



**Stretford**  
Grammar School  
*Aspirat primo fortuna labori*

# GCSE Design Technology



# Why Design Technology?

- Design Technology offers a unique opportunity for you to identify and solve real problems by designing and making a range of products.
- Both academic and applied practical ability is required.
- 50% coursework – doesn't make it easy but helps spread out the pressure of exams.
- By studying this course, you will benefit from the many transferable skills which will be highly prized by any FE or workplaces, such as organisational skills, practical dexterity (for those of you thinking about dentistry or medicine) and the capacity for imaginative, innovative thinking, creativity and independence.
- This coursework element allows you to work on a project that is completely your own choice relating to your personal interests.
- The UK is struggling with an annual shortfall of 59,000 engineers – capacity for employment ESPECIALLY for girls within this field is huge.
- Excellent results at GCSE:
  - 2023: 68% grades 9-7
- Logical, creative and practical, it's the only opportunity that school students have to apply what they learn in maths and science – directly preparing them for a future in engineering.



# GCSE Design and Technology

Over the course you will develop technical knowledge and understanding of materials and processes, you will be encouraged to be innovative in the design and development of prototypes and you will be expected to work creatively and independently to solve problems.


## Component 1: Exam

A mix of short answer and extended writing questions assessing your knowledge and understanding.

- 50% of total marks
- 100 marks
- 2 hours


GCSE DESIGN AND TECHNOLOGY Sample Assessment Materials 9

(b) Explain why a composite material is suitable for the frame of the squash racquet shown. [2]



(c) Study the wearable electronic device shown below. It is a holder for a mobile phone in which the phone can be strapped to a person's arm.

**LED Flash Light**



Describe one innovative feature that makes this product appeal to potential customers. [2]

(b) You have been asked to make 15 hooks out of either aluminium or mild steel. Each hook is 210mm long and you need to allow 3mm for cutting / waste.

Use the information in the table below to calculate the difference in materials costs of producing 15 hooks in aluminium or mild steel, using the readily available lengths of bar shown in the table. [5]

Material	Length of bar	Cost of bar
Aluminium	1m	£5.10
Mild Steel	2m	£3.80

(c) Analyse why consumers might choose metal products made in third world countries when making purchasing decisions. [3]

GCSE DESIGN AND TECHNOLOGY Sample Assessment Materials 17

5. Carefully study the images below and select one product to refer to when answering the questions (a) to (c). Place a tick (✓) in the box of your selected product.

 100,000 are manufactured	 50 are manufactured	 1,000 are manufactured
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 Single prototype manufactured	 100 are manufactured	 1,000 are manufactured
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



(a) Products are made in different scales of production.

(i) State the most suitable scale of production for your chosen product. [1]

(ii) Evaluate the suitability of this scale of production for your chosen product. [3]

11.11 Choose one product or component in Figure 2 and describe two features that make it suitable for mass production. [2 x 2 marks]

Figure 2

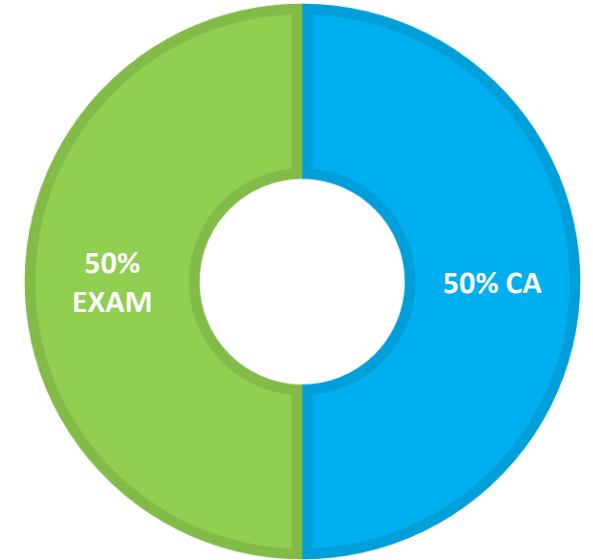
					
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Name of production component \_\_\_\_\_

