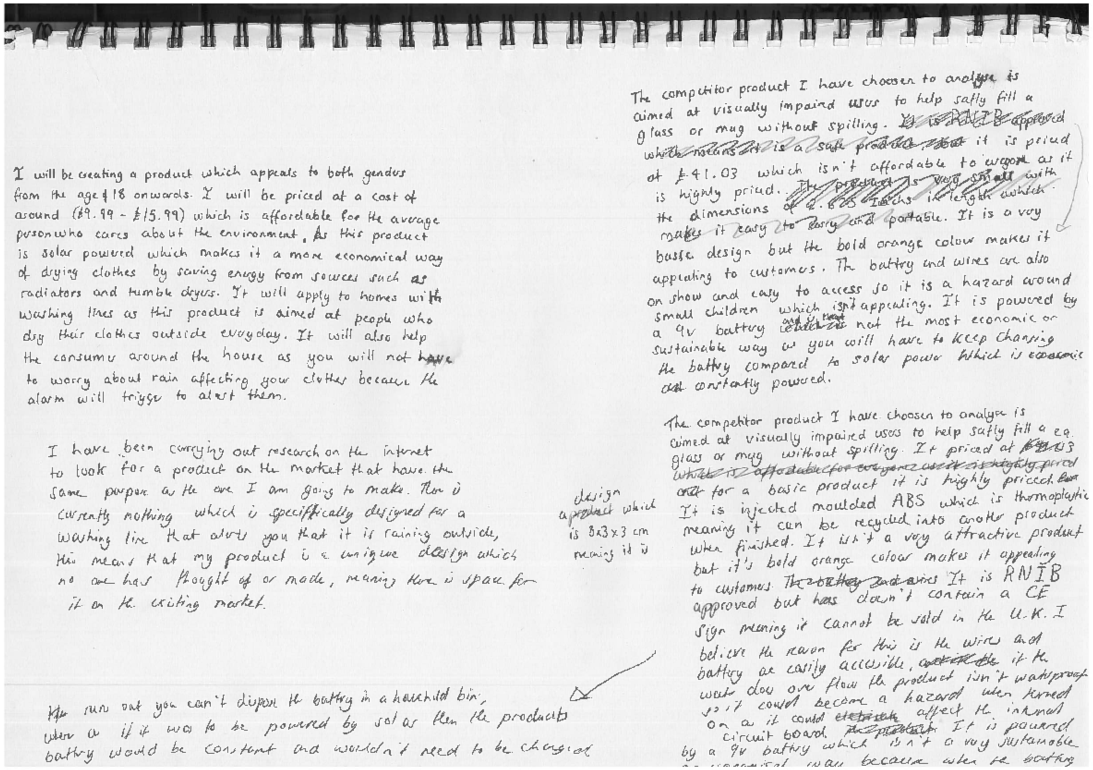

I will be creating a product which appeals to both genders from the age of 18 onwards. I will be priced at a cost of around (£9.99 - £15.99) which is affordable for the average person who cares about the environment. As this product is solar powered which makes it a more economical way of drying clothes by saving energy from sources such as radiators and tumble dryers. It will apply to homes with washing lines as this product is aimed at people who dry their clothes outside everyday. It will also help the consumer around the house as you will not have to worry about rain affecting your clothes because the alarm will trigger to alert them.

I have been carrying out research on the internet to look for a product on the market that have the same purpose as the one I am going to make. There is currently nothing which is speciffically designed for a washing line that alerts you that it is raining outside, this means that my product is a unique design which no one has thought of or made, meaning there is space for it on the existing market.

the run out you can't dispose the battery in a household bin, where as if it was to be powered by solar then the products battery would be constant and wouldn't need to be charged

The competitor product I have choosen to analyse is aimed at visually impaired users to help safely fill a glass or mug without spilling. ~~It is RNIB approved which means it is a safe product, but~~ it is priced at £41.03 which isn't affordable to everyone as it is highly priced. ~~The product is very small with the dimensions of 2.625 inches in length which makes it easy to carry and portable.~~ It is a very basic design but the bold orange colour makes it appealing to customers. The battery and wires are also on show and easy to access so it is a hazard around small children which isn't appealing. It is powered by a 9v battery and it is not the most economic or sustainable way as you will have to keep changing the battery compared to solar power which is economic and constantly powered.

design a product which is 8x3x3 cm meaning it is

The competitor product I have choosen to analyse is aimed at visually impaired users to help safely fill a eg. glass or mug without spilling. It priced at £41.03 ~~which is affordable for everyone as it is highly priced~~ for a basic product it is highly priced. It is injected moulded ABS which is thermoplastic meaning it can be recycled into another product when finished. It isn't a very attractive product but it's bold orange colour makes it appealing to customers. ~~The battery and wires~~ It is RNIB approved but doesn't contain a CE sign meaning it cannot be sold in the U.K. I believe the reason for this is the wires and battery are easily accessible, if the water does over flow the product isn't waterproof so it could become a hazard when turned on as it could affect the internal circuit board. It is powered by a 9v battery which isn't a very sustainable or economical way because when the battery

INFORMAL Sketchpad

- Understanding of the problem.
- Focussing on users.
- Research strategies.
- Analysis of information.
- Focussed relevant research.

(a) Identifying and investigating design possibilities [AO1] The candidate has:	Band
9 – 10 marks • undertaken thorough and effective identification of opportunities for the development of designs within the prescribed context. • undertaken detailed, relevant research and investigation, clearly linked to the context and, where appropriate, the work of past/present professionals and companies. • undertaken detailed and effective analysis of information, reflecting the needs, wants and values of clients or potential users. • identified a broad range of problems/opportunities to clearly inform the development of possible design briefs.	4
6 – 8 marks • undertaken effective identification of opportunities for the development of designs within the prescribed context. • undertaken relevant research and investigation, linked to the context and, where appropriate, the work of past/present professionals and companies. • undertaken effective analysis of information, reflecting the needs, wants and values of potential users. • identified a range of problems/opportunities to inform the development of possible design briefs.	3

(a) Identifying and investigating design possibilities [AO1] The candidate has:	Band
3 – 5 marks • identified some opportunities for the development of designs within the prescribed context. • undertaken research and investigation, generally linked to the context and, where appropriate, the work of past/present professionals and companies. • undertaken some analysis of information, though the needs, wants and values of potential users may not have not been fully considered. • identified some problems/opportunities which partially inform the development of possible design briefs.	2
1 – 2 marks • identified one opportunity for the possible development of designs within the prescribed context. • undertaken little research and investigation, which is only partially linked to the context. • undertaken a basic analysis of information, with little or no consideration of the needs, wants and values of potential users. • identified few problems/opportunities and developed a design brief with little reference to their investigations.	1
0 marks • produced no work that is worthy of a mark.	

