GCSE (9-1)

eduqas
Part of WJEC

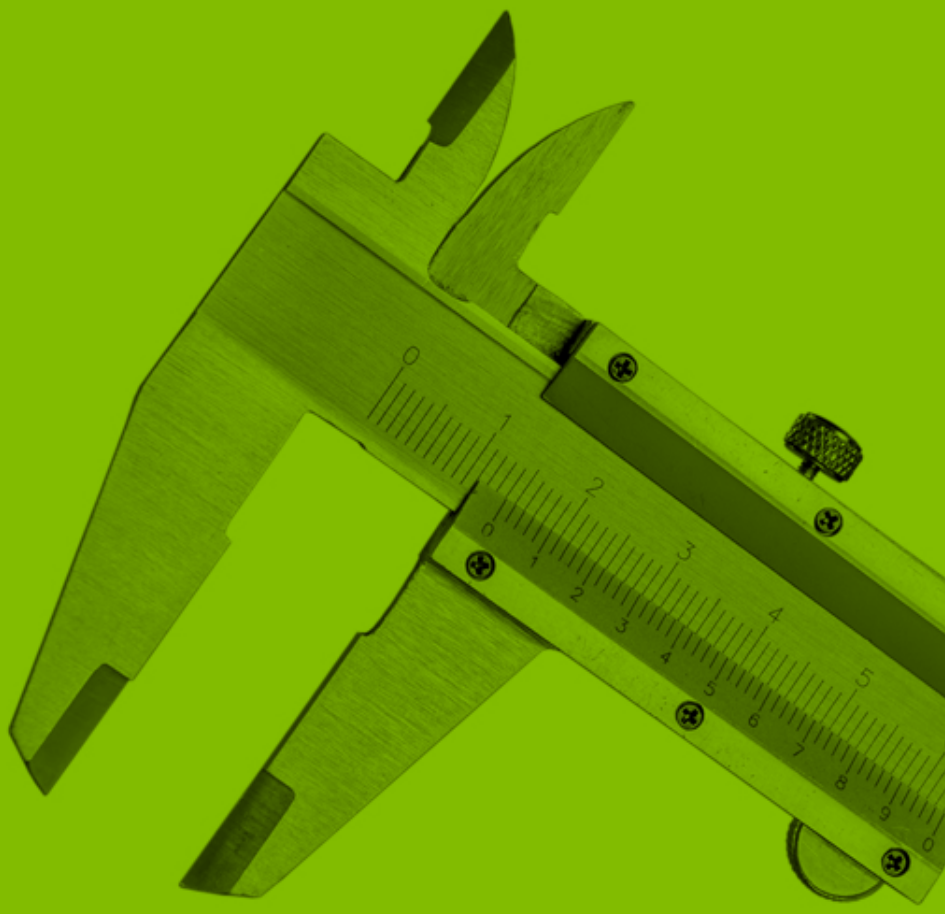
WJEC Eduqas GCSE (9-1) in

DESIGN AND TECHNOLOGY

ACCREDITED BY OFQUAL

GUIDANCE FOR TEACHING

Teaching from 2017



wjec
cbac

This Ofqual regulated qualification is not available for candidates in maintained schools and colleges in Wales.

Contents

Introduction

The WJEC EDUQAS GCSE Design and Technology specification can be delivered and assessed in:

- all schools and colleges in England
- schools and colleges in independent regions such as Northern Ireland, Isle of Man and the Channel Islands
- independent schools in Wales.

It will be awarded for the first time in summer 2018, using grades 9 to 1.

This specification meets the Conditions and Requirements for GCSE Design and Technology Qualifications which set out the requirements for all new or revised GCSE specifications developed to be taught in England from September 2017. Additionally, the specification meets the requirements of the Approval Criteria for GCSE Design and Technology (July 2016). WJEC EDUQAS has worked closely with teachers and outside organisations in developing this qualification.

This guidance for teaching publication is one of a number of ways in which WJEC EDUQAS provides assistance to teachers delivering this specification. This guide is to be used in conjunction with, and as a supplement to the Specification and Sample Assessment Materials (question papers and marking schemes). It is not intended as, and cannot be used as, a replacement for either of these essential materials.

Other provision which you may find useful:

- easy access to the specification and other key documents on the WJEC EDUQAS website
- CPD advice available via the WJEC EDUQAS website
- face to face CPD at a range of venues
- additional, free-to-access, digital resources
- easy access, by telephone or email, to both the Subject Officer and Subject Support Officer for GCSE Design and Technology
- opportunities to become an examiner or moderator for the new specification
- visiting moderation

Contact points for WJEC EDUQAS in GCSE Design and Technology are as follows:

Stephen Howells steve.howells@wjec.co.uk 029 2026 5017 (Subject Officer)
Candice Dempster candice.dempster@wjec.co.uk 029 2026 5118 (Subject Support Officer)

Subject page: http://www.wjec.co.uk/qualifications/design-and-technology/r-design-and-technology-gcse-from-2017/

Continuing Professional Development

CPD will be delivered to assist in explaining the WJEC EDUQAS GCSE in Design and Technology qualification. WJEC EDUQAS will continue to deliver CPD in England for the life of the qualification.

Please use the following link to search for CPD events and make bookings:

http://www.wjec.co.uk/cpd/

Aims and objectives

The WJEC EDUQAS GCSE specification in GCSE Design and Technology provides opportunities for learners to follow a course that is inspiring, rigorous, coherent and balanced.

The specification will enable learners to:

- demonstrate their understanding that all design and technological activity takes place within contexts that influence the outcomes of design practice
- develop realistic design proposals as a result of the exploration of design opportunities and users' needs, wants and values
- use imagination, experimentation and combine ideas when designing
- develop the skills to critique and refine their own ideas whilst designing and making
- communicate their design ideas and decisions using different media and techniques, as appropriate for different audiences at key points in their designing
- develop decision making skills, including the planning and organisation of time and resources when managing their own project work
- develop a broad knowledge of materials, components and technologies and practical skills to develop high quality, imaginative and functional prototypes
- be ambitious and open to explore and take design risks in order to stretch the development of design proposals, avoiding clichéd or stereotypical responses
- consider the costs, commercial viability and marketing of products
- demonstrate safe working practices in design and technology
- use key design and technology terminology including those related to: designing; innovation and communication; materials and technologies; making; manufacture and production; critiquing; values and ethics.

This specification also gives learners an opportunity to produce extended written responses and demonstrate the quality of their written communication, including appropriate use of punctuation and grammar.

The learners will also have the opportunity to produce an extended piece of design work based on contextual challenges where they will be expected to be creative, innovative and solve problems that they have realised themselves. They will be able to use the iterative design process in making real products that solve real problems identified by them.

www.eduqas.co.uk

Prior learning and progression

There are no previous learning requirements for this specification. Any requirements set for entry to a course based on this specification are at the school/college's discretion.

This specification builds on subject content which is typically taught at key stage 3 and provides a suitable foundation for the study of design and technology at either AS or A level. In addition, the specification provides a coherent, satisfying and worthwhile course of study for learners who do not progress to further study in this subject.

The specification at a glance

The subject content for Design and Technology is basically split into two parts.

Technical Principles

Core	Requirements
Core knowledge and understanding is presented in five clear and distinct topic areas: • design and technology and our world • smart materials • electronic systems and programmable components • mechanical components and devices • materials	Learners are required to study all of the content in these five areas, to ensure they have a broad knowledge and understanding of design and technology and that they are able to make effective choices in relation to which materials, components and systems to utilise within design and make activities.
In-depth	**Requirements**
In-depth knowledge and understanding is presented in six clear and distinct topic areas: **a.** electronic systems, programmable components & mechanical devices **b.** papers & boards **c.** natural & manufactured timber **d.** ferrous & non-ferrous metals **e.** thermoforming & thermosetting polymers **f.** fibres & textiles	Learners are required to study at least one of these six areas, to ensure they have an in-depth knowledge and understanding of a specific material area and/or components and systems to support their design and make activities.

Designing and making principles

Core	Requirements
Core knowledge and understanding that learners are required to develop and apply is presented in ten clear topic areas: • understanding design and technology practice • understanding user needs • writing a design brief and specifications • investigating challenges • developing ideas • investigating the work of others • using design strategies • communicating ideas • developing a prototype • making decisions	Learners are required to cover all of the content in these ten areas, to ensure they are able to apply a broad knowledge and understanding of design and technology principles within design and make activities.
In-depth	**Requirements**
In-depth knowledge and understanding is presented in five clear topic areas: • selecting and working with materials and components • marking out • using tools and equipment • using specialist techniques • using surface treatments and finishes	Learners are required to cover all of the content in these five areas, **in relation to at least one of the topic areas (a to f)** identified in the in-depth knowledge and understanding section of technical principles.

Technical principles		
Core knowledge & understanding		**In-depth knowledge & understanding**
• Design and technology and our world • Smart materials • Electronic systems and programmable components • Mechanical components and devices • Materials	Plus at least one from	**a.** Electronic systems, programmable components & mechanical devices
		b. Papers & boards
		c. Natural & manufactured timber
		d. Ferrous & non-ferrous metals
		e. Thermosetting & thermoforming plastics
		f. Fibres & textiles

Designing and making principles		
Core knowledge & understanding	Plus	In-depth knowledge & understanding (in relation to at least one of **a** to **f** above)

Course overview

GCSE Design and Technology

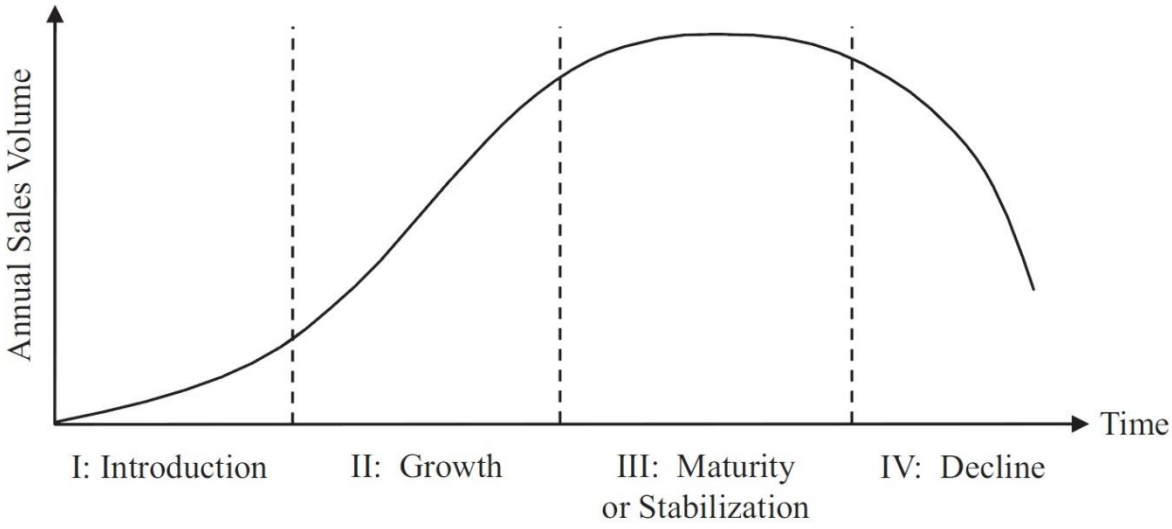
Component 1 – Design and Technology in the 21st Century

Written Examination: 2 hours
50% of qualification
100 marks in total
A mix of short answer structured and extended writing questions.

Learners are expected to attempt all questions in Section A and one from Section B. Learners will write their responses in the space provided underneath each question. The lined space provided is intended to give learners ample space to record their responses. There is no expectation that learners will fill up all the space provided. However, extra lined pages are provided within the question paper, and further continuation booklets will be provided for learners if necessary.

Sample core question

The Product Life Cycle Curve below shows the sales of a mobile telephone at each stage throughout its life cycle.



Wikimedia Creative Commons http://bit.ly/2AuKY4

(a) (i) Underline what you believe to be the most appropriate unit of time for the graph. [1]

Weeks **Months** **Years**

Exemplar response: Months

The only acceptable answer is Months.

(ii) Describe what happens during the Introduction stage of a product. [2]

Exemplar response: The product is introduced into the market and the start of the sales is slow because people are not aware of the product.

The answer is worth two marks as the learner explains what is happening and gives a detailed description.

(iii) Give **three** examples for the decline in sales of a product. [3]

Exemplar response: Technological advance - changes in taste and behaviour - economic circumstances

The question asks for three examples for the decline of sales. Each correct response will achieve 1 mark to a total of three.

(b) Recent energy legislation has meant that traditional light bulbs have been phased out and replaced by newer LED bulbs.

Traditional light bulb

LED bulb

(i) Explain why LED bulbs are now replacing the traditional light bulb.

Exemplar response: Traditional bulbs have short lifetimes; therefore there is a need to keep replacing them.

The question is specifically asking for an explanation, one mark has been awarded for a correct answer and one mark for a correct explanation.

(ii) Give a detailed reason why the energy legislation can be an advantage to the consumer. [2]

Exemplar response: The consumer would gain because the life of the bulb is longer than a traditional one without any reduction in the quality of the light.

The question is specifically looking for a detailed reason. One mark would be awarded for the reason and one mark would be for an explanation or justification of the reason.

(iii) The table below shows the costs related to running each light bulb for an average day.

Bulb Type	***Power***	***Cost per day (Pence)***
Traditional light bulb	100W	6.97p
LED bulb	18W	1.26p

Calculate as a percentage the saving that will be made by using the LED bulb over the period of a year (365 days).
(*Show all workings.)* [5]

Exemplar response:
6.97 x 365 = £25.4405 (1 Mark)

1.26 x 365 = £4.599 (1 Mark)

25.4405 – 4.599 = £20.8415 (1 Mark)

$\frac{20.8415}{25.4405} \times 100 = 81.9$ ***Saving*** (1 Mark for indication of method but the answer may be wrong). Final answer must be either 81.9% accept 82% (1 mark)

This question is a typical mathematics style of question. The marks will be awarded for each correct stage or step in the calculations. The learner must ensure that they show all workings.

(c) (i) Explain **one** disadvantage of using wind power to produce energy. [2]

Exemplar response: Good wind locations are often located in rural areas and transmission lines need to be built to bring the energy to populated towns and cities.

The question is specifically looking for one disadvantage worth 2 marks. One mark will be awarded for a correct disadvantage and one mark for a more detailed description, explaining or illustrating the disadvantage when producing energy.

(ii) Discuss how using energy panels on houses can have a positive effect on the environment. [3]

Exemplar response: The home owner has cheaper energy bills, saves money and even makes a profit from the panels by selling back to the electric company.

The answer must clearly indicate an understanding of how energy panels have a positive effect on the environment. We are then looking for some discussion from the learner to verify their understanding. If a learner submits a correct answer that is not in the marking scheme, the examiner can still award the marks appropriately.

Sample core question

The jacket pictured below has been made using a thermo-chromic smart material.

Unable to trace copyright, please contact us if you are the copyright holder.

(a) Explain why a thermo-chromic material has been used as an additional design feature of the jacket. [3]

Exemplar response: When the user wears the jacket, their body temperature provides the heat to change the colour of the jacket; the action of a thermo-chromic material. This gives an additional aesthetic feature to the jacket that may attract a wider target market.

The explanation must show a clear understanding of a thermo-chromic material; its ability to change colour by the body temperature of the user. The answer then explains how the action of the material could be an aesthetic feature and attract a wider market.

(b) (i) Medium density fibreboard (MDF), glass reinforced plastic (GRP) and plywood are known as composite materials. Explain the meaning of a composite material. [2]

Exemplar response: A composite material is where two or more constituent materials with different properties or strengths are combined together to make one material. This often means composite materials have an improved weight to strength ratio.

This response demonstrates that the learner has a full understanding of a composite material, the points made are clearly explained including reference to strength to weight ratio.

(ii) The snowboarding helmet is made from a carbon fibre reinforced polymer. Analyse why the material properties of carbon fibre make it a particularly suitable material for the snowboarding helmet. [3]

Exemplar response: The carbon fibres have a very high tensile strength while also being very light and flexible. By combining the two materials together, you create a very light material that can be easily formed into the shape of the helmet, while also being extremely strong and resistant to breaking if a collision occurs.

The response indicates a detailed understanding of the main property of carbon fibre with a balanced reason for its use in the product.

Sample in depth question

Fibres and textiles

(a) Study the pictures of the two cushions shown below and answer the questions that follow.

Floor cushion

Bolster cushion

(i) State the name of the edge finish that has been used on both cushions and give a reason for its use.

Edge finish: piping [1]

Reason: The quality of the finished product looks more professional and strengthens the cushion.

There is only one possible answer to the edge finish for 1 mark. In this case the answer for the reason the learner has put down two possible reasons for one mark ie the quality and strengthens the cushion. One detailed reason would also gain one mark.

(ii) The main material used for both cushions is woven cotton. Give **one** reason why a material with a woven construction is the most suitable choice for these products. [1]

The woven material is more stable and will help give structure to the cushions.

The learner has given a correct answer and with a justified reason. In this question reference to cotton in the answer is not needed.

(iii) Explain why it is important to lay templates out following pattern language in the construction of the two cushions. [2]

Pattern language gives guidance on how the templates should be laid on the material and how the pieces will fit together when making the cushions. Failure to follow pattern language can affect the quality of the final products as the pieces may not fit together as intended.

The question is asking for an explanation of pattern language and its importance. Within the body of the answer the learner shows an understanding because they make reference to 'guidance' and the importance it plays in ensuring all the pieces are joined precisely for a high quality outcome.

(iv) The pink flower design shown below needs to be appliquéd onto the bolster cushion to co-ordinate the two cushions.

Describe how you would appliqué the flower design onto the bolster cushion. [4]

Strengthen the top piece of material (in this case the patterned flower shape) with bondaweb by ironing it to the back of the flower.

Cut it out carefully following the shape of the flower.

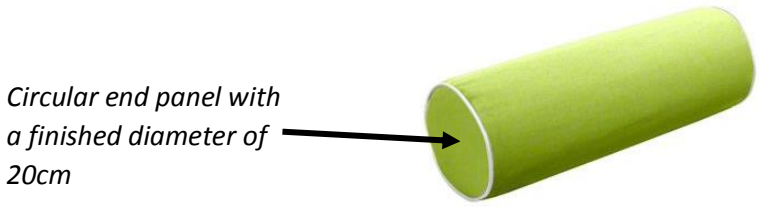
Peel off backing paper on the bondaweb and place it on the second material (green background in this case).

Iron the shape in place.

Stitch around the edge to secure it to the green material.

Appliqué can be done in a number of different ways, but all follow a logical sequence. The top material (flower shape in this case) has to have a method of stabilising the material prior to stitching. Any acceptable method would be marked. Within the body of the answer to the above question there must be a description and up to four different processes. In this case the learner has given five correct stages but he or she would only achieve 4 marks.

(b) The finished diameter of the circular ends on the bolster cushion is 20cm as shown below.



Calculate what the circumference of the circular template would need to be in order to achieve the finished measurement (a seam allowance of 1.5cm will need to be included in your calculation), and how many cylindrical sides of the bolster cushion can be cut from a 5m length of fabric. *(Show all workings.)*

NB. *The length of the bolster cushion is the same measurement as the width of material.*

Diameter plus seam allowance 20cm + 3cm (1.5cm +1.5cm) = 23cm (1)

3.142 (π) x 23cm (1)

= 72.3cm (1)

(Credit method based on: Radius plus seam allowance 10 + 1.5cm (1))

The learner needs to recognise that the seam allowance – standard measurement is 1.5cm - will need to be added twice to the diameter to get the full diameter for one mark to be awarded. This need to be multiplied by π (3.142) for another mark and the correct answer will get the final mark.

5m length of fabric / 62.84.cm circumference (circumference does not include seam allowance) (1)

7 lengths (round down from 7.956) (1)

The circumference is calculated again this time without seam allowances for one mark, which gives the length of the rectangular piece that will form the cylindrical side. This measurement will need to be divided into 5m for the number of pieces. The correct answer will need to be rounded down for the second mark.

It is essential that the learner clearly shows all the processes/steps involved. Any correct mathematical approach to the calculations will be acceptable. Marks will be awarded for steps within the mathematical process. Learners will be allowed to use calculators in the examination but a calculator will be not be of any use if the learner does not realise that units may be different; as in this case where the units are centimetres and metres. Credit will be given to any appropriate approach in calculating the circumference and the number of cylindrical sides that can be cut from the fabric.

(c) The cushions are to be sold under the fair trade logo. Analyse the impact on communities and workers who benefit under this scheme. [5]

Indicative content

This content is not prescriptive and candidates are not expected to refer to all the material identified below

- Fair Trade Foundation seeks to ensure greater equity in international trade, so workers should get paid a fair wage
- companies have better access to markets in developed countries, so workers can have better job security
- income means that there may be a reduction in poverty and improved education for children within communities
- it helps support employment and raising the standards of living in third world countries
- it can encourage the development of skills in third world countries
- the working conditions within third world suppliers can be improved by securing orders via the Fair Trade scheme/less exploitation of workers
- it can help small businesses in third world countries to move from income insecurity and poverty to economic self-sufficiency and ownership.

The above list is indicative content that learners could refer to within their answer. Credit would be given to alternative answers not listed but are considered appropriate. Within the answer learners will need to demonstrate an understanding of the term 'analyse.' It is expected that learners will apply reasoning to any of the statements they make. Band descriptions will be applied to questions with extended answers.

	AO3 2a 5 marks	
BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to analyse the impact on communities and workers who benefit under the fair trade scheme. There will be evidence of relevant examples and a well-developed logical chain of reasoning, sustained throughout.	**4-5**
BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to analyse the impact on communities and workers who benefit under the fair trade scheme. There will be some evidence of mostly relevant examples and a logical chain of reasoning, but this may not be sustained throughout.	**2-3**
BAND 1	Answer demonstrates only basic knowledge and understanding, to analyse the impact on communities and workers who benefit under the fair trade scheme There will be limited evidence of relevant examples or a logical chain of reasoning.	**1**
	Award 0 marks for incorrect or irrelevant answers	

(d) It is important that designers consider the world we live in and the needs of future generations. Evaluate how designers can lessen the impact on our environment when designing new textile products. [6]

Indicative content

This content is not prescriptive and candidates are not expected to refer to all the material identified below

Designers can lessen the impact on our environment when designing textile products by:

- considering how to minimise waste in manufacture of textile products
- for the product in question, considering whether using natural or synthetic textiles will have the least impact on the environment (response could also refer to sustainability)
- considering the use of natural finishes/dyes where appropriate
- if the product contains materials in addition to textiles; ensuring as far as possible that it is straightforward to separate the textile components from any other materials at the end of the product's life, to encourage recycling.
- reducing the need for unnecessary packaging of the product
- considering renewable energy sources during manufacture
- designing textile products to have a long life so that replacements should not be needed for some time (recognising that fashion/fads can impact here)

Credit would be given to alternative answers not listed but are considered appropriate. Within the answer learners will need to demonstrate an understanding of the term 'evaluate.' It is expected that learners will show evidence of appraising a situation and/or make judgements relating to any facts they include within their answer.

Band descriptions will be applied to questions with extended answers.

	AO3 2b 6 marks	
BAND 3	A coherent answer demonstrating detailed, relevant knowledge and understanding, to evaluate how designers can lessen the impact on the environment when designing textile products. There will be evidence of relevant examples and well-developed substantiated judgements in a response which is logically structured.	**5-6**
BAND 2	Answer has some coherence, demonstrating partial knowledge and understanding, to evaluate how designers can lessen the impact on the environment when designing textile products. There will be some evidence of mostly relevant examples and partly-substantiated judgements in a response which is generally well structured.	**3-4**
BAND 1	Answer demonstrates only basic knowledge and understanding, to evaluate how designers can lessen the impact on the environment when designing textile products. There will be limited evidence of relevant examples or judgements in a response which demonstrates little structure.	**1-2**
	Award 0 marks for incorrect or irrelevant answers	

Component 2 – Design and make task

NEA (Non Examined Assessment) – 50% of the qualification
Approximately 35 hours
Design and make task from a contextual challenge set by WJEC EDUQAS
Worth 100 raw marks
Apply the iterative process of designing

Contextual Challenge

The contextual challenge requires learners to demonstrate, at GCSE level, their knowledge and understanding of the following core designing and making principles, in the context of a sustained design and make activity.

- work within a context which will inform the outcome
- identify and understand client and user needs
- write a design brief and specification
- identify opportunities and constraints that influence the processes of designing and making
- explore, develop, test, critically analyse and evaluate ideas
- investigate and analyse the work of others
- use different design strategies to generate initial ideas
- develop, communicate, record and justify design ideas
- design and develop at least one prototype* that is fit for purpose
- make informed and reasoned decisions to identify the potential for further development

In addition, when designing and making in relation to at least one material or component/system(s) learners are required to:

- select and work with appropriate materials and components to produce a prototype
- use appropriate and accurate marking out methods; work within tolerances; understand efficient cutting and minimise waste
- use specialist tools and equipment, appropriate to the materials or components used, to create a specific outcome
- use specialist techniques and processes to shape, fabricate, construct and assemble a high quality prototype, as appropriate to the materials and/or components being used
- use appropriate surface treatments and finishes

In the context of this component, 'prototype' is used to describe all working solutions including products, models and systems.

NEA: A sustained design and make task, based on a contextual challenge set by WJEC EDUQAS, assessing learners' ability to apply the iterative approach to:

- Identify, investigate, analyse and outline design possibilities
- Design and make prototypes and evaluate their fitness for purpose.

Marked and standardised internally and moderated by a visiting moderator.

Requirements

Three contextual challenges available June 1st in the year preceding the year in which the qualification is awarded. Learners will choose to tackle **one** challenge. From the challenge the learner will investigate and decide upon possible problems/issues before deciding on a possible design task to tackle.

There will be NO SET PAGE FORMAT for the NEA.

Suggested structure of evidence required

Informal A4/A3 sketchbook

This will clearly:

- *Identify design possibilities*
- *Generate and develop design ideas.*

Note: Centres do not need to purchase an A4/A3 sketchbook and this does not have to be a bound book. It could simply be a series of A3 pages stapled together, or it could be a series of A3 and A4 pages loosely bound together with a treasury tag for example. How exactly the work is presented is up to the individual centre. However, it is important to track the work and record clearly where marks have been awarded against the marking criteria.

Formal presentation A3 portfolio to include evidence of:

- *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*

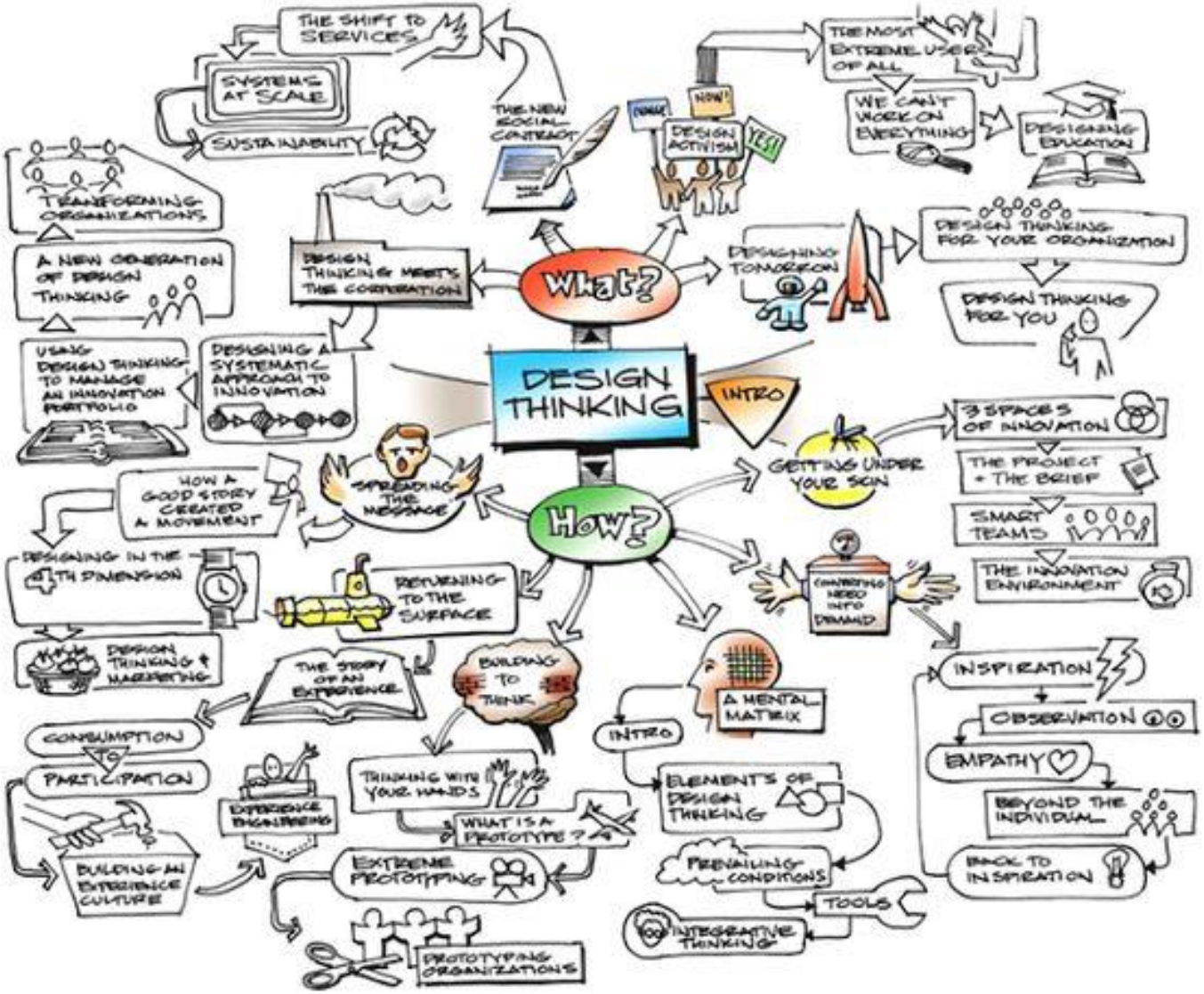
Make/practical outcomes

Final prototype (fully functioning high quality product) any supporting practical pieces including models, jigs, formers, patterns, tests, trials, iterations must be included.

Assessment criteria for the design and make contextual challenge.

Note: You do need to clearly indicate the learner's name and the centre name and number

Assessment Criteria		Marks	Assessment objective	Guidance
(a)	***Identifying and investigating design possibilities.***	10	AO 1	• *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*
(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		



A brainstorm might be the starting point for some learners to gather their thoughts about the context. It is a good opportunity to explore the divergent possibilities within the context, and also generate important areas for further investigation/research. Mind maps or brainstorms can allow learners to record potential ideas, questions, and tasks that can be extended at a later date, developed further during the iterative design process, or parked and not revisited.

Provide details of the **Target Market** for your product.

For my product I will need to know who my target market are, so I did some research. I will be making my product for both genders at the ages 18 months to 3 years old. Children that age will like colours and things that light up so I will have to include that. My product will have to be light to be used by chidren, it must be safe also. The parents will also be my target market so I will have to consider their financial status, I will have to make my product wall mounted, able to stand and to be carried around. I will make it automaticly powered so the parents dont have to knock it on and off.

This item comes in bubble wrap, and a box so the item doesn't get damaged.

This item is lightweight, this ables children and adults to carry it around the room with no hassle.

Materials

This product is made out of acrylic. Its opaque to let the light through

Target Market

The target market would be for children ages 18 months to 3 years this is because they will be movin from their parent bed to their own

Safety

its not got any sharp ends, and it's been marked with a bsi and a CE mark. Able to use in Britain and europe.

Colours.