Feature 1 \_\_\_\_\_

Feature 2 \_\_\_\_\_

Turn over >



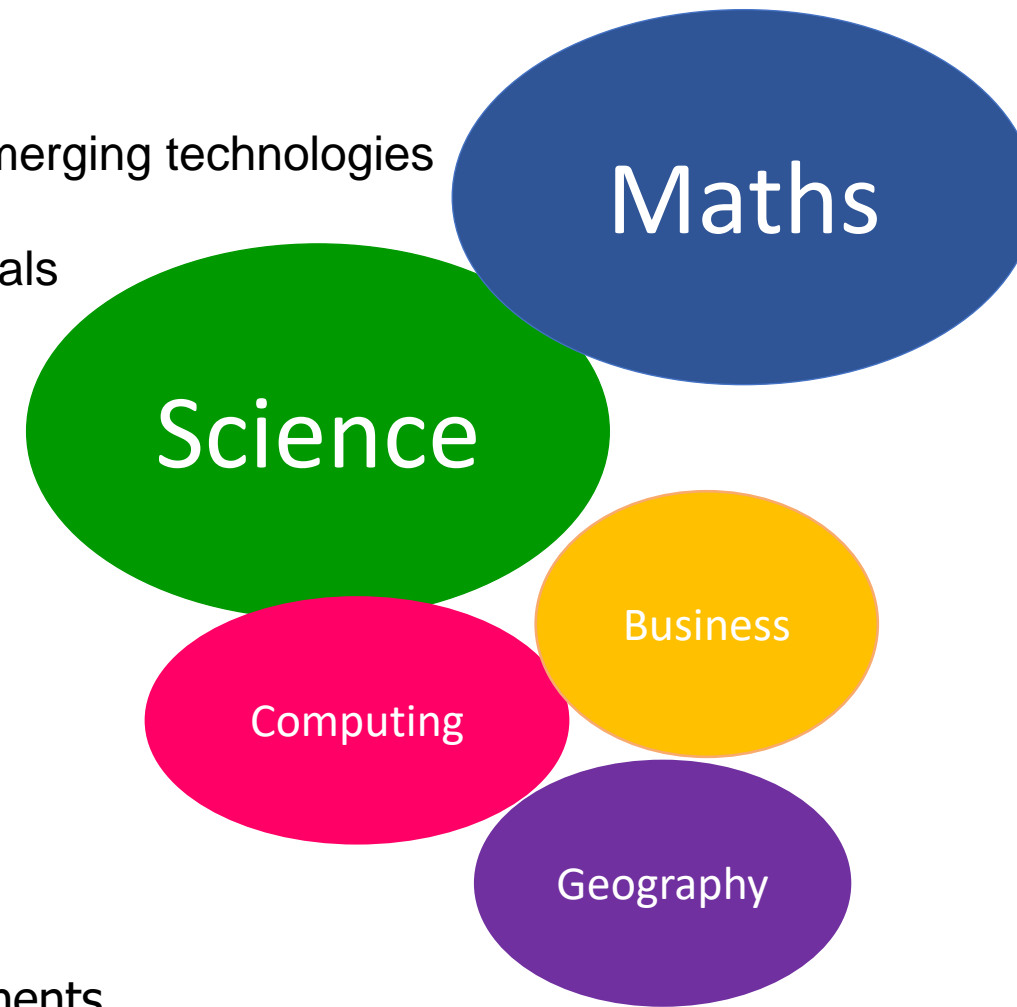
# Core Subject Content

## Technical Knowledge and Understanding

- Design and Technology in our world - new and emerging technologies
- Energy generation and storage
- Smart materials and developments in new materials
- Systems and programmable components
- Mechanical components devices
- Materials and their working properties.

## Designing and Making

- Understanding user needs
- Writing a design brief and specifications
- Developing and communicating design ideas
- Investigating the work of others
- Using design strategies
- Independent problem solving
- Selecting and working with materials and components
- Marking out and measuring
- Using specialist tools and equipment



## Links to science

Learners must be able to apply the following scientific knowledge and skills.

Ref	Scientific knowledge and skills requirements	Examples of D&T application	Examples of specification content
1	<i>Use scientific vocabulary, terminology and definitions</i>		
a	Quantities, units and symbols.	Appropriate use of scientific terms when developing a design brief and specifications.	NEA (assessment criteria <b>(b)</b> ) – developing a design brief and specification.
b	SI units (e.g. kg, g, mg; km, m, mm; kJ, J), prefixes and powers of ten for orders of magnitude (e.g. tera, giga, mega, kilo, centi, milli, micro and nano).	Calculation of quantities, measurement of materials and selection of components.	NEA (assessment criteria <b>(d)</b> ) – manufacturing a prototype.
c	Metals and non-metals and the differences between them, on the basis of their characteristic physical and chemical properties.	Classification of the types and properties of a range of materials.	technical principles – core knowledge and understanding – materials (sections 8 to 12).
2	<i>Life cycle assessment and recycling</i>		
a	The basic principles in carrying out a life-cycle assessment of a material or product.	Selection of materials and components based on ethical factors, taking into consideration the ecological and social footprint of materials.	technical principles – in-depth knowledge and understanding (section 2 in all material areas).