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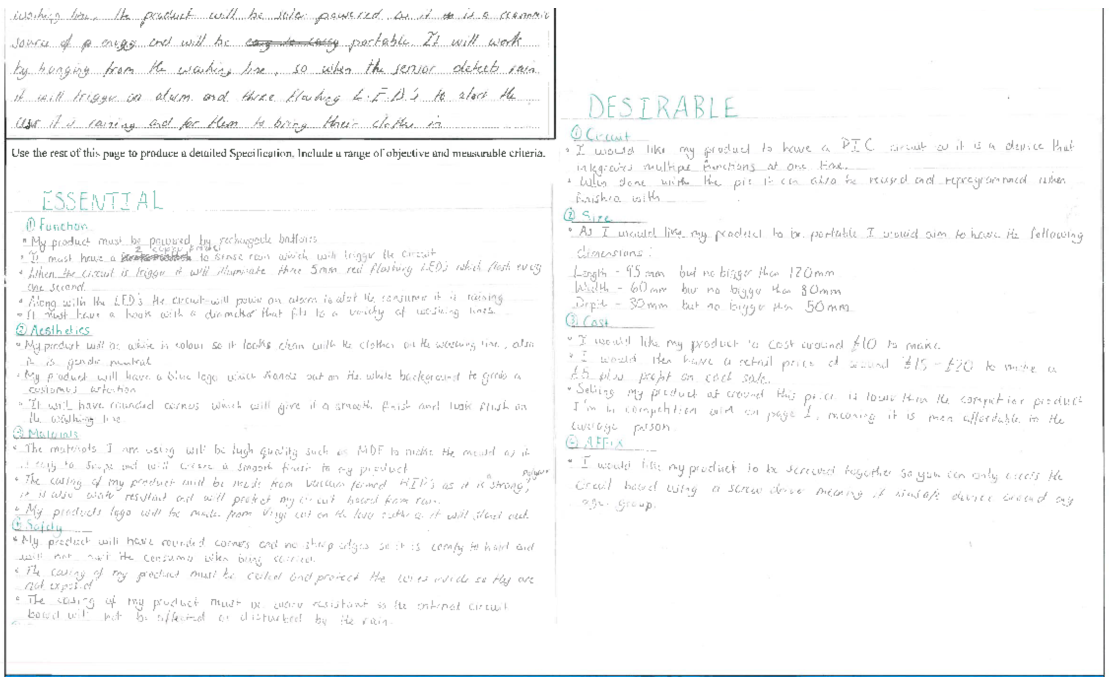
Assessment Criteria		Marks	Assessment objective
(b)	Developing a design brief and specification.	10	AO1



washing line. The product will be solar powered as it is a renewable source of energy and will be portable. It will work by hanging from the washing line, so when the sensor detects rain it will trigger an alarm and three flashing L.E.D's to alert the user it is raining and for them to bring their clothes in.

Use the rest of this page to produce a detailed Specification. Include a range of objective and measurable criteria.

ESSENTIAL

① Function
- My product must be powered by rechargeable batteries
- It must have a 2 copper probes to sense rain which will trigger the circuit
- When the circuit is trigger it will illuminate three 5mm red flashing LED's which flash every one second.
- Along with the LED's the circuit will power an alarm to alert the consumer it is raining
- It must have a hook with a diameter that fits to a variety of washing lines.

② Aesthetics
- My product will be white in colour so it looks clean with the clothes on the washing line, also it is gender neutral
- My product will have a blue logo which stands out on the white background to grab a customers attention
- It will have rounded corners which will give it a smooth finish and look flush on the washing line

③ Materials
- The materials I am using will be high quality such as MDF to make the mould as it is easy to shape and will create a smooth finish to my product
- The casing of my product will be made from vacuum formed HIPS as it is a strong polymer, it is also water resistant and will protect my circuit board from rain.
- My products logo will be made from vinyl cut on the laser cutter so it will stand out.

④ Safety
- My product will have rounded corners and no sharp edges so it is comfy to hold and will not hurt the consumer when being carried.
- The casing of my product must be sealed and protect the wires inside so they are not exposed
- The casing of my product must be water resistant so the internal circuit board will not be affected or disturbed by the rain.

DESIRABLE

① Circuit
- I would like my product to have a PIC circuit as it is a device that integrates multiple functions at one time.
- When done with the pic it can also be reused and reprogrammed when finished with

② Size
- As I would like my product to be portable I would aim to have the following dimensions:

Length - 95mm but no bigger than 120mm
Width - 60mm but no bigger than 80mm
Depth - 30mm but no bigger than 50mm

③ Cost
- I would like my product to cost around £10 to make.
- I would then have a retail price of around £15 - £20 to make a £5 plus profit on each sale.
- Selling my product at around this price is lower than the competitor product I'm in competition with on page 1, meaning it is more affordable to the average person.

④ Affix
- I would like my product to be screwed together so you can only access the circuit board using a screw driver meaning it is a safe device around any age group.

FORMAL PRESENTATION FOLIO

- A clear and detailed Design Brief.
- Specification with measurable criteria used.
- Users needs and wants identified.
- Specific factors critical to success.
- Identifies key aspects including Form, Function, Materials, Sizes, Safety, Ergonomics, Cost etc.

(b) Developing a design brief and specification [AO1] The candidate has:	Band
9 – 10 marks • fully considered a range of problems/opportunities before deciding upon a final design brief. • demonstrated a very good understanding of the task ahead and the requirements which have to be met, to satisfy fully the needs, wants and interests of potential users. • written a design brief, relevant to the context, based upon a thorough analysis of their research and investigation. • written a detailed, relevant specification, including a range of objective and measurable criteria, to direct and inform the design and manufacture of a prototype.	4
6 – 8 marks • considered a range of problems/opportunities before deciding upon a final design brief. • demonstrated a good understanding of the task ahead and most of the requirements which have to be met, to satisfy most of the needs, wants and interests of potential users. • written a design brief, relevant to the context, based upon a general analysis of their research and investigation. • written a relevant specification, including a range of objective and measurable criteria, to inform the design and manufacture of a prototype.	3

(b) Developing a design brief and specification [AO1] The candidate has:	Band
3 – 5 marks • considered some problems/opportunities before deciding on a final design brief. • demonstrated a general understanding of the task ahead and one or two requirements have been identified to satisfy some of the needs, wants and interests of potential users. • written a design brief, based upon some aspects of the analysis of their research and investigation. • written a specification, including the key points, to partially inform the design and manufacture of a prototype.	2
1 – 2 marks • focussed on a single opportunity to produce a design brief. • demonstrated a limited understanding of the task ahead, with little or no consideration of the needs, wants and interests of potential users. • written a design brief based upon simple analysis of their research and investigation. • produced a small range of partially appropriate specification points.	1
0 marks • produced no work that is worthy of a mark.	

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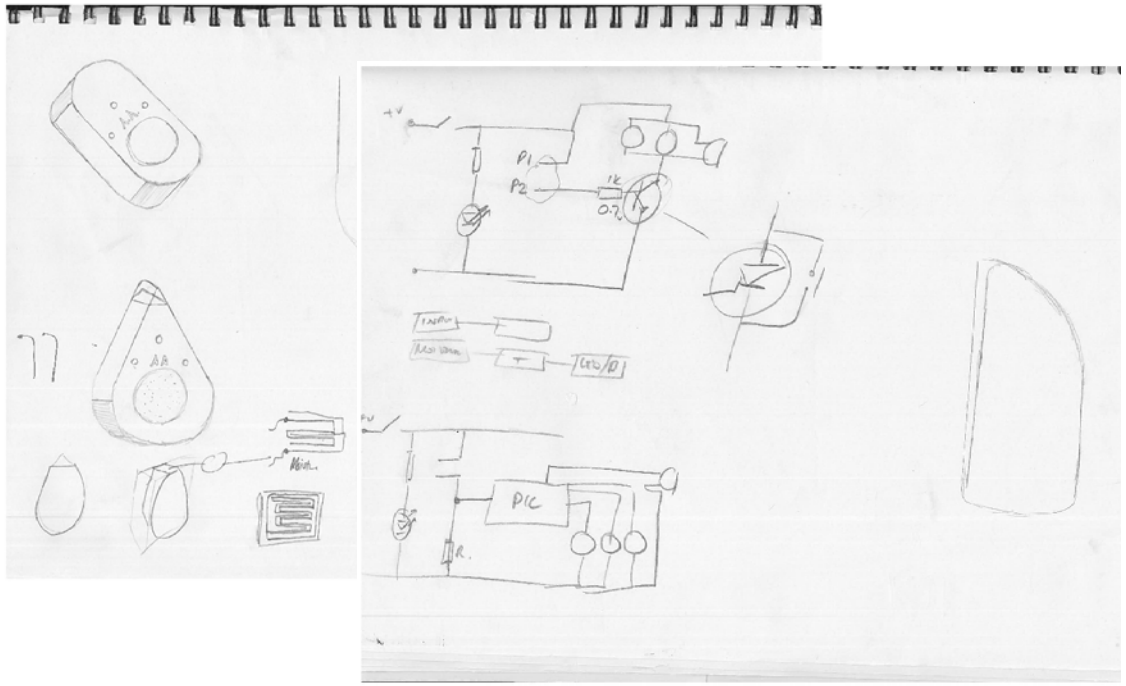
(c)	Generating and developing design ideas.	30	AO 2



INFORMAL Sketchpad

- Initial ideas.
- Basic concepts.
- Scant information.
- Starting point.
- Lots of ideas rejected.
- Shape / form / aesthetics.
- Sensing / input.