It is blue, this could be because the Product is a dolphin or it could be aimed at boys.

Size

This item is a small size but not to small and not to large. It is the perfect size to hold in your hand.

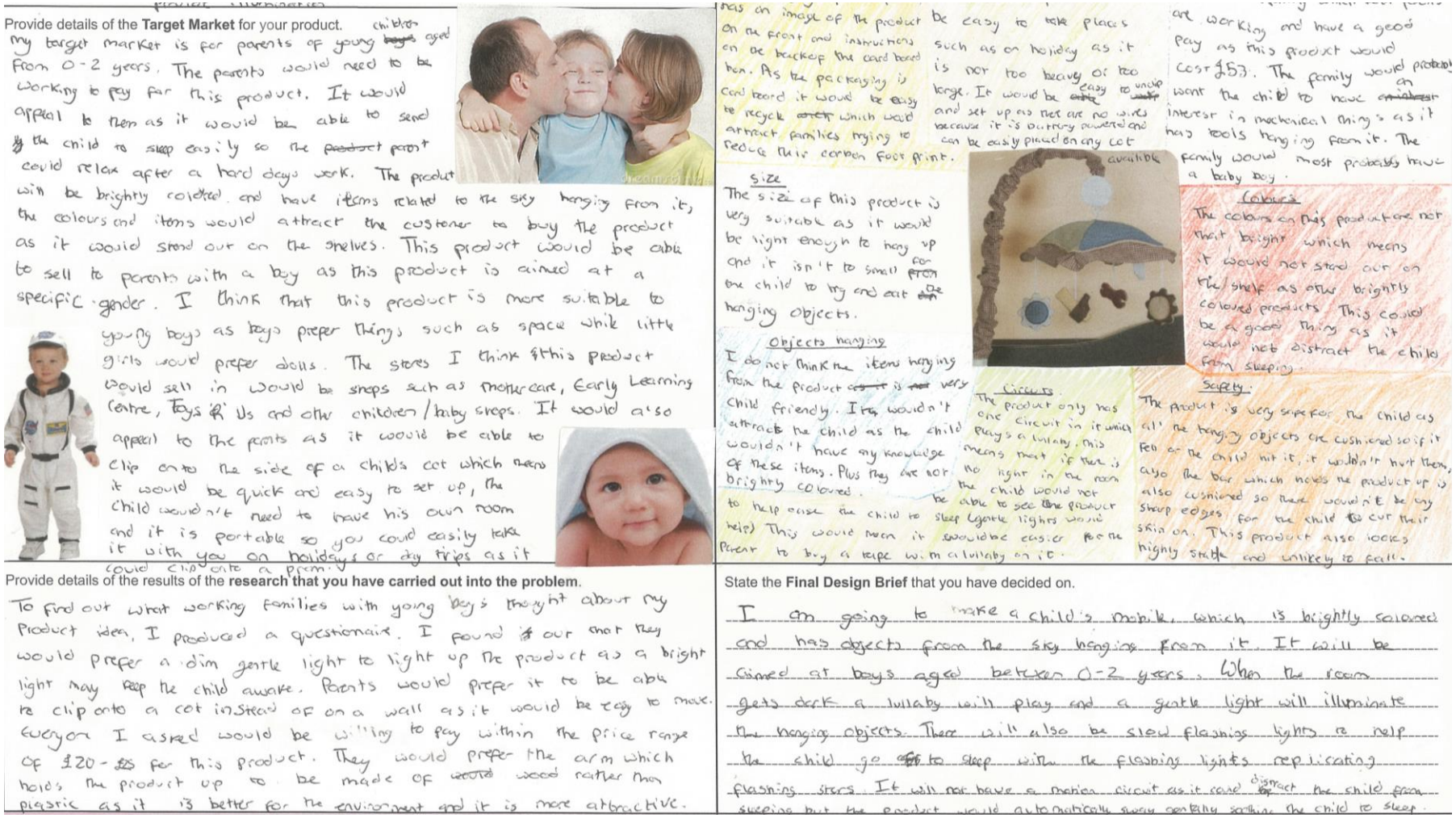
Provide details of the results of the **Research** that you have carried out into the problem.

I have asked family and friends with their children if they would like a nightlight for their child or not, 40% said no and 60% said yes. I asked the 60% what an ideal nightlight would be and they replied with the answers, lightweight, able to be used by children, freestanding and colourful. They also want it to be safe to hook up on the wall.

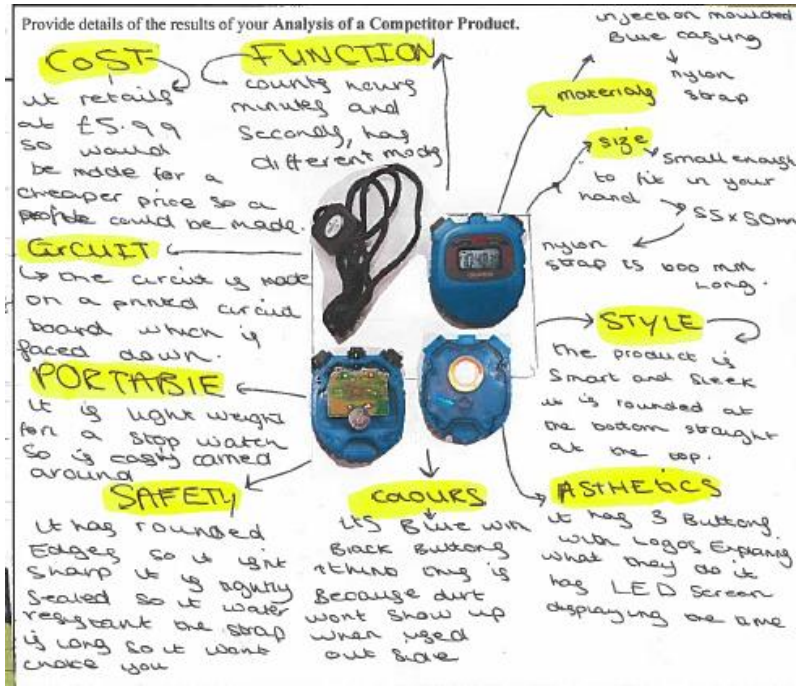
State your **Final Design Brief** here.

I will be making and designing a childrens nightligh that is colourful, battery operated, automatic to light up and off, freestanding, able to hook on th wall and able to use by children. I will also negotiate with parents economic status.

Evidence of critical analysis of users' needs and wants, with investigation into the problem. Target market is considered and the problem is understood fully.



Both pages show research into existing products, with the evaluation of features of existing designs on the market. All of the research is focussed and relevant. There is analysis of information rather than just the presentation of information. Learners are reminded that their evaluation and analysis of the research is the most important factor, not simply presenting raw research results.



Disassembling a product helps a learner see how typically similar products are manufactured and assembled.

LIGHTING SYSTEM

CHAIR

SOFA

FLAMINGO SLIDING TABLE

DRESSER

CABINET

LAMP

WINE GLASS

Where appropriate, the opportunity to look at other designers, manufacturers, design movements and practitioners can often bring inspiration and stimulate styles, colours, forms and textures. This research is then used to inspire learners' own designing.

Band 4 Assessment Criteria - Identifying design possibilities

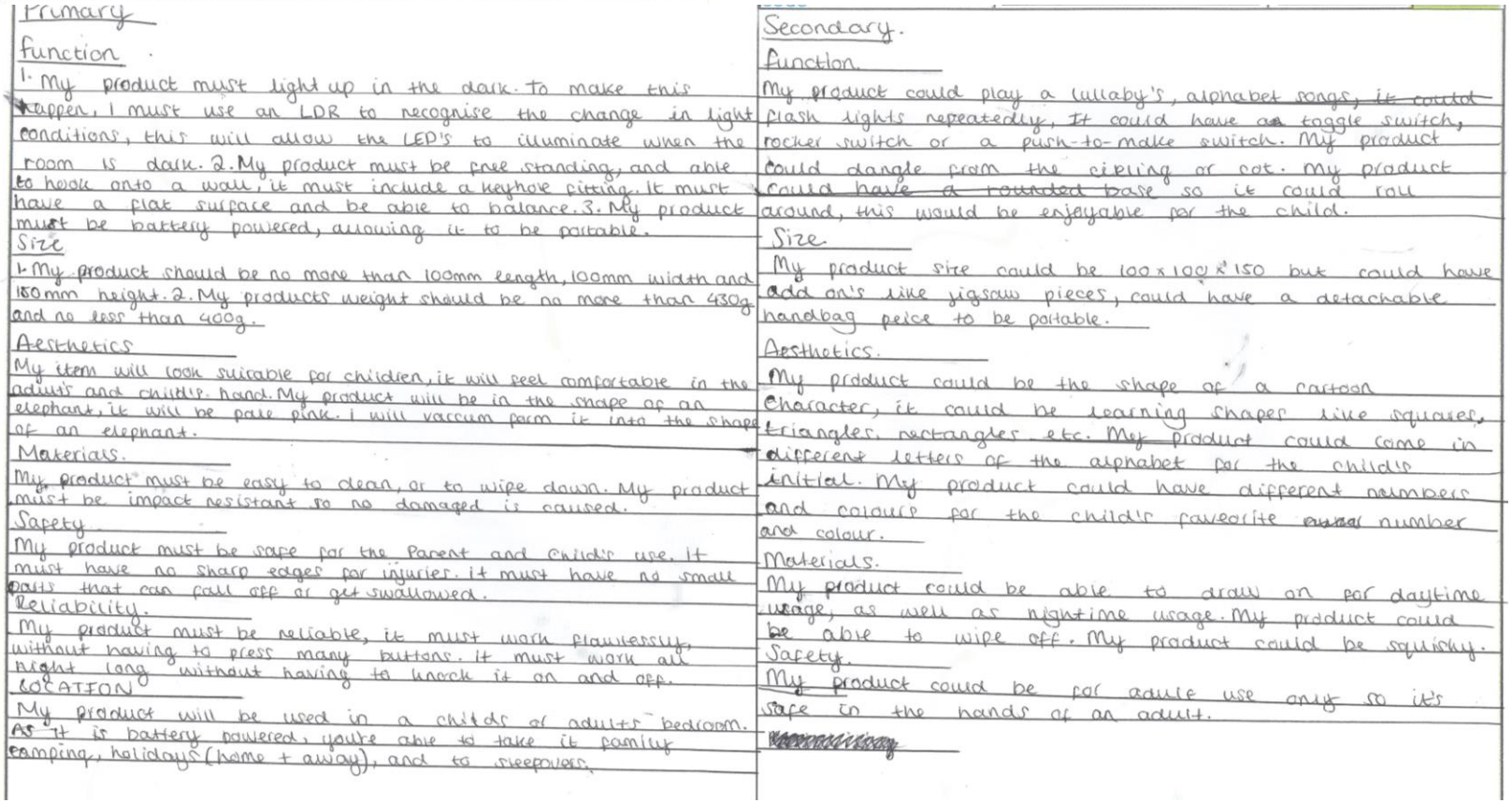
- Undertaken thorough and effective identification of opportunities for the development of designs within the prescribed context.
- Undertaken detailed, relevant research and investigation, clearly linked to the context and, where appropriate, the work of past/present professionals and companies.
- Undertaken 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.

Learners meeting the four descriptors from Band 4 of the marking criteria deserve 9-10 marks.

Assessment Criteria		Marks	Assessment objective	Guidance
(a)	Identifying and investigating design possibilities.	10	AO 1	• *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*
(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		

I will be making and designing a childrens nightlight that is colourful, battery operated, automatic to light up and off, freestanding, able to hook on the wall and able to use by children. I will also negotiate with parents economic status.

A clear final brief is presented as a result of the detailed, relevant and focussed research, following the consideration of a number of possible design tasks.



Primary

Function

1. My product must light up in the dark. To make this happen, I must use an LDR to recognise the change in light conditions, this will allow the LED's to illuminate when the room is dark. 2. My product must be free standing, and able to hook onto a wall, it must include a keyhole fitting. It must have a flat surface and be able to balance. 3. My product must be battery powered, allowing it to be portable.

Size

1. My product should be no more than 100mm length, 100mm width and 150mm height. 2. My products weight should be no more than 430g and no less than 400g.

Aesthetics

My item will look suitable for children, it will feel comfortable in the adult's and child's hand. My product will be in the shape of an elephant, it will be pale pink. I will vaccum form it into the shape of an elephant.

Materials.

My product must be easy to clean, or to wipe down. My product must be impact resistant so no damaged is caused.

Safety

My product must be safe for the Parent and Child's use. It must have no sharp edges for injuries. It must have no small parts that can fall off or get swallowed.

Reliability.

My product must be reliable, it must work flawlessly, without having to press many buttons. It must work all night long without having to knock it on and off.

LOCATION

My product will be used in a child's or adults' bedroom. As it is battery powered, you're able to take it family camping, holidays (home + away), and to sleepovers.

Secondary.

Function.

My product could play a lullaby's, alphabet songs, it could flash lights repeatedly. It could have a toggle switch, rocker switch or a push-to-make switch. My product could dangle from the ceiling or cot. My product could have a rounded base so it could roll around, this would be enjoyable for the child.

Size.

My product size could be 100 x 100 x 150 but could have add on's like jigsaw pieces, could have a detachable handbag peice to be portable.

Aesthetics.

My product could be the shape of a cartoon character, it could be learning shapes like squares, triangles, rectangles etc. My product could come in different letters of the alphabet for the child's initial. My product could have different numbers and colours for the child's favourite number and colour.

Materials.

My product could be able to draw on for daytime usage, as well as nightime usage. My product could be able to wipe off. My product could be squishy.

Safety.

My product could be for adult use only so it's safe in the hands of an adult.

This is a detailed specification containing measurable criteria that will be used to drive designing and development. The specification must be used as a design tool, and any ideas, models, tests, initial prototypes must be evaluated against the specification criteria. There are important features used as headings with multiple statements within each heading to 'split' up the success criteria into manageable aspects. There is a hierarchy of importance and the learner has split the criteria into Primary and Secondary which clarifies what must be included and what could be included in the final proposal.

Primary

Cost

The product must cost about £15 to produce and therefore be able to sell for £20 - £25 so that more people in my target market would be able to buy it.

Safety

The product must not have any sharp objects or corners for the child to cut themselves on. Any sharp corners or objects must be covered with fabric or filed down.

Colour

It must be brightly coloured so that the child is intrested in the product and also it would stand out on the shelves better than dark objects/products so it is more likely people would buy it.

Materials

The arm to hold the product must be made of ~~woold~~ wood as you can file down the sharp corners and plus it looks more child friendly than plastic. The engraved writting must be filled with glow in the dark paint so the child would be able to see it in the night. The product logo must be made out of Vinyl so that it doesn't stand out in the night.

Circuit.

The circuit must not have any motion included as it would distract the child from sleeping. The circuit must use a PicAxe 08M, an LDR and at least 3 LED's which flash slowly. There also has to be a ~~buzzer~~ piezo sounder for a lullaby to play.

Location

It must be able to clip onto the side of a cot and be easy to set up and able to travel with so that you can take it on day trips or holidays.

Batteries → It must run off batteries and be able to work with ~~large~~ rechargeable batteries so that families that care about the environment and their carbon

Secondary

Accesories

The objects hanging from my product would look good if they were small soft toys as it would look child friendly and would be very safe if a child hit them.

Size

I would like my product to be ~~able~~ no smaller than 30 x 15 cm² and no larger than 60x30 cm². This would mean it is easier to make pieces.

Circuit

I would like my circuit to have 2 PCB's for my design, one with 3 LED's, LDR and a buzzer to play a lullaby so when it goes dark it automatically turns on. One simple circuit with an LDR and a gentle light to light up the product in the night, this would also act as a night light.

Vacuum form

I would like my product to have a vacuum formed sun made out of HIPs to cover the clip that clips the product onto the cot and also to hide the circuit boards and have the 3 LED's and the one gentle light neatly poking through it. This would make it look more attractive and professional.

Shapes

I would like all the shapes on my design to be cut out of a lazer cutter as it would ~~tool~~ have no jagid edges for the child to cut itself on and be the exact size I need it to be.

This specification is slightly weaker than the previous example. The criteria are less developed. The statements do not include such specific details, and therefore it will be more difficult to begin iterative designing because the content has not been pin pointed clearly. Using '….must be brightly coloured…' is not specific. There are many bright colours, learners need to name 'lime green' if that is what the needs and wants of the users require. Avoiding basic and simplistic statements is crucial, often small, safe, cheap, aesthetically pleasing are often included in specification criteria, but these terms offer no meaning in isolation. Sizes need to be in measurable data form, e.g. 250mm x 120mm x 30mm. Cost must include prices in numerical values e.g. must cost no more than £12.00 to manufacture in a school workshop, and the end product must have a retail price of £18.99. The development of specification criteria is critical, and will make designing, prototyping, testing and evaluating far easier to conduct.

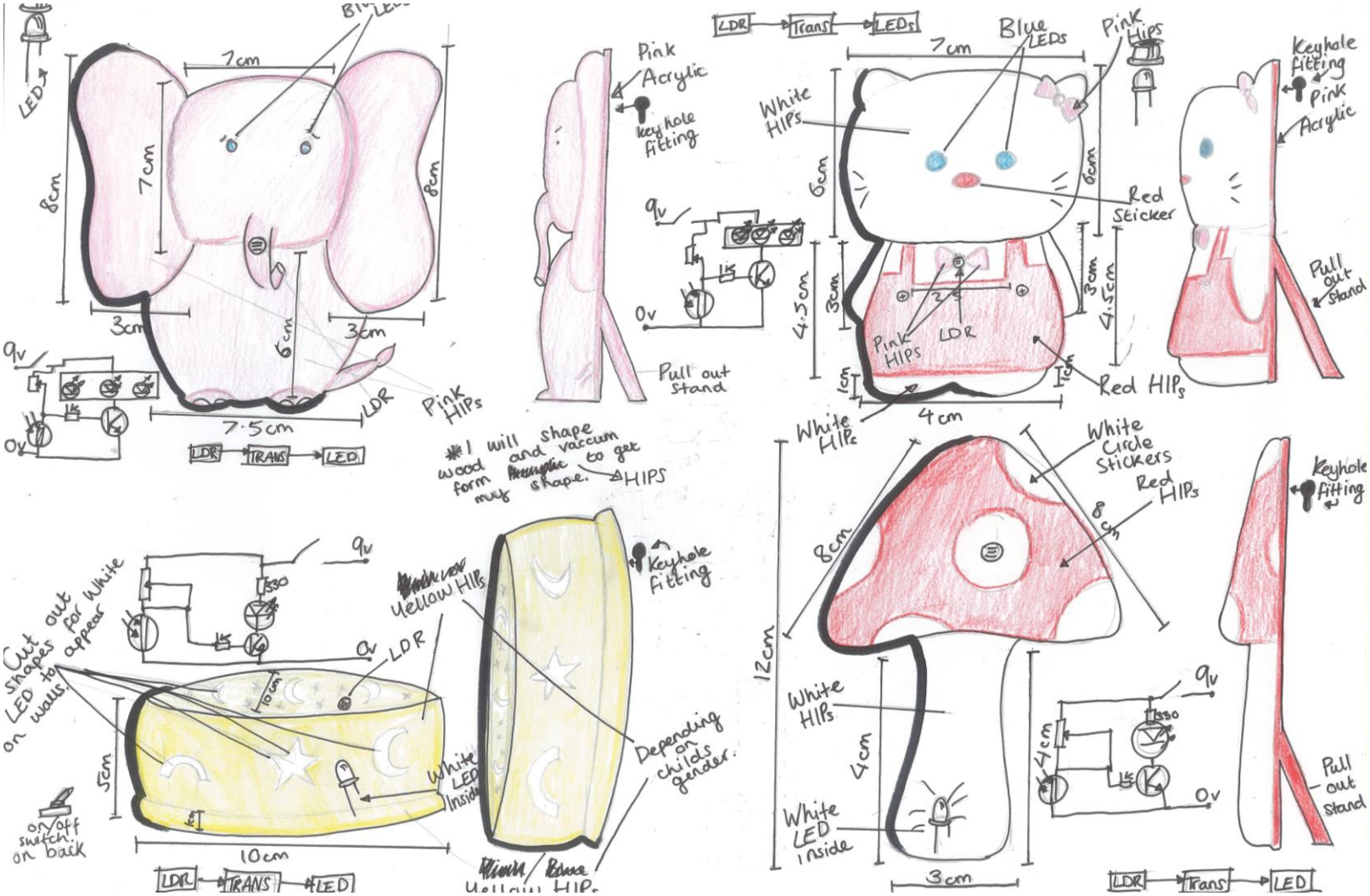
Band 4 Assessment Criteria - Developing a design brief and specification

- 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.

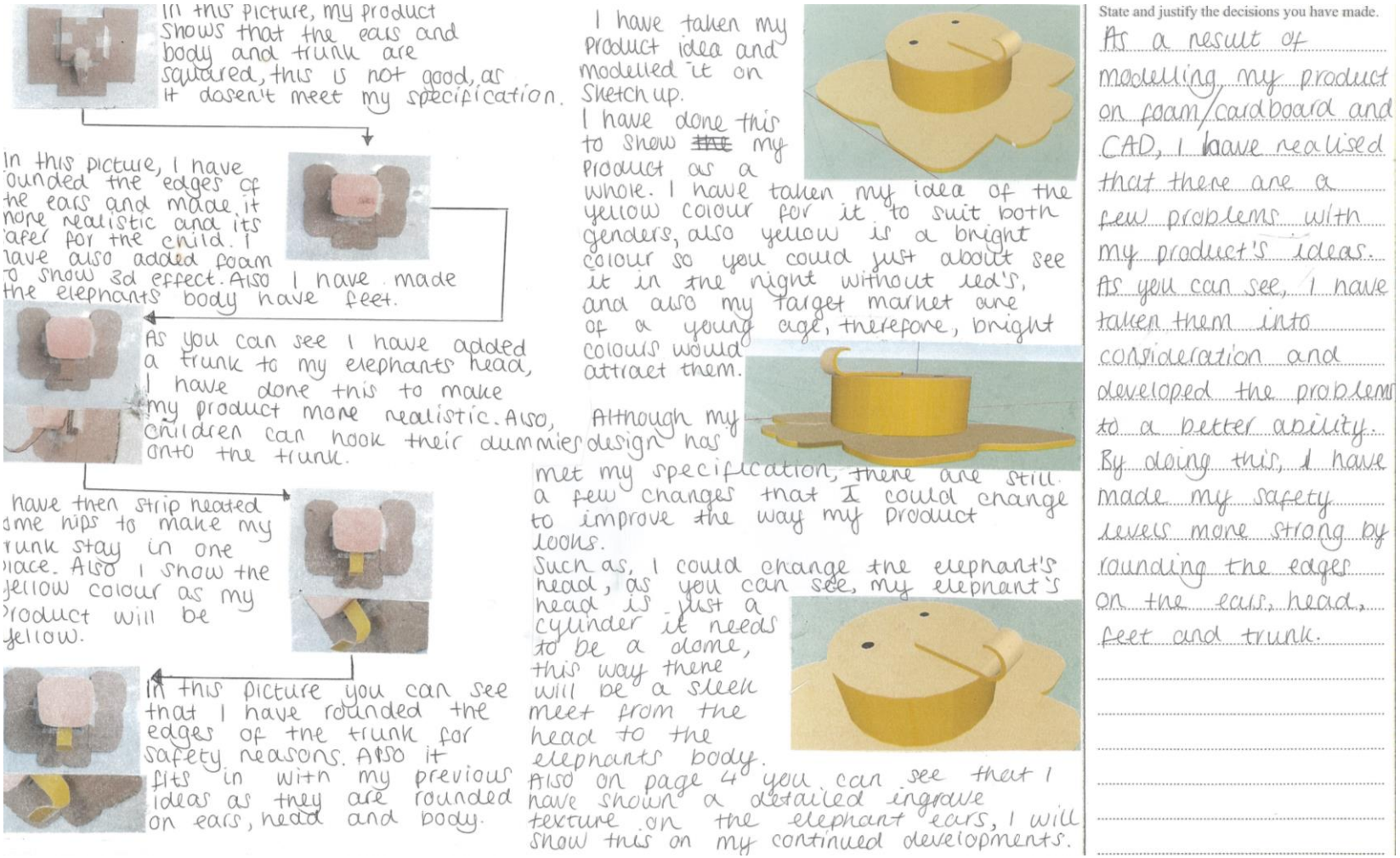
A learner who meets the descriptors above deserves to be awarded 9-10 marks in Band 4.

Assessment Criteria		Marks	Assessment objective	Guidance
(a)	Identifying and investigating design possibilities.	10	AO 1	• *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 skills evident*
(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		

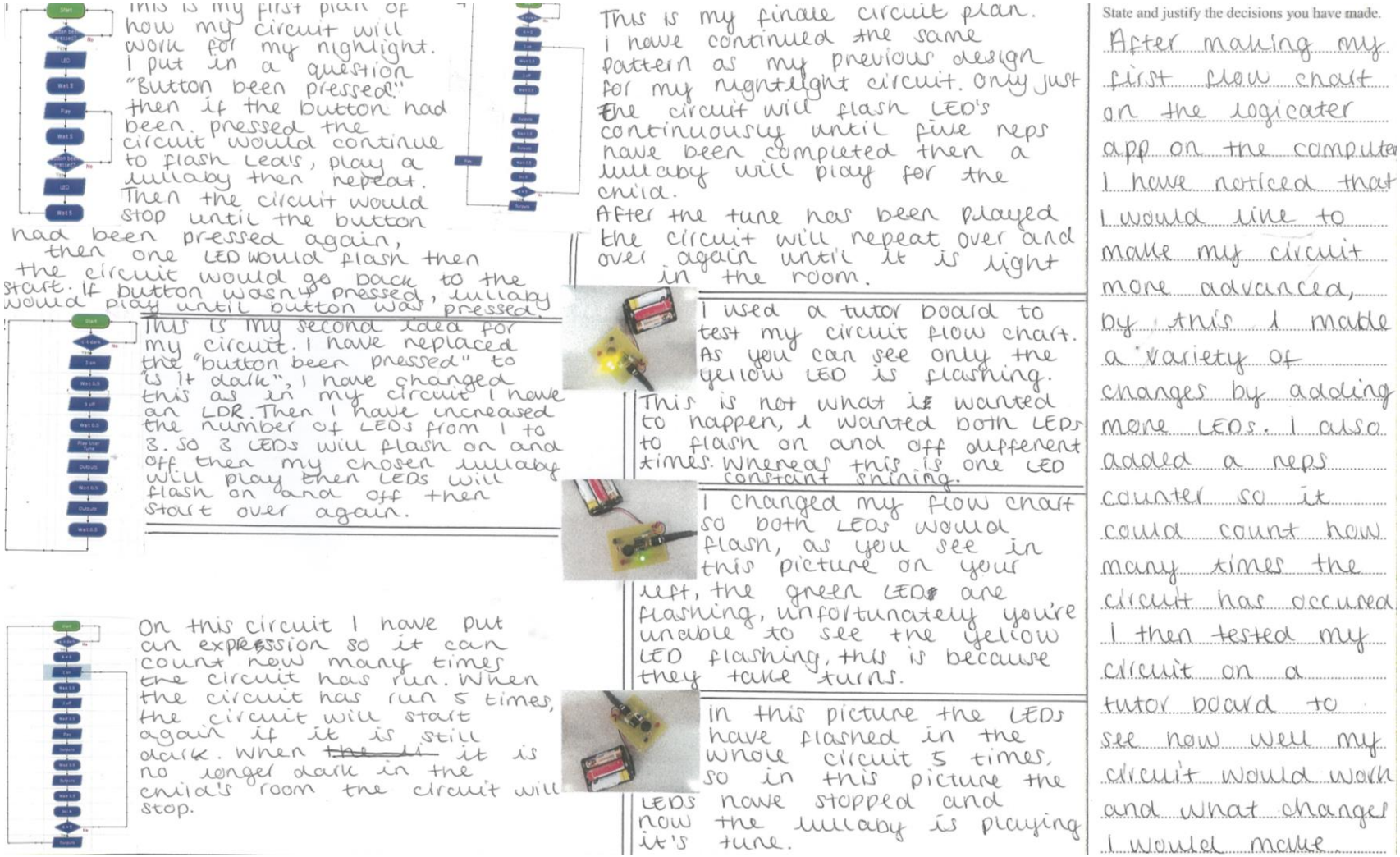
This aspect of the NEA represents a large proportion of the overall mark allocation, and there will need to be a variety of types of evidence to achieve high marks here. The iterative approach must allow learners to 'unpick' the problem and begin to come up with possible ideas for parts of the potential solution. There must be a clear 'think, create, test, evaluate' cyclic approach to the activities that learners undertake as part of their generating and developing of design ideas. This culminates in the presentation of the final prototype.



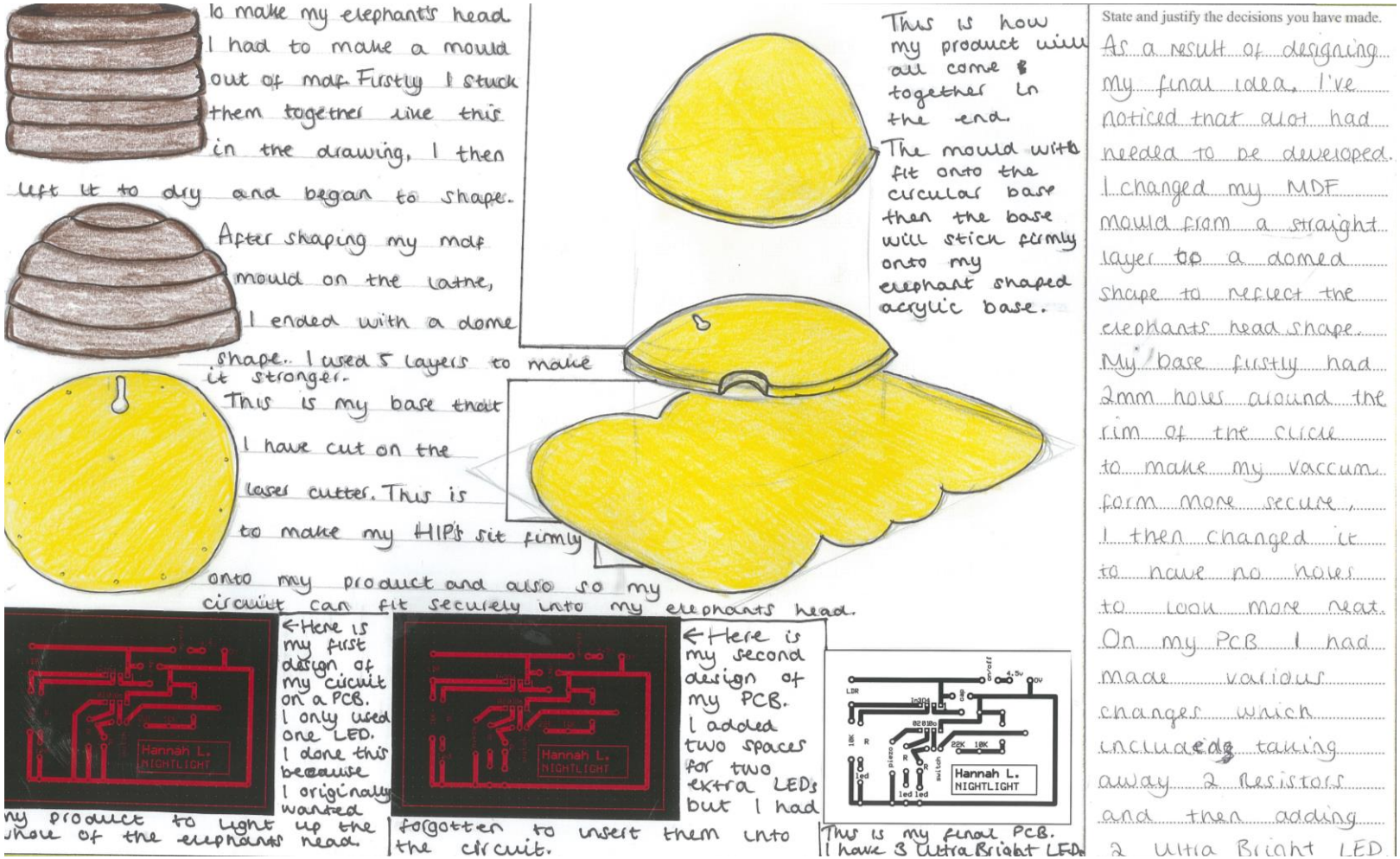
A learner could start with some initial ideas for the outcome. This might be an opportunity to think about the problem and possible solution as a ‘whole’.