Lots of links to science in knowledge content – sits very well with Triple Science as an option.

Ref	Scientific knowledge and skills requirements	Examples of D&T application	Examples of specification content
3	<i>Using materials</i>		
a	The conditions which cause corrosion and the process of corrosion and oxidation.	Understanding of properties of materials and how they need to be protected from corrosion through surface treatments and finishes. Appreciate how oxidation can be used when dyeing materials.	technical principles – core knowledge and understanding – materials (section 10 ferrous and non-ferrous metals).
b	The composition of some important alloys in relation to their properties and uses.	Selecting appropriate materials.	technical principles – core knowledge and understanding – materials (section 10 ferrous and non-ferrous metals).
c	The physical properties of [materials], how the properties of materials are selected related to their uses.	Knowledge of properties of materials to be applied when designing and making.	NEA (assessment criteria <b>(d)</b> ) – manufacturing a prototype.
d	The main energy sources available for use on Earth (including fossil fuels, nuclear fuel, bio-fuel, wind, hydro-electricity, the tides and the Sun), the ways in which they are used and the distinction between renewable and non-renewable sources.	Understanding of how to choose appropriate energy sources.	technical principles – core knowledge and understanding – D&T and our world – (section 3 how energy is generated and stored).
e	The action of forces and how levers and gears transmit and transform the effects of forces.	Knowledge of the function of mechanical devices to produce different sorts of movement, changing the magnitude and direction of forces.	technical principles – core knowledge and understanding – mechanical components and devices (section 7 the functions of mechanical devices).

## Links to mathematics

Learners must be able to apply the following mathematical skills.

Ref	Mathematical skills requirements	Examples of D&T applications	Examples of specification content
1	<i>Arithmetic and numerical computation</i>		
a	Recognise and use expressions in decimal and standard form.	Calculation of quantities of materials, costs and sizes.	NEA (assessment criteria <b>(c)</b> ) – details of dimensions. 2.1 in-depth, <b>4</b> . Stock forms, types and sizes in order to calculate and determine the quantity of materials or components required.
b	Use ratios, fractions and percentages.	Scaling drawings, analysing responses to user questionnaires.	NEA (assessment criteria <b>(a)</b> ) – analysis of information. 2.1 core, <b>7</b> . The functions of mechanical devices, to produce different sorts of movement, changing the magnitude and direction of forces.
c	Calculate surface area and volume.	Determining quantities of materials.	NEA (assessment criteria <b>(d)</b> ) – manufacturing a prototype. 2.1 in-depth, <b>4</b> . Stock forms, types and sizes in order to calculate and determine the quantity of materials or components required.