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INFORMAL Sketchpad

- Any starting point!
- Think, model, test, reflect.
- Variety of ideas based on Specification criteria.
- Quick developmental sketching.
- Annotation provides details.
- Decision making supports developmental iterations.

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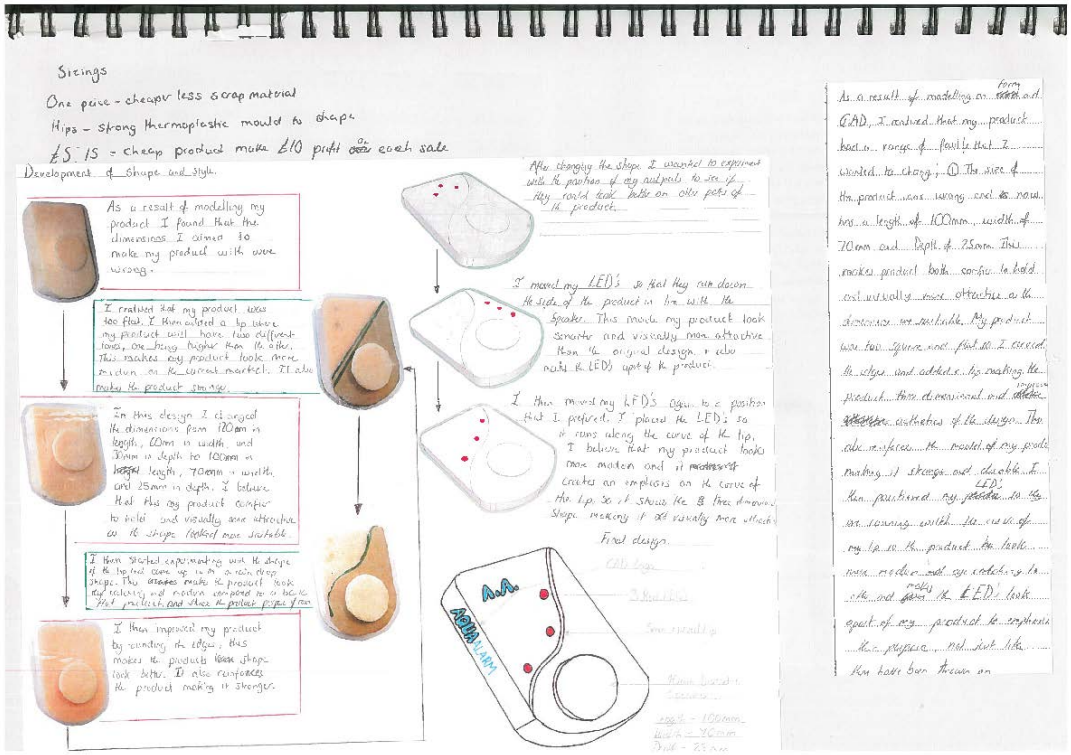

INFORMAL Sketchpad

- Good evidence of modelling.
- Testing v Spec.
- Analysis is perceptive.
- Clear decision making.
- A mix of practical activity, sketching, CAD, reflecting.
- Dynamic development!
- Lean design.

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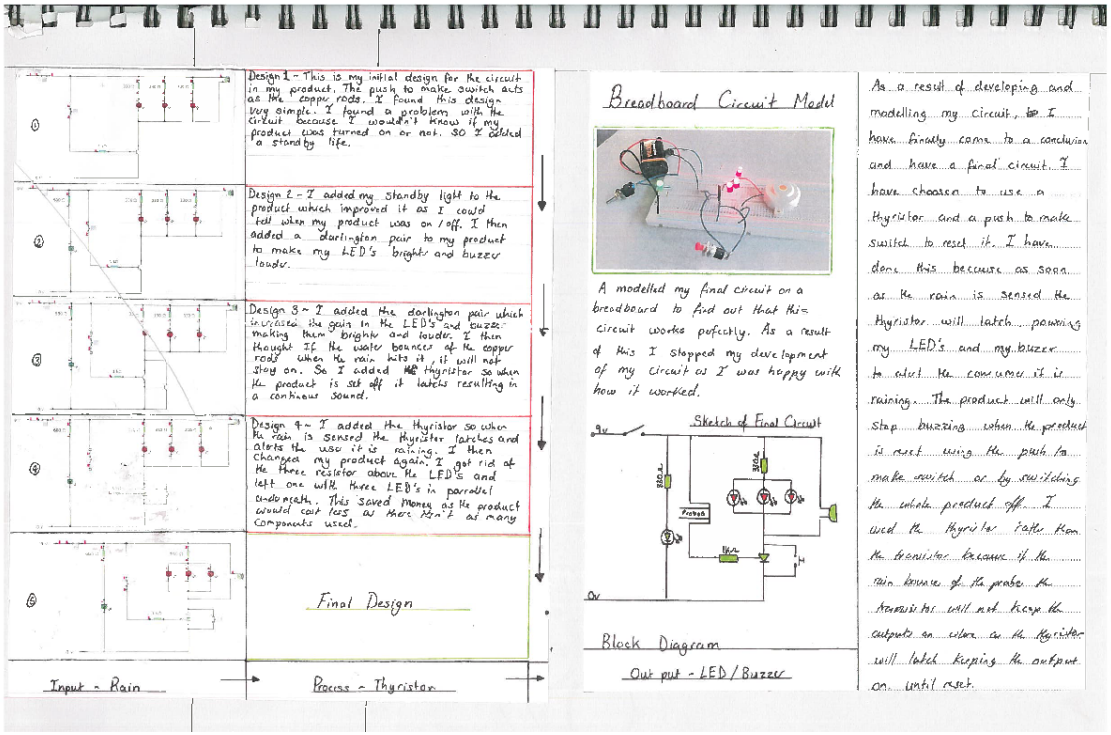

INFORMAL Sketchpad

- Functional development.
- CAD used effectively.
- Analysis supports change.
- Physical testing breadboard.
- Final control system evident.
- Full understanding demonstrated.
- Testing leads the way.

