GCSE Design and Technology

2017 Specification - NEA Guidance

Non Examined Assessment

- 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.

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

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**	

- 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 Specification is used throughout the designing process.

Assessment Criteria		Marks	Assessment objective
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(d)	Manufacturing a prototype.	30	
(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 Specification identifies further refinements.
- Testing and selection of :
  - Materials
  - Components
  - Dimensions
  - Manufacturing / production
  - Finishing
- High level design skills.

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**	

- 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.

Assessment Criteria		Marks	Assessment objective
(a)	Identifying and investigating design possibilities.	10	AO 1
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(e)	Analysing and evaluating design decisions and prototypes.	20	AO 3
	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.

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.

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.

100 Raw Mark Total v 180 Raw Mark Total

- AO1 – setting the scene 20 marks.
- AO2 – designing, testing, analysing, evaluating and reflecting in an iterative approach – 80 marks.

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.

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.

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.
- WJEC Electronic Resource.
- 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.

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.
- Design process: iteration. https://goo.gl/bZDs8q
- Design process: prototyping. https://goo.gl/nIjtrF

Interaction of Mind and Hand

Imaging and thinking inside the head

Confronting reality outside the head

First Impressions

Exploring
Speculating

Discussion

Sketching
Diagrams

Graphs
Data

Taking Risks

Clarifying
Validating
Consolidating

Modelling
Testing
Reflecting

Prototyping

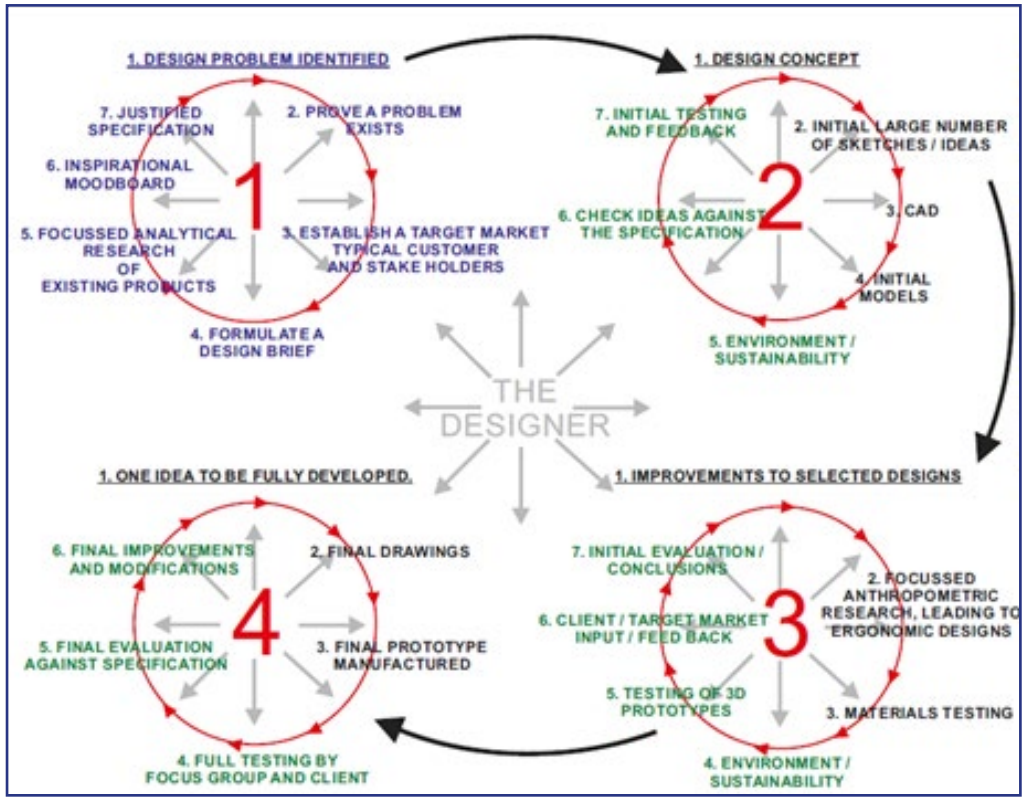
Critical
appraisal

Provisional
Solution

Potential of more developed thinking

Potential of more developed solutions

The Designer



Iterative Designing

- **Explore**
- **Create**
- **Evaluate**

1

1. Design problem identified
2. Prove a problem exists
3. Establish a target market typical customer and stake holders
4. Formulate a design brief
5. Focussed analytical research of existing products
6. Inspirational moodboard
7. Justified specification.

2

1. Design concept
2. Initial large numbers of sketches / ideas
3. CAD
4. Initial models
5. Environment / sustainability
6. Check ideas against the specification
7. Initial testing and feedback

3

1. Improvements to selected designs
2. Focussed anthropometric research, leading to ergonomic designs
3. Materials testing
4. Environment / sustainability
5. Testing of 3D prototypes
6. Client / target market input / feedback
7. Initial evaluation / conclusion

4

1. One idea to be fully developed
2. Final drawings
3. Final prototype manufactured
4. Full testing by focus group and client
5. Final evaluation against specification
6. Final improvements and modifications

Development bias v Very structured developments

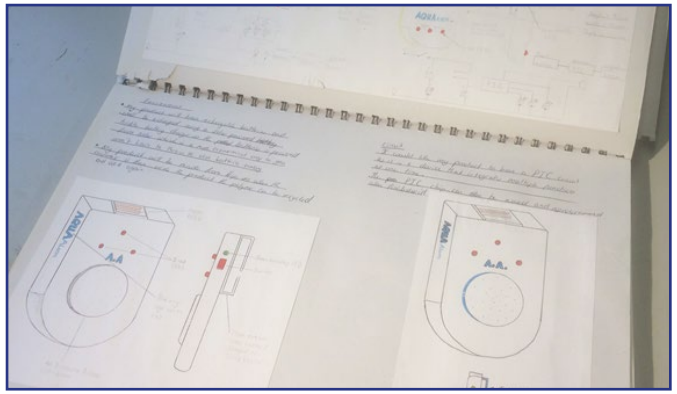
- Candidates need to test ideas!
- Analyse the results.
- Refine the concept.
- Test the next Iteration!
- Evidence of the development process is critical.
- No more one A3 page by page approach.
- Too contrived! One size does not fit all!

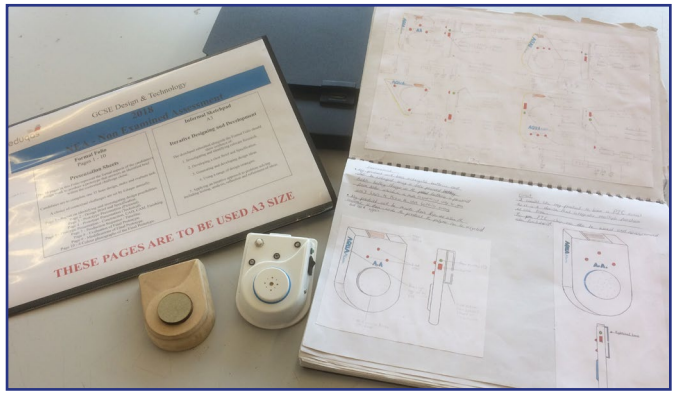
Contextual Challenge v Defined Briefs

- 3 broad '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.

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.





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.

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.

The following are exemplar briefs from the Specimen Assessment Materials

Brief 1: SUSTAINABILITY AND OUR FUTURE NEEDS

- Look at an everyday product and consider how it could be redesigned using recycled or waste materials.

Brief 2: IMPROVING THE DAILY LIFE OF ELDERLY PEOPLE

- Look at the specific needs of elderly people and design a unique product that would support their everyday lives.

Brief 3: OUTDOOR PURSUITS AND PHYSICAL FITNESS

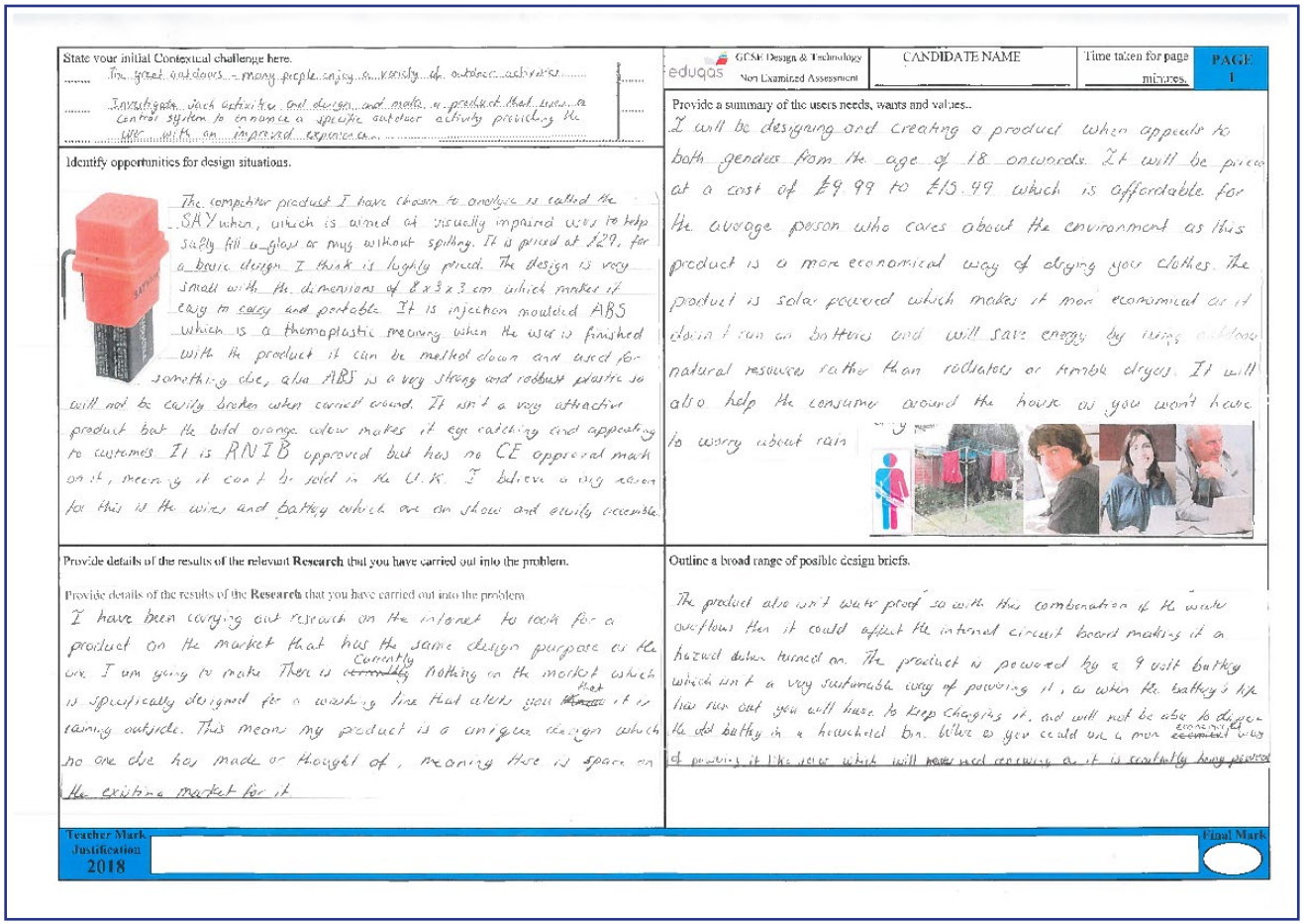
- Look at outdoor activities and physical fitness and consider the needs and wants of people who do such activities.