Once a learner has an idea that has potential, it requires testing. Here the learner explores form, aesthetics and size issues in order to establish a further understanding of the casing issues as part of the engineering design product. There are multiple models in card, foam and HIPS which are fully evaluated against specification criteria. Refinements are made as a result of analysis, and further iterations are produced and tested. The introduction of CAD is useful here and supports the modelling, testing, analysing and refining of possible ideas.



The function of the device is being developed here. Again in an iterative style, the learner designs, models, evaluates and improves a number of possible flowcharts to control a PICAXE system for the nightlight. The learner has used a prototype pcb to run different iterations of the flowchart to test whether the device functions as specified in the specification. Detailed commentary supports decision making.



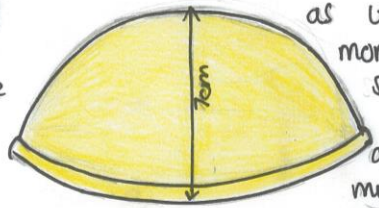
Here the learner uses CAD to develop a pcb for the PICAXE system. There are several iterations showing how the pcb is developing, analysis and decision making is evident. Analysis shows how the former will be constructed for the vacuum forming process. There are details of the base, with holes included to ensure the air is removed and the shell fits the base accurately.

Product Name	Colour	Quantity	Cost	Total
LDR	N/A	1		
Toggle Switch	Black	1	0.573	0.518
Piezo	N/A	1	0.51	0.51
Download Socket	N/A	1	0.12	0.12
Ultra Bright LED	White	3	0.42	01.26
PIC Axe or M2	N/A	1	2.00	2.00
Capasitor	N/A	1	0.05	0.05
Resistor	N/A	6	0.01	0.06
Battery Clip	N/A	1	0.01	0.01
4.5 V battery	N/A	1	2.00	2.00
				£0.59

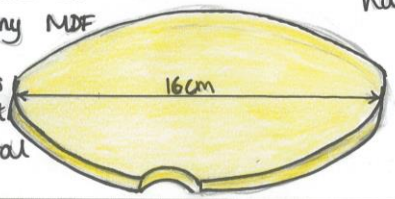
HIPS =£0.60p (2ml, 500ml)

MDF =£0.50p (2ml, 150ml)

I will need to make a mould out of MDF to vacuume form a dome case for my product.
I used a 150ml x 150ml sheet of MDF and used 5 layers which came to a total of £0.50.



During the process of making my dome out of HIPS I had to make sure it was very smooth and fit to my MDF mould.
I used a vaccume former to do this. I used a 500ml x 500ml sheet of HIPS which came to a total of £0.60



I could use 9mm thickness MDF. This would benefit me as the former wouldn't need as much layers and would not need as much materials such as glue. The cost of this would be £0.06, therefore I will do it like this.

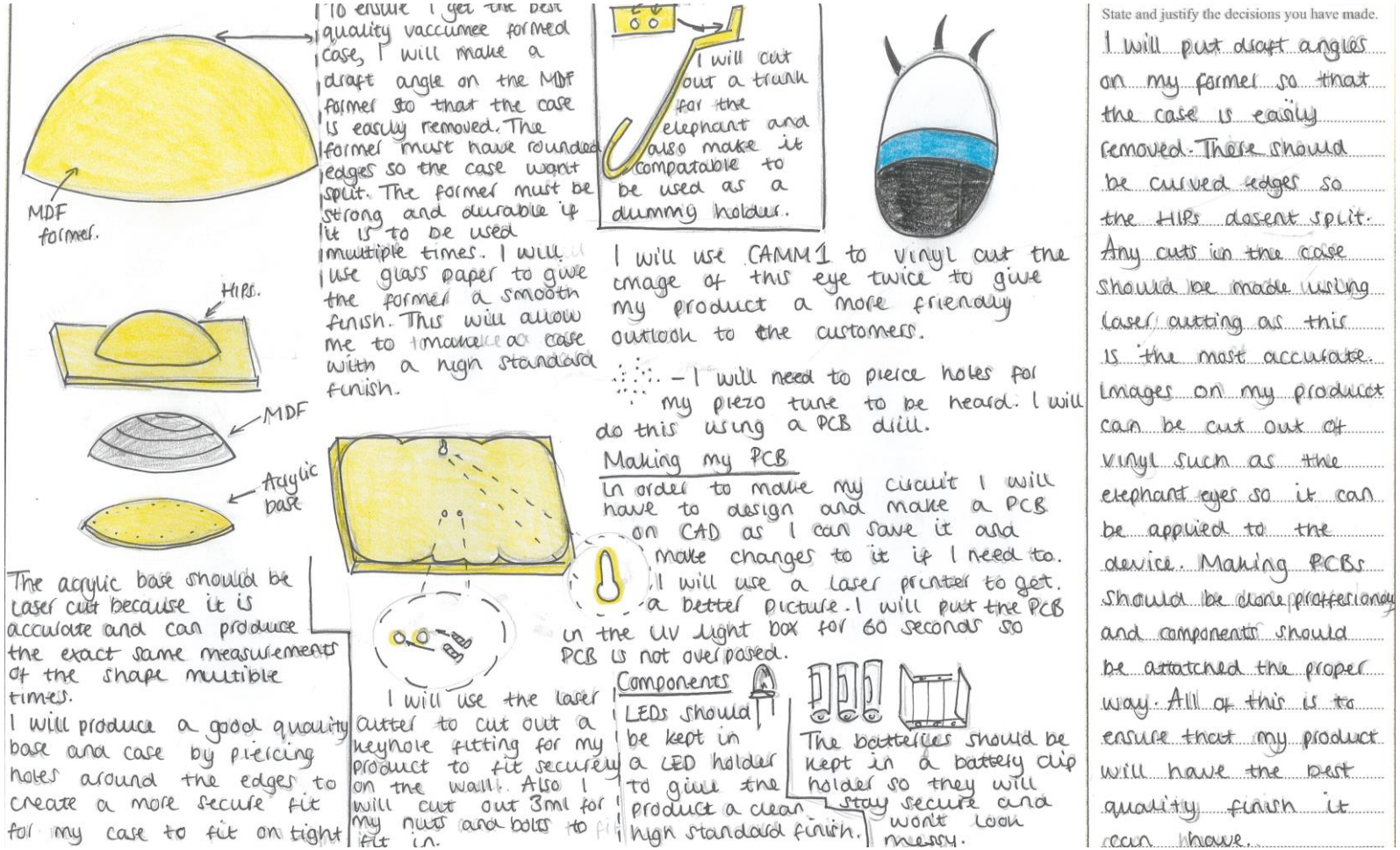
My product will need a base made of acrylic, in able to make this happen I need to make the acrylic base bigger than the MDF former, therefore, I will make the base 63mm x 63mm.

I could use 3mm thickness acrylic as it would make the product more lightweight and easy to secure to the wall.
I could use 5mm thickness acrylic as it will benefit my product making it stronger and more reliable as the customer will not have to worry about the product breaking easily on the child.

State and justify the decisions you have made.

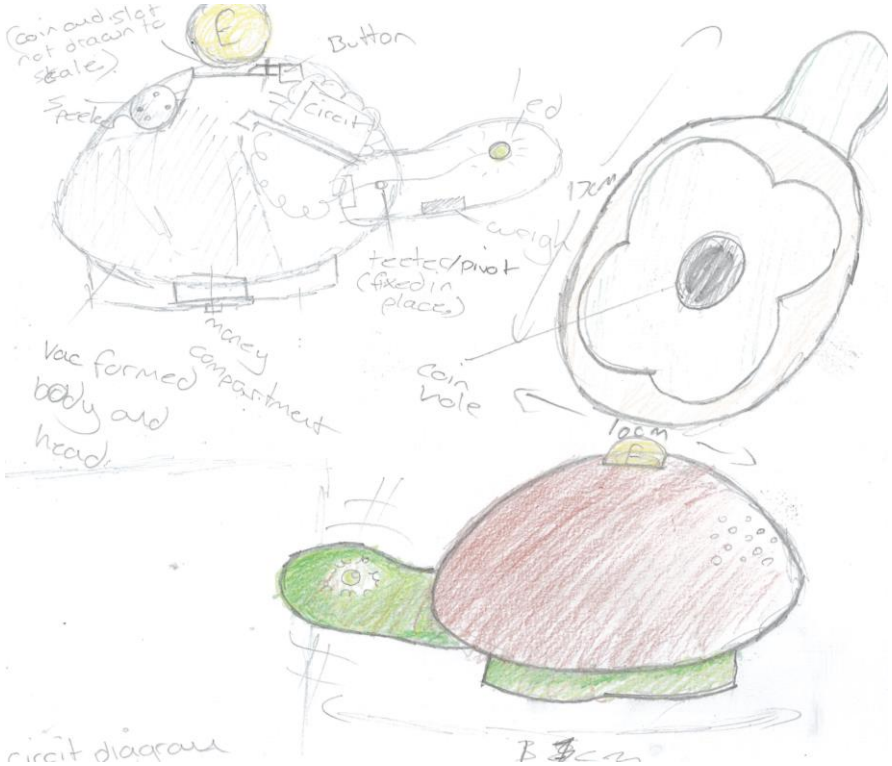
I have decided to use 9mm thickness MDF as this would reduce the cost of the product and the use of materials. I will use 3mm thickness acrylic for the base to reduce the weight of the product because it will be hung on the wall and will be easy to transport. I will use HIPS of 1mm thickness because it is a cheap yet durable material for the casing. I will use an LDR to able my circuit to start when it is dark for the child will be in bed ready to sleep. A piezo will enable the product to play a lullaby for the child.

This page focusses on the construction of the product, the components required and possible costs. Size issues are considered, decisions made are clearly referenced.

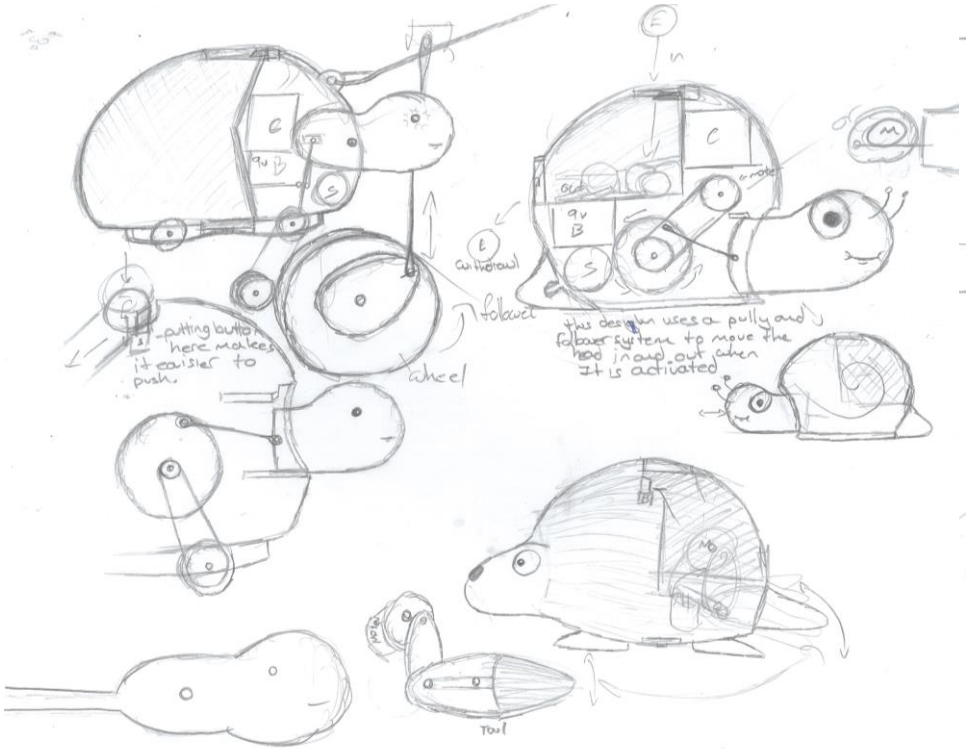


This page concentrates on construction of the shell, and how components fit together when assembled. Fine details such as battery pack holders, holes for screws, and keyhole fittings are finalised. Speaker holes are included, alongside CAMM1 vinyl details for finishing. Again, there is comprehensive analysis and decision making evident, with detailed annotation of all design decisions.

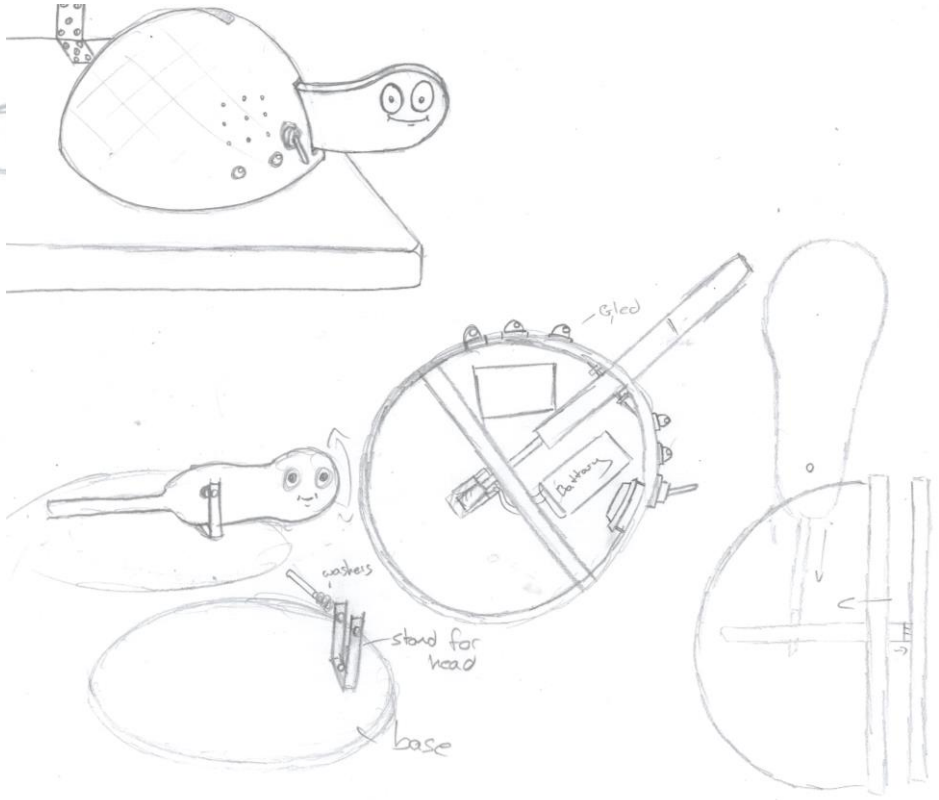
Within the NEA the learner may interperate the contextual challenges and decide to do a different form of project which may focus on different content.



Initial design sketches for a mechanical toy money box. When a coin is placed inside the money box, the device moves forwards, with the head oscillating.

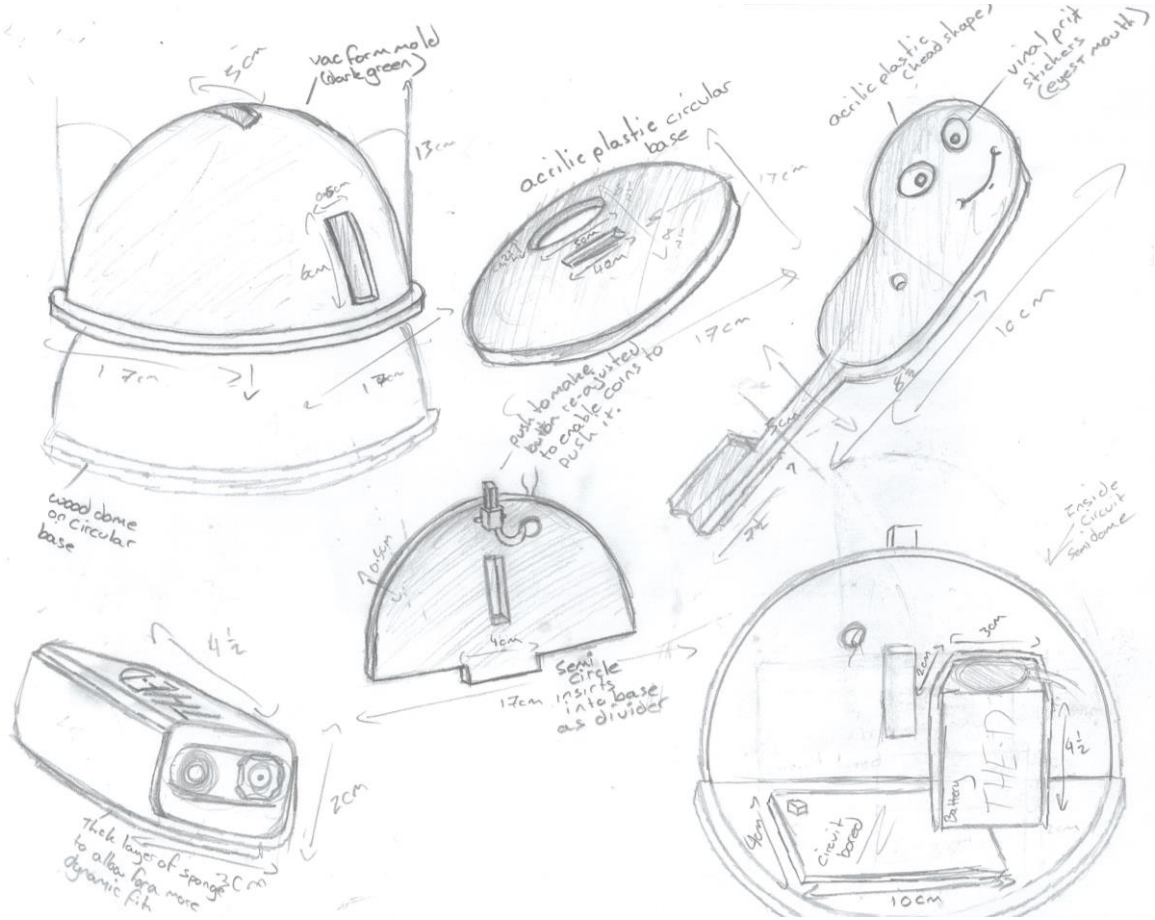


Further mechanical designs for the possible movement of the tortoise's head. Pulley systems, crank and sliders and cam and follower mechanisms suggested, with detailed annotation and high quality sketching.

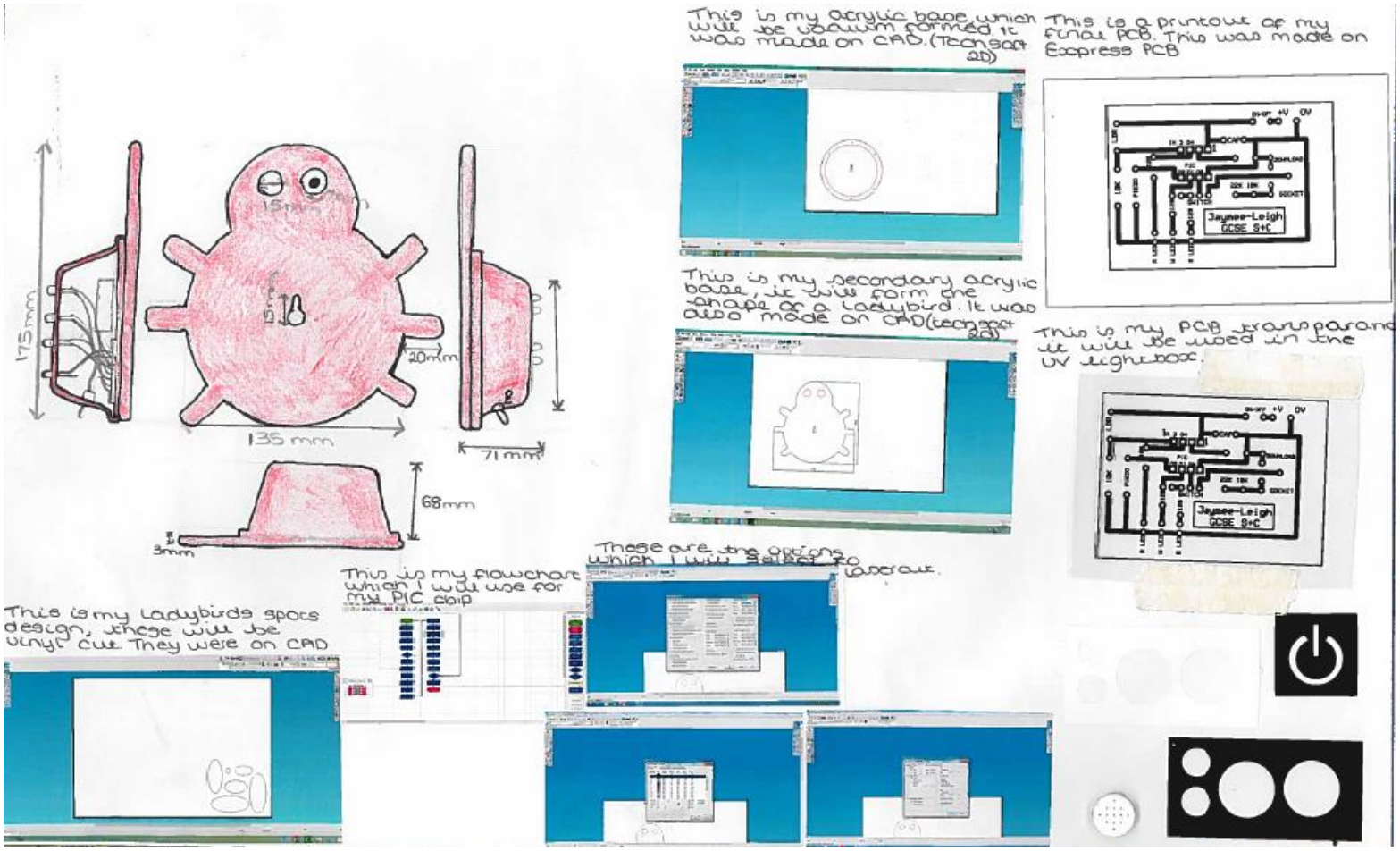


The electro-mechanical device is being developed from 'inside out' which is an effective style of iterative designing for products with internal control systems.

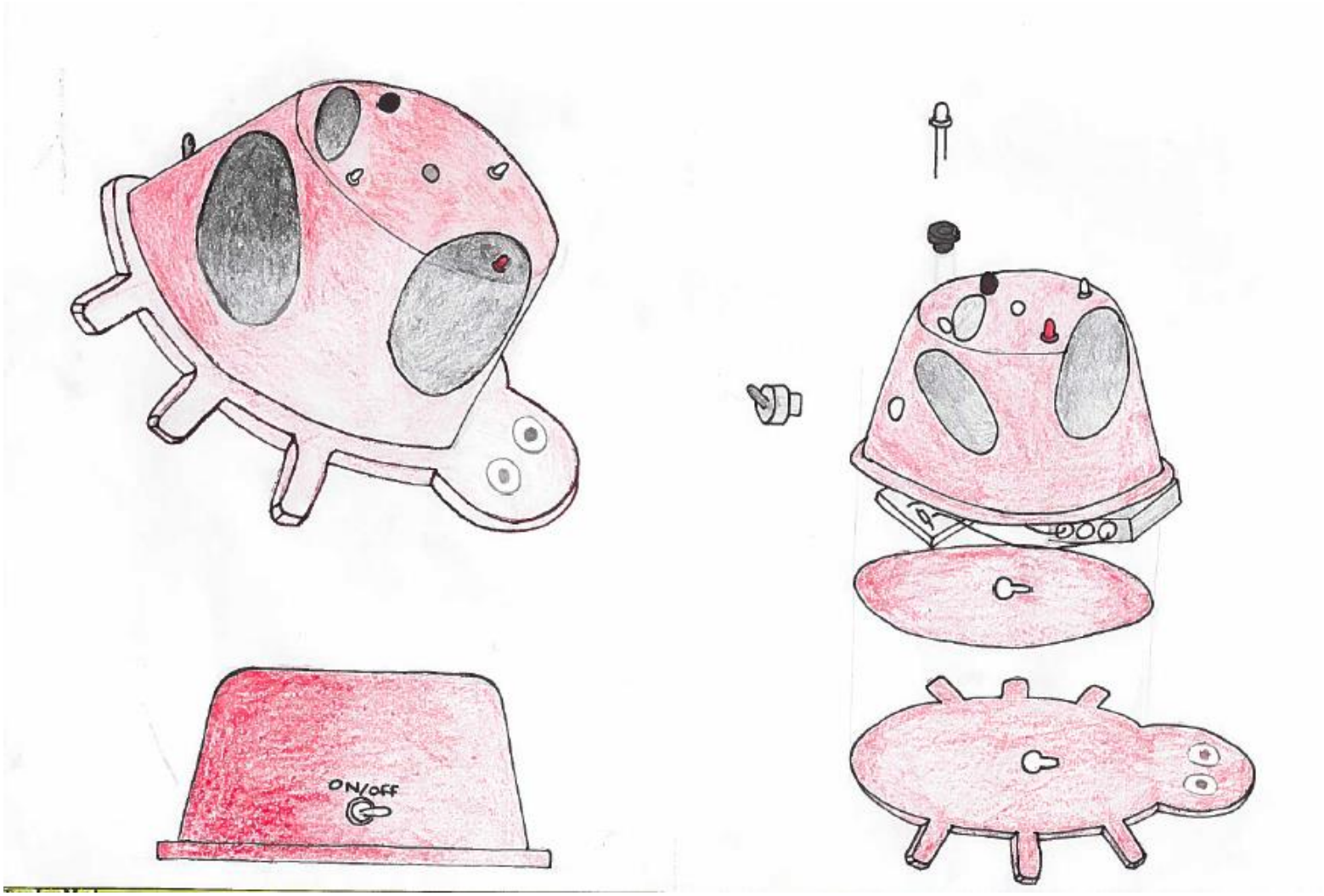
Battery positions, pcbs, pivot points/levers, external input components all being configured.



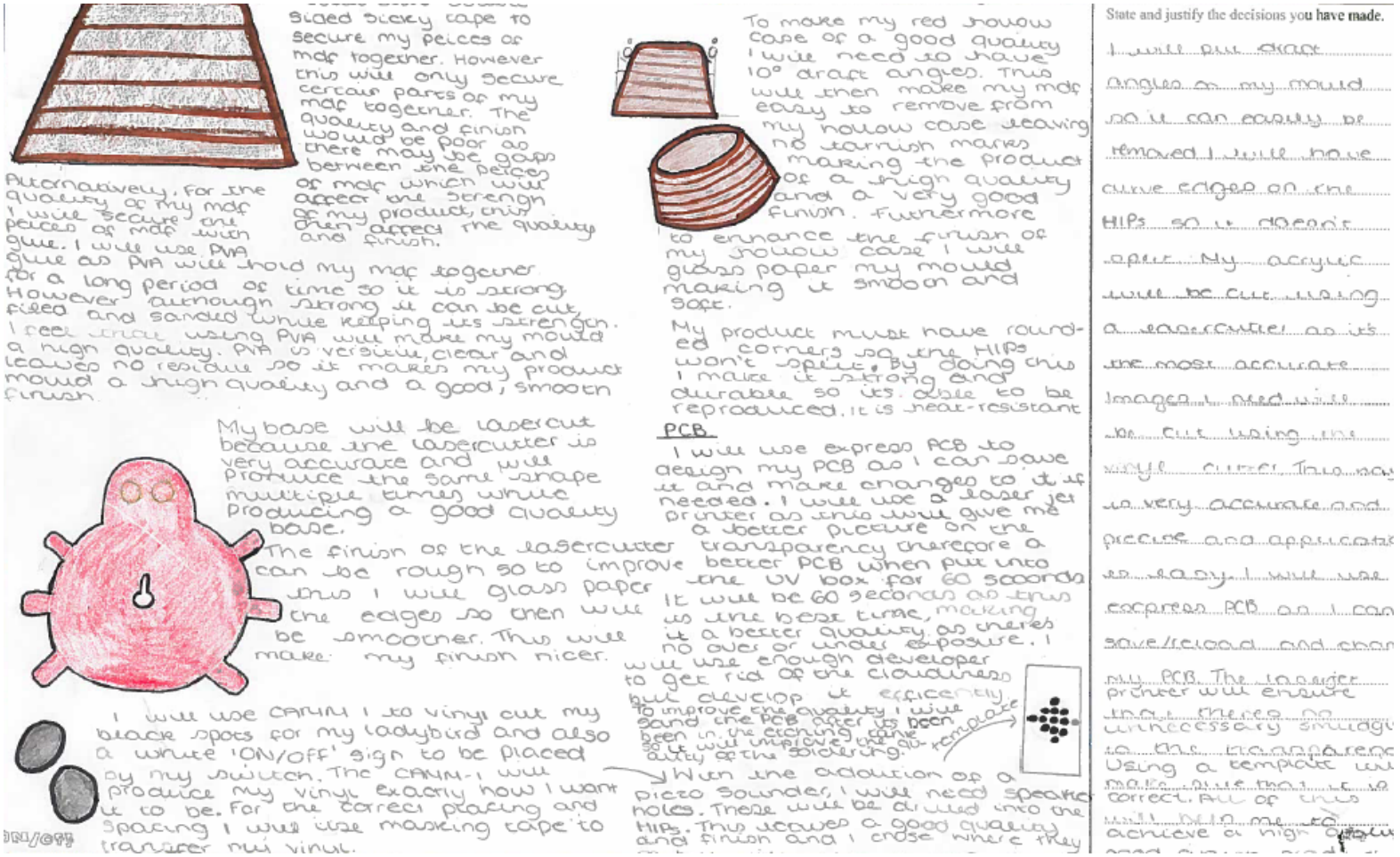
Finalising the individual component parts for the moving money box.
The vacuum formed shell provides space for internal electronic components and mechanical parts to achieve the desired function.



This example shows final technical details of a proposal, with all CAD CAM data, power and speed settings, and CAMM1 vinyl detailing.
The final transparency for PCB manufacture is presented, along with the final flowchart to program the pcb.



This is the final pictorial presentation of the prototype to be manufactured. A good attempt at generating a 3D drawing of a complex product. The exploded diagram offers details of how components are assembled, and how electronic devices are attached to the casing of the prototype.



A manufacturing specification page provides evidence of specific specialist tools, equipment and processing that will be used to manufacture the product.