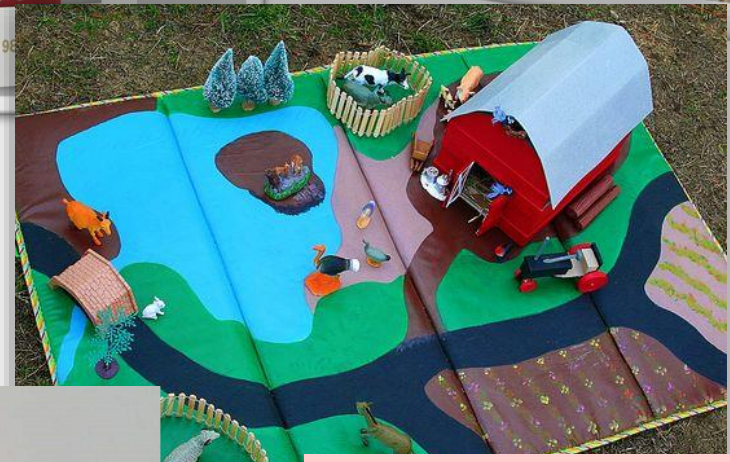
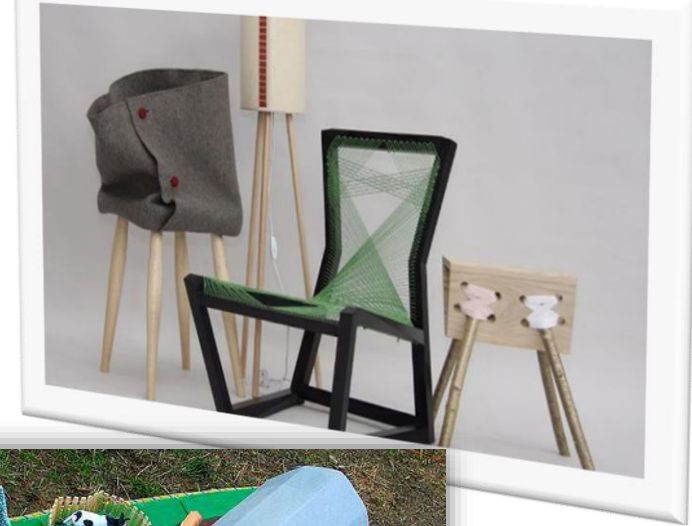
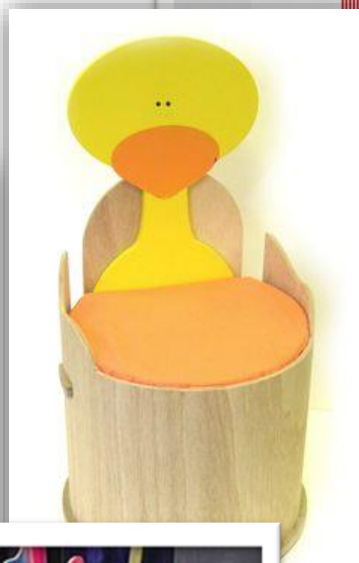
10% of the questions of the exam paper will be contextual Maths questions

Ref	Mathematical skills requirements	Examples of D&T applications	Examples of specification content
2	<i>Handling data</i>		
a	Presentation of data, diagrams, bar charts and histograms.	Construct and interpret frequency tables; present information on design decisions.	NEA (assessment criteria <b>(c)</b> ) – communicating ideas and proposals to a third party.
3	<i>Graphs</i>		
a	Plot, draw and interpret appropriate graphs.	Analysis and presentation of performance data and client survey responses.	NEA (assessment criteria <b>(a)</b> ) – analysis of information.
b	Translate information between graphical and numeric form.	Extracting information from technical specifications.	NEA (assessment criteria <b>(a)</b> ) – analysis of information.
4	<i>Geometry and trigonometry</i>		
a	Use angular measures in degrees.	Measurement and marking out, creating tessellated patterns.	NEA (assessment criteria <b>(d)</b> ) – manufacturing a prototype.
b	Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects.	Graphic presentation of design ideas and communicating intentions to others.	NEA (assessment criteria <b>(c)</b> ) – communicating ideas and proposals to a third party.
c	Calculate areas of triangles and rectangles, surface areas and volumes of cubes.	Determining the quantity of materials required.	NEA (assessment criteria <b>(d)</b> ) – manufacturing a prototype. 2.1 in-depth, <b>4</b> . Stock forms, types and sizes in order to calculate and determine the quantity of materials or components required.

# Component 2: Design and Make Project

A sustained design and make task, based on a contextual challenge set by the exam board.

- 50% of total marks
- 100 marks
- Approximately 35 hours



- Examples of Project Contexts:**
- Promoting a high profile event
  - The contemporary home
  - Children's learning and development
  - The world of travel and tourism
  - Sustainability and our future needs
  - Improving the daily life of elderly people
  - Outdoors pursuits and physical fitness

# Product Analysis

BookArc Pro

**FUNCTION:**

- THE FUNCTION OF THE BEDSIDE TABLE IS TO KEEP THE LAMP ON THE BEDSIDE TABLE FROM FALLING OFF THE BEDSIDE TABLE.
- THE BEDSIDE TABLE IS ALSO USED TO HOLD THE LAMP ON THE BEDSIDE TABLE.
- THE BEDSIDE TABLE IS ALSO USED TO HOLD THE LAMP ON THE BEDSIDE TABLE.

**PERFORMANCE:**

- IT IS A SIMPLE TABLE THAT IS EASY TO USE AND DOES NOT TAKE UP TOO MUCH SPACE.
- IT IS A SIMPLE TABLE THAT IS EASY TO USE AND DOES NOT TAKE UP TOO MUCH SPACE.
- IT IS A SIMPLE TABLE THAT IS EASY TO USE AND DOES NOT TAKE UP TOO MUCH SPACE.