AO1 Identify, investigate and outline design possibilities to address needs and wants

Definitions used in AO1	
Identify	looking at areas and opportunities in which designs can take place
Investigate	pursuing ideas and gathering information relating to a context
	identify and investigate are interdependent - the processes work together and take place in no particular order
Outline	to produce a design brief and specification to inform AO2

INFORMAL Sketchpad

Assessment Criteria		Marks	Assessment objective
(a)	Identifying and investigating design possibilities	10	AO 1



State your initial Contextual challenge here.

The great outdoors - many people enjoy a variety of outdoor activities

Investigate, pick activity and design and make a product that uses a control system to enhance a specific outdoor activity providing the user with an improved experience.

eduqas GCSE Design & Technology Non Examined Assessment | CANDIDATE NAME | Time taken for page ____ minutes. | PAGE 1

Identify opportunities for design situations.

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 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

The competitor product I have chosen to analyse is called the SAY which, 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 use 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 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 ~~that~~ 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 in the existing market for it.

Outline a broad range of possible design briefs.

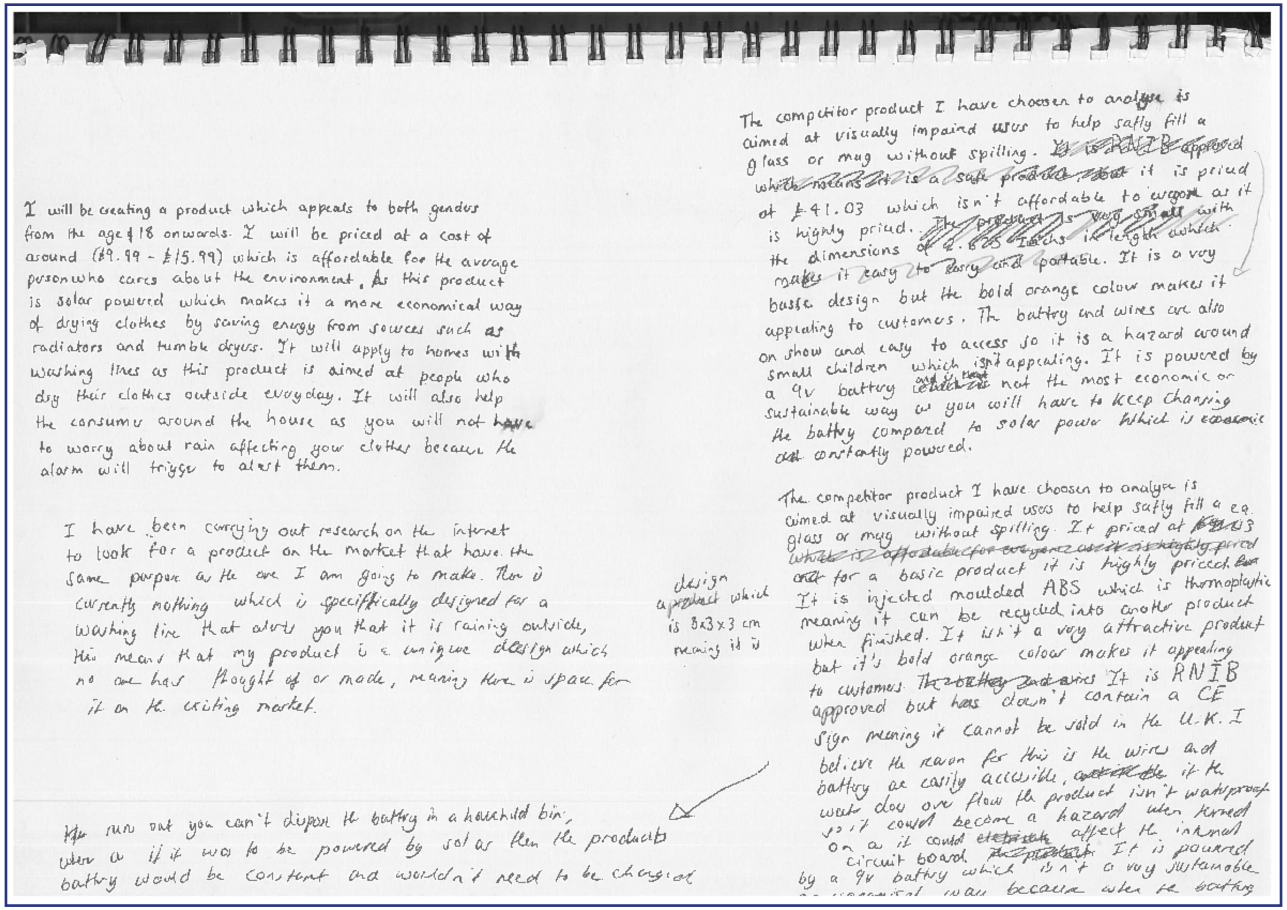
The product also isn't water proof so with the combination of the water overflows then it could affect the internal circuit board making it a hazard before turned on. The product is powered by a 9 volt battery which isn't a very sustainable way of powering it, as when the battery's life has run out you 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~~ economical way of powering it like solar which will ~~not need~~ need recurring as it is constantly being powered

Teacher Mark Justification 2018 | Final Mark

- **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.**

INFORMAL Sketchpad

Assessment Criteria		Marks	Assessment objective
(a)	Identifying and investigating design possibilities	10	AO 1



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 competitor product I have choosen to analyse is aimed at visually impaird users to help safly fill a glass or mug without spilling. It is RNIB approved which means it is a safe product, but it is pried at £41.03 which isn't affordable to everyone as it is highly pried. The product is very small with the dimensions of 2.625 Inchs 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 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.

The competitor product I have choosen to analyse is aimed at visually impaired users to help safly fill a eg. glass or mug without spilling. It priced at £41.03 which is affordable for everyone as it is highly priced and 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 has 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, and it the water does over flow the product isn't waterproof so it could become a hazard when turned on as it could electric 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

design a product which is 3x3x3 cm meaning it is

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 changed

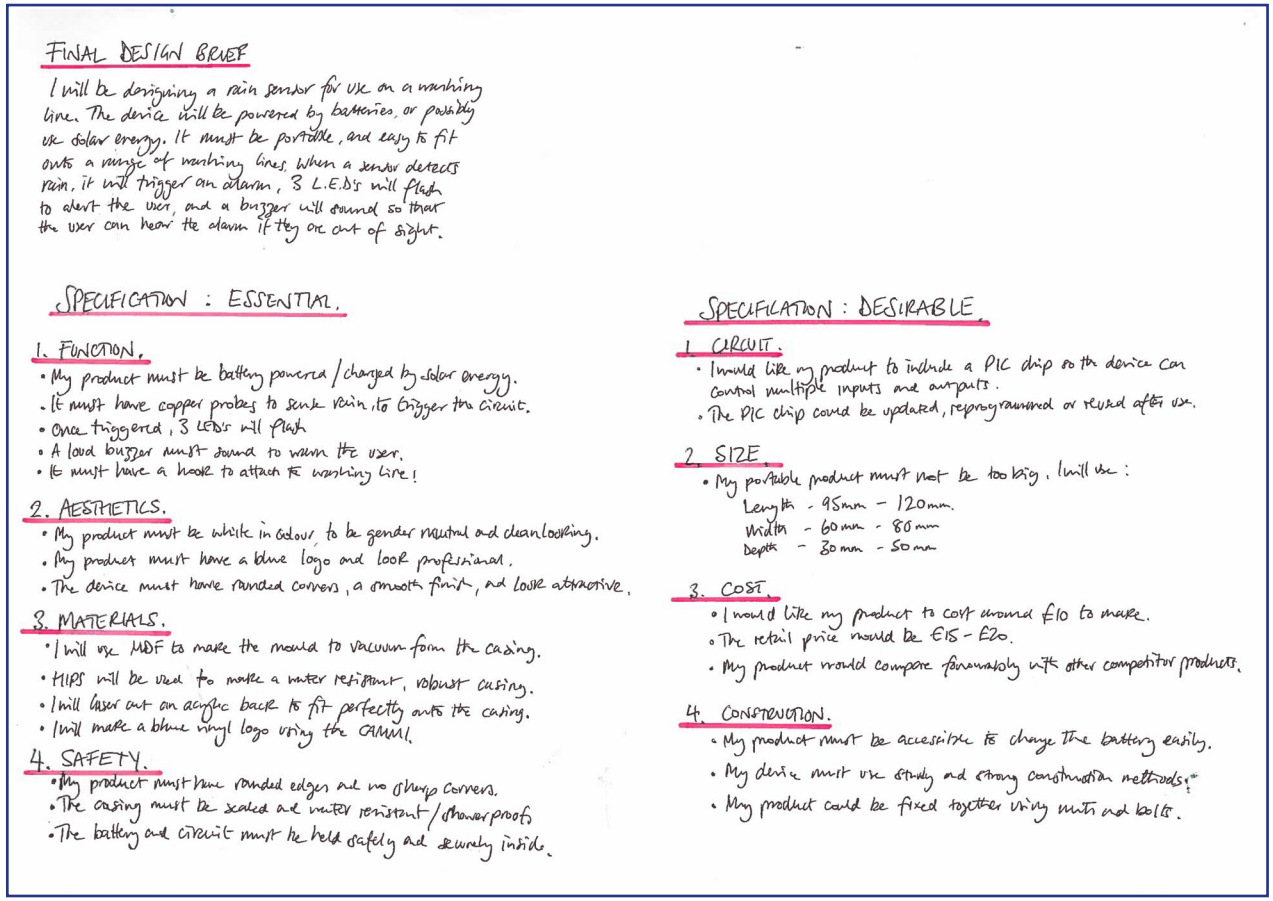
- **Understanding of the problem.**
- **Focusing on users.**
- **Research strategies.**
- **Analysis of information.**
- **Focussed relevant research.**

(a) Identifying and investigating design possibilities [AO1] The candidate has:	Band
9 - 10 marks • undertaken a **comprehensive** and **effective** identification of opportunities for the development of designs within the prescribed context. • undertaken **comprehensive**, **relevant** research and investigation, clearly linked to the context and, where appropriate, the work of past/present professionals and companies. • undertaken an effective analysis of information, reflecting the **needs**, **wants** and values of **clients** or potential **users**. • identified a **range** of problems/opportunities to clearly inform the development of possible design briefs.	**4**
6 - 8 marks • undertaken a generally 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 a mostly 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 a partially effective 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 **superficial** analysis of information, with **little or no** consideration of the needs, wants and values of potential users. • identified **few** problems/opportunities which are of **little** use in the development of possible design briefs.	**1**
0 marks • produced no work that is worthy of a mark.	