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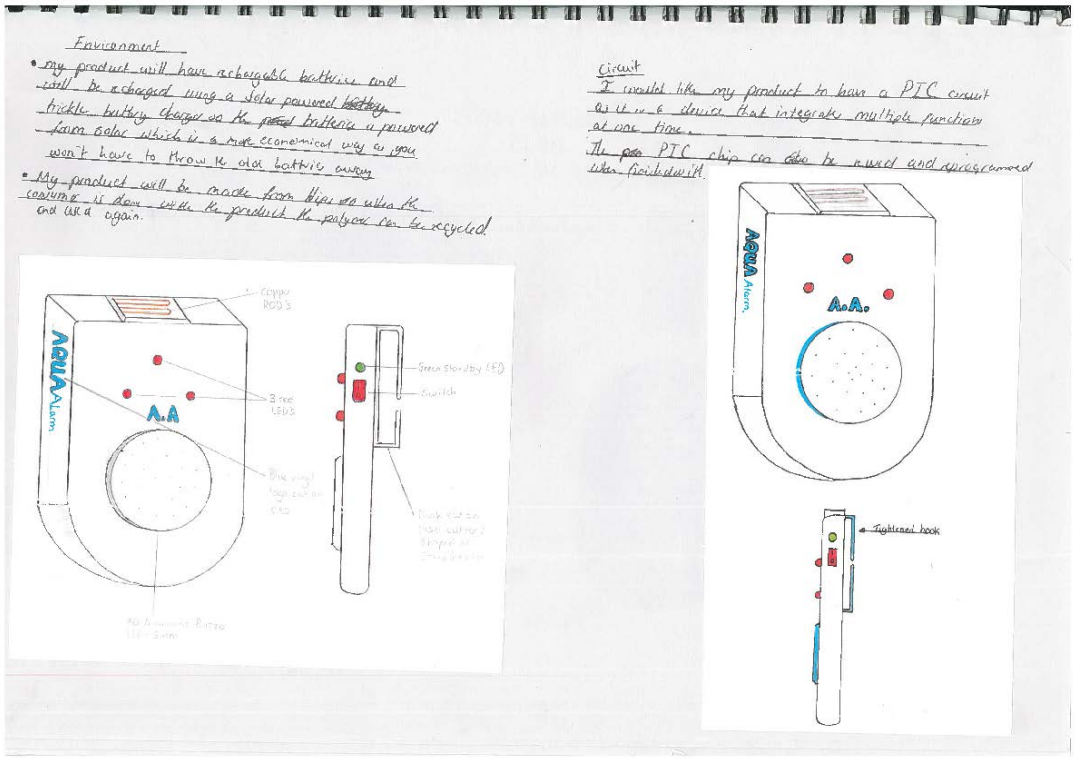

INFORMAL Sketchpad

- Re-think based on testing and outcomes.
- Opinions of users?
- Introduce prototyping.
- Solid modelling.
- CAD / simulations
- Functional / performance testing.
- 3D printing.

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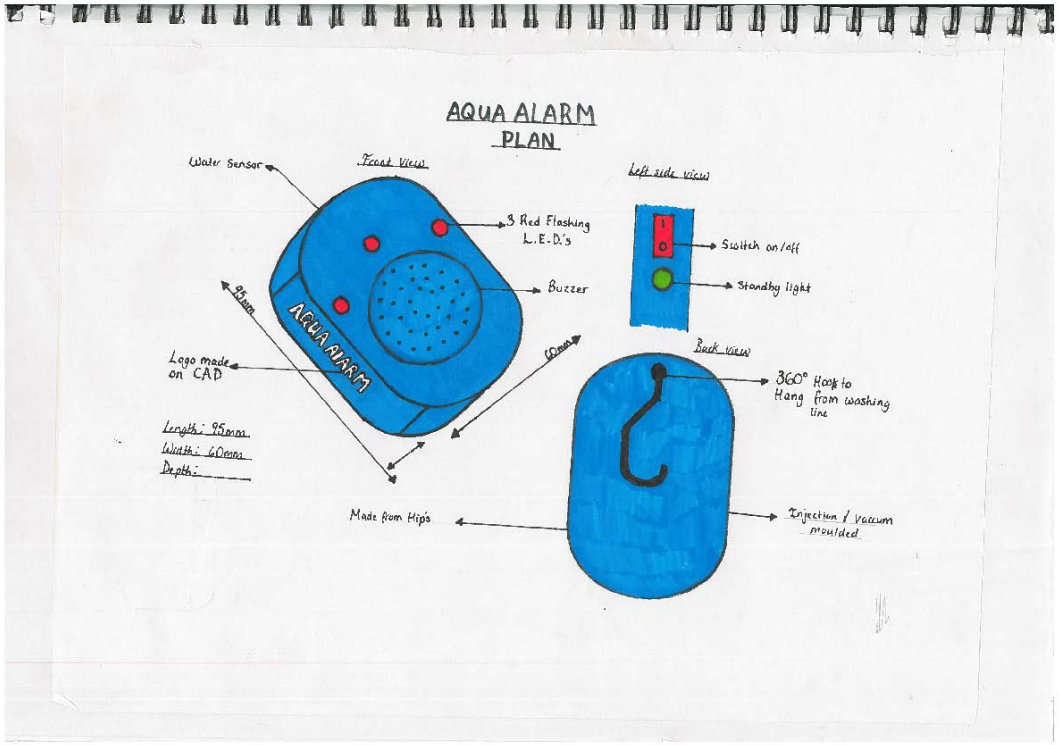

INFORMAL Sketchpad

- Another iteration.
- User controls / interface.
- Sizes being considered.
- Fold away hook idea.
- Introducing stand by light.
- Logo / branding considered.
- Buzzer / speaker holes.

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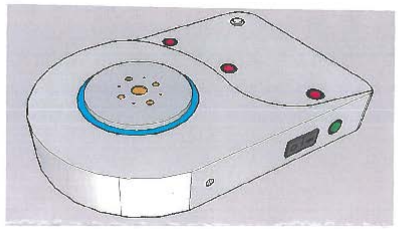
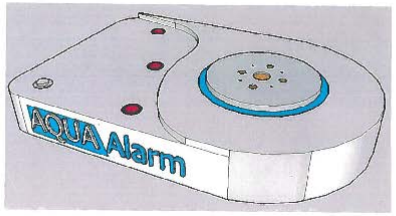
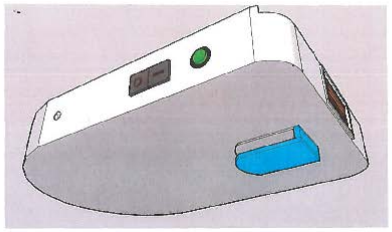
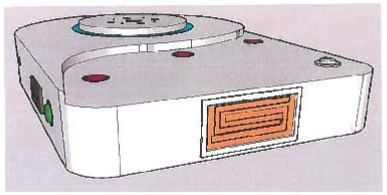
(c)	Generating and developing design ideas.	30	AO 2









FORMAL PRESENTATION FOLIO

- A clear pictorial drawing of the final prototype.
- Hand drawn / CAD.
- High quality.
- Detailed presentation.
- Could a 3rd party / manufacturer produce the prototype.

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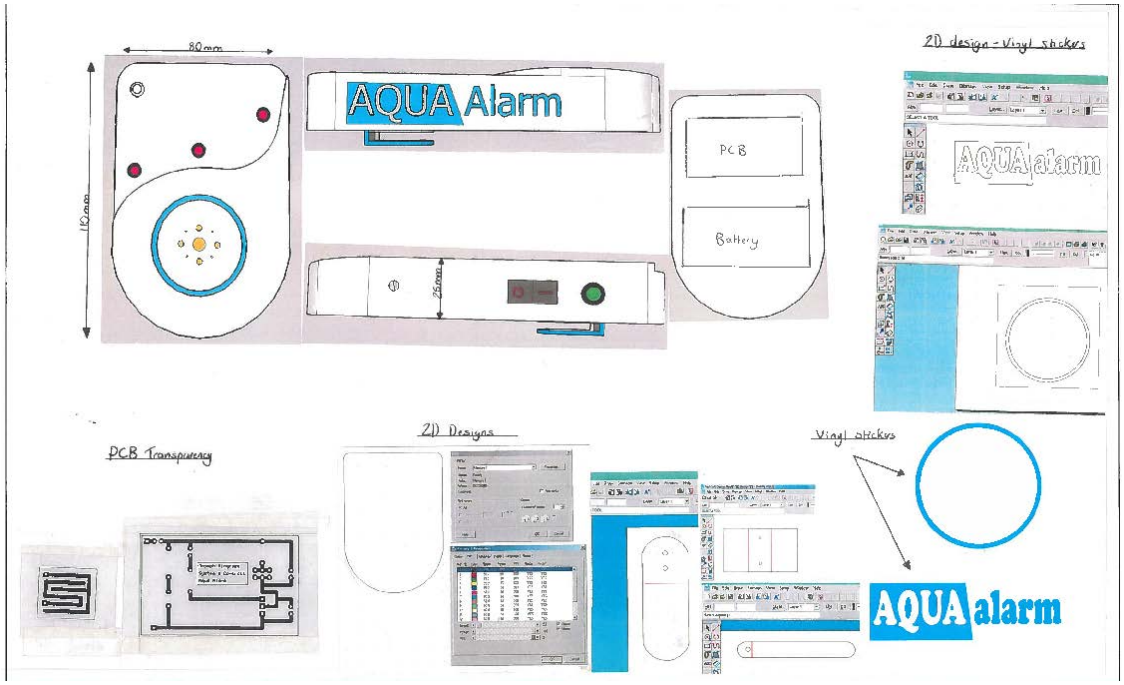
Assessment Criteria		Marks	Assessment objective
(c)	Generating and developing design ideas.	30	AO 2



FORMAL PRESENTATION FOLIO

- Detailed proposal.
- All dimensions present.
- CAD CAM CNC data.
- Finishing techniques.
- Could a 3rd party / manufacturer produce the prototype?
- Sophisticated skills evident here.