Band 4 Assessment Criteria – Generating and Developing Ideas

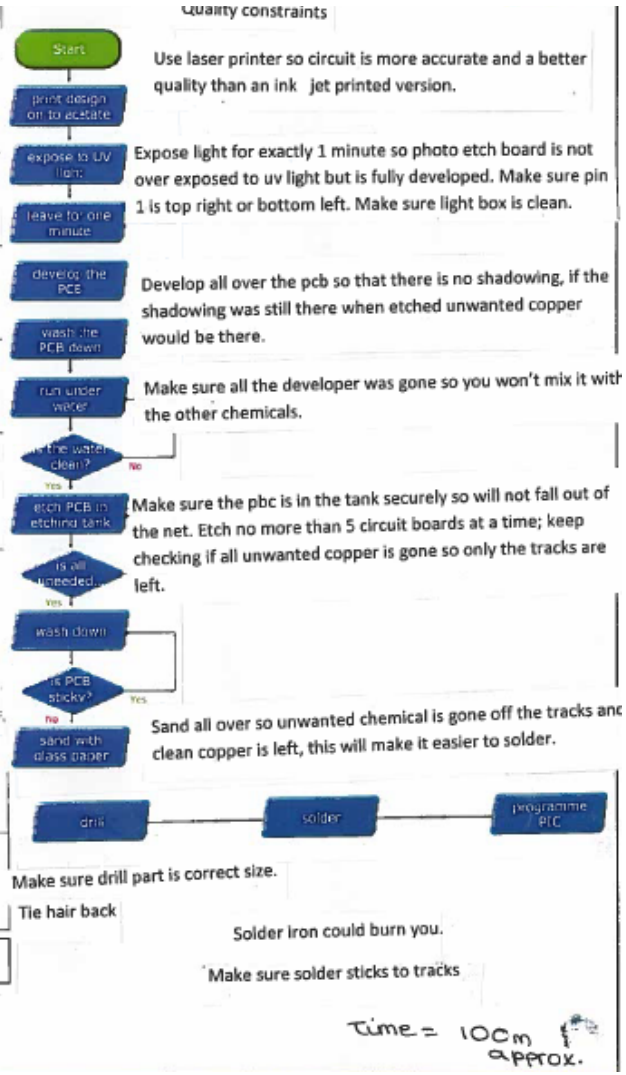
- Considered a range of design strategies, techniques and approaches and applied an iterative design process to generate and communicate a broad, complex and diverse range of initial ideas.
- Identified and considered social, moral and economic factors which are relevant to the context and potential 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.

A learner meeting this assessment descriptor deserves 24-30 marks.

Assessment Criteria		Marks	Assessment objective	Guidance
(a)	Identifying and investigating design possibilities.	10	AO 1	• *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*
(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		

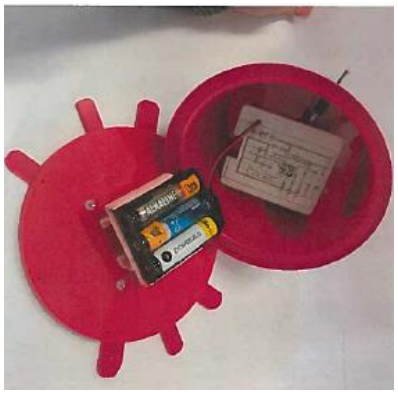
Stage	Method	Material	Tool	Risk	Quality constraints	Time (mins)
1-Marking out	Measure layers of MDF and cut them to 12x12 and glue together using PVA. Leave overnight in clamp or vice.	MDF PVA	Ban saw Ruler Tri Square Clamp/ vice	Cut fingers on ban saw.	Use tri square so lines are parallel. Leave overnight so glue is set.	30
2- Shaping	Shape the glued layers of PCB into the shape of my product using a coping saw.	Glued layers of MDF	Coping saw vice	Snapping blade on coping saw Coping saw cutting your fingers.	Cut on the outside of the line on the shape to leave room for sanding.	60
3-Putting on draft angles and rounding edges	File an angle on the MDF former to it will come out of the vacuum formed HIPS.	MDF former	file	Catch yourself with file	Not putting enough of an angle on. Edges not round enough casing will split.	30
4- Sand down	Sand down with glass paper to there is no dents between layers and the join isn't visible.	MDF former	Sander Glass paper	Catch your finger in the sander. The room can get too dusty	Remove join so it on come out in the HIPs casing.	30
5- Cut base, lenses, hooks for back and acrylic to hold PCB	Design on 2D design and send to the laser cutter so the acrylic will be the right sizes and be self-finishing	Acrylic	Laser cut	The acrylic being hot after taken out of the laser cutter	The acrylic is the correct sizes that are needed, and the laser cutter is on the correct setting.	30
6- Vaccum form	Place the former in the vacuum former with acrylic base underneath and lenses on the former Heat HIP's on vacuum former until its malleable then suck the air out so the case is formed.	HIPs Acrylic lenses Acrylic base Acrylic pieces	Vacuums former		The casing splitting The	40
7-Cut holes for lenses and components	Drill holes with pillar and handheld drill then cut out square with coping saw blade.	HIP casing Components lenses	Pillar drill	Hair or tie getting caught in the drill. Cut fingers on coping saw blades.	The holes being perfect sizes for components not too big or too small.	40
8- Strip heat hooks for back and acrylic to hold PCB	Suspend acrylic on middle of strip heater for 30 seconds and bent to joints needed.	Laser cut acrylic pieces	Strip heater	Burning hand on strip heater	Burning and snapping acrylic or dropping it on the heat source. Making sure acrylic is hot enough to bend.	40

Total hours=5approx



A sequence of stages for the production of the prototype is presented. The stages need to include details about the materials, processes, tools and equipment that will be used at each stage when making the prototype. Factors such as quality control are good indicators that learners are mindful of the necessity for a high quality final proto type.






The final prototype is a neatly constructed vacuum formed HIPS shell. The learner has used a wood turning lathe to create the former from layered mdf. There is a laser cut acrylic base so that the HIPS shell fits perfectly and tightly. The bottom layer of acrylic has again been laser cut, with CAMM 1 vinyl used to create two eyes for the ladybird. Inside, the pcb is of a very high quality. It has been developed accurately and constructed well with high level skills. There are no burn marks or defects. There is a battery pack holder which has been cut from a HIPS sheet, heated using a line bender, and set at the desired angle. There are three LEDs equally spaced and neatly positioned using a pillar drill to create the holes, with LED holders mounting the LEDs in place. There is a series of holes drilled with a pcb drill to act as a speaker vent. The on/off toggle switch is located at the back of the product. The LDR is mounted onto the surface of the ladybird and each leg fits through a small pcb drilled hole. CAMM 1 vinyl spots are used to create the spots for the ladybird. The device is fully programmed, works perfectly, to complete a high quality pre-production prototype.

Band 4 Assessment Criteria – Manufacturing a prototype

- 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 meets 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.

This learner is clearly demonstrating skills within the 24 – 30 mark descriptor.

Assessment Criteria		Marks	Assessment objective	Guidance
(a)	Identifying and investigating design possibilities.	10	AO 1	• *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*
(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		

My Evaluation

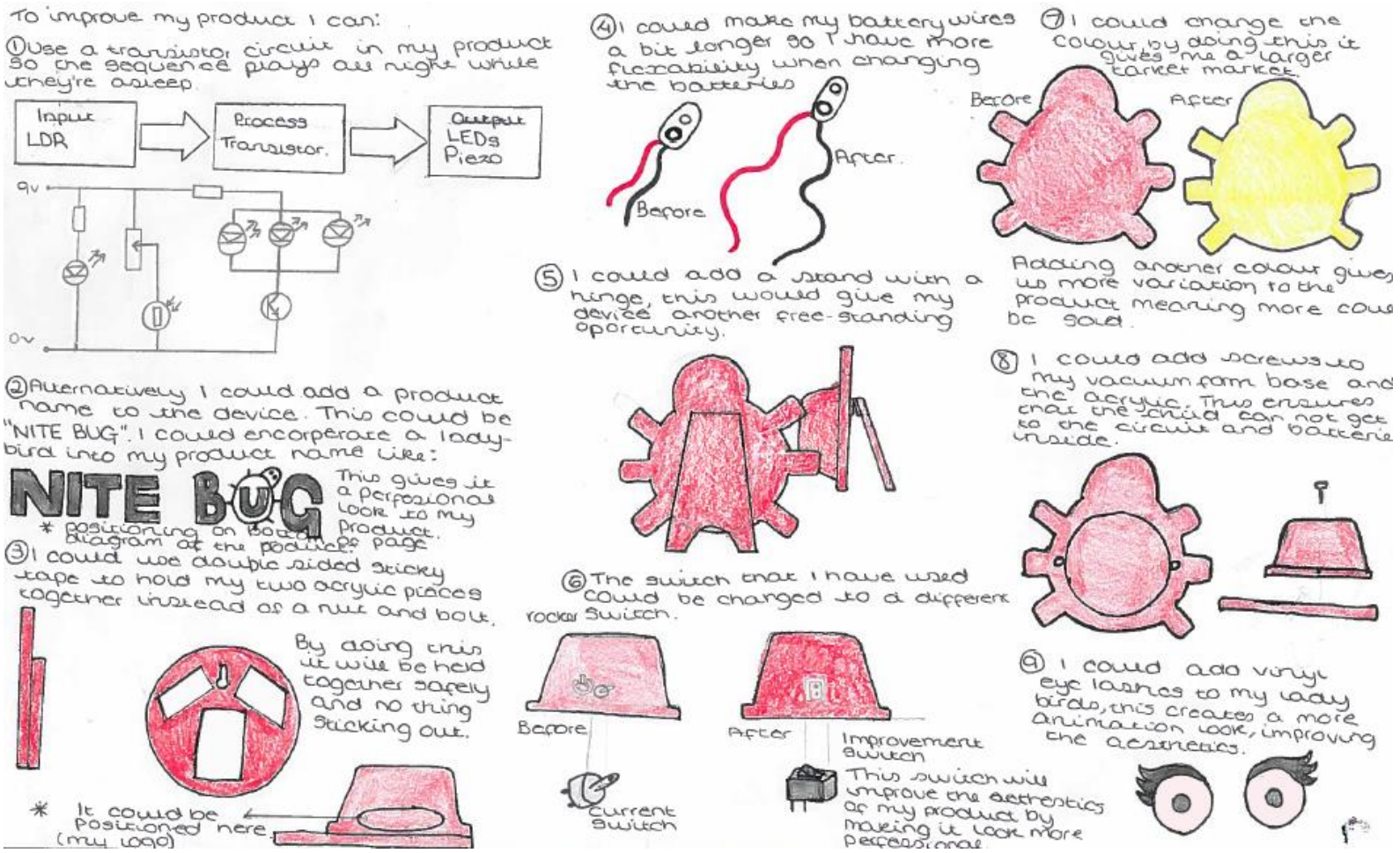
Overall I am very happy with my product as it has fulfilled my specification even having making a few alterations during manufacture. One of my alterations was the size of my product because while I was making my prototype I found out that in my vacuum formed base there was not enough room for the PCB board and all the components with the wires, so I made the product bigger. Another change I made to my product was changing the number of LEDs in which would have been included into my product. At first I design my product with 4 LEDs which was then changed to 3 LEDs and a piezo sounder because I thought that my target audience would not be attracted to my product as it could be deemed 'less value for money' as other products have sounders. I had to reduce the number of LEDs as there wasn't enough outputs on my PICAXE 08M2 chip for 4 LEDs and a piezo sounder.

The final design brief that I chose was design brief 2. My design brief was "Infants night light – parents often use illumining devices to reassure and comfort young children when you going to bed/sleep in dark conditions. Investigate this problem and design and make a battery powered automatically illumining night light for infants which is portable, freestanding and wall-mountable." The ways in which my product achieves my design brief this is as it is aimed at babies and children form the ages of one and three years old. At this stage in their life they are moved into their own room which could lead to them being difficult to get to sleep. As a result of this difficult stage in their life parents may resort to buying a nightlight which could comfort the so the child to sleep and this is where they could come to buy my product. My product tests this brief well as my product is automatically illumining which will reassure and comfort young child while in dark conditions. The product which I have made is powered by 3 AA batteries which makes my device portable and with a keyhole fitting it is also wall-mountable; this means that my product fully fulfils my design brief. Before my night light children didn't have nothing to soothe them to sleep which could make them feel unsafe but with my product the feeling of unsafeness will disappear.

To check that my product does what I intended to do when I was first given my task I can test my final product against the specification which I made at the start. The primary functions in my specification are that it must be automatically illumining with the use of and LDR which I have included into my product. My product must be powered by 3 AA batteries and it must have a keyhole fitting all of these are used in my device fulfilling my specification. However I did not include 2 red LEDs and 2 ultra-bright white LEDs as specified in my specification. In my secondary specification I said it could use a PIC chip to run the circuit and play a lullaby and my product has fulfilled this specification point. Under the heading safety I had to make my product with rounded corners with a diameter of 10mm my product fulfilled this as well as my product concealing away the components. I was very successful in this aspect. Nonetheless I did not include a screw for the batteries to be covered as I thought that my device will be out of the child's reach so it poses no real danger. However I did include no detachable parts which could be put in the child's mouth. For sustainability I have used 3 AA batteries which are rechargeable as it makes my product more sustainable. My product is also made sustainable by the use of recycled materials so the environment isn't at harm. Fulfilling my secondary specification requirement I have used a PIC chip circuit as it uses less power than a thyristor circuit for example do less electricity is used while my product is in use. For the overall look on my product I stated that: the colour must be bright and colourful but it must appeal to both genders; it must be smooth with curved corners, so it looks modern; my LEDs must be alternatively flashing to attract the parents and child's attention and the theme will be unisex. I have fulfilled all the aesthetics criteria I set out to do so it fulfils my specification. My device was animal themed this was a suggestion of a theme in my secondary specification, so this is fulfilled. With the sizes specified in my specification I designed my product within those restrictions and I have fulfilled this. My products RRP has been kept to as it costs less to construct so there is room for profit, so this fulfils my specification. However due to the product costing more to manufacture than expect I cannot fulfil the secondary specification of having a profit of £4.19. My device has kept to the weight restriction of 400g to 1kg as this fulfils my design brief and my specification at the same time as it makes it portable. The materials in which I have used to manufacture my product are recycled this is because it doesn't do as much harm to the environment as non-recycled materials and it fulfils my specification.

When I tested my product against the people in my target market they thought that the design concept was very creative, imagination and innovative. My audience found that my product was of good dimensions. They thought that my product was very "colourful", "bright" and "not gender specific". While looking at my product they knew that it was a night light because of the LEDs, LDR and the speaker holes, from this they could see it would detect darkness which would trigger the LEDs to turn on and a tune to

There are evaluative comments running throughout the iterative development of the proposals. The final analysis is clearly linked to the brief and specification, and critical and perceptive comments are evident.
Opinions are sought from others, but there is little evidence of this. The learner would benefit from constructing a live user trial, with photographic/video evidence of the testing, together with the thoughts, opinions and comments of those users.



There is some evidence of reflection on feedback here, where this learner offers further modifications. This needs to be a designing/sketching based activity where learners do not simply point out faults, but offers solutions and further refinements which would develop the final prototype further.

Band 4 Assessment Criteria - Analysing and evaluating design decisions and prototypes.

- 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.

The learner does not quite meet all of the descriptors here, so cannot be awarded the Band 4 level 16 – 20 marks. The learner deserves a Band 3 mark, which fits between 11 – 15 marks. There is some reference to users and testing, but due to the lack of evidence, and depth of analysis, 13 marks would be a fair reflection.

Summary of what is required for the iterative design and make task

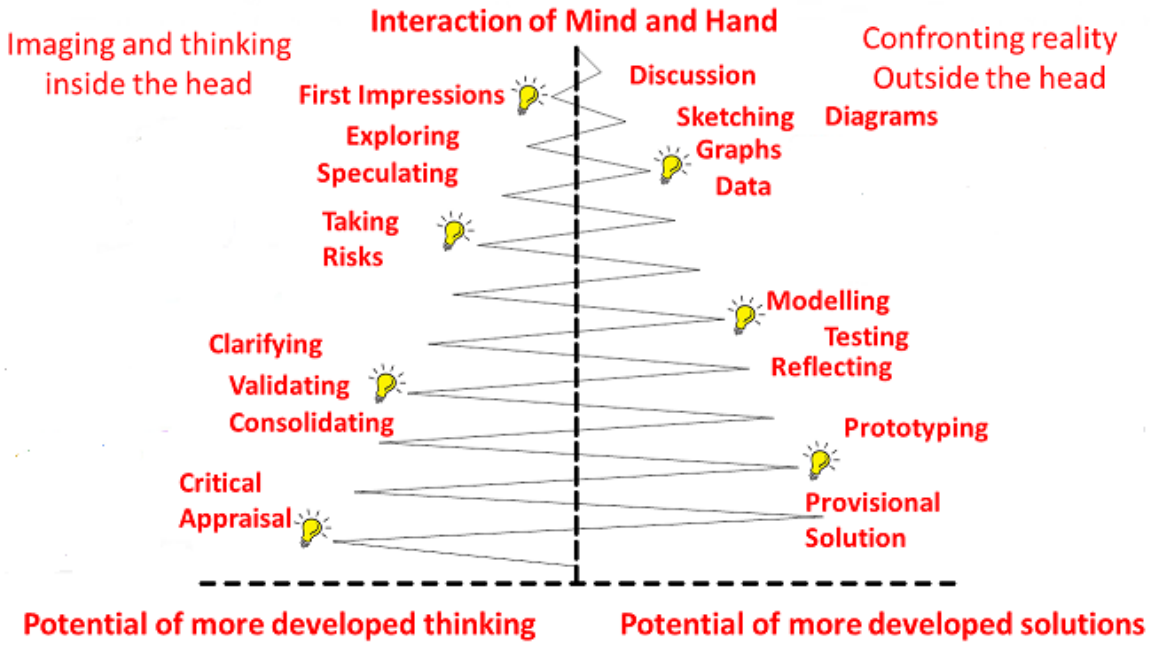
Informal A4/A3 sketchbook	Formal presentation A3 portfolio	Final prototype (fully functioning high quality product)

Exemplar pages can be found on the WJEC EDUQAS website:

http://www.eduqas.co.uk/qualifications/design-and-technology/gcse/

Design iteration

Definition: A design method based on the process of prototyping, testing, analysing, and refining a product or process. It is not a method that will follow the traditional linear path to create a desired outcome but a cyclic one.



Interaction of Mind and Hand model Source: Modified from
The Design and Technology Association http://bit.ly/2BtDKJh

The following links are available for you to watch to support and develop your understanding of the iterative process.

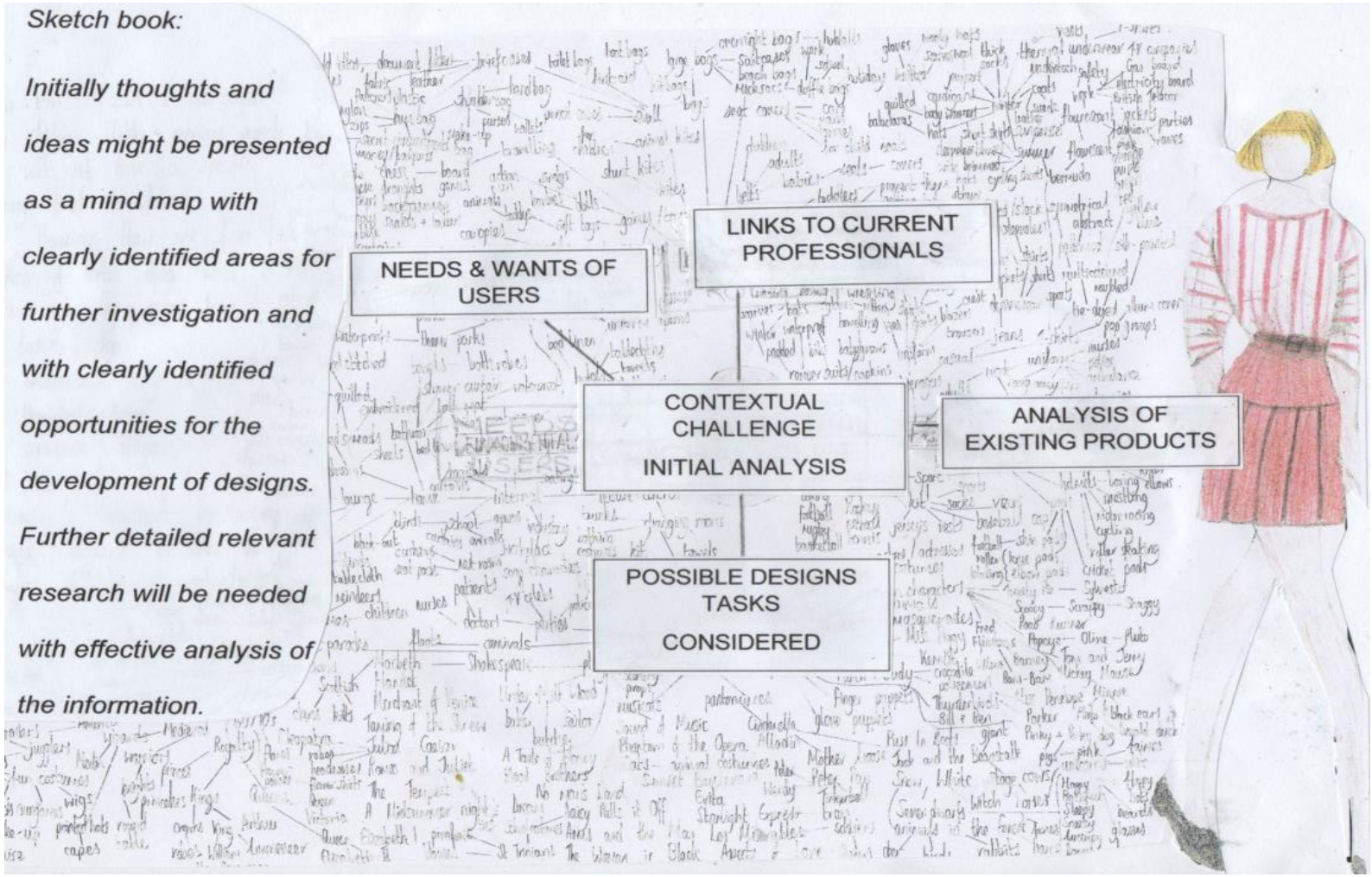
- https://www.youtube.com/watch?v=16rGwTX4NcM
- https://www.youtube.com/watch?v=WcFSZGvXtjA

Teacher guidance during the design and make

You are allowed to guide/support the learner through the iterative process. The subject teacher should check that the learner selects a problem that is appropriately challenging and provides the opportunity to address all the assessment criteria. For further details on teacher guidance please refer to pages 38 – 41of the specification.

Component 2 – Further examples of informal sketch pad and formal portfolio for the design and make

Identifying and investigating design possibilities.



Some learners find mind maps a useful means of gathering their initial thoughts and ideas and to identify key points for further consideration. It provides an excellent means of exploring the divergent range of possibilities within the chosen context.

Focussing on users

Relevant research/product analysis

Provide details of the Target Market for your product.

I have decided to design a soft furnishing for a child's bedroom. The product will be unisex and for the ages between 12 months-3 years old.

Parents

The parents choice of soft furnishing would be a unisex product which is not expensive but is also of a good quality. They would often buy products from nearby super-markets or nursery shops but they would still want something that won't age quickly. They would like a product that won't stretch their budget because they have a low income. They would also like a product which is colourful, eye-catching and entertaining. They also may want something educational. They would obviously want a safe product so that no harm will come to their child. The parent often leads a busy life so something that can be washed and dried easily would be better.

This is the sort of family that I'm designing the product for. A family of four with a baby and toddler.

Provide details of the results of your Analysis of a Competitor Product.

Function: the main purpose of this product is to entertain and stimulate a young child. It is meant to help the child with their hand and eye co-ordination through building up blocks and stacking them one on top of the other.

Aesthetics: The item has small range of bright colours and have funny characters and animals appliqued on to them. The fabrics used have different textures to them. The product is cubed and has many different faces on them

Safety: The item is safe for a young child to play with as it has no sharp edges that could harm a child. It has no loose threads that a child could pull and break the item. There are no small objects attached to the item that the young child could swallow.

Target Market: The product has been designed for a young child but as they don't really know what they like the main target market here is the parents. It has been made with the parents wishes in mind but is also child friendly.

Dimensions/size: The building blocks are the right size for a young child to grasp with both hands. The exact size of the blocks is not given but are suitable for the ages of 6-18 months.

Quality: The quality of this product is really good. It has been put together well and sewn neatly with no faults. It looks like it will last a number of years. The product is tough and durable.

Economics: The product was being sold for £14.99. I don't think this is a reasonable price as it may stretch a parents budget, on the other hand it will last a long time and the product will entertain and stimulate a young child so its worth the money.

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

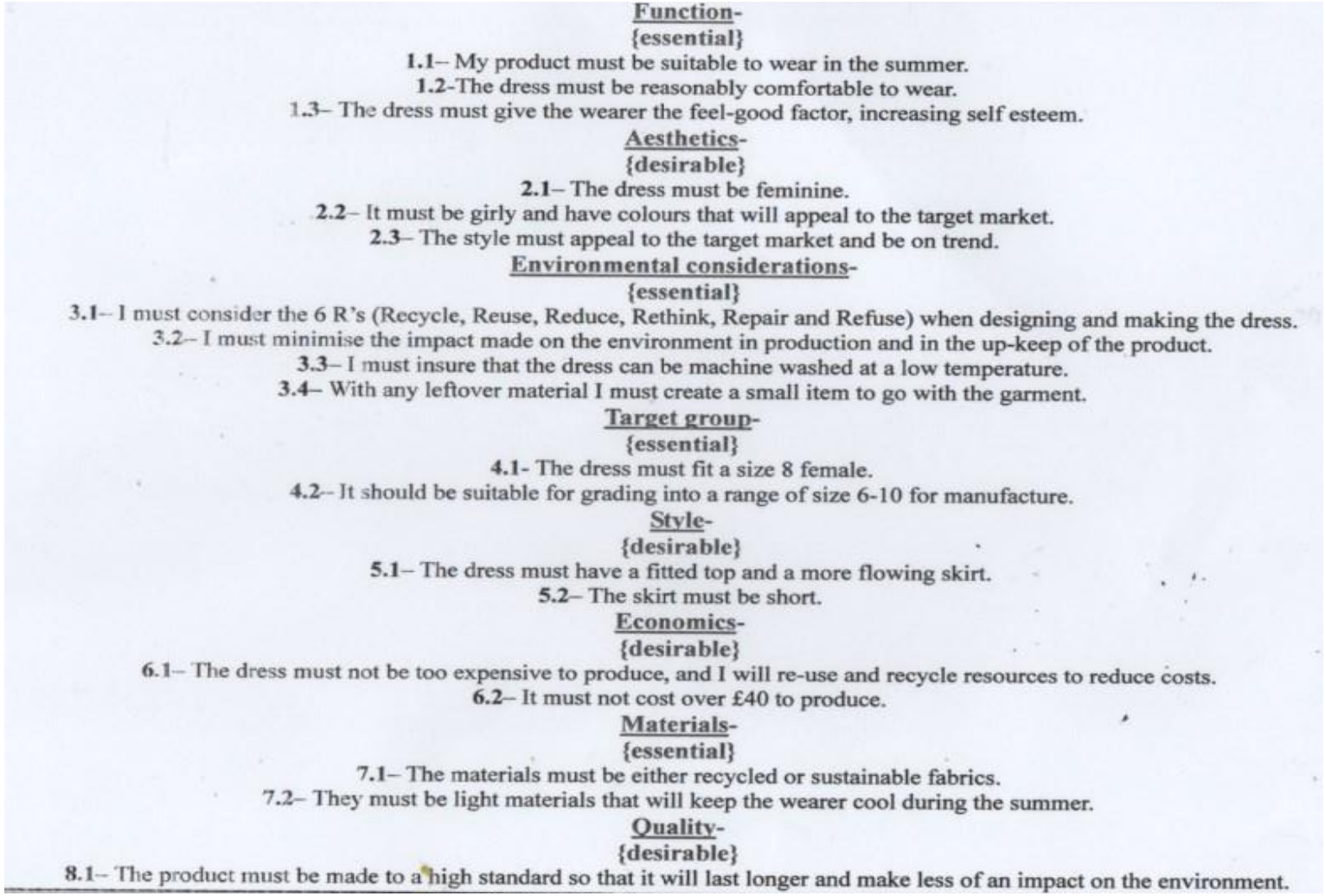
I've looked on the internet at soft furnishings to decorate a child's bedroom and what is already available in stores. There are a wide variety of items that can be purchased such as baby rugs, cushions, floor cushions, bean bags, curtains, wall hangers, throws and soft building blocks. The product has to be safe so no child harms themselves. To keep the product safe for use there should be no sharp edges, no loose treads that could be pulled and fray the item, there should be no small objects that a child could swallow and the material must be non-flammable. Most soft furnishings are brightly coloured and the most popular colours are orange, yellow, pink, red, and purple. The products are usually made out of soft fabrics like cotton and fleece. The products that I looked at had funny characters or animals on them but they also had girly ones with butterflies on and more boyish ones with super heroes on. The size of the soft furnishing products range from big to small all depending on the age of the child. From my research I found out that all soft furnishings for a child's bedroom have some sort of entertainment on them. Squeakers, soft touchy feely fabrics, mirrors and rattles are found on soft furnishing products. Some items maybe educational. You can purchase these products in shops and on the internet. The most popular stores and websites are IKEA, mother care and any big super-markets. The cost of the items depends on the stores they are purchased from and the manufacture or brand. I asked older family members what they did with the soft furnishing items they had for their children, the replies I had were all very similar. "I kept it for a future child we may have had" was one of the most popular replies I had off my family. From this information I have concluded that the products have to be suitable and last a number of years. I will use this information when I start designing.

State your Final Design Brief here.

I have decided to design a unisex soft furnishing item such as a floor cushion/beanbag to decorate a young child's bedroom. It will be for the ages between 12months and 3 years old. The style of the product needs to entertain and stimulate the child. It need to have bright colours and animals on it to make it eye-catching and different from the other products on the high street. It needs to retail below £25 which will make it affordable for the parents. It needs to be washable and with stand wear and tear.

A range of possible design briefs

Design Brief: Using the concept of the 6R's design and make a garment out of recycled materials and components for the teenage market. The product can be casual but fashionable, it could be versatile. The garment could raise awareness of the millions of tonnes of textiles thrown away each year and how to recycle your old materials.



Function-
{essential}
1.1– My product must be suitable to wear in the summer.
1.2-The dress must be reasonably comfortable to wear.
1.3– The dress must give the wearer the feel-good factor, increasing self esteem.

Aesthetics-
{desirable}
2.1– The dress must be feminine.
2.2– It must be girly and have colours that will appeal to the target market.
2.3– The style must appeal to the target market and be on trend.

Environmental considerations-
{essential}
3.1– I must consider the 6 R's (Recycle, Reuse, Reduce, Rethink, Repair and Refuse) when designing and making the dress.
3.2– I must minimise the impact made on the environment in production and in the up-keep of the product.
3.3– I must insure that the dress can be machine washed at a low temperature.
3.4– With any leftover material I must create a small item to go with the garment.

Target group-
{essential}
4.1- The dress must fit a size 8 female.
4.2– It should be suitable for grading into a range of size 6-10 for manufacture.

Style-
{desirable}
5.1– The dress must have a fitted top and a more flowing skirt.
5.2– The skirt must be short.