FORMAL PRESENTATION FOLIO

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



FINAL DESIGN BRIEF

I will be designing a rain sensor for use on a washing line. The device will be powered by batteries, or possibly use solar energy. It must be portable, and easy to fit onto a range of washing lines. When a sensor detects rain, it will trigger an alarm, 3 L.E.D's will flash to alert the user, and a buzzer will sound so that the user can hear the alarm if they are out of sight.

SPECIFICATION : ESSENTIAL.

1. FUNCTION.
- My product must be battery powered / charged by solar energy.
- It must have copper probes to sense rain, to trigger the circuit.
- Once triggered, 3 LED's will flash
- A loud buzzer must sound to warn the user.
- It must have a hook to attach to washing line!

2. AESTHETICS.
- My product must be white in colour, to be gender neutral and clean looking.
- My product must have a blue logo and look professional.
- The device must have rounded corners, a smooth finish, and look attractive.

3. MATERIALS.
- I will use MDF to make the mould to vacuum form the casing.
- HIPS will be used to make a water resistant, robust casing.
- I will laser cut an acrylic back to fit perfectly onto the casing.
- I will make a blue vinyl logo using the CAMM1.

4. SAFETY.
- My product must have rounded edges and no sharp corners.
- The casing must be sealed and water resistant / shower proof.
- The battery and circuit must be held safely and securely inside.

SPECIFICATION : DESIRABLE.

1. CIRCUIT.
- I would like my product to include a PIC chip so the device can control multiple inputs and outputs.
- The PIC chip could be updated, reprogrammed or reused after use.

2. SIZE.
- My portable product must not be too big. I will use :

  Length - 95mm - 120mm.
  Width - 60mm - 80mm
  Depth - 30mm - 50mm

3. COST.
- I would like my product to cost around £10 to make.
- The retail price would be £15 - £20.
- My product would compare favourably with other competitor products.

4. CONSTRUCTION.
- My product must be accessible to change the battery easily.
- My device must use sturdy and strong construction methods.
- My product could be fixed together using nuts and bolts.

- **A clear and detailed Design Brief.**
- **Specification with measurable criteria.**
- **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 • **thoroughly** considered a **range** of problems/opportunities in detail 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 comprehensive design brief, directly **relevant** to the context, based upon a **thorough** analysis of their research and investigation. • written a **comprehensive**, **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 good design brief, linked 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**

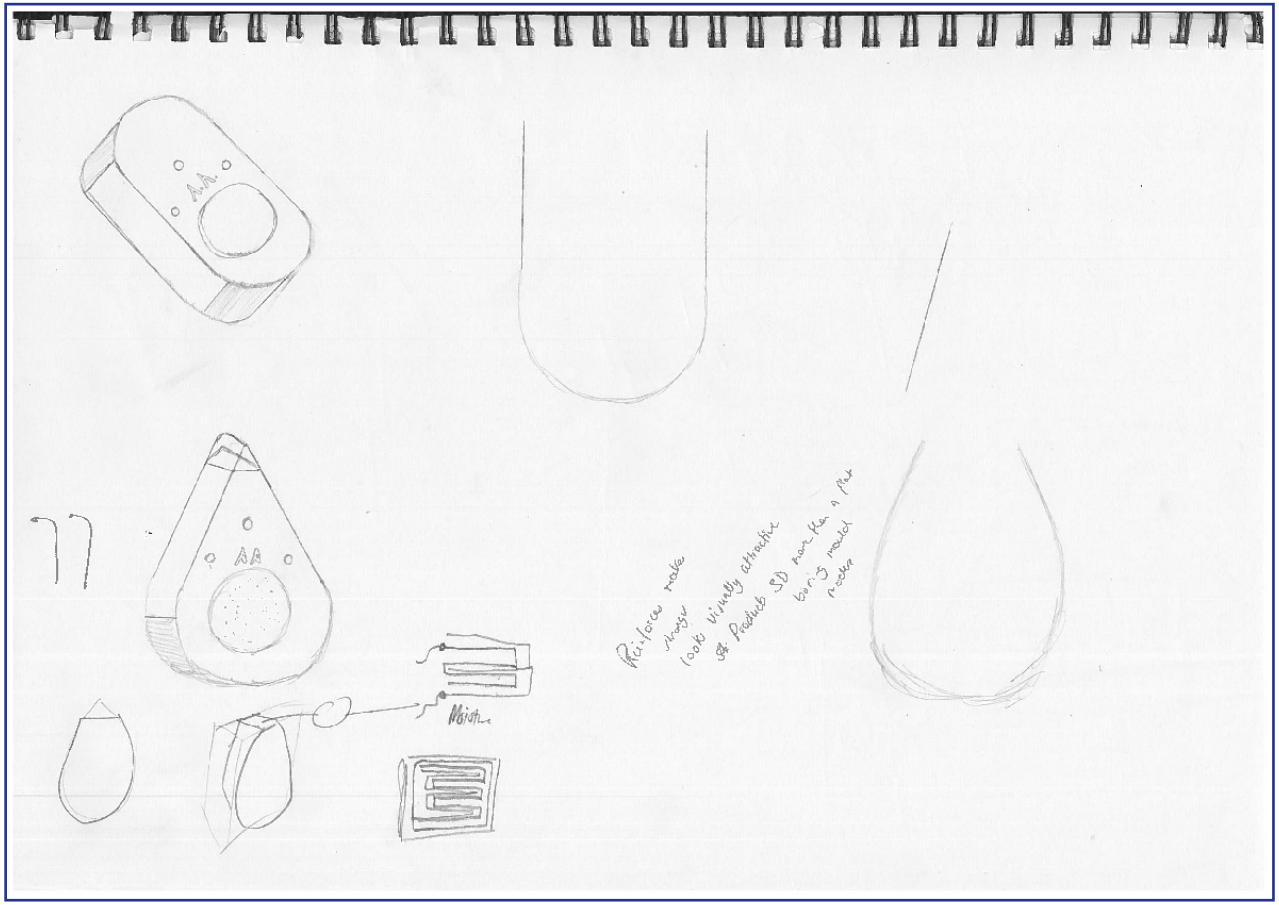
(b) Developing a design brief and specification [AO1] The candidate has:	Band
3 - 5 marks • considered some problems/opportunities before deciding on a final design brief. • demonstrated a general understanding of the task ahead and one or two requirements have been identified to satisfy some of the needs, wants and interests of potential users. • written a satisfactory design brief, based upon some aspects of the analysis of their research and investigation. • written a satisfactory specification, including some 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 with little or no reference to 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.	

AO2 Design and make prototypes that are fit for purpose

Definitions used in AO2	
Design	the generation and development of ideas that can be presented to a third party, and can be evaluated and tested (however, the actual analysis and evaluation forms part of AO3).
Prototype	an appropriate working solution to a need or want that is sufficiently developed to be tested and evaluated (for example, full sized products, scaled working models or functioning systems).
Fit for purpose (prototype)	in addition to being a working solution, addressing the needs/wants of the intended user.
	making skills can be assessed through the designing and making of the prototype(s), as well as the nature and quality of the final prototype.

INFORMAL Sketchpad

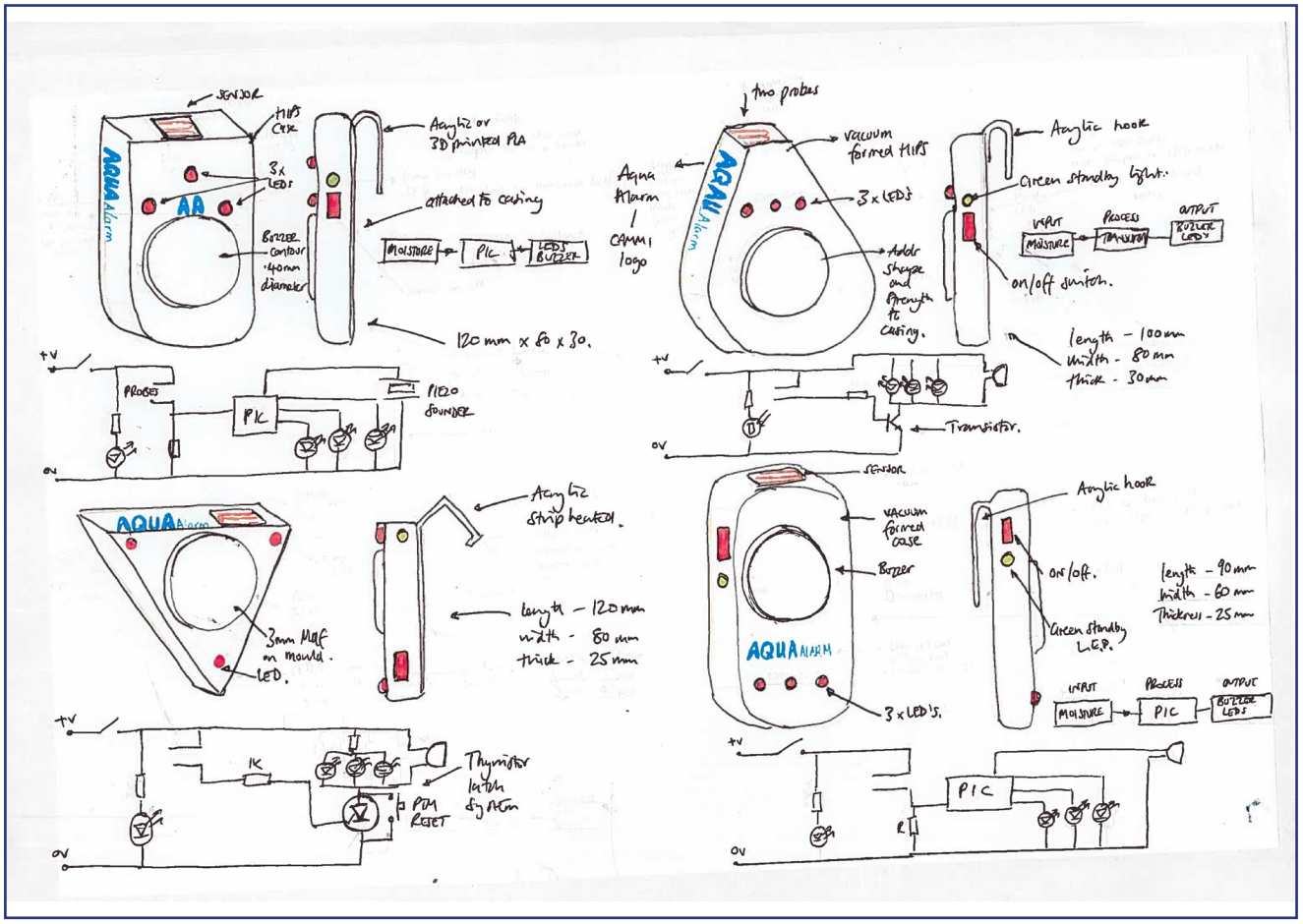
Assessment Criteria		Marks	Assessment objective
(c)	Generating and developing design ideas	30	AO 2