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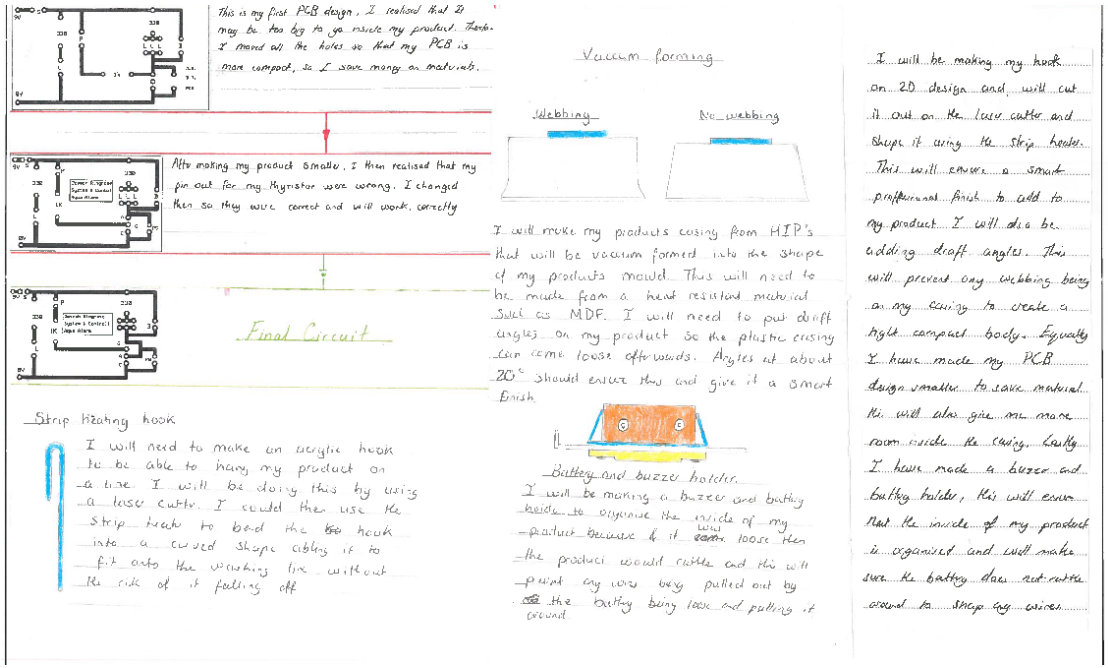
Assessment Criteria		Marks	Assessment objective
(c)	Generating and developing design ideas.	30	AO 2



FORMAL PRESENTATION FOLIO

- Details of tools, equipment and making.
- Specialist processes.
- Manufacturing Specification.
- Quality Control factors.
- CNC / CAD CAM details speeds and settings.
- Production information.

(c) Generating and developing design ideas [AO2] The candidate has:	Band
24 – 30 marks • considered a range of design strategies, techniques and approaches and applied an iterative design process to generate and communicate a broad, complex and diverse range of initial ideas. • identified and considered social, moral and economic factors which are relevant to the context and potential user(s). • clear, effective and detailed use of testing to evolve ideas and to refine their design decisions. • developed a detailed proposal, including comprehensive and relevant details of materials, dimensions, finishes and production techniques, which clearly address all requirements of the design brief and specification. • demonstrated sophisticated use of a range of skills/techniques to clearly communicate ideas and proposals to a third party.	4
16 – 23 marks • considered a range of design strategies, techniques and approaches and applied an iterative design process to generate and communicate a broad range of initial ideas. • identified and considered social, moral and economic factors which are generally relevant to the context and potential user(s). • clear and generally effective use of testing to evolve ideas and to refine their design decisions. • developed a proposal, including relevant details of materials, dimensions, finishes and production techniques, which address most requirements of the design brief and specification. • demonstrated good use of a range of skills/techniques to communicate ideas and proposals to a third party.	3

(c) Generating and developing design ideas [AO2] The candidate has:	Band
8 – 15 marks • considered some design strategies and techniques and applied an iterative design process to generate and communicate a range of basic initial ideas. • identified social, moral and/or economic factors with some attempt to relate these to the context and potential user(s). • made some use of testing to evolve ideas and to refine their design decisions. • developed a proposal, including some details of materials, dimensions, finishes and/or production techniques, which addresses some requirements of the design brief and specification. • demonstrated satisfactory use of a small range of skills/techniques to communicate ideas and proposals to a third party.	2
1 – 7 marks • generated and communicated a limited range of undeveloped initial ideas. • identified aspects of social, moral or economic factors, though these are not closely related to the context and or potential user(s). • made little or no use of testing to evolve ideas. • developed a proposal, with superficial details of materials, dimensions, finishes and/or production techniques which addresses few requirements of the design brief and/or specification. • demonstrated limited ability to communicate their idea(s) to a third party.	1
0 marks • produced no work that is worthy of a mark.	

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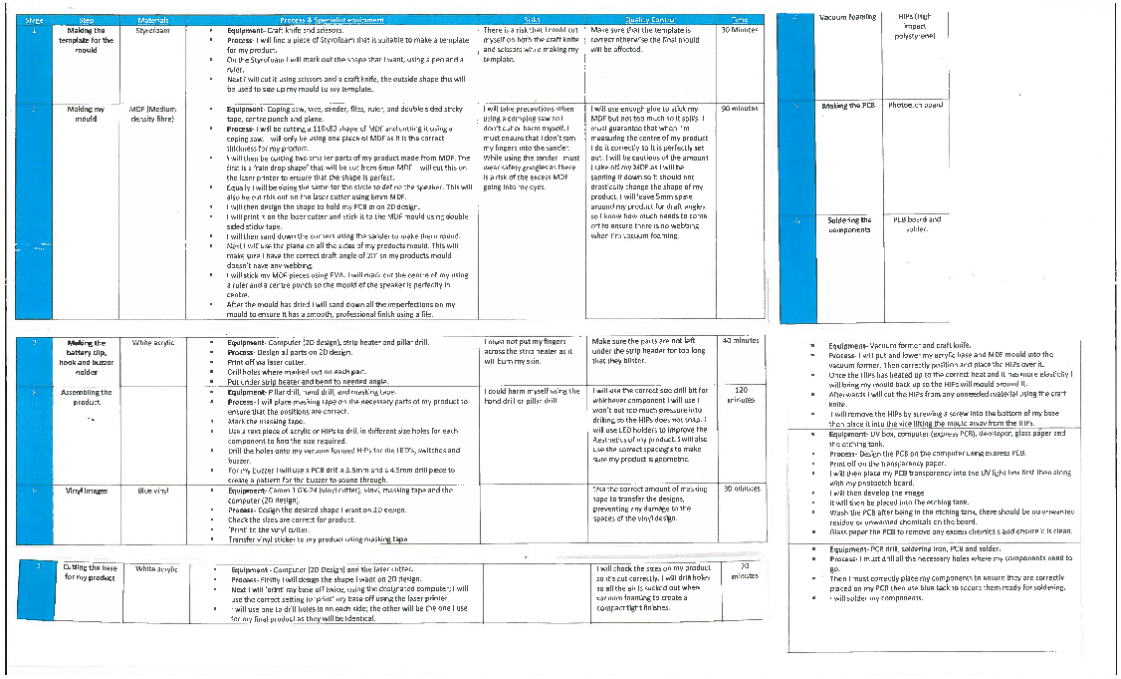
Assessment Criteria		Marks	Assessment objective
(d)	Manufacturing a prototype.	30	AO2

FORMAL PRESENTATION FOLIO

- Details of a sophisticated logical sequence.
- Achievable timeline for manufacture.
- Supports the manufacture.