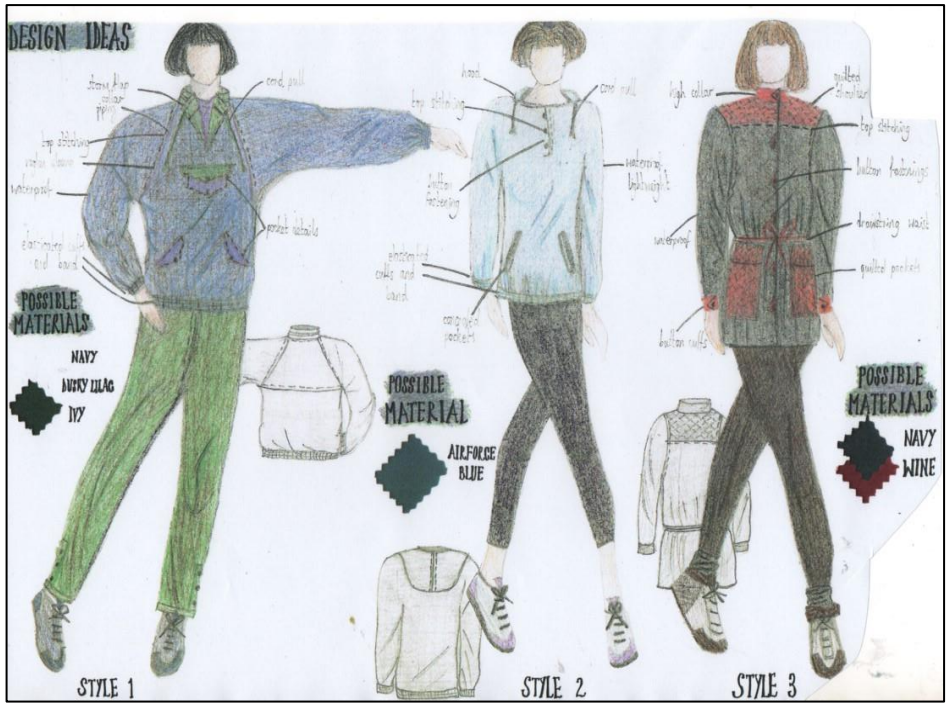
Economics-
{desirable}
6.1– The dress must not be too expensive to produce, and I will re-use and recycle resources to reduce costs.
6.2– It must not cost over £40 to produce.

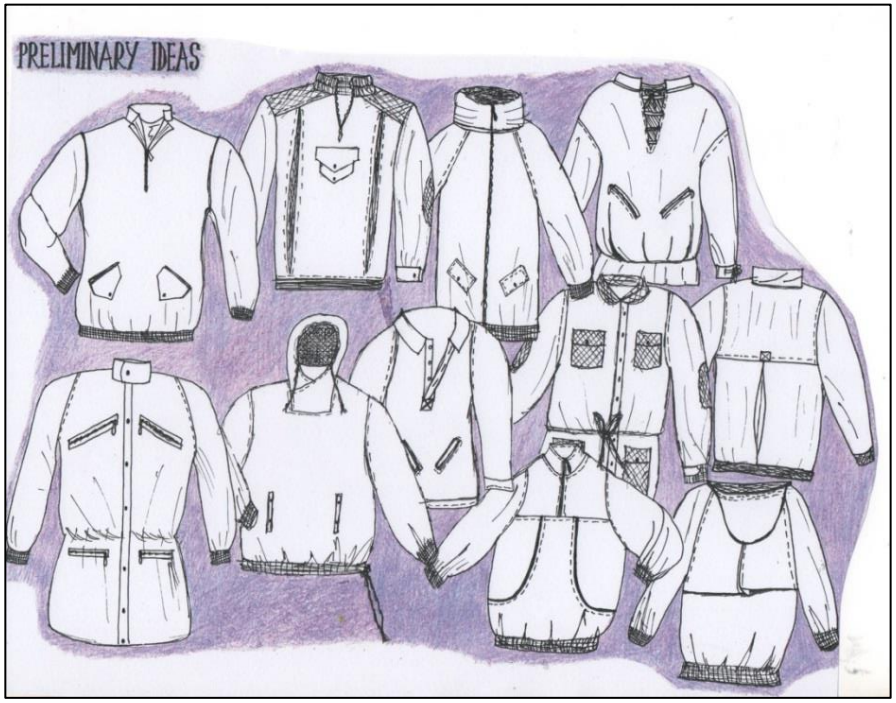
Materials-
{essential}
7.1– The materials must be either recycled or sustainable fabrics.
7.2– They must be light materials that will keep the wearer cool during the summer.

Quality-
{desirable}
8.1– The product must be made to a high standard so that it will last longer and make less of an impact on the environment.

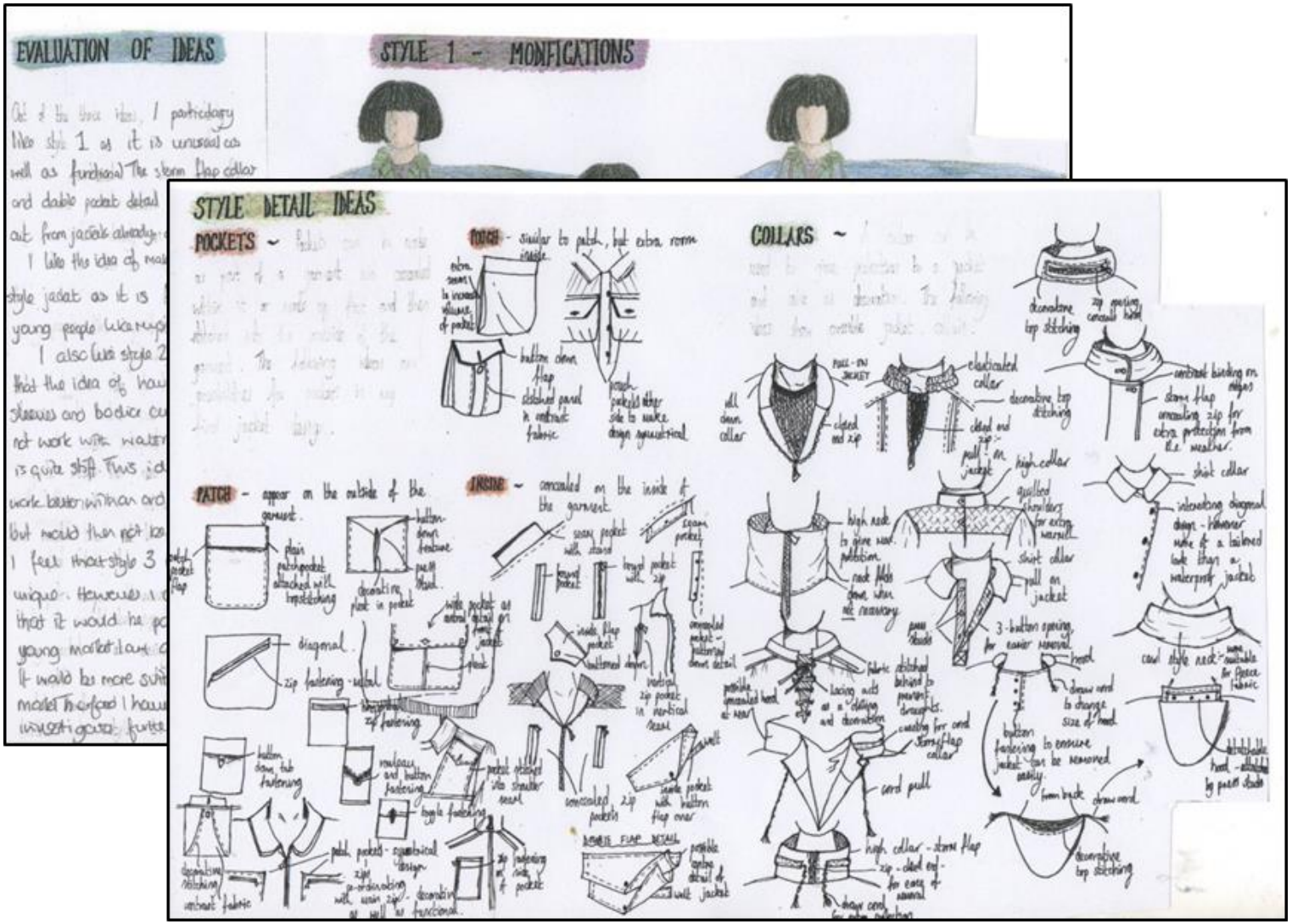
The final design brief is clear and detailed formed as a result of focussed and relevant research. It offers numerous opportunities for a range of possible design ideas.
The Specification is reasonably detailed and includes some measurable criteria. User needs and wants have been identified alongside some factors critical to success. Identifies key aspects including: form, function, materials, sizes, safety, ergonomics, cost etc.

Generating and developing design ideas: Informal sketch pad





A range of initial ideas that meet the design specification and brief – a good starting point. Ideas need to be evaluated and some will be rejected.
First iteration for example could focus on form, shape and style.
First toile: evidence of modelling could be considered at this point.



Any starting point!

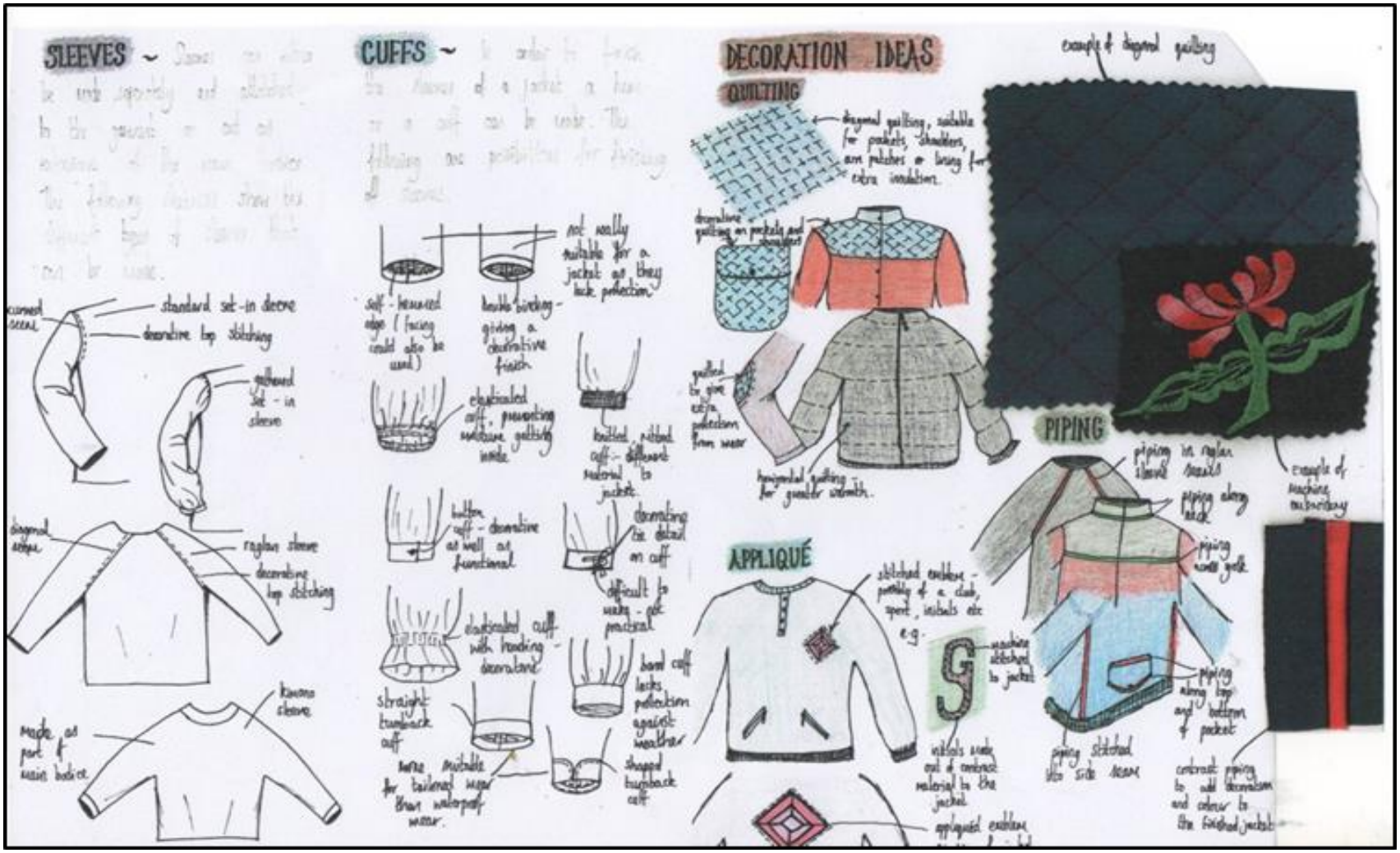
Another iteration focussing on style details:

Quick developmental sketches with high levels of appropriate annotation.

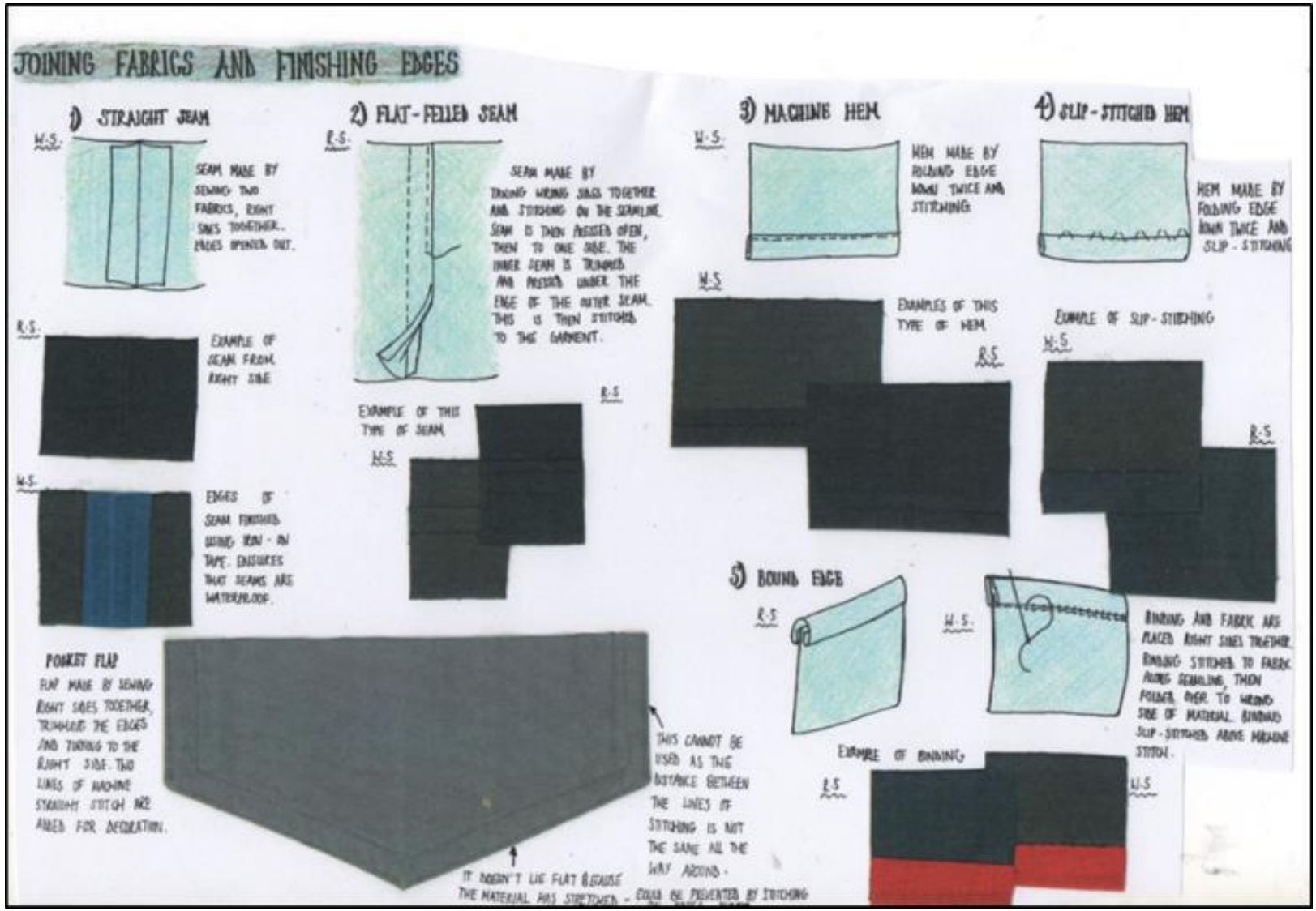
On-going evaluation of ideas with lots of ideas rejected.

Practical testing of ideas is essential.

Decision making will support developmental iterations.



Good evidence of modelling the ideas:
Consider a mix of practical activity, sketching, CAD/CAM.
Analysis should be perceptive, with thorough testing against the specification.
Lean design: focussing on the most important details!



Another iteration focussing on functional development:

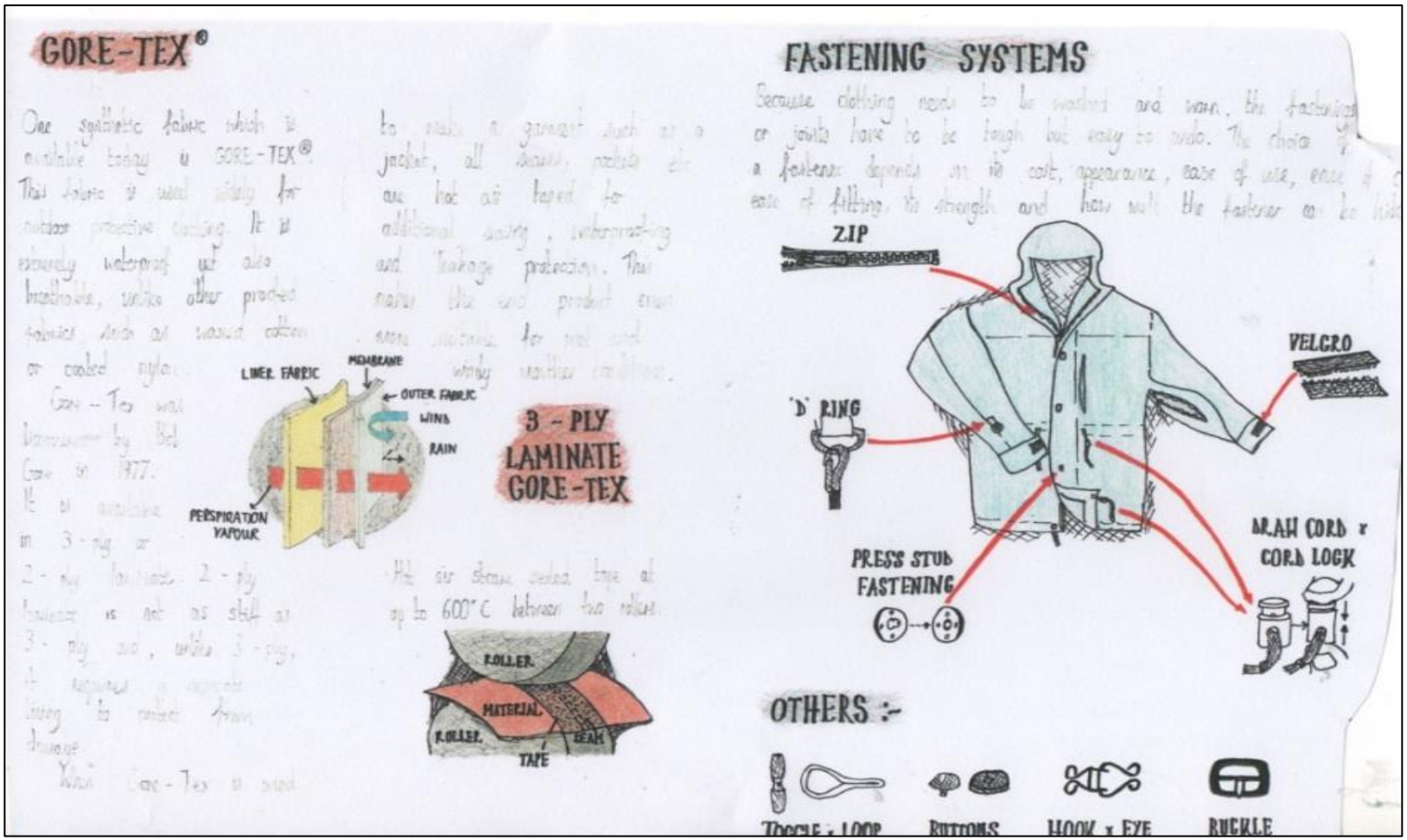
Practical testing of processes for the construction of the product. Quick sketches and alternative methods need to be considered.

Lots of ideas will be rejected. Learners will have a better understanding of the task ahead through thorough testing of ideas.

Development needs to be relevant.

Alongside the practical testing of construction processes, materials and components should be considered. Appropriate tests should determine the suitability of materials for example: wash tests, shrinkage, stain resistance, durability and so on.

Decorative processes for example stitched embellishments such as appliqué and embroidery, paint effects, dyes could also be considered as yet another iteration. Testing leads the way, ideas need to be analysed and developed further or rejected.

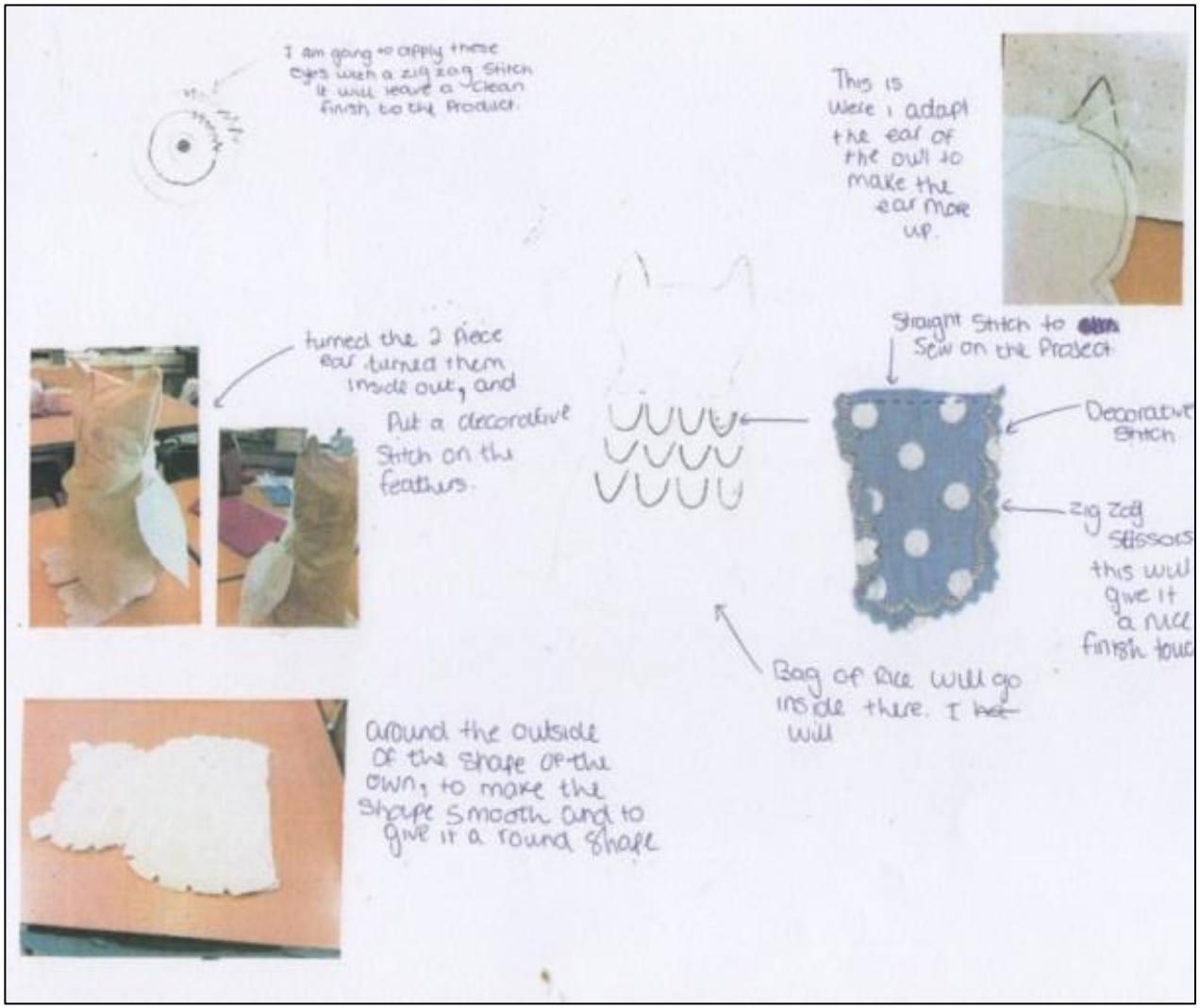


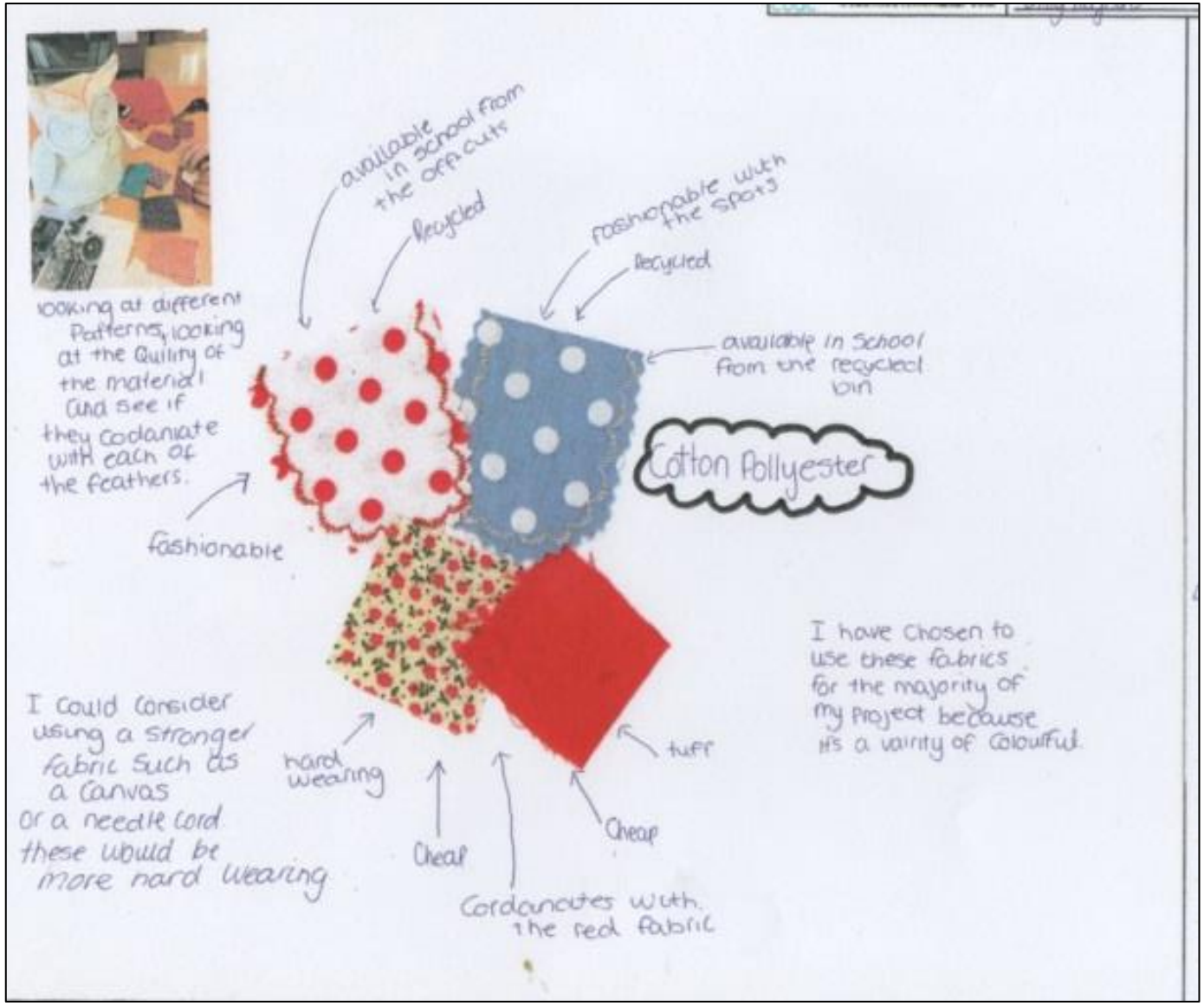
Another iteration focusses on functional and performance testing.

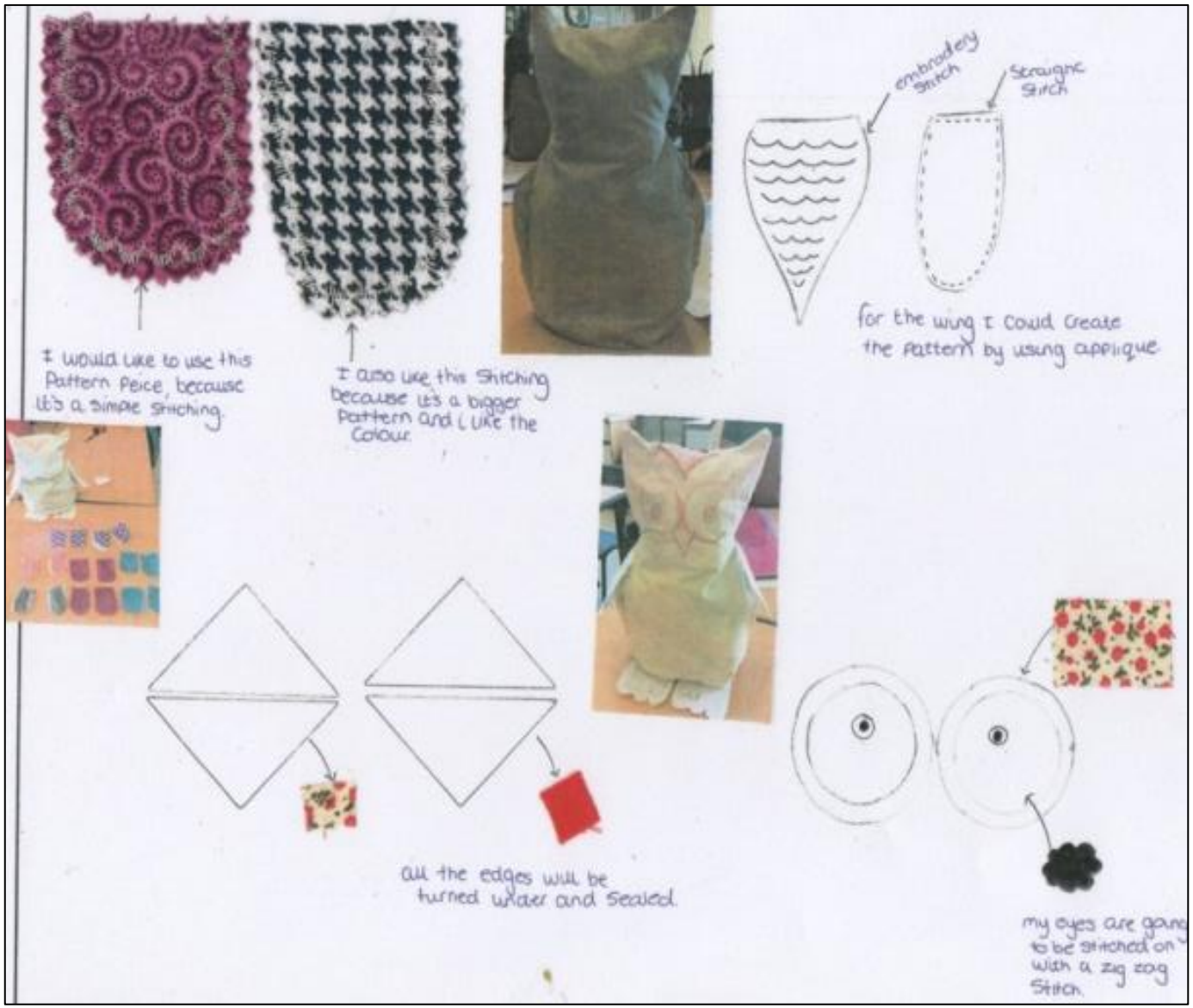
Materials are selected and tested for suitability. 3D printing of component parts offer additional iterations in the development of the prototype.