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

INFORMAL Sketchpad

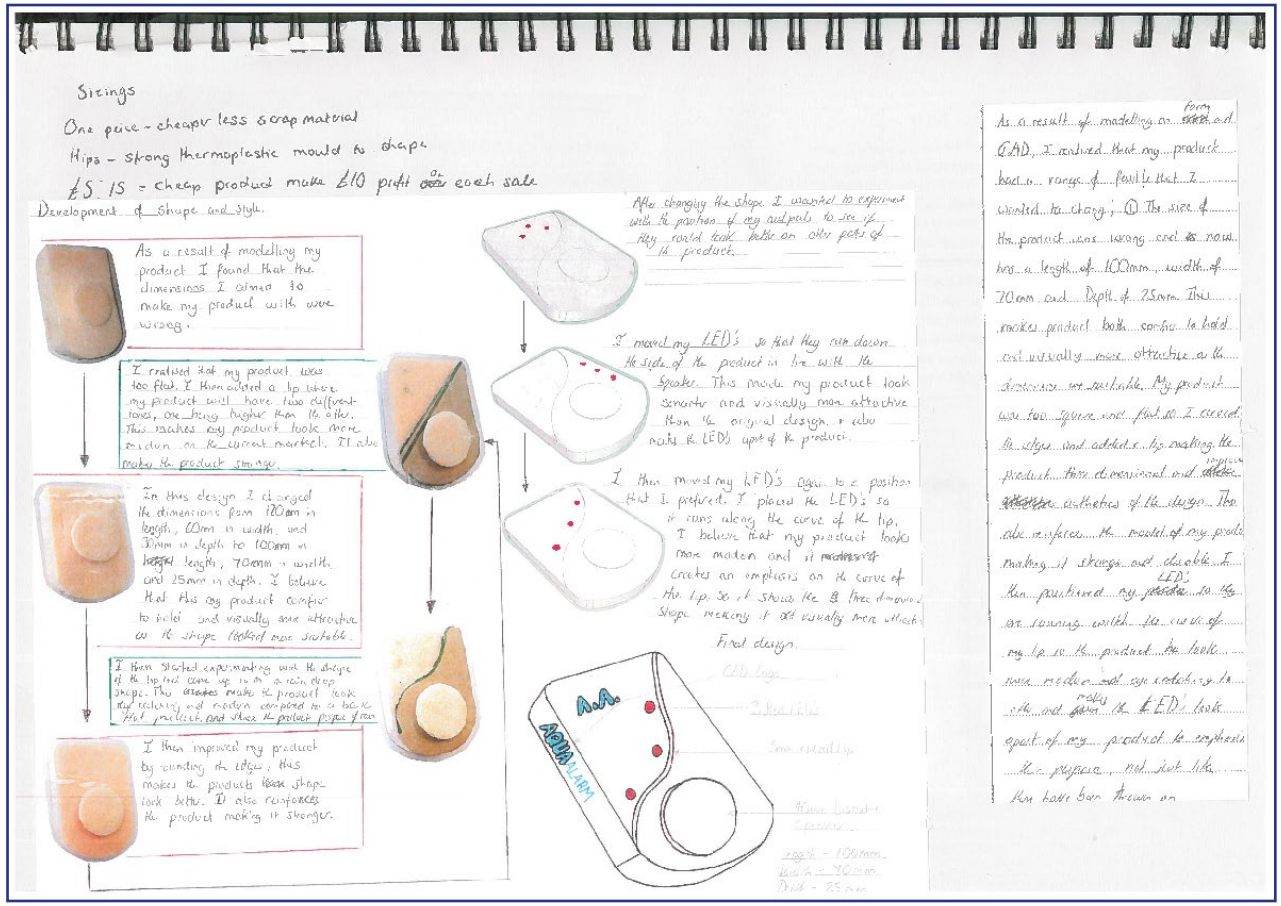
Assessment Criteria		Marks	Assessment objective
(c)	Generating and developing design ideas	30	AO 2



- 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.

INFORMAL Sketchpad

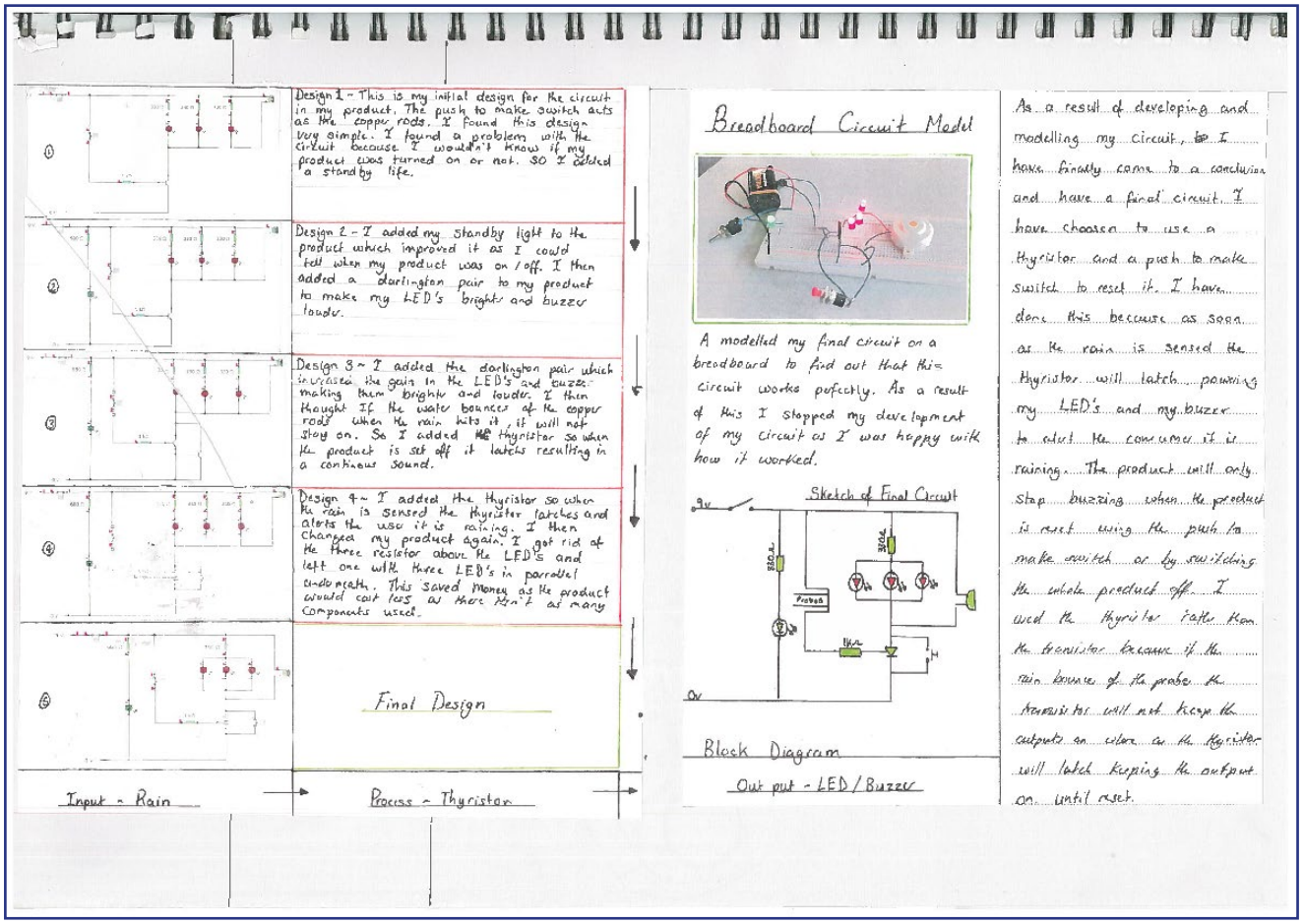
Assessment Criteria		Marks	Assessment objective
(c)	Generating and developing design ideas	30	AO 2