Stage	Step	Materials	Process & Specialist equipment	Risks	Quality Control	Time
1	Making the template for the mould	Styrofoam	• Equipment- Craft knife and scissors. • Process- I will find a piece of Styrofoam that is suitable to make a template for my product. On the Styrofoam I will mark out the shape that I want, using a pen and a ruler. • Next I will cut it using scissors and a craft knife, the outside shape this will be used to size up my mould to my template.	• There is a risk that I could cut myself on both the craft knife and scissors while making my template.	• Make sure that the template is correct otherwise the final mould will be affected.	30 Minutes
2	Making my mould	MDF (Medium density fibre)	• Equipment- Coping saw, vice, sander, files, ruler, and double sided sticky tape, centre punch and plane. • Process- I will be cutting a 110x80 shape of MDF and cutting it using a coping saw. I will only be using one piece of MDF as it is the correct thickness for my product. • I will then be cutting two smaller parts of my product made from MDF. The first is a 'rain drop shape' that will be cut from 6mm MDF. I will cut this on the laser printer to ensure that the shape is perfect. • Equally I will be doing the same for the circle to define the speaker. This will also be cut this out on the laser cutter using 6mm MDF. • I will then design the shape to hold my PCB on 2D design. • I will print it on the laser cutter and stick it to the MDF mould using double sided sticky tape. • I will then sand down the cut out using the sander to make them round. • After I will use the plane on all the sides of my products mould. This will make sure I have the correct draft angle of 20° so my products mould doesn't have any webbing. • I will stick my MDF pieces using PVA. I will make out the centre of my using a ruler and a centre punch so the mould of the speaker is perfectly in centre. • After the mould has dried I will sand down all the imperfections on my mould to ensure it has a smooth, professional finish using a file.	• I will take precautions when using a coping saw so I don't cut or harm myself. I must ensure that I don't push my fingers into the sander. While using the sander must wear safety goggles as there is a risk of the excess MDF going into my eyes.	• I will use enough glue to stick my MDF but not too much so it spills. I must guarantee that when I'm measuring the centre of my product I do it correctly so it is perfectly set out. I will be cautious of the amount I take off my MDF as I will be sanding it down so it should not drastically change the shape of my product. I will leave 5mm spare around my product for draft angles so I know how much needs to come off to ensure there is no webbing when I'm vacuum forming.	90 minutes
3	Making the battery clip, hook and buzzer holder	White acrylic	• Equipment- Computer (2D design), strip heater and pillar drill. • Process- Design all parts on 2D design. Print off via laser cutter. • Drill holes where marked out on each part. • Put under strip heater and bent to needed angle.	• I must not put my fingers across the strip heater as it will burn my skin.	• Make sure the parts are not left under the strip heater for too long that they blister.	40 minutes
4	Assembling the product.		• Equipment- Pillar drill, hand drill, and masking tape. • Process- I will place masking tape on the necessary parts of my product to ensure that the positions are correct. • Mark the masking tape. • Use a test piece of acrylic or HIPs to drill in different size holes for each component to find the size required. • Drill the holes onto my vacuum formed HIPs for the LEDs, switches and buzzer. • For my buzzer I will use a PCB drill a 3.5mm and a 4.5mm drill piece to create a pattern for the buzzer to come through.	• I could harm myself using the hand drill or pillar drill	• I will use the correct size drill bit for whichever component I will use I won't put too much pressure into drilling so the HIPs don't break. I will use LED holders to improve the aesthetics of my product. I will also use the correct spacing to make sure my product is symmetric.	120 minutes
5	Vinyl Images	Blue vinyl	• Equipment- Canon 1 DX-24 (vinyl cutter), ruler, masking tape and the computer (2D design). • Process- Design the desired shape I want on 2D design. Check the sizes are correct for product. • Print to the vinyl cutter. • Transfer vinyl sticker to my product using masking tape		• Ask the correct amount of masking tape to transfer the designs, preventing any damage to the spaces of the vinyl design.	30 minutes
6	Cutting the base for my product	White acrylic	• Equipment - Computer (2D Design) and the laser cutter. • Process- Firstly I will design the shape I want on 2D design. Next I will 'print' my base off twice, using the designed computer. I will use the correct setting to 'print' my base off using the laser printer • I will use one to drill holes in on each side; the other will be the one I use for my final product as they will be identical.		• I will check the sizes on my product as it's cut correctly. I will drill holes so all the air is sucked out when vacuum forming to create a compact tight finishes.	30 minutes

Stage	Step	Materials
7	Vacuum forming	HIPs (High Impact polystyrene)
8	Making the PCB	Photosensitive board
9	Soldering the components	PCB board and solder.

- Equipment- Vacuum former and craft knife.
- Process- I will put and lower my acrylic base and MDF mould into the vacuum former. Then correctly position and place the HIPs over it.
- Once the HIPs has heated up to the correct heat and it has risen elastically I will bring my mould back up so the HIPs will mould around it.
- After words I will cut the HIPs from any unneeded material using the craft knife.
- I will remove the HIPs by screwing a screw into the bottom of my base then place it into the vice lifting the magic away from the HIPs.

- Equipment- UV box, computer (express PCB), developer, glass paper and the etching tank.
- Process- Design the PCB on the computer using express PCB.
- Print off on the transparency paper.
- I will then place my PCB transparency into the UV light box first then along with my photoetch board.
- I will then develop the image.
- It will then be placed into the etching tank.
- Wash the PCB after being in the etching tank, there should be no unwanted residue or unwanted chemicals on the board.
- Glass paper the PCB to remove any excess chemicals and ensure it is clean.

- Equipment- PCB drill, soldering iron, PCB and solder.
- Process- I must still all the necessary holes where my components need to go.
- Then I must correctly place my component to ensure they are correctly placed on my PCB then use blue tack to secure them ready for soldering.
- I will solder my components.

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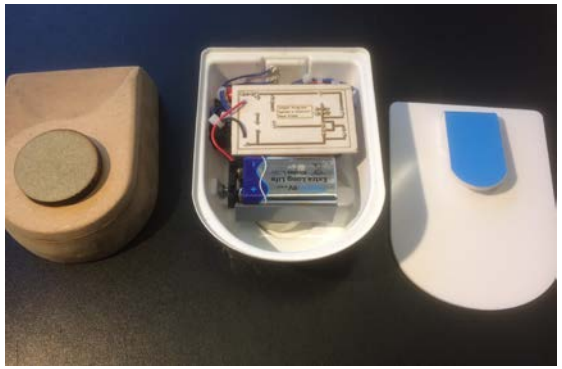
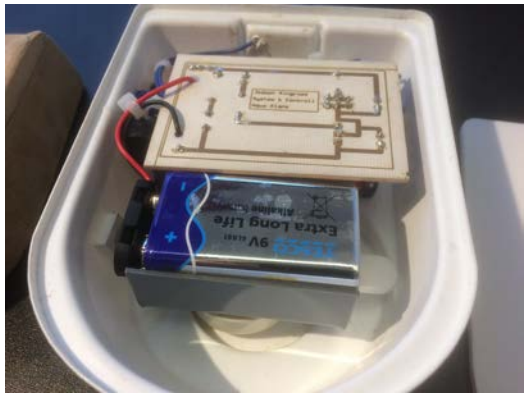
Assessment Criteria		Marks	Assessment objective
(d)	Manufacturing a prototype.	30	AO2





Final Prototype

- High quality fully functioning prototype.
- Highly appropriate making skills.
- Excellent understanding shown.
- Specialist processes and materials used skilfully.
- High levels of accuracy achieved.
- A precise outcome.