After a number of iterations learners should be drawing closer to the final iteration and chosen idea for manufacture.

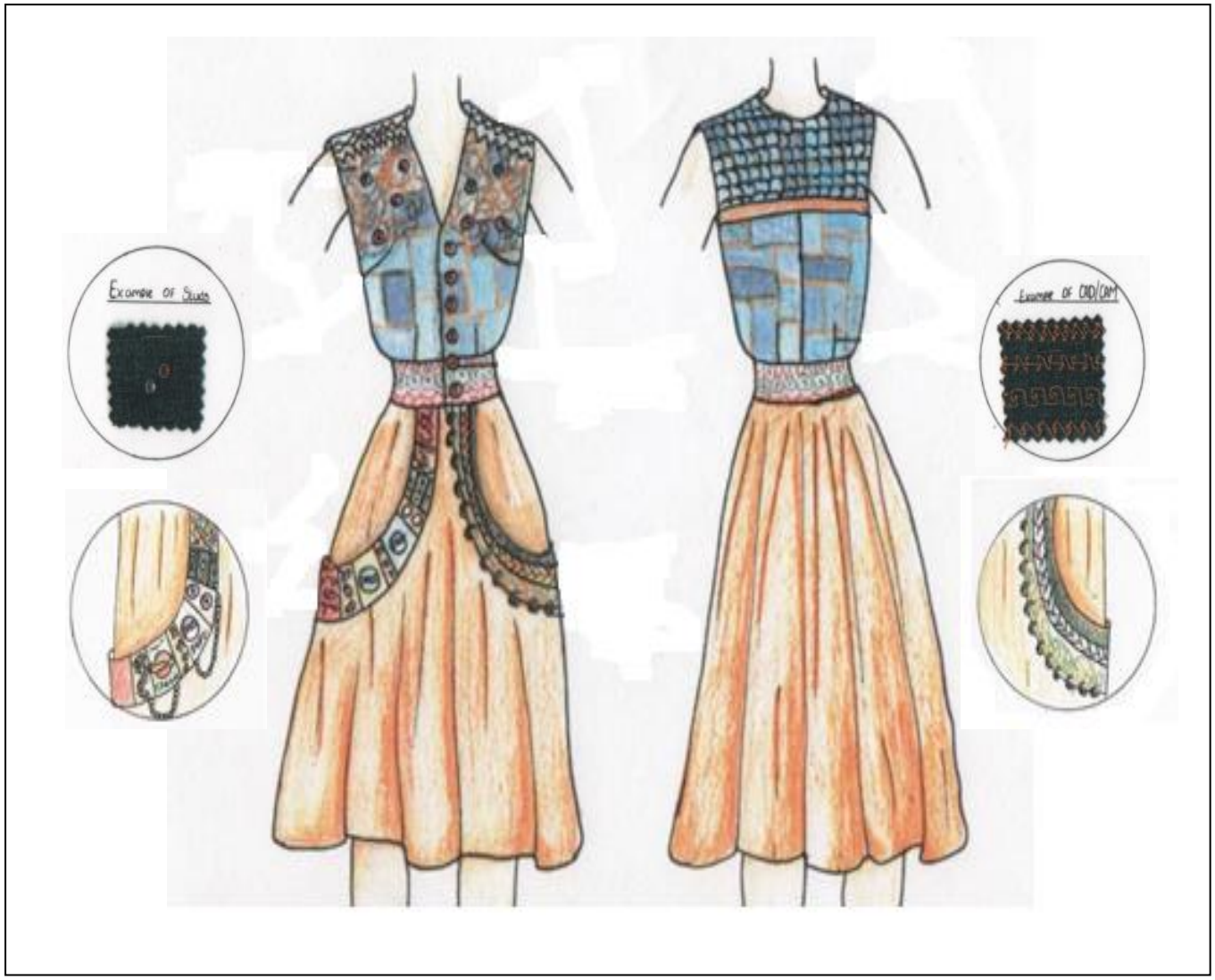
A final prototype before manufacture and opinions of users considered. All important details will have been considered for example: form and style; dimensions and sizes; materials and components; construction and decorative process and techniques.




looking at different Patterns, looking at the Quality of the material and see if they codaniate with each of the feathers.
available in school from the office
Recycled
fashionable with the sport
Recycled
available in School from the recycled bin
Cotton Pollyester
fashionable
I could consider using a stronger fabric such as a Canvas or a needle cord these would be more hard wearing
hard wearing
Cheap
Cheap
Cordanoites with the red fabric
I have chosen to use these fabrics for the majority of my project because it's a variety of colourful.

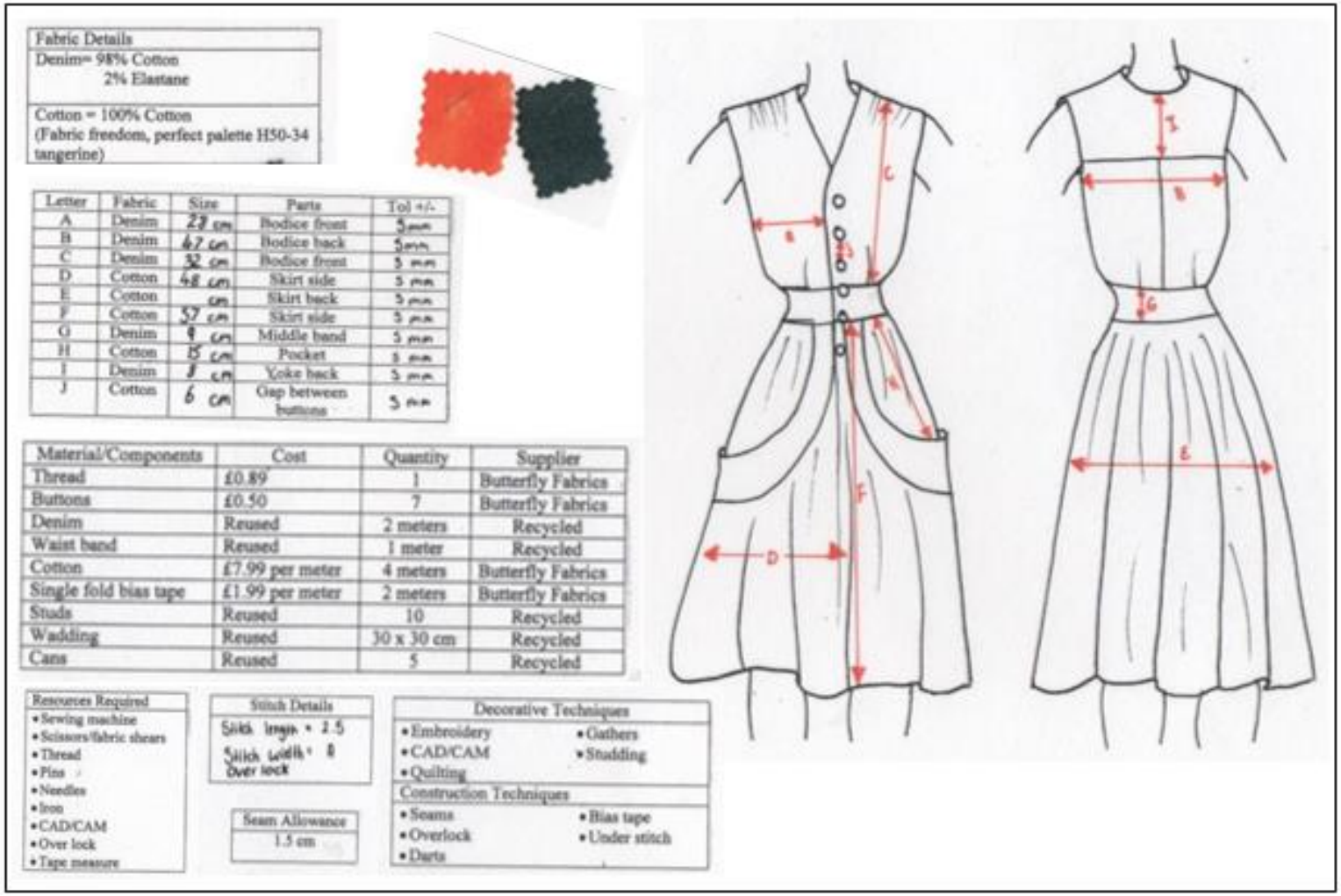

I would like to use this Pattern Peice, because it's a simple Stitching.
I also like this Stitching because it's a bigger Pattern and I like the Colour.
embroidery Stitch
Straight Stitch
for the wing I could create the Pattern by using applique
all the edges will be turned under and Sealed.
my eyes are going to be stitched on with a zig zag Stitch.

Evidence of the iterative process of design albeit at a simplistic level.
There is clear evidence of modelling and testing of ideas.
Some evaluative comments and rejection of ideas.



FORMAL PRESENTATION FOLIO

- A clear pictorial drawing of the final prototype which includes front and back views and exploded diagrams to show important decorative details.
- Presentation drawings can be hand drawn or CAD but always high quality and should include all essential details.
- Learners should consider whether a 3rd party/manufacturer could produce the prototype from the information provided.



Fabric Details
Denim= 98% Cotton 2% Elastane
Cotton = 100% Cotton (Fabric freedom, perfect palette H50-34 tangerine)

Letter	Fabric	Size	Parts	Tol +/-
A	Denim	28 cm	Bodice front	5mm
B	Denim	67 cm	Bodice back	5mm
C	Denim	32 cm	Bodice front	5 mm
D	Cotton	48 cm	Skirt side	5 mm
E	Cotton	cm	Skirt back	5 mm
F	Cotton	57 cm	Skirt side	5 mm
G	Denim	9 cm	Middle band	5 mm
H	Cotton	15 cm	Pocket	5 mm
I	Denim	8 cm	Yoke back	5 mm
J	Cotton	6 cm	Gap between buttons	5 mm

Material/Components	Cost	Quantity	Supplier
Thread	£0.89	1	Butterfly Fabrics
Buttons	£0.50	7	Butterfly Fabrics
Denim	Reused	2 meters	Recycled
Waist band	Reused	1 meter	Recycled
Cotton	£7.99 per meter	4 meters	Butterfly Fabrics
Single fold bias tape	£1.99 per meter	2 meters	Butterfly Fabrics
Studs	Reused	10	Recycled
Wadding	Reused	30 x 30 cm	Recycled
Cans	Reused	5	Recycled

Resources Required
• Sewing machine
• Scissors/fabric shears
• Thread
• Pins
• Needles
• Iron
• CAD/CAM
• Over lock
• Tape measure

Stitch Details
Stitch length = 2.5
Stitch width = 8
Over lock

Seam Allowance
1.5 cm

Decorative Techniques	
• Embroidery	• Gathers
• CAD/CAM	• Studding
• Quilting	
Construction Techniques	
• Seams	• Bias tape
• Overlock	• Under stitch
• Darts	

A fairly detailed proposal has been presented with <u>most</u> critical dimensions present.
Information needed on this page includes:

- CAD CAM CNC data - if it is appropriate.
- Finishing techniques and processes.
- All material and component details needed.

Learners should consider whether a 3rd party/manufacturer could produce the prototype from the information provided.

Pre-production quality issues:

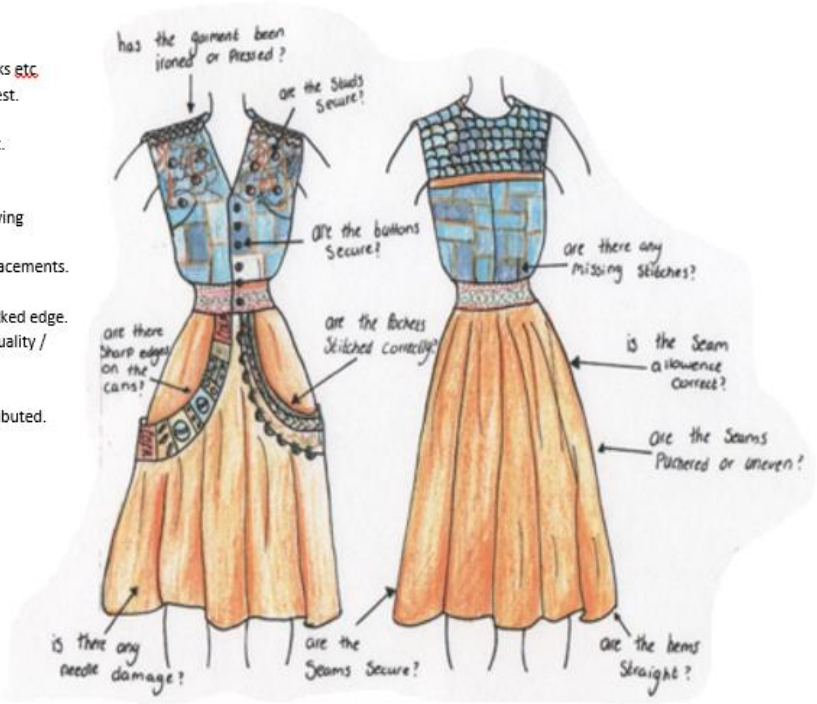
- Check materials for flaws, marks etc
- Set up machinery correctly – test.
- Check additional equipment.
- Check templates are all correct.

During manufacture:

- Lay template accurately observing pattern language.
- Transfer all pattern marking placements.
- The seam allowance is 1.5cm.
- All seams finished with overlocked edge.
- Consistent checking of stitch quality / tension.
- Match thread colours.
- Gathers should be evenly distributed.
- Symmetrical design.
- Straight hem line.
- Seams lie flat.
- Decorative panels secure.

Post production:

- Remove all pins.
- Trim threads.
- Press.



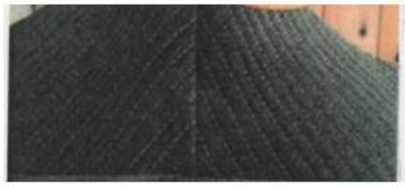
Processes need to be clearly defined: Seam finishing, hemline, fastenings, facing, patchwork etc.




- Details of decorative features needed – could be test samples to show stitch details, machine settings etc





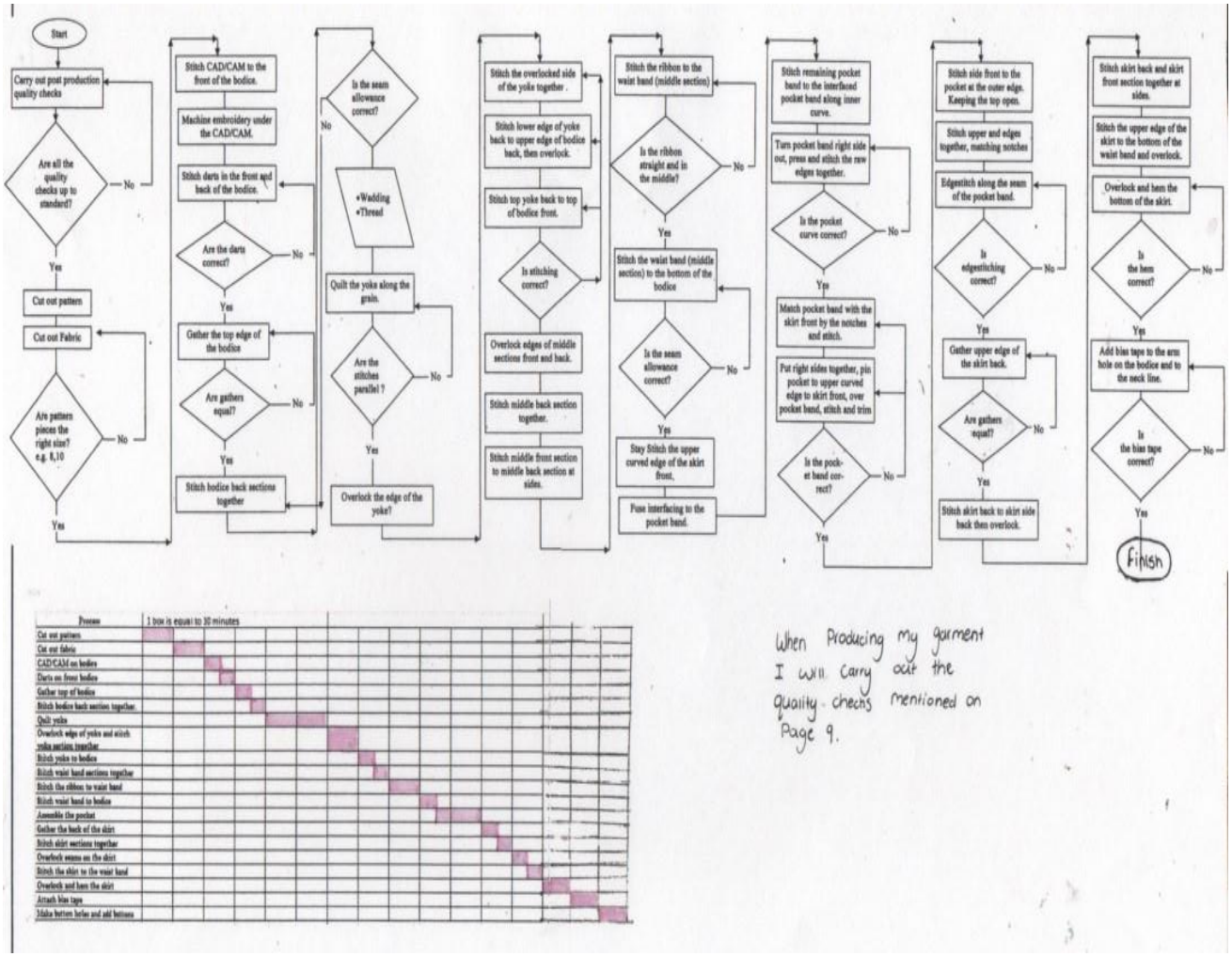


Additional technical details include:

- Tools and equipment for manufacture.
- Specialist processes.
- Quality Control factors.
- CNC/CAD CAM details speeds and settings if appropriate.

All essential production information that would be necessary for a 3rd party to manufacture the same product.

Manufacturing a prototype.



FORMAL PRESENTATION FOLIO

A plan for manufacture should contain:

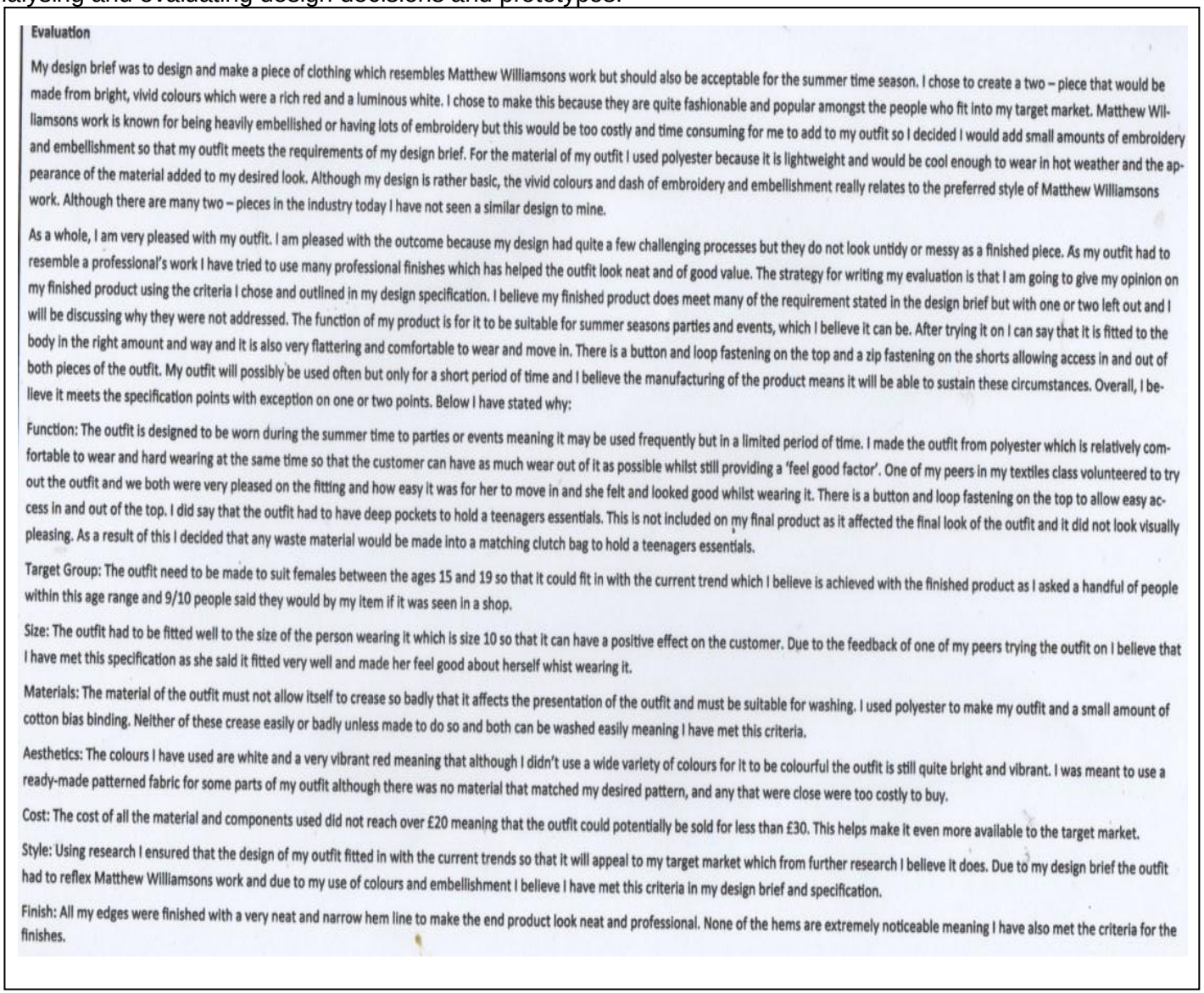
- Details of a logical sequence with sufficient detail for a 3rd party to realise the same product.
- An achievable timeline for manufacture.
- Reference to machinery needed for manufacture.

A Gantt chart could provide an overview of time for manufacture. The plan should support the manufacture of the product. If the iterative process has been followed in sufficient detail with testing and practical modelling of ideas learners will have the capability and knowledge to manufacture their products independently and to a good standard.

Final Prototype

- A high quality fully functioning prototype which demonstrates highly appropriate making skills.
- The learner has an excellent understanding of the manufacturing process for this product.
- Specialist processes and materials have been used skilfully with high levels of accuracy achieved.
- A precise outcome.

Analysing and evaluating design decisions and prototypes.



Evaluation

My design brief was to design and make a piece of clothing which resembles Matthew Williamsons work but should also be acceptable for the summer time season. I chose to create a two – piece that would be made from bright, vivid colours which were a rich red and a luminous white. I chose to make this because they are quite fashionable and popular amongst the people who fit into my target market. Matthew Williamsons work is known for being heavily embellished or having lots of embroidery but this would be too costly and time consuming for me to add to my outfit so I decided I would add small amounts of embroidery and embellishment so that my outfit meets the requirements of my design brief. For the material of my outfit I used polyester because it is lightweight and would be cool enough to wear in hot weather and the appearance of the material added to my desired look. Although my design is rather basic, the vivid colours and dash of embroidery and embellishment really relates to the preferred style of Matthew Williamsons work. Although there are many two – pieces in the industry today I have not seen a similar design to mine.

As a whole, I am very pleased with my outfit. I am pleased with the outcome because my design had quite a few challenging processes but they do not look untidy or messy as a finished piece. As my outfit had to resemble a professional's work I have tried to use many professional finishes which has helped the outfit look neat and of good value. The strategy for writing my evaluation is that I am going to give my opinion on my finished product using the criteria I chose and outlined in my design specification. I believe my finished product does meet many of the requirement stated in the design brief but with one or two left out and I will be discussing why they were not addressed. The function of my product is for it to be suitable for summer seasons parties and events, which I believe it can be. After trying it on I can say that it is fitted to the body in the right amount and way and it is also very flattering and comfortable to wear and move in. There is a button and loop fastening on the top and a zip fastening on the shorts allowing access in and out of both pieces of the outfit. My outfit will possibly be used often but only for a short period of time and I believe the manufacturing of the product means it will be able to sustain these circumstances. Overall, I believe it meets the specification points with exception on one or two points. Below I have stated why:

Function: The outfit is designed to be worn during the summer time to parties or events meaning it may be used frequently but in a limited period of time. I made the outfit from polyester which is relatively comfortable to wear and hard wearing at the same time so that the customer can have as much wear out of it as possible whilst still providing a 'feel good factor'. One of my peers in my textiles class volunteered to try out the outfit and we both were very pleased on the fitting and how easy it was for her to move in and she felt and looked good whilst wearing it. There is a button and loop fastening on the top to allow easy access in and out of the top. I did say that the outfit had to have deep pockets to hold a teenagers essentials. This is not included on my final product as it affected the final look of the outfit and it did not look visually pleasing. As a result of this I decided that any waste material would be made into a matching clutch bag to hold a teenagers essentials.

Target Group: The outfit need to be made to suit females between the ages 15 and 19 so that it could fit in with the current trend which I believe is achieved with the finished product as I asked a handful of people within this age range and 9/10 people said they would by my item if it was seen in a shop.

Size: The outfit had to be fitted well to the size of the person wearing it which is size 10 so that it can have a positive effect on the customer. Due to the feedback of one of my peers trying the outfit on I believe that I have met this specification as she said it fitted very well and made her feel good about herself whist wearing it.

Materials: The material of the outfit must not allow itself to crease so badly that it affects the presentation of the outfit and must be suitable for washing. I used polyester to make my outfit and a small amount of cotton bias binding. Neither of these crease easily or badly unless made to do so and both can be washed easily meaning I have met this criteria.

Aesthetics: The colours I have used are white and a very vibrant red meaning that although I didn't use a wide variety of colours for it to be colourful the outfit is still quite bright and vibrant. I was meant to use a ready-made patterned fabric for some parts of my outfit although there was no material that matched my desired pattern, and any that were close were too costly to buy.

Cost: The cost of all the material and components used did not reach over £20 meaning that the outfit could potentially be sold for less than £30. This helps make it even more available to the target market.

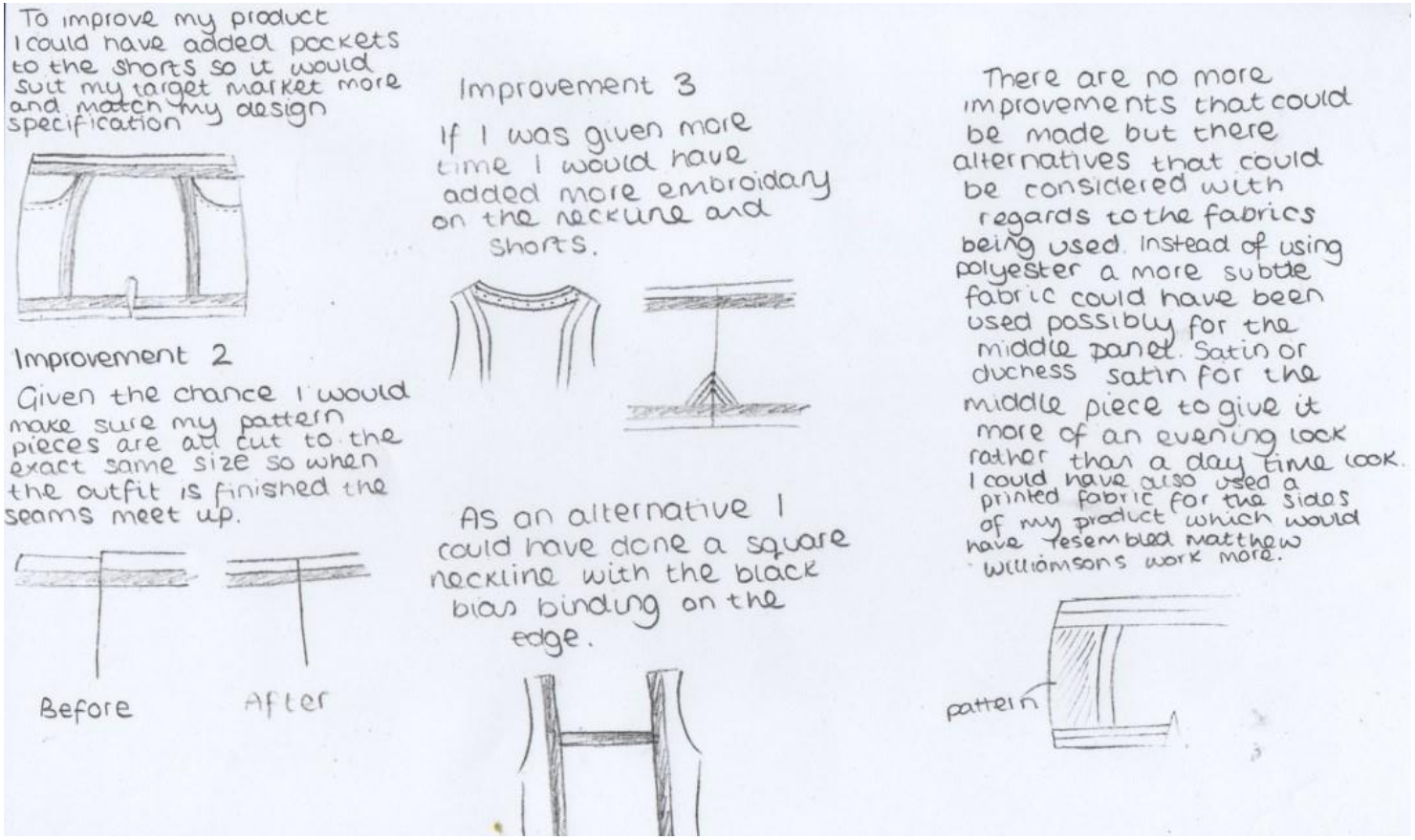
Style: Using research I ensured that the design of my outfit fitted in with the current trends so that it will appeal to my target market which from further research I believe it does. Due to my design brief the outfit had to reflex Matthew Williamsons work and due to my use of colours and embellishment I believe I have met this criteria in my design brief and specification.

Finish: All my edges were finished with a very neat and narrow hem line to make the end product look neat and professional. None of the hems are extremely noticeable meaning I have also met the criteria for the finishes.

FORMAL PRESENTATION FOLIO

Ongoing analysis is essential throughout the iterative process of design and developing ideas.

The final evaluation should form a critical and objective appraisal of the final outcome against the criteria laid out in the specification. It should also meet the requirements of the design brief.
The final prototype should be tested and the results analysed.
Learners should seek the opinions of users.



FORMAL PRESENTATION FOLIO

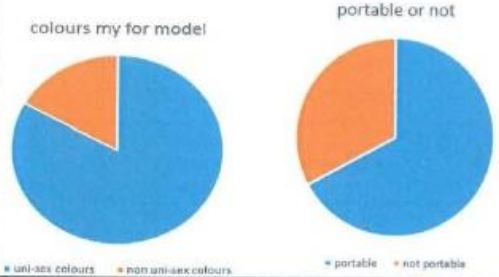
- This is an opportunity for further design and development that would improve the product.
- Learners should respond to feedback from users when considering improvements.
- In the example shown some modifications have been offered but lack detail.

Identifying and investigating design possibilities.

Provide details of the **Target Market** for your product.