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

INFORMAL Sketchpad

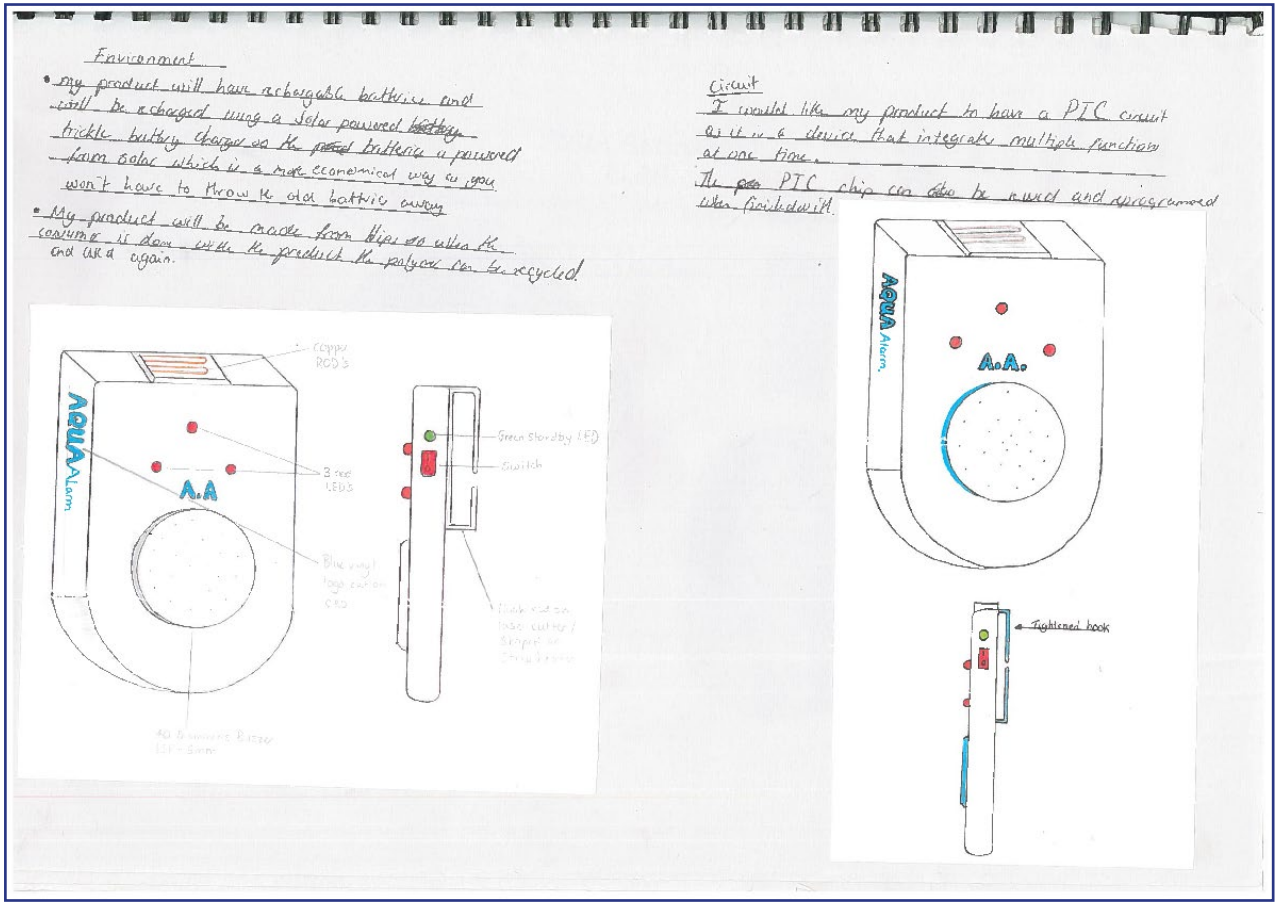
Assessment Criteria		Marks	Assessment objective
(c)	Generating and developing design ideas	30	AO 2



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

INFORMAL Sketchpad

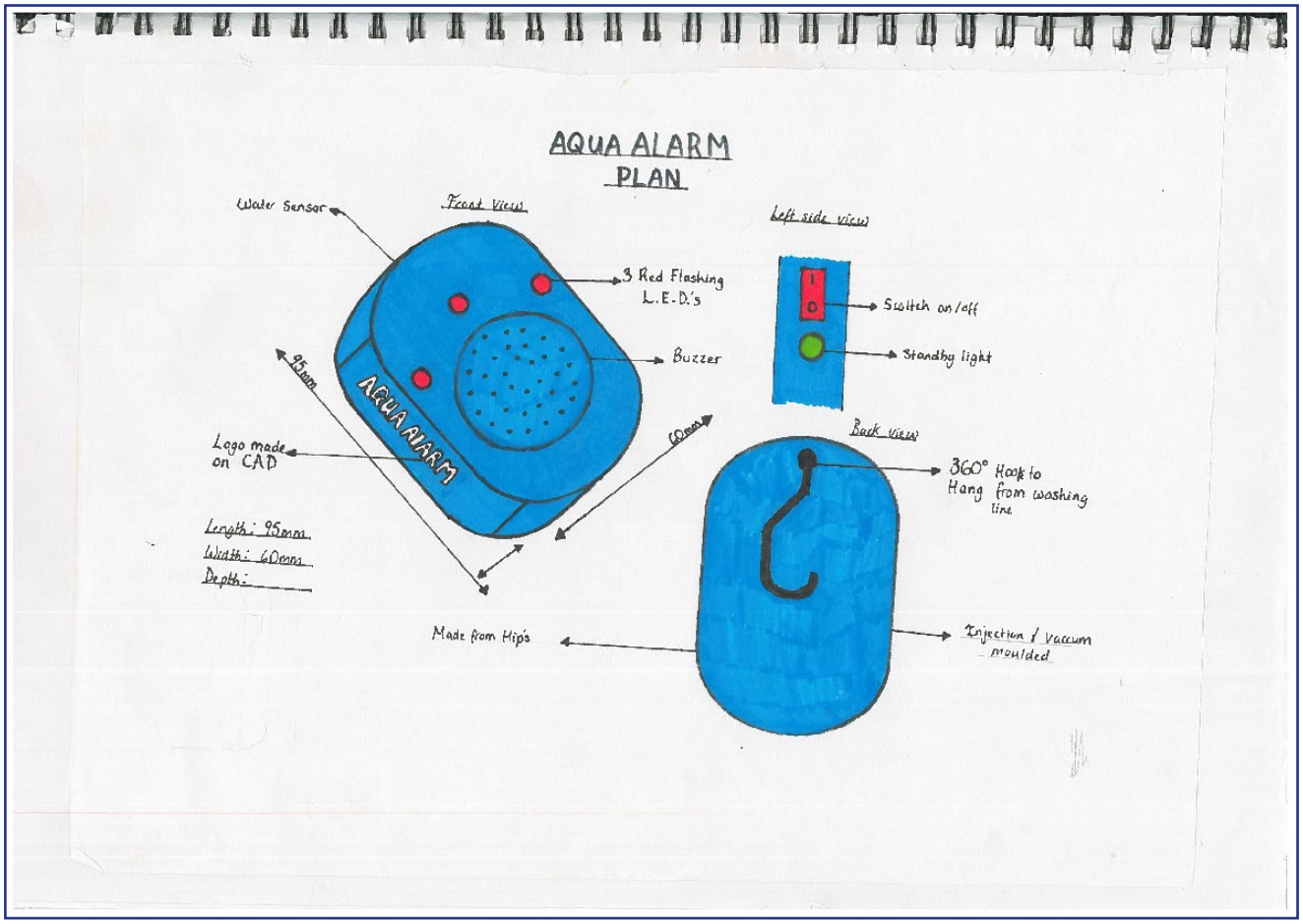
Assessment Criteria		Marks	Assessment objective
(c)	Generating and developing design ideas	30	AO 2



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

INFORMAL Sketchpad

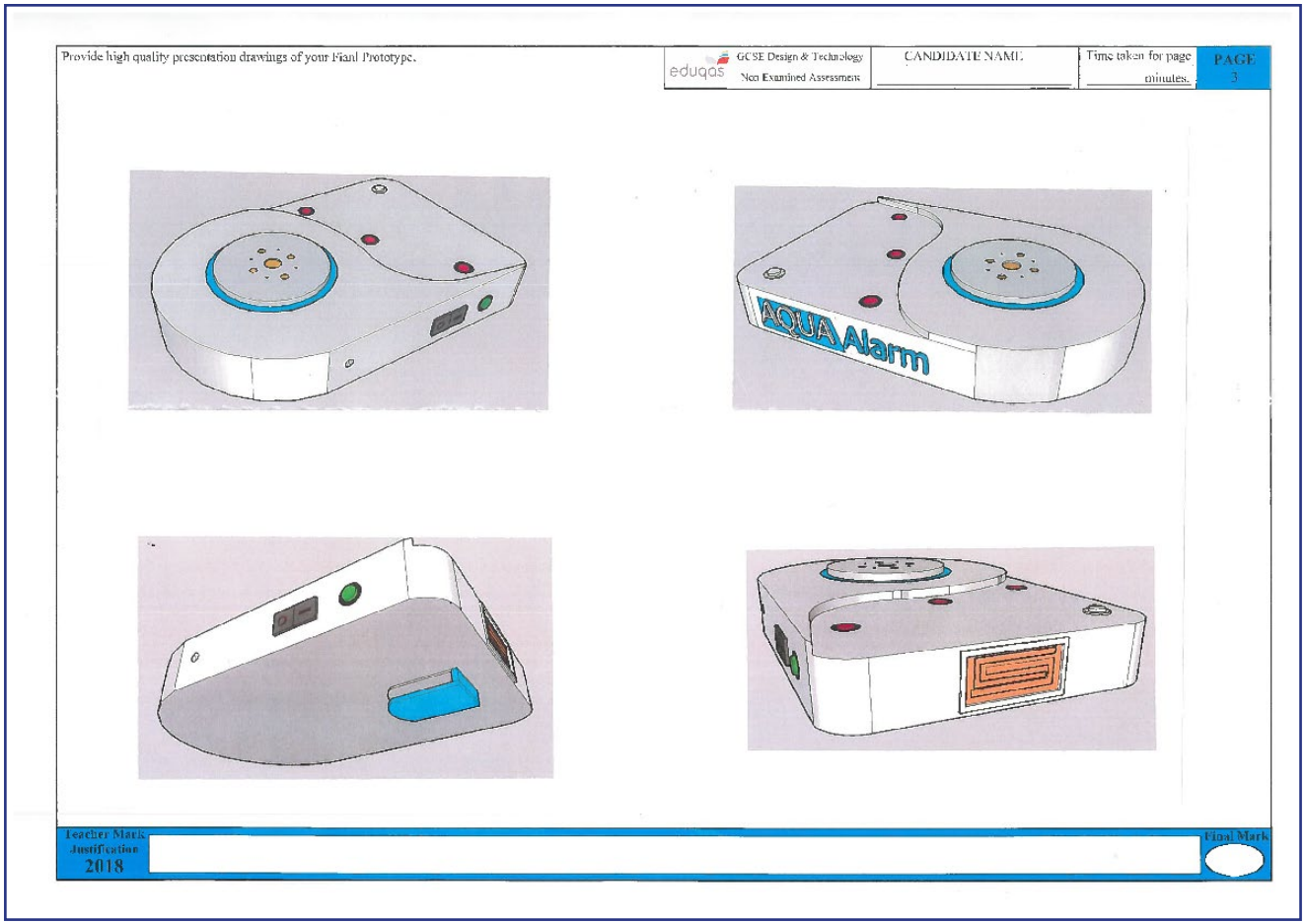
Assessment Criteria		Marks	Assessment objective
(c)	Generating and developing design ideas	30	AO 2