(d) Manufacturing a prototype The candidate has: [AO2]	Band
24 – 30 marks • clearly communicated comprehensive and relevant details of a logical sequence and achievable timeline for the stages of production and testing of their final prototype. • selected and worked with appropriate materials and components to successfully complete the manufacture of their prototype to a defined schedule. • used a range of appropriate making skills and processes to produce a high quality functioning prototype that the requirements of the design specification and is fit for purpose. • an excellent understanding of the working properties and performance characteristics of the specified materials and, where appropriate, demonstrated consideration of surface treatments/finishes. • selected and safely used specialist tools, appropriate techniques, processes, equipment and machinery with a high level of accuracy and precision to enable the prototype to perform as intended and fully meet the user's requirements.	4
16 – 23 marks • communicated details of a logical sequence and achievable timeline for the stages of production and testing of their final prototype. • selected and worked with appropriate materials and components to successfully complete the manufacture of their prototype, generally to a defined schedule. • used a range of appropriate making skills and processes to produce a good quality functioning prototype that generally meets most of the requirements of the design specification , one or two points have not been addressed and is fit for purpose. • a good understanding of the working properties and performance characteristics of the specified materials and, where appropriate, demonstrated consideration of surface treatments/finishes. • selected and safely used specialist tools, appropriate techniques, processes, equipment and machinery with accuracy and precision to enable the prototype to perform as intended and generally meet the user's requirements.	3

(d) Manufacturing a prototype The candidate has: [AO2]	Band
8 – 15 marks • communicated details of a sequence for manufacture and testing of their final prototype. • selected and worked with materials and components to partly complete the manufacture of their prototype, generally to a defined schedule. • used an adequate range of making skills and processes to be able to produce a functioning prototype that has tentative links to the requirements of the design specification and is generally fit for purpose. • an understanding of the main working properties and performance characteristics of the specified materials and, where appropriate, demonstrated basic consideration of surface treatments/finishes. • selected and safely used specialist tools, techniques, processes, equipment and machinery with a limited degree of accuracy and precision, the prototype only just performs as intended and meets some aspects of the user's requirements.	2
1 – 7 marks • communicated superficial or no details of a sequence for manufacture and/or testing of their final prototype. • worked with materials and components to partly complete the manufacture of their prototype. • Implemented some making skills and processes to produce a partially functioning prototype, aspects of which meet elements of the design specification. • a limited understanding of the working properties and/or performance characteristics of the specified materials. • selected and safely used specialist tools, techniques, processes, equipment and machinery with a limited degree of accuracy, the prototype partially or is unable to fully perform as intended, though meets few aspects of the needs, wants and values of the user.	1
0 marks • produced no work that is worthy of a mark.	

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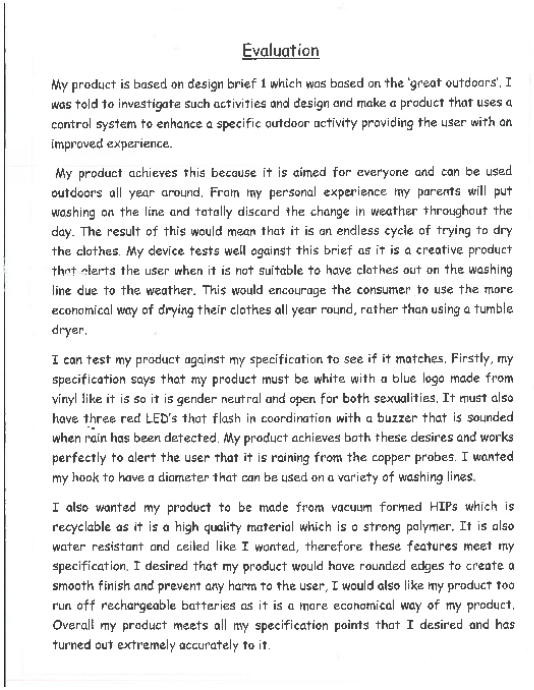
Assessment Criteria		Marks	Assessment objective
(e)	Analysing and evaluating design decisions and prototypes.	20	AO 3

FORMAL PRESENTATION FOLIO

- Critical objective analysis.
- Ongoing analysis throughout designing and development.
- Final prototype testing.
- Opinions of users.



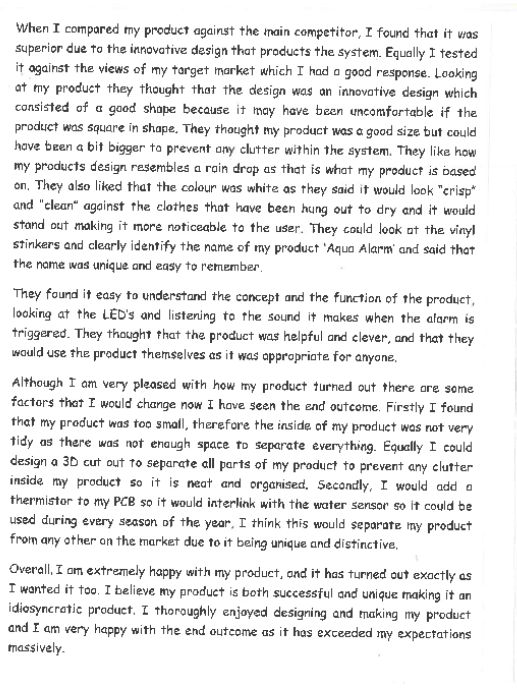
Evaluation

My product is based on design brief 1 which was based on the 'great outdoors'. I was told to investigate such activities and design and make a product that uses a control system to enhance a specific outdoor activity providing the user with an improved experience.

My product achieves this because it is aimed for everyone and can be used outdoors all year around. From my personal experience my parents will put washing on the line and totally discard the change in weather throughout the day. The result of this would mean that it is an endless cycle of trying to dry the clothes. My device tests well against this brief as it is a creative product that alerts the user when it is not suitable to have clothes out on the washing line due to the weather. This would encourage the consumer to use the more economical way of drying their clothes all year round, rather than using a tumble dryer.

I can test my product against my specification to see if it matches. Firstly, my specification says that my product must be white with a blue logo made from vinyl like it is so it is gender neutral and open for both sexualities. It must also have three red LED's that flash in coordination with a buzzer that is sounded when rain has been detected. My product achieves both these desires and works perfectly to alert the user that it is raining from the copper probes. I wanted my hook to have a diameter that can be used on a variety of washing lines.

I also wanted my product to be made from vacuum formed HIPs which is recyclable as it is a high quality material which is a strong polymer. It is also water resistant and ceiled like I wanted, therefore these features meet my specification. I desired that my product would have rounded edges to create a smooth finish and prevent any harm to the user, I would also like my product too run off rechargeable batteries as it is a more economical way of my product. Overall my product meets all my specification points that I desired and has turned out extremely accurately to it.



When I compared my product against the main competitor, I found that it was superior due to the innovative design that products the system. Equally I tested it against the views of my target market which I had a good response. Looking at my product they thought that the design was an innovative design which consisted of a good shape because it may have been uncomfortable if the product was square in shape. They thought my product was a good size but could have been a bit bigger to prevent any clutter within the system. They like how my products design resembles a rain drop as that is what my product is based on. They also liked that the colour was white as they said it would look "crisp" and "clean" against the clothes that have been hung out to dry and it would stand out making it more noticeable to the user. They could look at the vinyl stinkers and clearly identify the name of my product 'Aqua Alarm' and said that the name was unique and easy to remember.

They found it easy to understand the concept and the function of the product, looking at the LED's and listening to the sound it makes when the alarm is triggered. They thought that the product was helpful and clever, and that they would use the product themselves as it was appropriate for anyone.