**MARKET:**

- THE PRODUCT IS IN A MARKET THAT IS GROWING AND HAS A HIGH DEMAND.
- THE PRODUCT IS IN A MARKET THAT IS GROWING AND HAS A HIGH DEMAND.
- THE PRODUCT IS IN A MARKET THAT IS GROWING AND HAS A HIGH DEMAND.

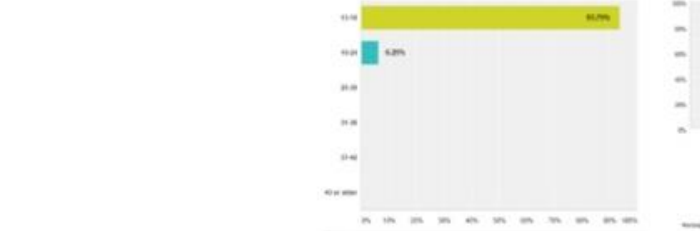
**SAFETY:**

- THE PRODUCT IS SAFE TO USE AND DOES NOT HAVE ANY DANGEROUS PARTS.
- THE PRODUCT IS SAFE TO USE AND DOES NOT HAVE ANY DANGEROUS PARTS.
- THE PRODUCT IS SAFE TO USE AND DOES NOT HAVE ANY DANGEROUS PARTS.



**HEALTH AND SAFETY:**

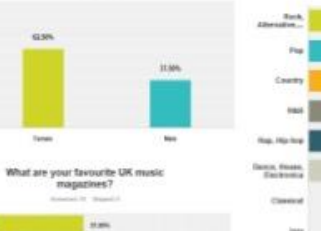
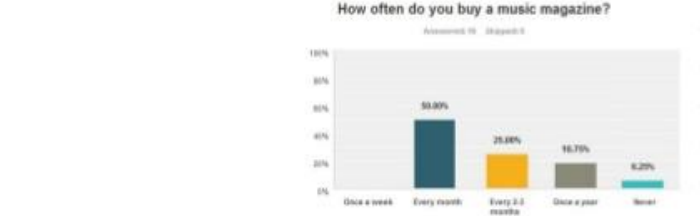
- THE PRODUCT IS SAFE TO USE AND DOES NOT HAVE ANY DANGEROUS PARTS.
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- THE PRODUCT IS SAFE TO USE AND DOES NOT HAVE ANY DANGEROUS PARTS.



**How often do you buy a music magazine?**

Answers from respondents:

- Once a week: 59.0%
- Every month: 25.0%
- Every 3-4 weeks: 16.7%
- Once a year: 0.0%
- Never: 0.0%



**What are your favourite UK music magazines?**

Answers from respondents:

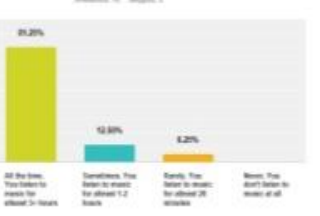
- Rolling Stone: 21.0%
- NME: 19.0%
- Q: 14.0%
- Uncut: 11.0%
- Other: 35.0%



**How often do you listen to music a day?**

Answers from respondents:

- All the time, I can't stop listening to music for at least 30 minutes: 82.0%
- Occasionally, I can listen to music for about 1-2 hours: 12.0%
- Rarely, I can listen to music for about 20 minutes: 6.0%
- Never, I can't listen to music at all: 0.0%



## Project Analysis

Through research I have realised, the advantages and disadvantages of a bedside table. By using my friend as a market potential I am going to make a product specific to him as he is a target market.

**Who:** Elderly people, Male/Female, Boys, Girls, Young trendy teenagers. After being test marketed, if successful, the product should be batch produced.

**Ergonomics:** Measuring another drawers cabinet allowed me to start looking at different dimensions for my bedside table. If I target a younger market I have to consider their ergonomics.

**Materials:** Stainless steel is very aesthetically pleasing as it is very well finished and very popular within the furniture industry. Oak seems to be a very popular hardwood in the area of furniture as it is a very resistant wood and nice to work with. MDF is a material that is very easy to work with, light weight and I should take in consideration the cost aspect of this project as if successful, the product should be mass produced.

**Environment:** Bedroom, Big room, Small room, Multifunctional, Compact.

**Where:** Produced in factory, Batch produced in factory, Small work shop as tester.

**What:** Personal storage, Magazine storage, A source of lighting: mood lighting/ Reading light, Multifunctional, Waste disposal, Laundry basket.