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

FORMAL PRESENTATION FOLIO

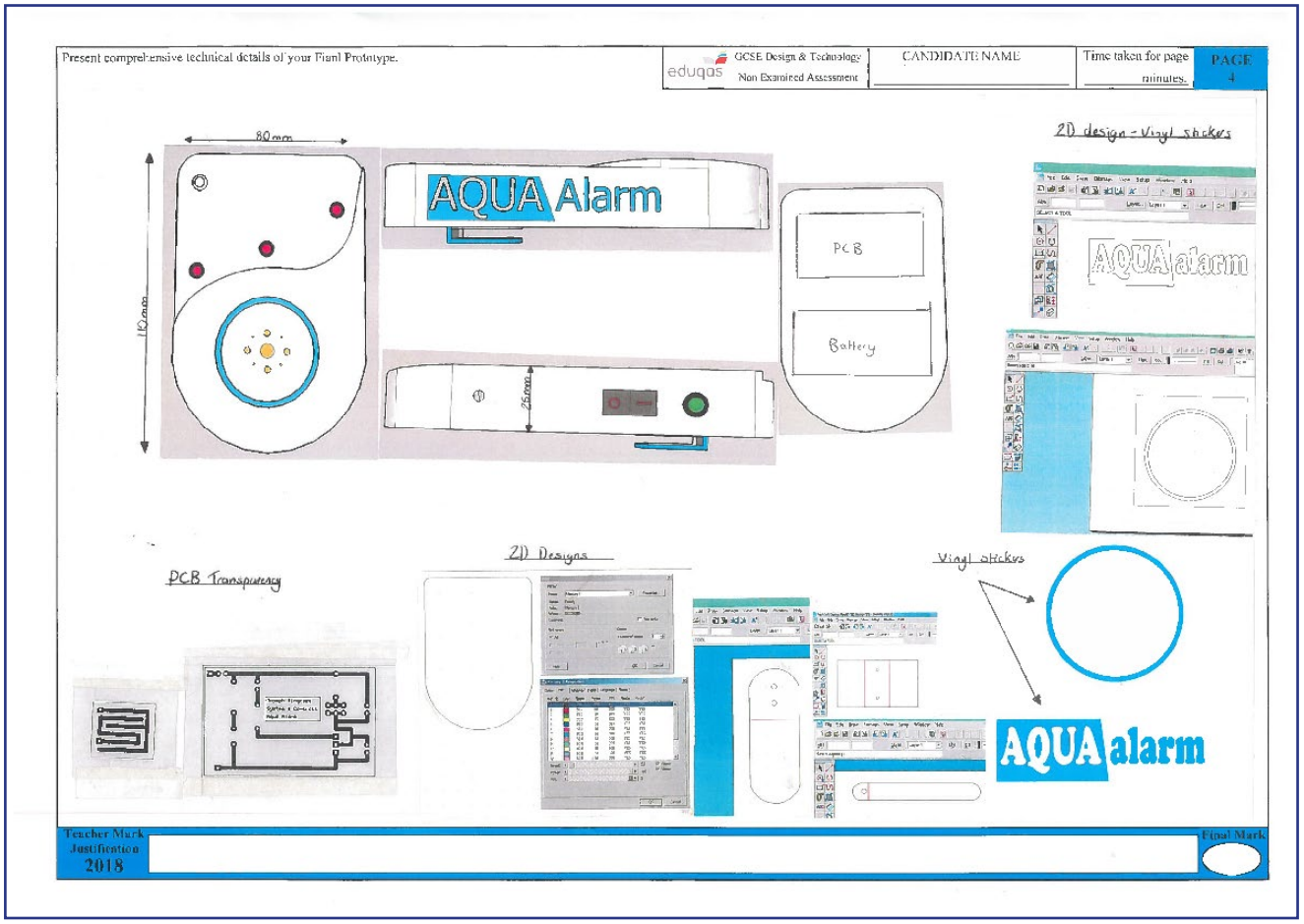
Assessment Criteria		Marks	Assessment objective
(c)	Generating and developing design ideas	30	AO 2



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

FORMAL PRESENTATION FOLIO

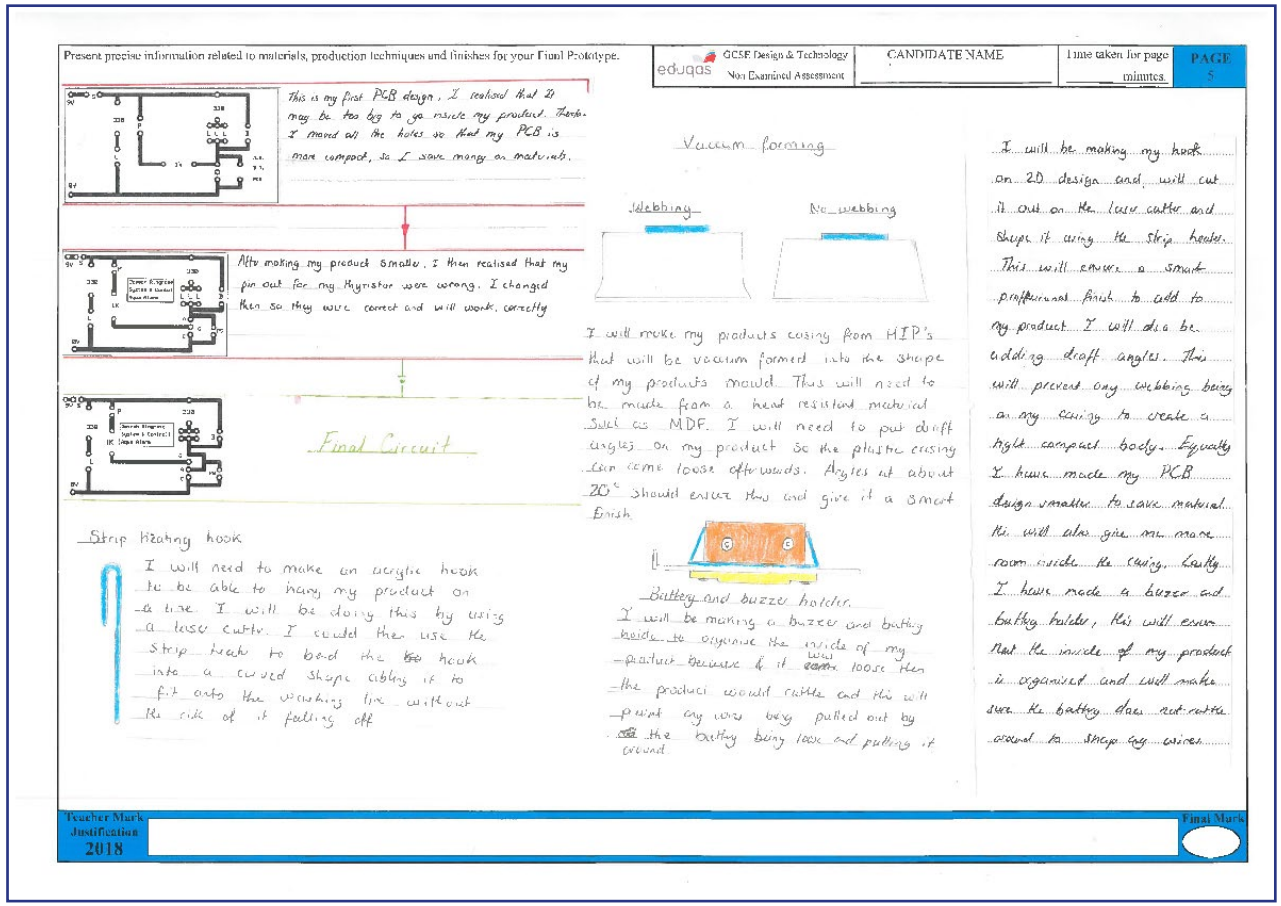
Assessment Criteria		Marks	Assessment objective
(c)	Generating and developing design ideas	30	AO 2



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

FORMAL PRESENTATION FOLIO

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



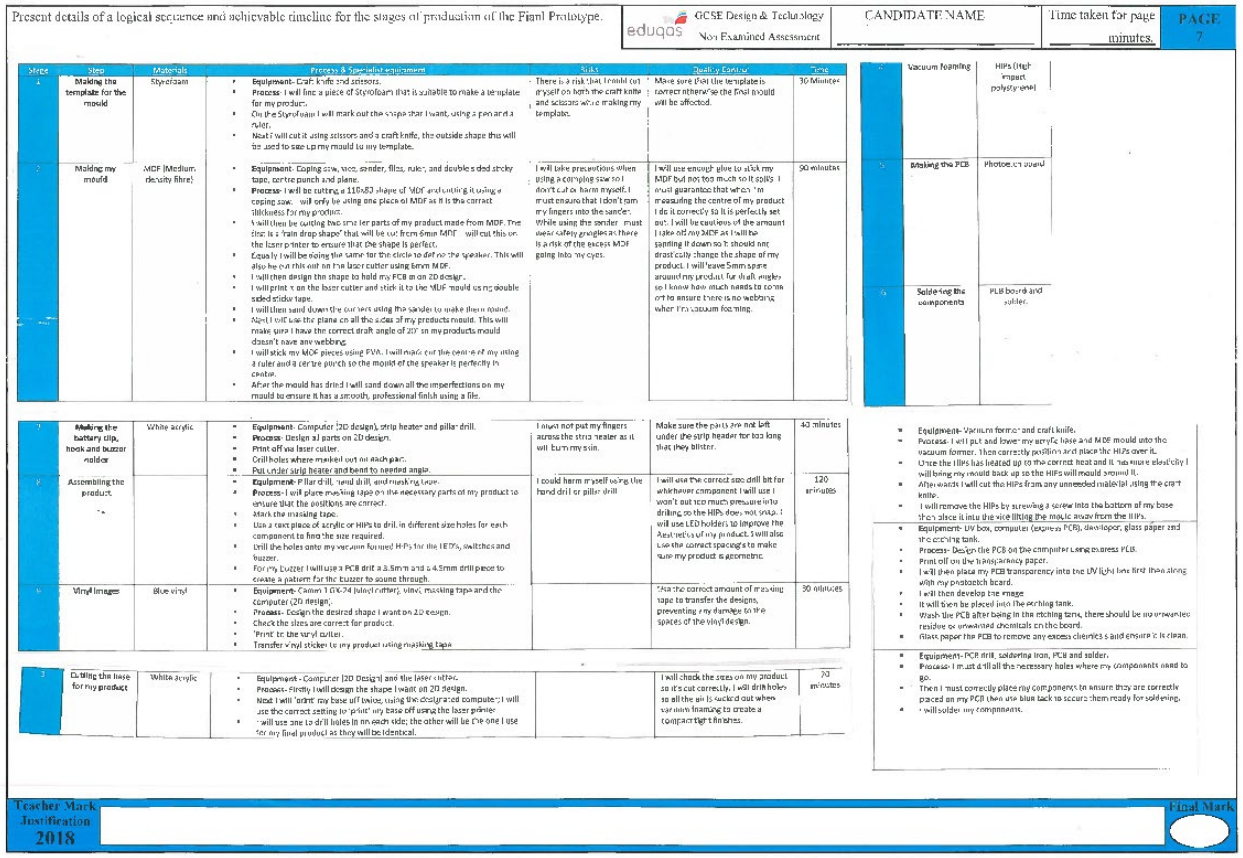
- **Details of a sophisticated logical sequence.**
- **Achievable timeline for manufacture.**
- **Supports the manufacture.**

(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 **range** of initial ideas which **fully reflect** all requirements. • identified and considered social, moral and economic factors which are fully **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 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 range of initial ideas which generally reflect requirements. • 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 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 satisfactory details of materials, dimensions, finishes and/or production techniques, which address the main requirements of the design brief and specification. • demonstrated satisfactory use 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.	