Although I am very pleased with how my product turned out there are some factors that I would change now I have seen the end outcome. Firstly I found that my product was too small, therefore the inside of my product was not very tidy as there was not enough space to separate everything. Equally I could design a 3D cut out to separate all parts of my product to prevent any clutter inside my product so it is neat and organised. Secondly, I would add a thermistor to my PCB so it would interlink with the water sensor so it could be used during every season of the year, I think this would separate my product from any other on the market due to it being unique and distinctive.

Overall, I am extremely happy with my product, and it has turned out exactly as I wanted it too. I believe my product is both successful and unique making it an idiosyncratic product. I thoroughly enjoyed designing and making my product and I am very happy with the end outcome as it has exceeded my expectations massively.

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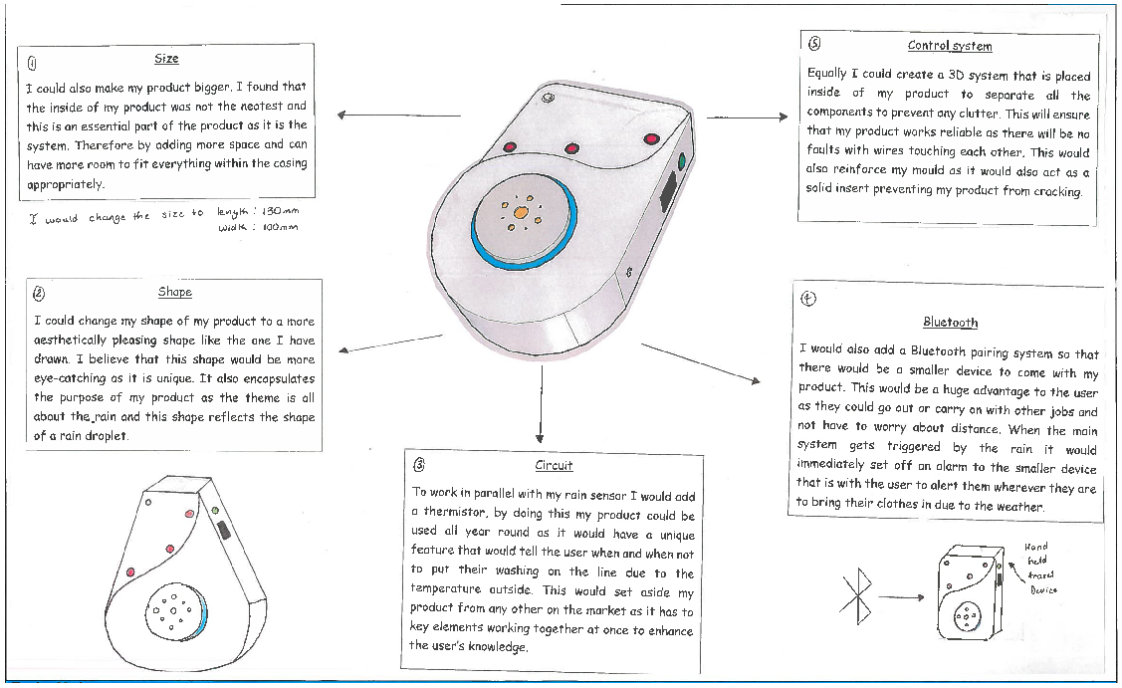
Assessment Criteria		Marks	Assessment objective
(e)	Analysing and evaluating design decisions and prototypes.	20	AO 3

FORMAL PRESENTATION FOLIO

- Further developments.
- Respond to feedback from users.
- Modifications offered.



(e) Analysing and evaluating design decisions and prototypes [AO3] The candidate has:	Band
16 – 20 marks • undertaken a critical, objective analysis, evaluation and testing of their ideas and decisions whilst applying iterative design processes. • undertaken a critical and objective evaluation and testing of their final prototype, taking into account the views of potential users. • responded to feedback and clearly identified the potential for further development of their prototype, with detailed suggestions for how modifications could be made.	4
11 – 15 marks • undertaken an objective analysis, evaluation and testing of their ideas and decisions whilst applying iterative design processes. • undertaken an objective analysis, evaluation and testing of the final prototype, with some consideration of the views of potential users. • responded to feedback and identified the potential for further development of their prototype, suggesting how modifications could be made. • responded to feedback and identified the potential for further development of their prototype, with suggestions of how modifications could be made.	3

(e) Analysing and evaluating design decisions and prototypes [AO3] The candidate has:	Band
6 – 10 marks • undertaken some analysis, evaluation and/or testing of their ideas and decisions whilst applying iterative design processes. • undertaken some analysis, evaluation and/or testing of their final prototype, with partial consideration of the views of potential users. • identified the potential for some further development of their prototype, including suggestions of how modifications could be made.	2
1 – 5 marks • produced a limited evaluation of their ideas and decisions. • produced a limited evaluation of their final prototype. • partially identified how their prototype could be modified.	1
0 marks • produced no work that is worthy of a mark.	

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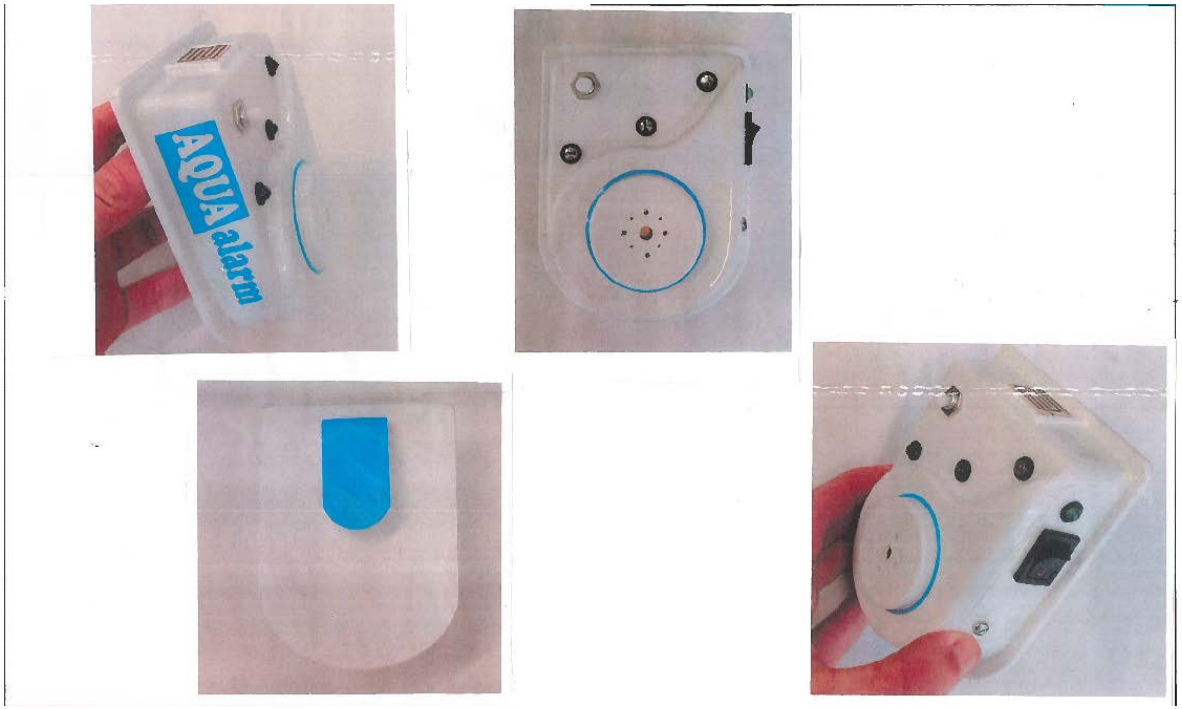
FORMAL PRESENTATION FOLIO



- Final Prototype images
- Completes a concise formal portfolio.
- Moderation / awarding evidence.