Having conducted a costumer survey of 100 people I have found that 95% of my customers want a docking station or music playing device that will charge their phone. I also found out that 83% of my customers would like unisex colours of the docking station such as red, black, gold or white as these colours fit in with most room colours whereas 17% preferred gender specific colours like blue and pink. I also found out 67% of people want the device to be portable, then 69% of people said they would pay between £40-£80 for such a device. I will also look at recyclable materials like timber as 79% of people surveyed said they would prefer it if the product did not harm the environment.

Ideal Customers:
Gender: Boys and Girls
Age: Teenagers
Hobbies: Listening to music, playing on Xbox/Play Station
Other Products they have: Apple iPhone, Samsung Galaxy Note, Blackberry, BEATS Headphones
Shops at: Nike shop, Adidas Shop, Amazon
Apps they use: Snap Chat, WhatsApp, iTunes, Sound Hound
My customers care about the planet and would prefer me to use recyclable or renewable materials.



BEATS PILL
RRP: £169.99 Found on Amazon.co.uk

For all this design is rounded it is very **stable** as it has a flat bottom to stop it rolling around. It features a **USB port** at the back to connect your phone with so you can play music directly from it or use the Bluetooth feature. **Being able to connect your phone means you do not have to rely on wi-fi connection making this product more portable and usable in more places. You could also charge you phone off the battery as well.** My target audience would like this as it is a unisex colour it is sleek and looks modern, I think stands out from other designs of speaker/docking stations. **The bad points are that it is expensive (£169.99) and uses mains power to charge it (to make it portable) which use energy and therefore harmful to the environment. use.**

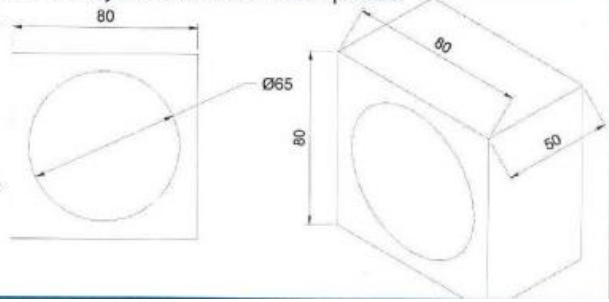
PHILIPS DS3400
RRP: £89.99 Found on Amazon.co.uk

I think my target audience would also like this docking station as it looks **high quality** made from aluminium and ABS plastic material which is scratch proof and **long lasting**, therefore they won't have to buy a new one anytime soon which could be expensive at £89.99 each. It is a **unisex colour** with a sleek design is very **modern with its curvaceous design. The negatives are that it is only compatible with iPhones and therefore people with Samsungs or Blackberry's cannot use this. However iPhone are the most popular phone brand so I may concentrate on just designing a device for this type of phone as I think I could still sell a lot and make more profit. It has a flat bottom like the BEATs Pill to give it stability and not fall over easily. I think it looks less portable than the BEATs pill because there is no obvious place to pick it up from.**

Thoughts:
From looking at these two designs, the features I like are not having any wires on show so the product looks neat and tidy and makes it more portable. I like the unusual and different shapes that make the designs stand out from traditional 'box' type designs. The Philips one looks chunkier and less portable so I will need to consider if my product should charge your phone or not as it affects the overall size if I need to allow for somewhere to stand the phone securely.

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

I have completed a customer survey (results above) and have also taken apart an existing product to find out sizes for components like speakers and circuit boards. I have found out that the circuit board and battery pack is 55mm x 65mm and the speaker has a diameter of 65mm and depth of 25mm so my docking station must be between a minimum of w80mm x h80mm x d50mm to hold the most basic components. As long as my design fits these it will work, the smaller it is the more portable it is so I think it should be no more than h250mm x h250mm x d100mm to sit on someone's desk and not look too big.

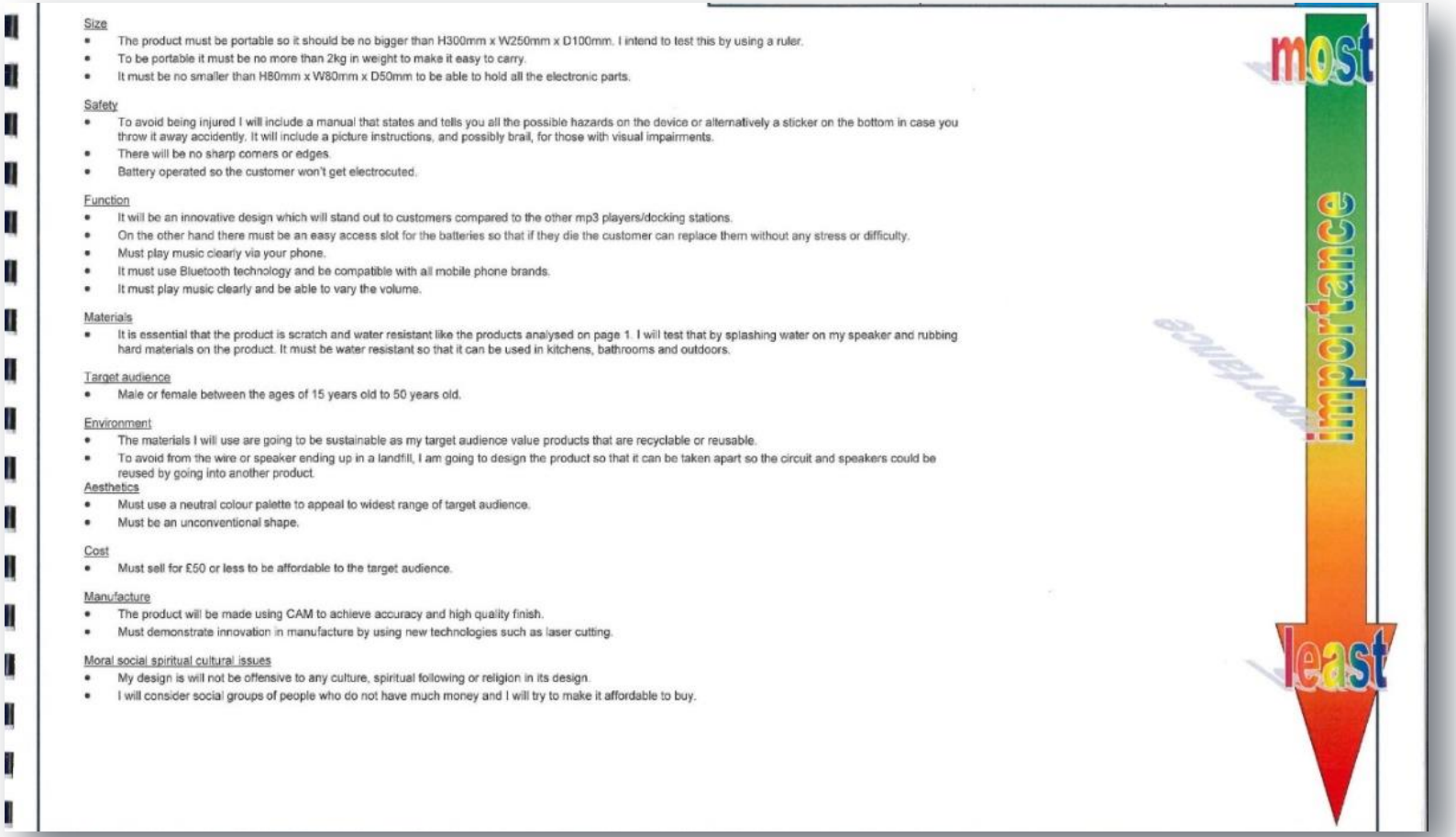


State your **Final Design Brief** here.

I have decided to design a portable docking station that charges your phone while playing music. It will be compatible with the iPhone 5c, 5s, 6 and 6+ as they all have the same charge pin and connector at the minute and are the number one selling mobile phone. The design will have unisex colours to appeal to boys and girls and will be innovative in some way through the use of new technologies to make it or as part of the features/functions. It must fit within the minimum and maximum sizes I have said (left).

The design will be sleek and modern and have an unusual shape to make it stand out from its competitors.

Developing a design brief and specification.



Size
- The product must be portable so it should be no bigger than H300mm x W250mm x D100mm. I intend to test this by using a ruler.
- To be portable it must be no more than 2kg in weight to make it easy to carry.
- It must be no smaller than H80mm x W80mm x D50mm to be able to hold all the electronic parts.

Safety
- To avoid being injured I will include a manual that states and tells you all the possible hazards on the device or alternatively a sticker on the bottom in case you throw it away accidently. It will include a picture instructions, and possibly brail, for those with visual impairments.
- There will be no sharp corners or edges.
- Battery operated so the customer won't get electrocuted.

Function
- It will be an innovative design which will stand out to customers compared to the other mp3 players/docking stations.
- On the other hand there must be an easy access slot for the batteries so that if they die the customer can replace them without any stress or difficulty.
- Must play music clearly via your phone.
- It must use Bluetooth technology and be compatible with all mobile phone brands.
- It must play music clearly and be able to vary the volume.

Materials
- It is essential that the product is scratch and water resistant like the products analysed on page 1. I will test that by splashing water on my speaker and rubbing hard materials on the product. It must be water resistant so that it can be used in kitchens, bathrooms and outdoors.

Target audience
- Male or female between the ages of 15 years old to 50 years old.

Environment
- The materials I will use are going to be sustainable as my target audience value products that are recyclable or reusable.
- To avoid from the wire or speaker ending up in a landfill, I am going to design the product so that it can be taken apart so the circuit and speakers could be reused by going into another product.

Aesthetics
- Must use a neutral colour palette to appeal to widest range of target audience.
- Must be an unconventional shape.

Cost
- Must sell for £50 or less to be affordable to the target audience.

Manufacture
- The product will be made using CAM to achieve accuracy and high quality finish.
- Must demonstrate innovation in manufacture by using new technologies such as laser cutting.

Moral social spiritual cultural issues
- My design is will not be offensive to any culture, spiritual following or religion in its design.
- I will consider social groups of people who do not have much money and I will try to make it affordable to buy.

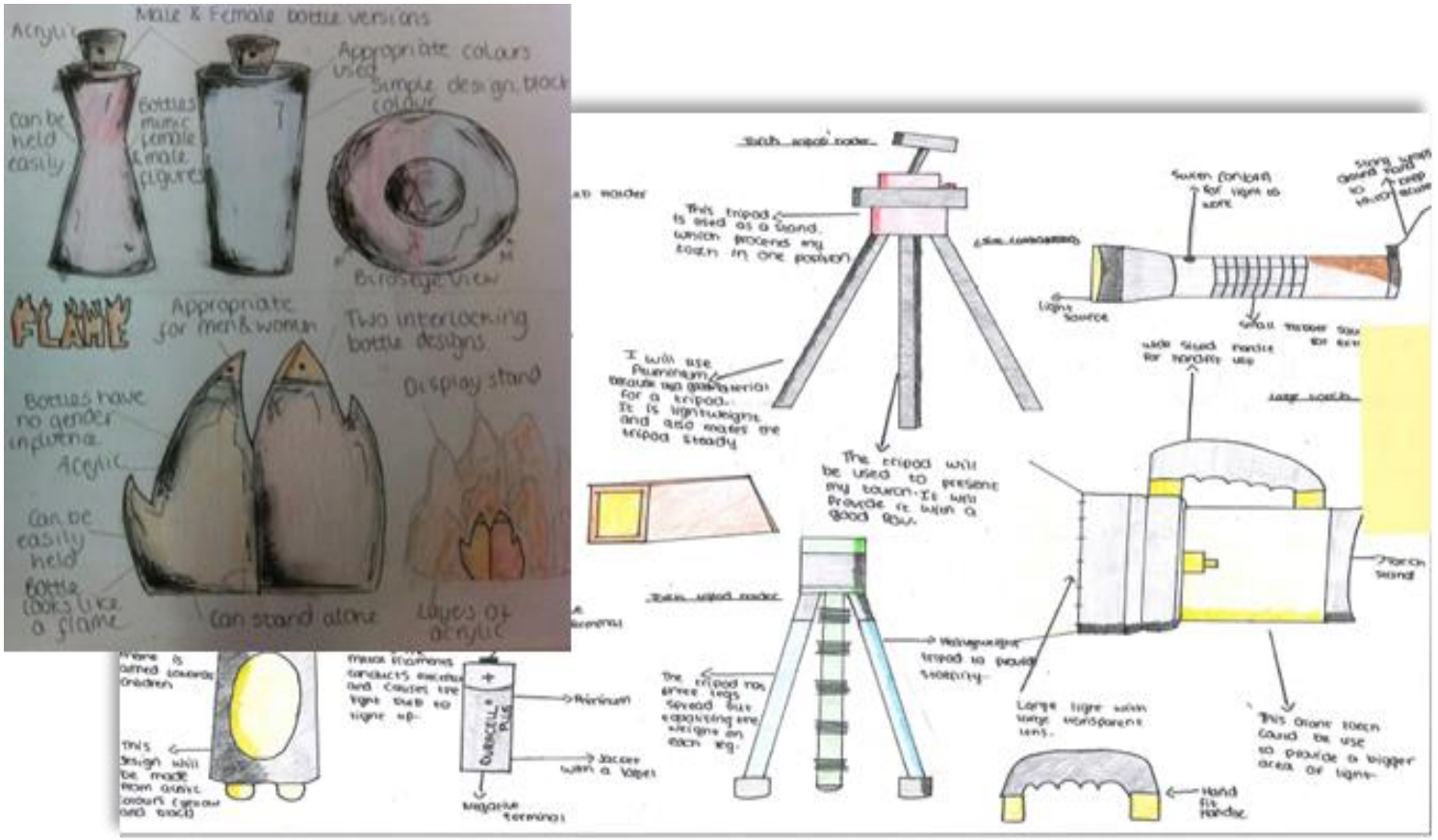
The specification must be used as a design tool, and any ideas, models, tests, initial prototypes must be evaluated against the specification criteria. There are important features used as headings with multiple statements within each heading to 'split' up the success criteria into manageable aspects. There is a hierarchy of importance.

I have decided to design a portable docking station that charges your phone while playing music. It will be compatible with the iPhone 5c, 5s, 6 and 6+ as they all have the same charge pin and connector at the minute and are the number one selling mobile phone. The design will have unisex colours to appeal to boys and girls and will be innovative in some way through the use of new technologies to make it or as part of the features/functions. It must fit within the minimum and maximum sizes I have said (left).

The design will be sleek and modern and have an unusual shape to make it stand out from its competitors.

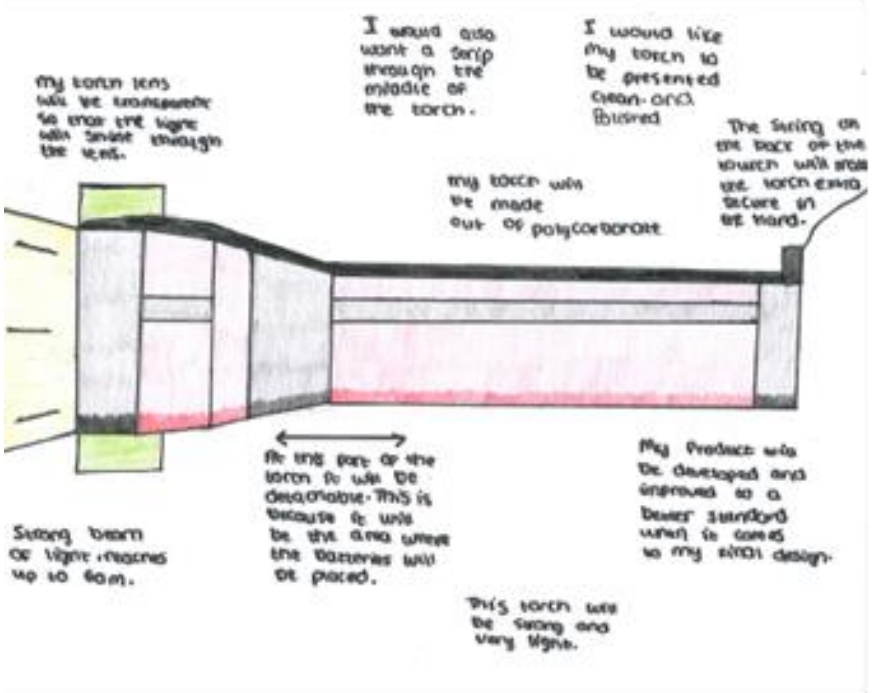
A clear final brief is presented as a result of the detailed, relevant and focussed research, following the consideration of a number of possible design tasks.

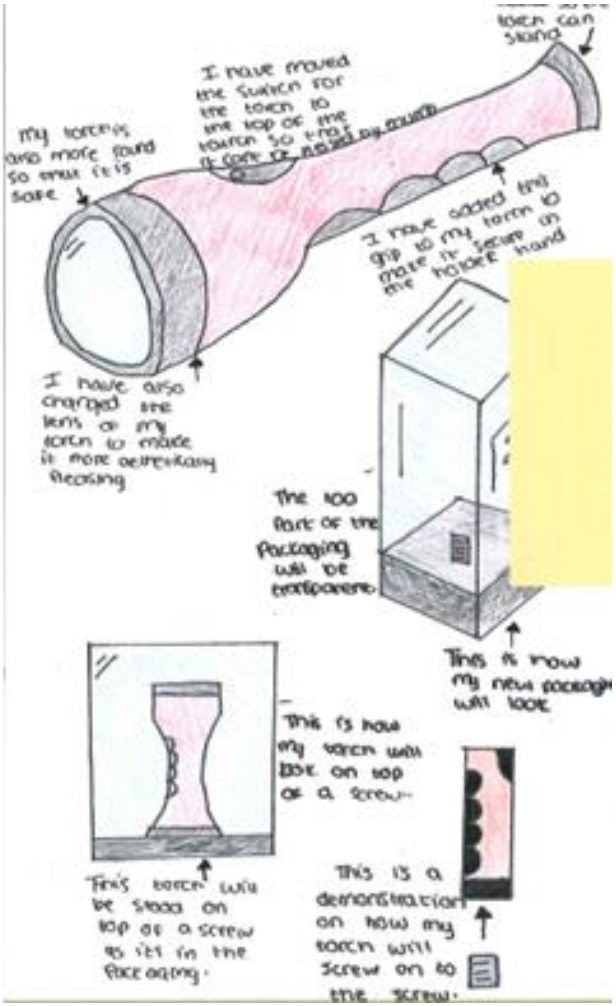
Generating and developing design ideas.



INFORMAL **Sketchpad**

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





- 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.

This was my original design for my docking station but I felt is was impractical and also risked health and safety as the **sharp spike** at the top would be to easy to impale your self on. Also it was **not that supportive of the phone by not having much of a gradient to place the phone on and nothing on the sides to stop the phone falling off the sides this made the phone susceptible to damage.**

Technology
If I add Bluetooth any phone could connect to the dock but I am basing the size of the dock area around the iPhone 6 as this is the largest of the iPhones and the top selling phone at the minute (most people have one). Puting all the connectors for different phones on will start to look messy and untidy and therefore not sleek my customers want.

My sketches from my design ideas show how I changed the shape to make it more **sturdy** and hold the iPhone better by adding sides and making the base wider. **The sides could easily be made from laser cut acrylic**. Acrylic comes in lots of different colours in school so I will start to consider this in my design as it develops. The only negative is that there is no obvious handle to pick this up by but if I make it lightweight enough that will not matter.

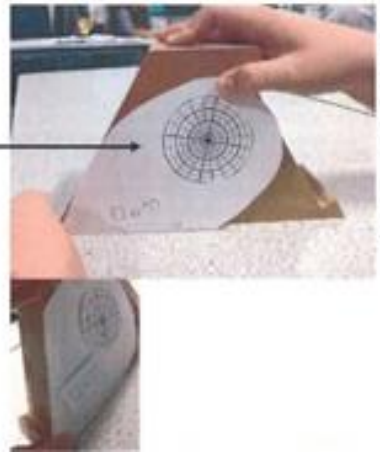
Speakers
I also designed some different speaker designs for the hole in the middle..

If the holes are too big they will let water in if it is used in a bathroom and damage the electrics, if they are too small no sound will come out!

I like this one because it looks like the dots are bursting out.

Speakers 2
I like this design as it is symmetrical and will work well with my round speaker hole.

I used the blue Styrofoam to make multiple designs for my docking station sides. Because I want the curve to hold the phone I tried lots of different cuts. To make sure I didn't prefer the straight edges like the 1st and 2nd sketch, I tried using just straight edges which is what the picture shows, but I prefer the curve as its more unique and will appeal to teenagers more I think.

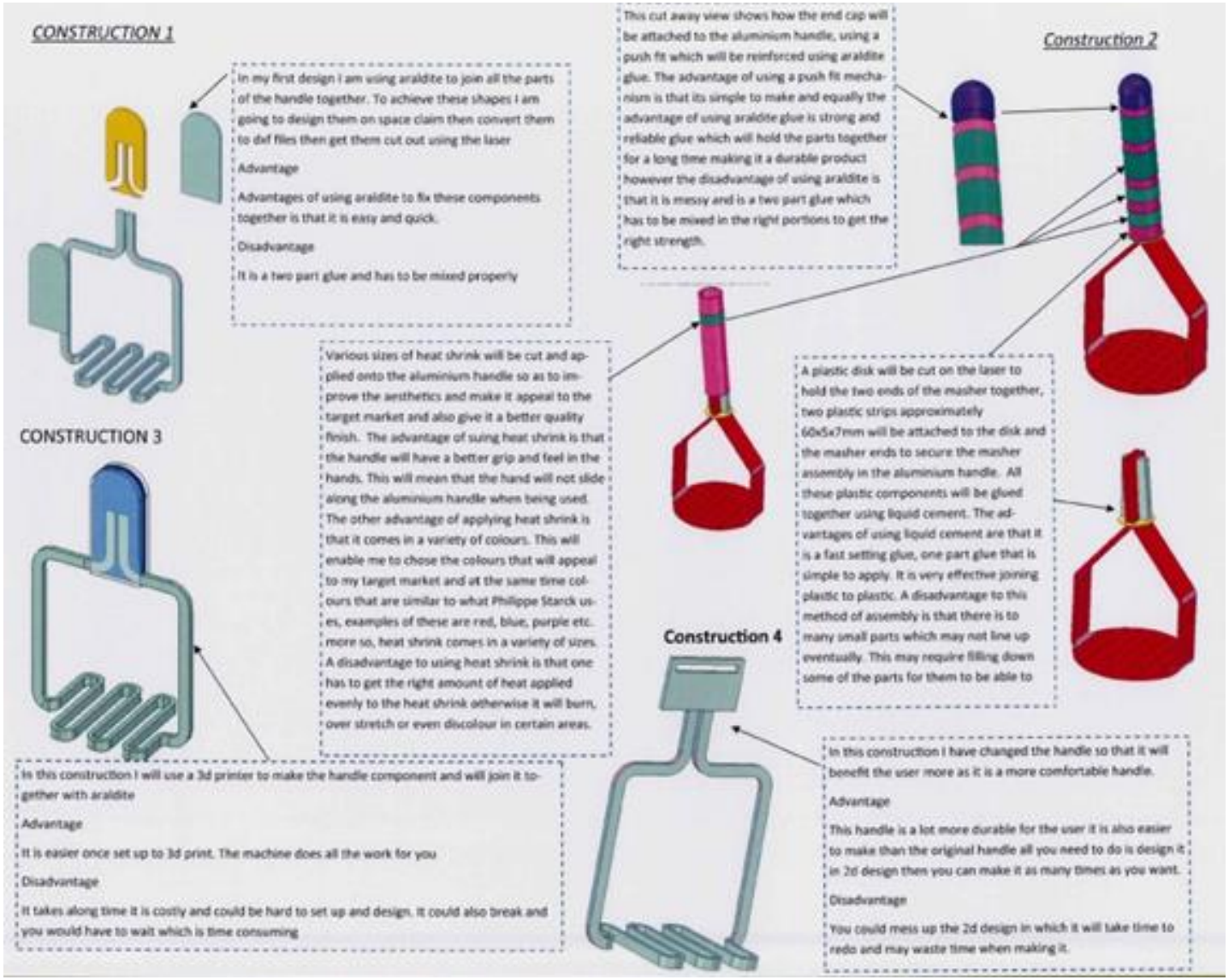


Here I am developing the shape of the curved side using a paper template. I checked it against paper cut outs of the speaker and controls to make sure it all fits.

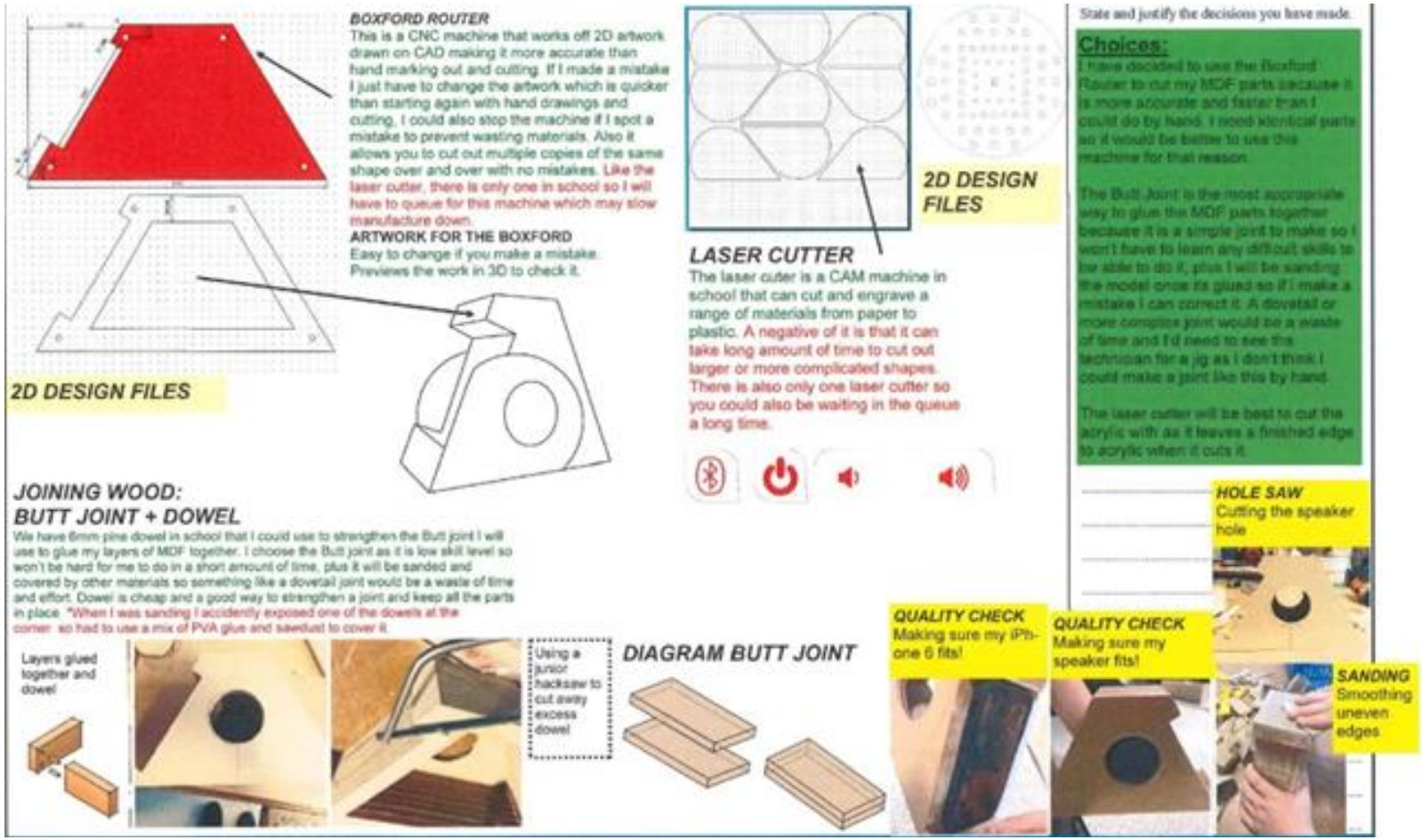
I constantly need to check that the iPhone 6+ fits the design as this is the biggest phone size.

Speakers 3
I also like this design because it looks like the wi-fi symbol which is a modern technology. But I think it also looks like a sign from science and might put people off and I think it looks like it will appeal more to boys because of this danger element, so I prefer option 1.

- 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.



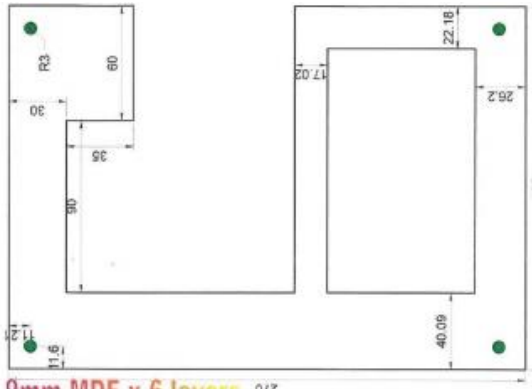
- Functional development.
- CAD used effectively.
- Analysis supports change.
- Physical testing.
- Full understanding demonstrated.
- Testing leads the way.

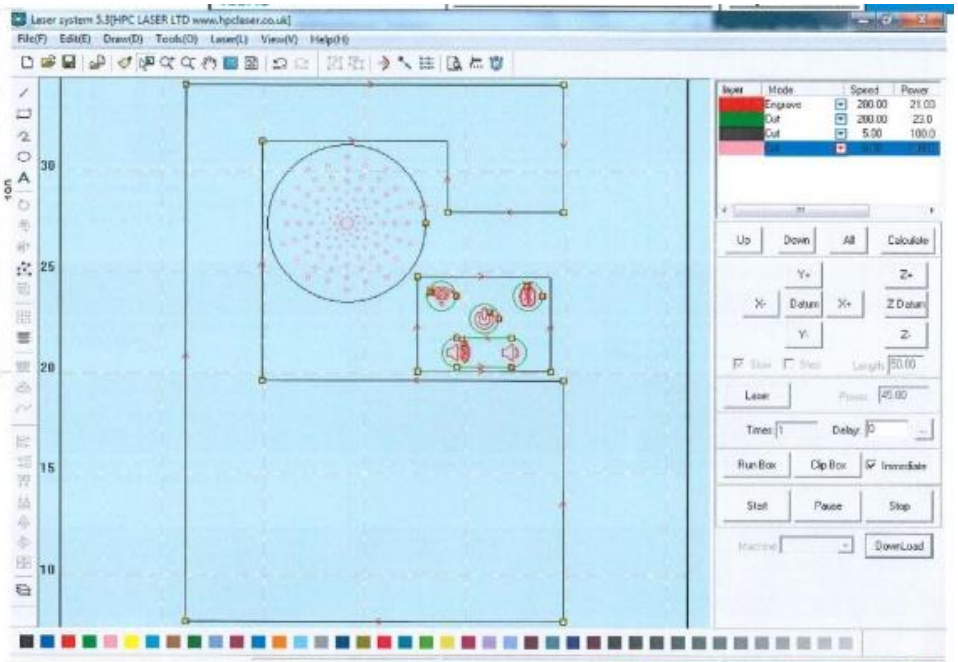


- Re-think based on testing and outcomes.
- Opinions of users?
- Introduce prototyping.
- Solid modelling.
- CAD/simulations
- Functional/performance testing.
- 3D printing.

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.