FORMAL PRESENTATION FOLIO

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


Present details of a logical sequence and achievable timeline for the stages of production of the Final Prototype.

eduqas GCSE Design & Technology Non Examined Assessment | CANDIDATE NAME | Time taken for page ____ minutes. | PAGE 7

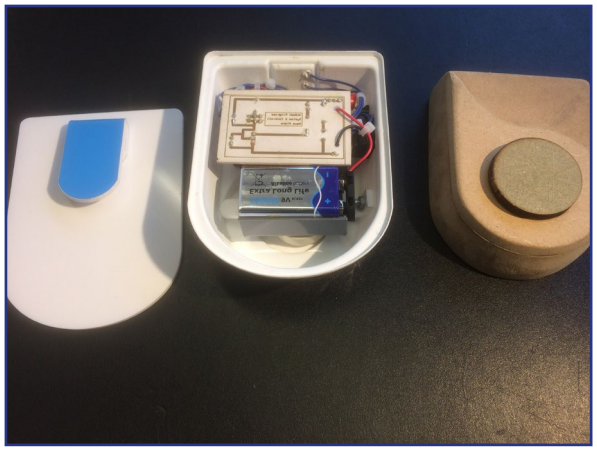
Stage	Step	Materials	Process & Specialist equipment	Risks	Quality Control	Time
1	Making the template for the mould	Styrofoam	Equipment- Craft knife and scissors. Process- I will line a piece of Styrofoam that is suitable to make a template for my product. On the Styrofoam I will mark out the shape that 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 should 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. 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. 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 def no 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 in 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 curves using the sander to make them round. Next 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° on my products mould doesn't have any webbing. I will stick my MDF pieces using PVA. I will mark 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 turn 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 MDF 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 sound 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 does not snap. I will use LED holders to improve the Aesthetics of my product. I will also use the correct spacings to make sure my product is geometric.	120 minutes
5	Vinyl images	Blue vinyl	Equipment- Cameo 3 GX-24 (vinyl cutter), vinyl, 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		Use 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 designated 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 is cut correctly. I will drill holes so all the pin is sucked out when vacuum foaming to create a compact tight finishes.	30 minutes
7	Vacuum foaming	HIPs (High Impact polystyrene)	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 more elasticity I will bring my mould back up so the HIPs will mould around it. Afterwards 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 mould away from the HIPs.			
8	Making the PCB	Photoboard	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 photoboard. 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.			
9	Soldering the components	PCB board and solder.	Equipment- PCB drill, soldering iron, PCB and solder. Process- I must drill all the necessary holes where my components need to go. Then I must correctly place my components to ensure they are correctly placed on my PCB then use blue tack to secure them ready for soldering. I will solder my components.			

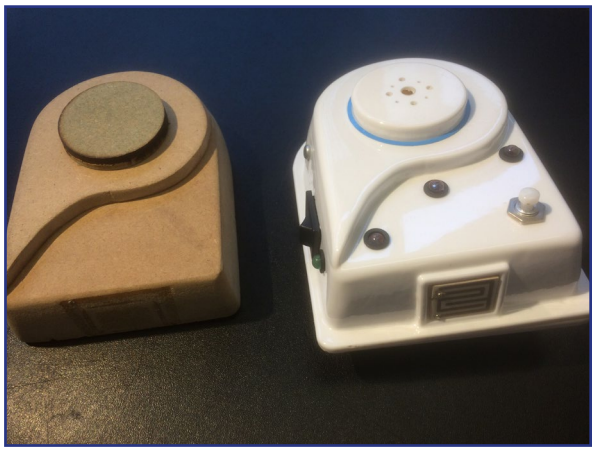
Teacher Mark Justification 2018 | Final Mark

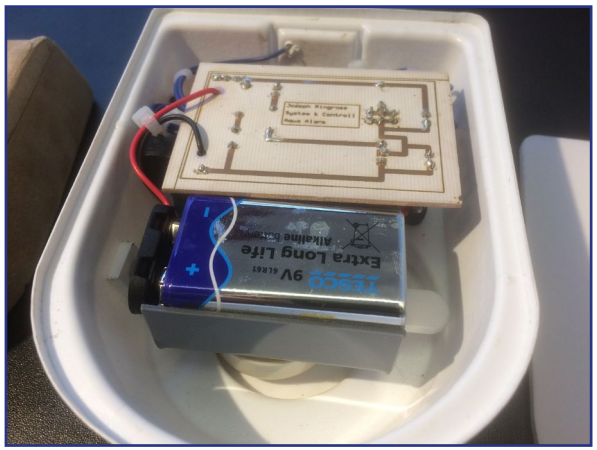
- **Details of a sophisticated logical sequence.**
- **Achievable timeline for manufacture.**
- **Supports the manufacture.**

Final Prototype

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







- 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 [AO2] The candidate has:	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. • worked with **appropriate** materials and components to complete all aspects of the manufacture of their prototype to a defined schedule. • used **appropriate** making skills and processes to produce a **high quality functioning** prototype that fully meets all 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 **excellent accuracy** and **precision** to enable the prototype to perform as intended and **fully** meet the user's requirements	**4**

(d) Manufacturing a prototype [AO2] The candidate has:	Band
16 - 23 marks	
• communicated relevant details of a logical sequence and achievable timeline for the stages of production and testing of their final prototype. • worked with appropriate materials and components to complete most aspects of the manufacture their prototype, generally to a defined schedule. • used appropriate making skills and processes to produce a good quality functioning prototype that generally meets most of the requirements of the design specification 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 good accuracy and precision to enable the prototype to perform as intended and generally meet the user's requirements.	**3**

(d) Manufacturing a prototype [AO2] The candidate has:	Band
8 - 15 marks • communicated details of a sequence for manufacture and testing of their final prototype. • worked with materials and components to partly complete the manufacture of their prototype, generally to a defined schedule. • used making skills and processes to produce a satisfactory functioning prototype that partially meets the requirements of the design specification and is generally fit for purpose. • a satisfactory 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 fair degree of accuracy and precision, the prototype partially performs as intended and meets some aspects of the user's requirements	**2**

(d) Making a prototype [AO2] The candidate has:	Band
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 making skills and processes to produce a **partially** functioning prototype, some 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 **only just performs** or is **unable** to perform as intended, and meets few aspects of the needs, wants and values of the user.	**1**
0 marks • produced no work that is worthy of a mark.	

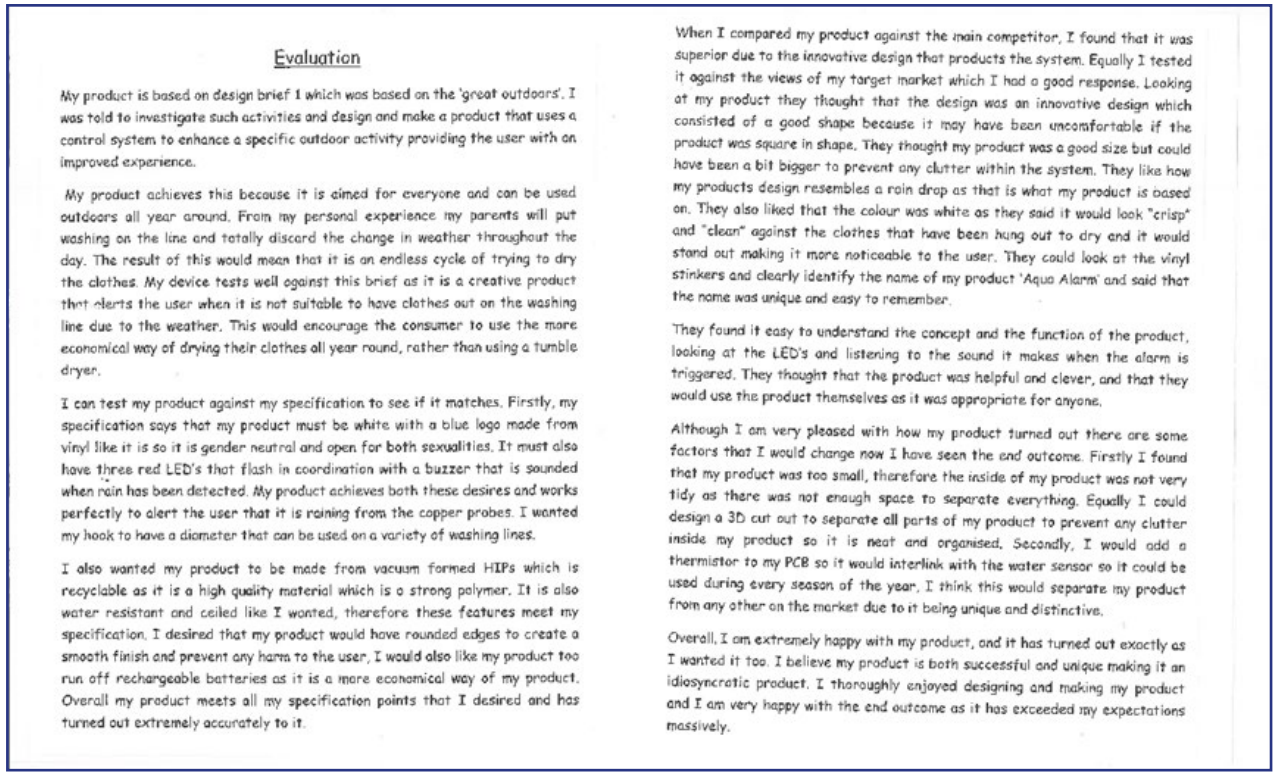
AO3 Analyse and evaluate

- **design decisions and outcomes, including for prototypes made by themselves and others**
- **wider issues in design and technology**

Definitions used in AO3	
Analyse	Deconstructing information and/or issues to find connections and provide logical chain(s) of reasoning.
Evaluate	Appraising and/or making judgements with respect to information and/or issues.
	Analysis and evaluation should draw on underpinning knowledge and understanding.

FORMAL PRESENTATION FOLIO

Assessment Criteria		Marks	Assessment objective
(e)	Analysing and evaluating design decisions and prototypes	20	A03



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.

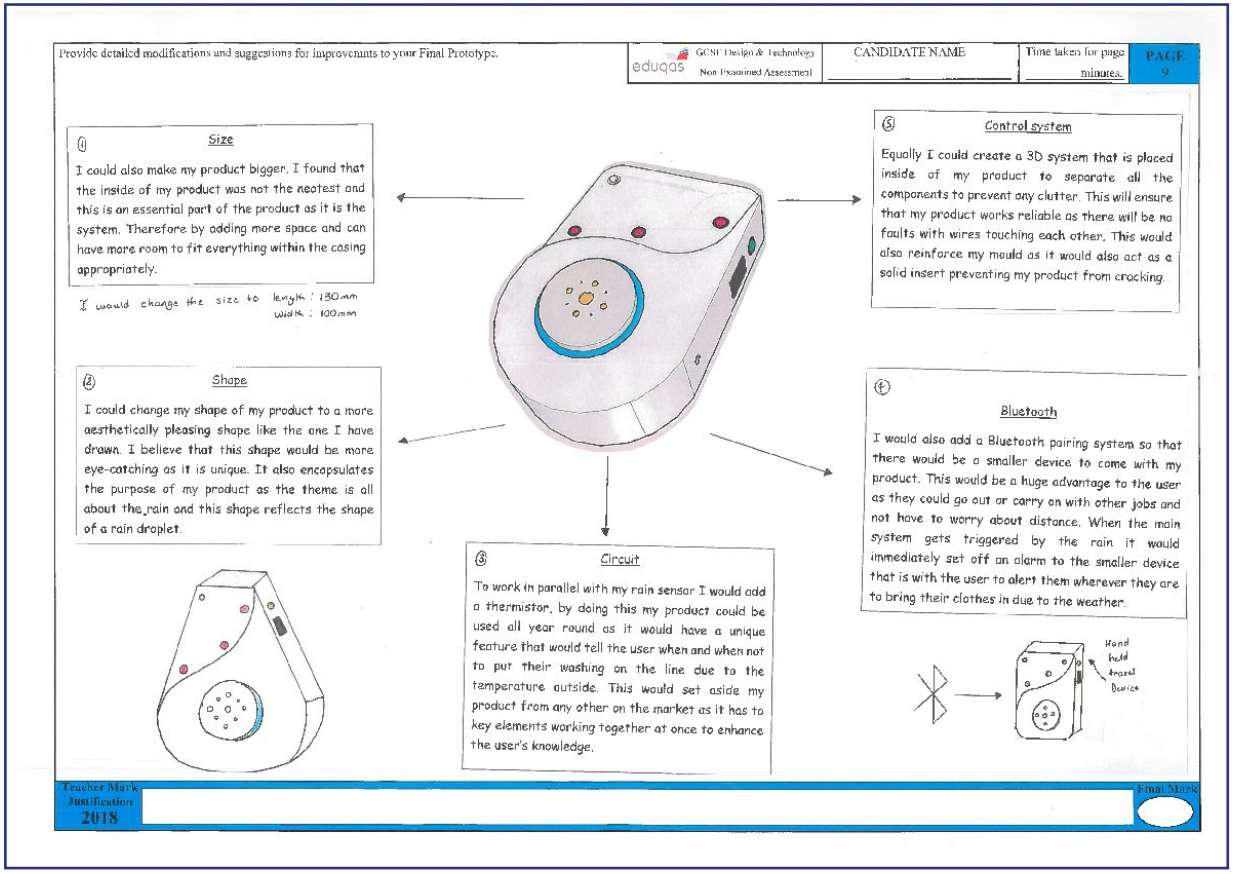
Although I am very pleased with how my product turned out there are some factors that I would change now I have seen the end outcome. Firstly I found that my product was too small, therefore the inside of my product was not very tidy as there was not enough space to separate everything. Equally I could 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.

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

FORMAL PRESENTATION FOLIO

Assessment Criteria		Marks	Assessment objective
(e)	Analysing and evaluating design decisions and prototypes	20	A03



Provide detailed modifications and suggestions for improvements to your Final Prototype.

eduqas GCSE Design & Technology Non Examined Assessment | CANDIDATE NAME | Time taken for page ____ minutes. | PAGE 9

① Size

I could also make my product bigger. I found that the inside of my product was not the neatest and this is an essential part of the product as it is the system. Therefore by adding more space and can have more room to fit everything within the casing appropriately.

I would change the size to length : 130mm width : 100mm

② Shape

I could change my shape of my product to a more aesthetically pleasing shape like the one I have drawn. I believe that this shape would be more eye-catching as it is unique. It also encapsulates the purpose of my product as the theme is all about the rain and this shape reflects the shape of a rain droplet.

③ Circuit

To work in parallel with my rain sensor I would add a thermistor, by doing this my product could be used all year round as it would have a unique feature that would tell the user when and when not to put their washing on the line due to the temperature outside. This would set aside my product from any other on the market as it has to key elements working together at once to enhance the user's knowledge.

④ Bluetooth

I would also add a Bluetooth pairing system so that there would be a smaller device to come with my product. This would be a huge advantage to the user as they could go out or carry on with other jobs and not have to worry about distance. When the main system gets triggered by the rain it would immediately set off an alarm to the smaller device that is with the user to alert them wherever they are to bring their clothes in due to the weather.

Hand held traced Device

⑤ Control system

Equally I could create a 3D system that is placed inside of my product to separate all the components to prevent any clutter. This will ensure that my product works reliable as there will be no faults with wires touching each other. This would also reinforce my mould as it would also act as a solid insert preventing my product from cracking.

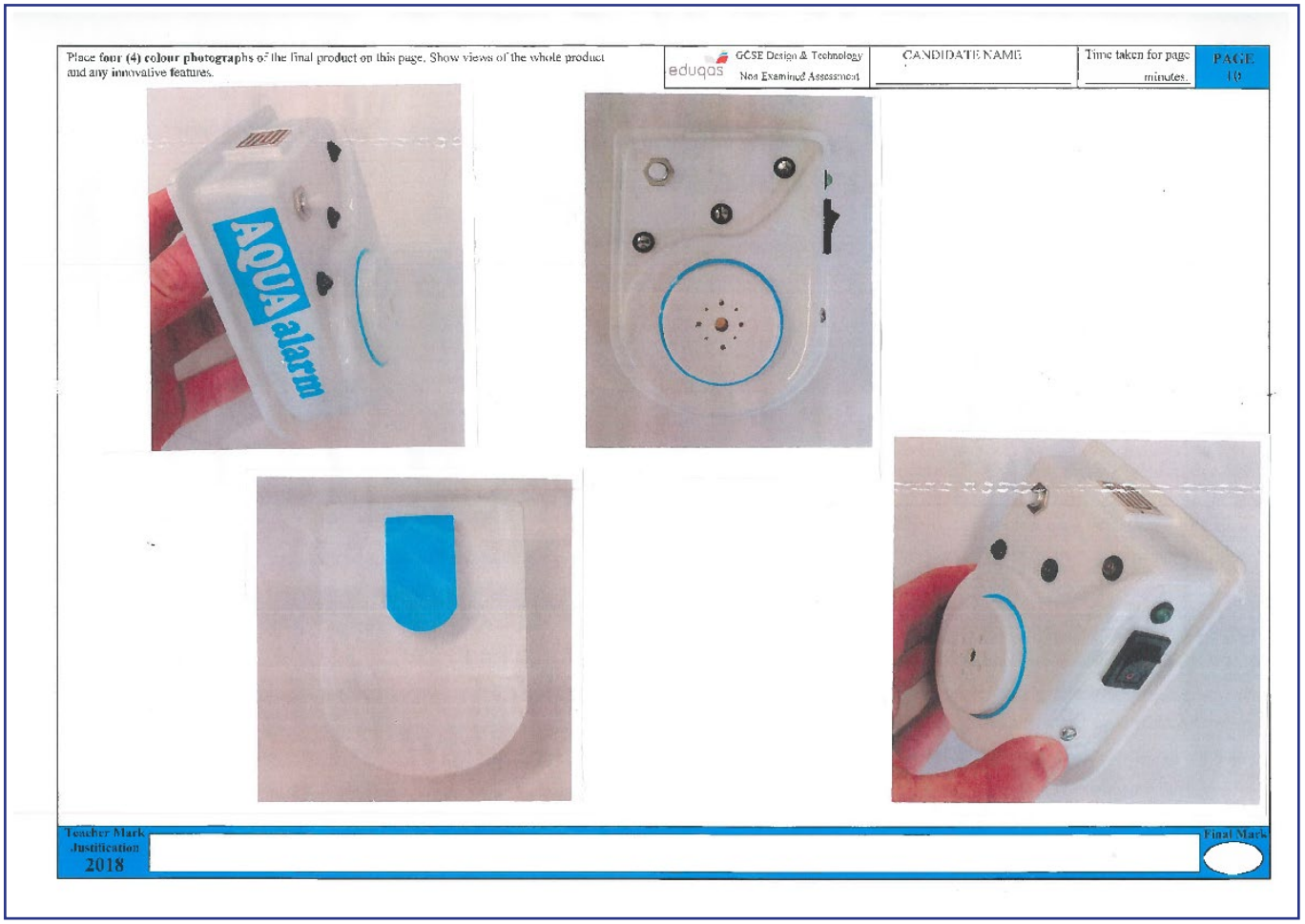
Teacher Mark Justification 2018 | Final Mark

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

(e) Evaluating a prototype's fitness for purpose [AO2] 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) Evaluating a prototype's fitness for purpose [AO2] The candidate has:	Band
6 - 10 marks • undertaken a satisfactory analysis, evaluation and/or testing of their ideas and decisions whilst applying iterative design processes. • undertaken a satisfactory 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 **superficial evaluation** of their **ideas** and **decisions**. • produced a **superficial 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.	

FORMAL PRESENTATION FOLIO



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

Acknowledgements

- Drawing (cover), blackred / Getty Images
- Lightbulb, idimair / Getty Images.
- Girl thinking, asiseeit / Getty Images.
- Scrunched up paper, BrianAJackson / Getty Images
- Group meeting, jacoblund / Getty Images