To cut 3mm Acrylic	
Speed	Power
6	100

To engrave 3mm Acrylic	
Speed	Power
100	21

Materials needed:
MDF
Acrylic
Glue
Sanding sealer
Spray paint
Grey Primer
6mm Dowel

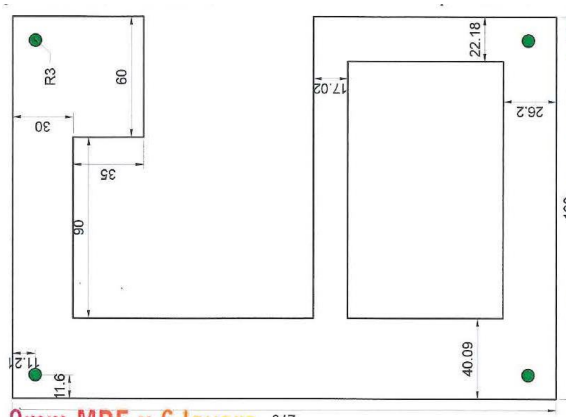
Equipment needed:	
Ruler	Pencil
Paint brush	Paper
Spray booth	Tri square
Mask	Coping saw
Sanding board	Tenon saw
Sand paper	Sander
G Cramp	Hammer
2D Design	Pillar Drill
Boxford	Hole saw
Laser cutter	

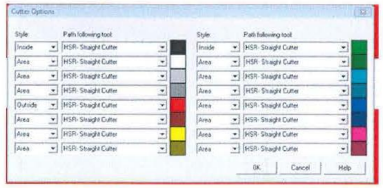
- Detailed proposal.
- All dimensions present.
- CAD CAM CNC data.
- Finishing techniques.
- Could a 3rd party/manufacturer produce the prototype?
- Sophisticated skills evident here.

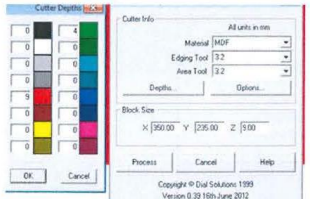
Manufacturing a prototype.

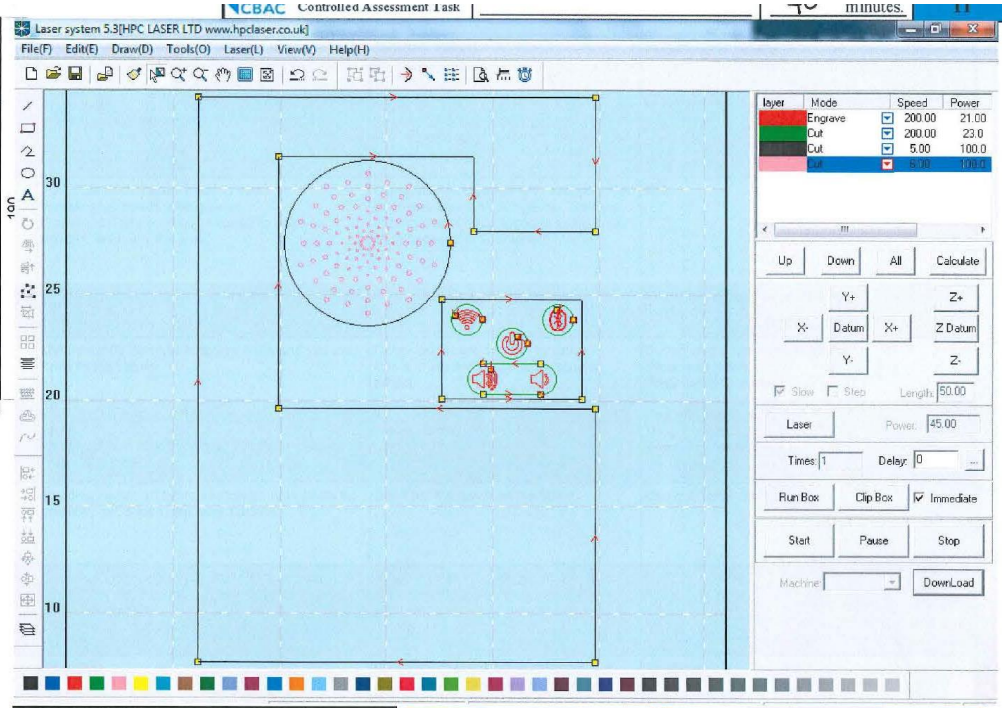
Task	Time	Materials needed	Tools needed	Potential problems	Quality check	Health and safety
Export artwork to the Boxford router to be cut out x9.	30mins	9m MDF	2D Design, Boxford	Cutting depths may not be set correctly. Might have to alter artwork.	Put all the layers together to make sure they are all the same size and line up. Use 3D simulation tool on Boxford Router to check artwork.	Must be supervised when using Boxford.
Glue MDF layers together using Butt Joint (see page 7).	20mins 24hrs drying time	6mm pine dowel and PVA glue. MDF layers	G Cramp	PVA glue could cause wood to swell. Excess glue needs wiping away. Dowel rod holes marked too close to edge on artwork, weakens the joint.	Clamp pieces together with enough force to ensure layers stick together. Remove excess glue. Clamp together using scrap MDF between G Cramp and model.	N/A
Cut excess dowel rods.	10mins	MDF model (glued)	Bench vice Coping saw	Dowel may snap in joint and require filling.	Sand back where dowel rods were.	Keep fingers back when sawing
Sanding	10 minutes	MDF model	Belt Sander Tri Square	Over sanding can ruin a square edge and you may have to start again.	Check edges are smooth by touch. Use a tri square to check for square edges.	Supervised when using machine. Wear dust mask. Wear safety goggles.
Cutting Speaker Holes	45mins	MDF model	Hole Saw Bench vice (secure work).	Marking out inaccurately can lead to speakers not fitting. Must hold hole saw upright so you don't create a lean in the hole.	Re-check measurements before cutting, once cut cannot be undone.	Use with supervision. Wear goggles. Wear dust mask. Secure work so it does not slip.
Apply sanding sealer x3 coats	5mins apply 24hrs to dry	Sanding sealer Sandpaper	Sanding sealer Sand paper Paint brush	Sanding sealer isn't very viscous so runs easily so you may get drips in the work surface.	Don't put too much on the brush.	Use in a well ventilated room.
Apply grey primer	10mins apply 24hrs to dry	MDF model Grey aerosol primer	Spray Booth Scrap piece of MDF Dust mask	Shake can well before use and check the expiry. If it is old the can may be clogged and lots might come out at once. Place model on scrap MDF so you can cover all corners.	When dry see what imperfections have appeared. If there are lots, sand lightly with sand paper and reapply primer.	Use spray booth. Wear dust mask. Use in well ventilated area.
Apply white spray paint	10mins apply 24hrs to dry	White aerosol paint	Spray Booth Scrap piece of MDF Dust mask	As above.	When dry check surface of model, is it smooth, even, are there any cracks? Reapply if necessary.	As above.
Export 2D Design file of acrylic parts to laser cutter and cut.	40mins	Acrylic	2D Design Laser Cutter Bed height gauge	Incorrect settings means you have to re-cut work, time wasting. May not have any of your chosen acrylic left.	Check bed height with gauge. Use test button to check work fits on acrylic. Check settings against manual.	Use with supervision . Make sure extraction is on.
Assembly	1hr	Acrylic Parts MDF Model Tensol Epoxy Resin	Spreader/Brush	Use correct glue for task: Tensol = acrylic to acrylic Epoxy Resin = acrylic to MDF Takes a long time to dry, parts may be knocked or slip while waiting.	Use a tri square/ruler to make sure buttons are glued parallel to edges and look right.	Both glues are toxic, use in a well ventilated area. Make sure it does not come into contact with skin.
Testing and Modifications	30mins	Finished concept model	Survey Ruler Scales	If feedback is negative you may have to start again or dissemble parts to change/modify them.	Use ruler and scales to check measurable specification points. Use survey to get feedback on aesthetics and suitability for brief.	N/A

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









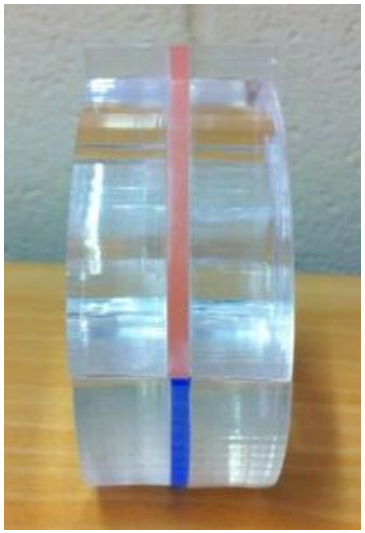
To cut 3mm Acrylic	
Speed	**Power**
6	100

To engrave 3mm Acrylic	
Speed	**Power**
100	21

Materials needed:
MDF
Acrylic
Glue
Sanding sealer
Spray paint
Grey Primer
6mm Dowel

Equipment needed:	
Pencil	Ruler
Paper	Paint brush
Tri square	Spray booth
Coping saw	Mask
Tenon saw	Sanding board
Sander	Sand paper
Hammer	G Cramp
Pillar Drill	2D Design
Hole saw	Boxford
	Laser cutter

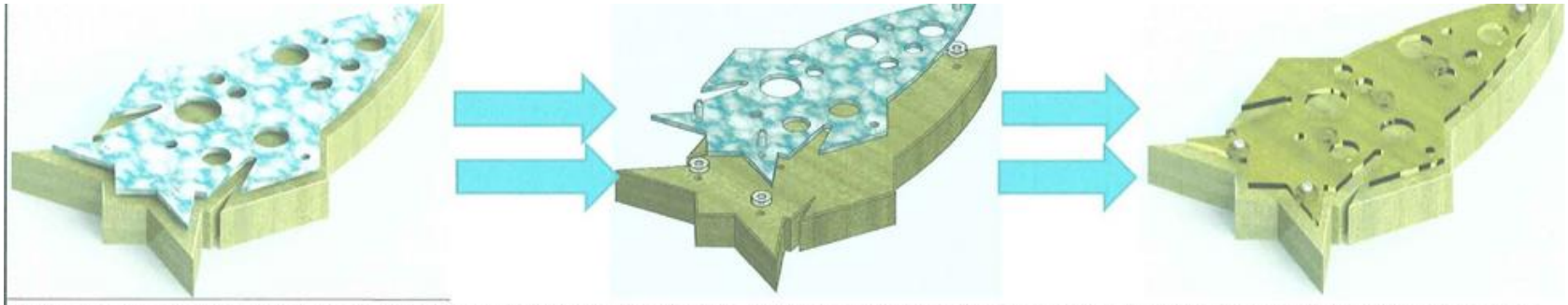
Here the learner indicates clearly sizes and machine setting for the making and cutting of the parts of the final product.



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.

Analysing and evaluating design decisions and prototypes.



This is my main design that I have made this rocket will have know improvements to it the only thing that I will change will be the colour of the acrylic form brown to bright orange and it will have three holes in the middle of the design with white led lights in the middle of it so when u turn the light on you will have a good quality finish to the design I discussed with a verity of people and I showed them all the changes that I could of made for the design like the shape of the base the different but they all the said the only thing wrong with this design is the colour of the acrylic this will change the design a lot I was going to have a stand on the back to make sure the rocket don't fall but it will be laid flat on the floor and it will light up the room with a bright orange colour and the battery will not overheat because this will be powered by a usb as you can see I have also added some bolts so if I decide to change the colour it will be a lot easy for me to change the acrylic if I need to and when I drilled the bolts through the acrylic it went right through the wood and now the acrylic piece will not move I have also made the colour see through with lots of holes in the middle of the rocket so when u turn the light on this will give out a bright orange glow in the room I have also added three washers to make sure the acrylic or the wood will not get damaged when using the light this protect the led from getting damaged also when making the design people said I should make my base a little bit thicker because now that its going to be laid flat all the time they recon I would have more protection on the design as you can see on the first one I had know protection on it so the lights would break easy and all the bottom of the design would have cracks on it the new design that I have made will be a lot safer and this will refer to my specification the wood and the acrylic that I used

this is the inside of my design this is how the led lights will be set up the grey parts will represent the led lights and if you can see there will be three holes in the middle of the design they will be powered by a usb cable this will not require charge and it can last up to 10 hours of light it will be low voltage so this will not harm the user of the product but it will have florescent acrylic it is also acrylic rod so u will be able to have two colours to the max to add to your light this will also have a hollow shell there will only be one wire attached to the led lights and that will be the usb cable I will solder the usb on to the light the advantage of having a hollow shell is the light will stay internal this is the function of the design is to give out light like it said in my specification when turned on the light will be shining through the holes to create bright orange light because when I put the acrylic piece on top of the design so we could have a brighter light for the owner to make the rocket have more light I will be shaping the rocket so that it can stand up straight and I have cut about ten holes in the acrylic piece so when it is dark an your turn on the light it will shine like a larva lamp but there will be all bright orange circles shining around the room and you will be able to have all different colours on it as you can see on the middle design u will be able to take it apart and if you want to put your own colour acrylic on it that why I made the design like it is I will shape it so them to corners on the bottom of the design and that how the rocket will stand up straight there will be know stand then as you can see them three holes is where the lights will be coming from to protect the light I will have three washer to protect the light from any dust or water and then there will be another three washers protecting the screws so they don't get loose and fall of the design at the bottom of the design is where the usb for powering the light will go first we will drill a hole in to the middle of the design then we will make like a line of drilling right through the middle of the wood to get from the bottom light to the top light and then I will solder the usb cable to all the wires then I will use filler to cover up all the big line down the middle of the design and then a little switch will be added to the bottom of the design when the filler is done drying you will not be able to see any marks on the design any more the usb light switch will not Come right through the bottom of the design because then the rocket will not stand up on its own I will be standing the rocket up straight because then it will give out more light to the user I will make sure the edges on the bottom are not sharp due to having hazards to the design the usb will go in the side of the design this will not do anything to the design they are the only changes that I will be making to the design the base will stay the same the acrylic will stay the same I will not be adding any components to it because it has three washers screws but you will be able to change the colour of the acrylic the pictures on the top is representing all the improvements the first to acrylic you could not see much light through them then that why I thought I would have a see through acrylic decorative piece I will be using low powered because then there will be know hazards to the lighting but when turned on this will give out a bright orange light I will still make sure the wood will have a high quality finish to I will be sanding it many time with wet and dry sand paper but I will not wet it then when it is smooth I will be using the belt sander this will make sure any marks on the design are gone and then I will be applying wax polish many time to make sure that the design will have the best finish possible you will need to apply the wax with a clean cloth and then if the design did not come out with the shine that you wanted it you could apply some varnish this will make your design smooth and a better quality to the design I will also be taking the felt of the back of the rocket now because it wont be on its side there will be know use to put the felt on I will do the same to the back as I do to the front I will make sure that non of the screws come through the back of the base and the usb cable will be going through the middle I don't think I would improve this design I think I have made it to my best quality

Evaluation

I have made a lamp , that has orange and pink flower petals and that has a wooden base .The specification point reflects to different colours such as the orange and pink because they stand out the asthetics is very important because if it looks nice it will be bought and people will spend money on it. The asthetics could be evaluated visually by when peoples opinions meet the best group.

The purpose of my product is to reflect the chosen era of my design and its designed to illuminate a room and set a mood while being free standing. The main thing is the function so how it works that is very important in my opinion because without a lamp working there's not really a point in having a lamp .The light reflects to the 1960s because that's the time period of my design. Its going to be used because it's a lamp its something that would help you see in the dark. This could be evaluated by seeing if the light actually works. The product is aimed at teenagers 14-16 years old girls living in a house a girly style that makes makes a good teenager., this could be evaluated by checking if it meets the target audience who it is aimed at. This design is used by a a usb and can be placed in a room such as a living room or bedroom for a teenager in the house. This could be evaluated by making sure everything is in its right position so when its needed its easily found and could be used.

The main measurements are the length , width and height of my product is 36-40cm and the length is 10cm and the width is 10-15, the size is very important because you need to know if it would fit where it would be placed so wont be to big or small. This could be evaluated by checking if it's the size you wanted or thought would come out to. The main parts are my flower petals and my base, my main materials are wood and plastic I used acrylic for my petals and I used pine for my base. The product is joined together by glue.
The safety features are no sharp edges no loose parts safety is very important because in case you get get cute and have deep bleeding and other injuries to so should keep away from sharp edges health is first. . Safety could be evaluated by making sure no sharp edges and its all nice and smooth nothing dangerous. I have checked the quality control by making a visual test and a touch text to see if its good. The finished product would cost would be around £10..The cost is important because your making the design and you need to get a reasonable amount back. This could be evaluated by seeing if the materials were good quality so from that the price would be selected.

My product wouldn't effect the environment ,the wood is from a sustainable source, its very important that you would use friendly wood because it comes under safety , also the right amount of energy should be used. This could be evaluated by seeing if it's a sustainable source. Possible conflicts energy skills products costs of the materials vs. size of the design complication or difficult design vs. skills and ability choice of material vs. what is available and what costs. The conflicts is important because I have chose a deign which could be made to a great standard ,with my marked and equipment that could be made in school this could be by the slandered and quality of the lamp.

My over all design meets my design brief but I have added a few changes.
,my lamp works its free standing and it lights. The shape and the size meet my initial suggestions because its all as planed. I think my final product matches the design on mage 10 and 11 I did not make any changes because changes didn't need to be made to my design.Im happy with the materials I chose to make my design out of I chose pine for my base and acrylic for my petals. To make my product I would pain my base in a darker colour so it stands out and is eye-catching instead of the natural look. And I would also add another layer of petals underneath the two but a bigger version in a darker colour so it gives a lift to my design. The colour scheme is how I accspected it to be I would improve it to make it better by using black and white petals. This would definitely alter the cost of my design because it would look more original and unique .My solution is safe to use the reason being is because I have no loose bits and I don't have any sharp edges there nice and smooth. The techniques I used to make my solution adequate i would n't use different range of manufacturing techniques. My design looks very nice unique and modern and lightens the atmosphere in the room because of the light colours used. My target audience group have came up with different suggestions in how to improve my design how it could look more original by changing the colours of the flower petals and varnishing my base and making sure there was no scratches on the wood.

Both evaluations discuss and reflect on the specification. There should be evidence of modifications which should have been done using sketches and detailed diagrams of the changes.

Further support and resources

There are a free range of digital resources available for centres which can be found on:

http://resources.eduqas.co.uk/Pages/ResourceByArgs.aspx?subId=8&lvlId=0

Examinations and assessment

Command words

To assist teachers when preparing learners for the examination they may like to consider the following information.

This table is intended to define the command words used in papers and explain how they are used and what is expected from the learner.

Command words	Marks	Comments
Give State Name	1 mark	These command words will feature in the early parts of questions. These are designed to ease the learner into the question. They need a simple statement or a short phrase. They do not need elaboration or explanation in the answer.
Describe Outline	2 marks	These command words will be commonly used on the paper and will feature in many questions. These questions ask the learner to describe something in detail. The answer will be in sentences and/or in a list. There is a need for detail in the answers with elaboration of the answer.
Explain Justify	2 or more marks	These command words will be commonly used on the paper and will feature in many questions. These questions are asking the learner to respond in detail to the question providing a full answer with an explanation. Full and detailed sentences will be required and will often contain the word "because". A short phrase will not be acceptable, the learner will need to make a valid point and justify it.
Evaluate Analyse	2 or more marks	These command words will feature towards the end of some questions. • *Evaluate could involve assessing or appraising a situation or product or material giving reasons to support their answers.* • *Analyse means examining and dissecting a situation or product giving thoughtful appropriate reasons to support the answer. It could include finding logical chains of reasoning.* These questions are designed to test, stretch and challenge the more able learner. The question requires the learner to make a well-balanced argument involving both advantages and disadvantages. Extended writing will be required.

Banded descriptors

This form of assessment will be associated with the questions that specifically require an extended answer. It will also be used in questions where the quality of written communication is to be assessed.

Incorrect/no answer.	**0**
Brief analysis with little detail of…….. Quality of Written Communication is limited, presenting material with limited coherence, many errors of grammar, punctuation and spelling.	**1 - 2**
More detailed analysis, with some explanation of required……... Quality of Written Communication is basic, presenting occasionally appropriate material with some coherence, some errors of grammar, punctuation and spelling.	**3 - 4**
Detailed analysis and explanation of the types of…….. Quality of Written Communication is good, presenting mainly appropriate material in a coherent manner, few errors of grammar, punctuation and spelling.	**5 - 7**
Clear and detailed analysis and explanation of the types of ……... Quality of Written Communication is excellent, presenting wholly appropriate material in a coherent and logical manner, hardly any errors of grammar, punctuation and spelling.	**8 - 10**

The following are general examples of questions with information about how they would be marked.

Examples

Question 1

Give two reasons why paper is sometimes laminated. [2]
What is required?

The question is a straightforward "give" question so short statements or phrases are needed and they do not need justification.

Weak answer

Reason 1: Makes the paper stronger. (1)
Reason 2: (0)

Here the learner gives one relevant answer. However they have not attempted to state a second reason. It is vital that all parts of questions are answered.

Good answer

Reason 1: Makes the paper stronger. (1)
Reason 2: Protects the paper. (1)

Here the learner gives two relevant answers.

Question 2

Eight card handles for a carrier bag can be CAM cut from one A3 sheet of card.
Describe one advantage to the manufacturer of doing this. [2]

What is required?

The question asks the learner to describe an advantage that the manufacturer would gain from cutting more than one handle from each sheet of card. Short statements or phrases will not be adequate. A clear description with justification using a sentence or sentences is needed.

Weak answer

It is cheaper because the handles can be made in batches which reduces costs. (1)

Here the learner gives a relevant answer but the learner does not give any detail of the advantage.

Good answer

It reduces the cost of making the handles, as there will be less waste material than cutting one handle from each piece of card. (2)

Here the learner gives a full and detailed answer in a well-constructed sentence.

Question 3

Explain why it is necessary to score printed card that is 500 microns thick before folding it to make a package [3]

What is required?

- *The question asks the learner to explain the reasons for having to score card before folding.*
- *Short statement will not be adequate.*
- *A clear explanation using a sentence or sentences is needed clearly stating a reason and then elaborating the answer with appropriate reasons.*

Weak answer

500 micron printed card will not fold easily so scoring the card makes the card able to be folded. (1)

Here the learner gives a relevant answer but does not give any detail to support their assertion.

Satisfactory answer

> It makes the card easy to fold because it makes a dent in the card where it is to be folded. (2)

Here the learner gives a relevant answer and does give some detail to support their assertion. The detailed reason is rather superficial, as it does not explain why the card is easier to fold.

Good answer

> It makes the card easy to fold because it makes a dent in the card where it is to be folded. This dent stretches some of the fibres and squashes others into a U shape so that they are ready to fold. (3)

Here the learner gives a full and detailed answer in well-constructed sentences. They show a detailed understanding of the reasons that allow the process to work.

Suggested frameworks for delivery

This GCSE in Design and Technology is designed to be taken by 16 year-old learners following a two-year programme of study comprised of 120 guided learning hours (GLH). This is reflected in the breadth, depth and challenge of the content that learners will be assessed against.

Note: Alessi is not part of the specification, it is purely a theme used in the design of the key fob.

<table>
<tr><th colspan="10">WJEC GCSE D&T New Specification – Year 10 Possible Course layout</th></tr>
<tr><td colspan="2">Sept Oct</td><td colspan="2">Nov</td><td colspan="2">Dec Jan</td><td>Feb</td><td colspan="3">Mar Apr May</td><td>June Jul</td></tr>
<tr><td colspan="2">New and Emerging Technology
Design Practice 1
Alessi CAD CAM KeyFob</td><td colspan="2">Work of Others
Presentation
Research, Product Analysis Evaluation</td><td colspan="2">Energy – Eco design
Design Practice 2
Solar powered novelty</td><td>Modern and SMART Materials
Product Study</td><td colspan="3">In-depth Knowledge and understanding
Engineering Design
Fashion & Textiles
Product Design</td><td rowspan="5">NEA – 3 Contexts Released by WJEC 1st June
Context analysis – multiple starting points
NEA tasks begins – 35 hours
Sketchbook analysis
Formal Portfolio</td></tr>
<tr><td colspan="4">Core knowledge & Understanding</td><td colspan="2"></td><td>Focussed Study</td><td colspan="3">In depth Knowledge and understanding from Specification</td></tr>
<tr><td colspan="2">• D&T and our world
• CAD CAM
• Emerging technology
• Electronics
• Materials / Polymers
• 3D printing PLA</td><td colspan="2">• Study on designers
• Professionals
• Companies
• In Wales
• Their style
• Products / USP
• Their impact</td><td colspan="2">• Sustainability
• Energy – solar -wind
• Greener design
• Ecological footprint
• Generating clean energy
• Life cycle analysis
• Cradle to cradle</td><td>• Thermo's
• Photo's
• SMA and nitinol
• Polymorph
• QTC pills
• Fibres
• Others</td><td colspan="3">• Further study in specialist area
• More depth in chosen topic
• Narrower / deeper coverage
• Additional topics
• Focussed tasks
• Disassembly / evaluation
• Specific coverage of topics
• Pushing iteration forwards</td></tr>
<tr><td colspan="4">Core Designing & Making Principles</td><td colspan="2"></td><td>Product Analysis</td><td colspan="3">In depth Designing & Making</td></tr>
<tr><td colspan="2">• D&T Practice
• User needs
• Brief / Specification
• Iterative design development
• Work of others
• Prototyping
• Decision making</td><td colspan="2">• Users
• Sketching
• Ideas / concepts
• Prototypes
• Evaluating
• User trials</td><td colspan="2">• Material areas may vary
• Group activities
• Different mechanical systems / outputs
• Iterative designing</td><td>The study of a wide range of products that use SMART, modern and technical materials</td><td colspan="3">• Mini tasks
• Specialist processes
• Specific practical skills
• Further study
• Examination practise
• Challenge / advanced content
• Preparation for NEA in Yr11</td></tr>
</table>

Eduqas GCSE D&T New Specification – Year 11 Possible Course layout									
Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Assessments
NEA – Context Released on June 1st Centres / candidates can start analysing contexts Informal Sketchbook work Formal Folio work				NEA – Prototyping Refinement of Proposal Informal Sketchbook work Formal Folio work		NEA – Prototyping Completion of Final Prototype Manufacture Final Prototype		NEA – Testing, Final Evaluation And modifications Final Prototype Formal Folio work	Deadline for NEA Marks – secure website – 2nd week May GCSE Moderation - 3rd / 4th week May GCSE D&T Examination Paper – end May / early June
Iterative Designing				Iterative Designing		Manufacturing Final Prototype		Evaluating Final Prototype	
• Research into the context • Understanding User requirements • Considering range of possible design briefs • Sketching ideas • Disassembly / analysis of other products • Modelling & testing • Inspiration sources • Further research • ITERATIVE CYCLE (NO STARTING OR ENDING POINT)				• Refining ideas • Construction issues • Functional requirements • Materials and Processes • Joining / combining • Finishing techniques • Innovations and creativity • USP		• Production • Quality control • High quality skills • Safe use of equipment and machinery • Accuracy in implementing final prototype • Final assembly • High quality finish		• Testing of Final Prototype in context • User Trials and analysis • Specification • Identification of modifications • Expert advice / opinions • Evaluation techniques	
Outcomes				Outcomes		Outcomes		Outcomes	
• Full understanding / appreciation • Range of possible briefs evident • Clear Final Brief and Specification • Varied research / investigation results • Early models, test pieces, experiment • Materials / manufacturing methods Risk Reward • Aesthetics / form / appearance				• Scale / models • CAD simulations • Card / foam / 3D • Evidence of testing • Evolving iterations • Jigs, formers, patterns, templates, moulds.		• Analysis of development • Iterations • Final Prototype construction • Final assembly • Finishing techniques applied		• Final evaluation in Formal Folio • Opinions of Users through testing Final Prototype • Prototype V Spec • Identify / make modifications	

Frequently asked questions

Question	Answer
Does this qualification count in performance tables?	Yes. This qualification counts within performance tables.
What is the split in the qualification for the exam and coursework units?	50% for each unit (Exam and Non-exam assessment).
How will the units be assessed?	Exam unit – Externally examined (2 hours, 100 marks). Non-exam assessment (NEA) – Internally marked and externally moderated (approx. 35 hours, 100 marks).
Will there be any resources available?	We are currently working on a website which will include useful resources, such as information on materials and processes, plus quizzes for learners. This will be ready for the start of the new specification.
Does WJEC provide a Scheme of Work for delivering the new specifications?	We will provide a basic guide to schemes of work but it will be up to centres to apply to their own timetable structure.
How is the exam structured?	A mix of short answer structured and extended writing questions. All questions are compulsory.
Weighting of questions?	There will be weighted questions. e.g. 1 mark, 2 mark, 4 mark, 6 marks questions etc.
Forms of questions?	The learner will be expected to write formal structured answers, use diagrams to support answers, complete diagrams etc.

How many assessment criteria is the NEA split into?	**5 assessment criteria:** **- Identifying and investigating design possibilities (10 marks)** **- Developing a design brief and specification (10 marks)** **- Generating and developing design ideas (30 marks)** **- Manufacturing a prototype (30 marks)** **- Analysing and evaluating design decisions and prototypes (20 marks)**
Will there be a prescribed workbook for learners to work on?	There is no prescribed workbook. Learners are to use a formal portfolio and an informal sketchbook. This will be to encourage an iterative approach to design and development of their work.
What should be included within the sketchbook and portfolio?	The iterative process is essential to NEA. It is anticipated that centres will be providing evidence on: Reviewing contextual challenges, reviewing primary/secondary research, suggested design briefs, final design brief, testing, initial design ideas, refinement and development of ideas, prototyping, evaluative decision making, high quality 2D/3D images of proposals, planning/timelines, modifications and evaluations, final prototype of finished product etc. Worth noting that when we moderate will expect to see everything that the learner has used in the development of the design and project.
Can the portfolio be purely digital?	Yes, the portfolio can be entirely digital. If this is appropriate for the work undertaken and enables the learner to fully and successfully address all aspects of the Assessment Objectives. Drawing can be included, for example, through the use of a stylus and graphics tablet or by simply scanning hand drawn sketches. There must though be evidence of a range of design strategies within the e-portfolio.
Will there be set briefs?	There will be three contextual challenges made available from 1st June in the year prior to the award. They will be designed so that learners can go down the route of their area of interest. Centres are encouraged to let the learner decide upon their own design brief.

How will the design and make unit be assessed?	**Internally marked and externally moderated. A WJEC EDUQAS moderator will visit the centre and look at the sample generated by the online mark input system. Verbal feedback will be provided (marks will not be discussed) as well as a written report made available on results day.**
What paper size should be used?	We are suggesting that A4 or A3 paper size should be used. Our recommendation is no more than 20 x A3 (approximately). Please note this is a recommendation, what we don't want to see is that centres are making learners do more and more sheets because volume creates more marks. This will not be the case, it is the quality of the work that is submitted that will decide upon the marks.
Are teachers able to give guidance?	Essential at the start of the NEA, to ensure that the learner does not set a problem that is unachievable in the time limit.
Can work be taken home?	Yes. The majority of the work should be done within the school to ensure that the assessor is able to authenticate the work as being the learner's own. We suggest that you only allow the learners to take home what they are working on and leave the rest of the work in a secure place within the school.
Are writing frames allowed?	No. As soon as you add in framed boxes onto pages it is classified as leading the learner, which is not allowed.

Can a specific making process be done by an outside company?	**Where a specific making process needs to be done outside the school or college, each learner must produce their final prototype or prototypes under *'immediate guidance or supervision'.* This means the prototype(s) have to be produced either:** **(i) with the simultaneous physical presence of the learner and the supervisor, or** **(ii) remotely by means of simultaneous electronic communication.** **In most cases supervision will be of the form described in (i), but in some circumstances, for example, if the learner is carrying out a specialist process away from the centre, (ii) may be more appropriate.**
Can practical work be done at home?	All practical work should be completed within the school or college under the guidance or supervision of the teacher. The final prototype should be completed within the school or college and not be allowed to be taken home at any point.