**Aesthetics:** The aesthetics will depend on my markets. Depending on who my product is aimed to I will take in consideration the subtleties. I must take in consideration work shop safety rules as some materials have dangerous properties when working with them.

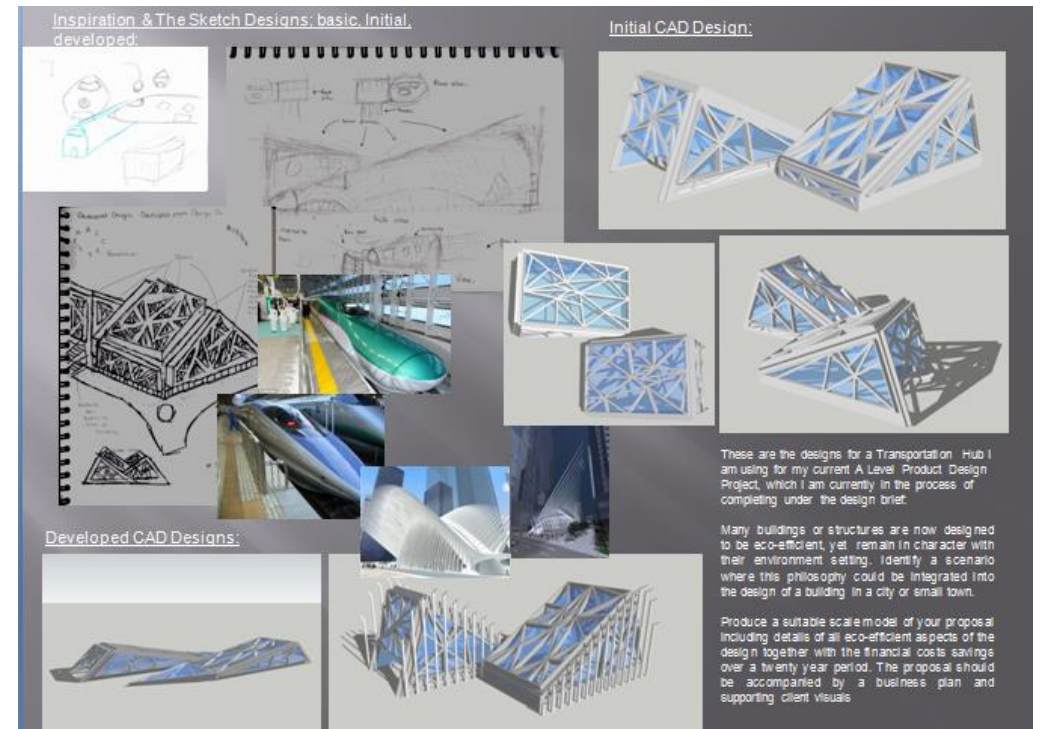
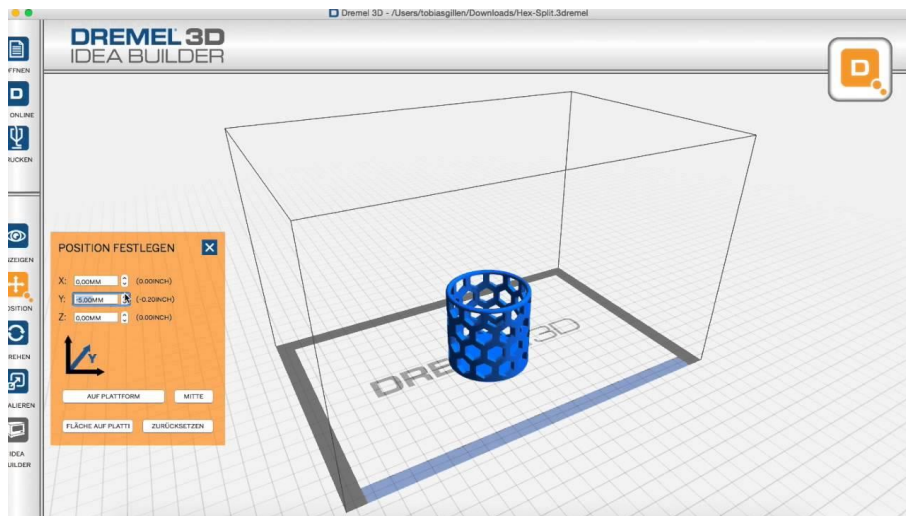
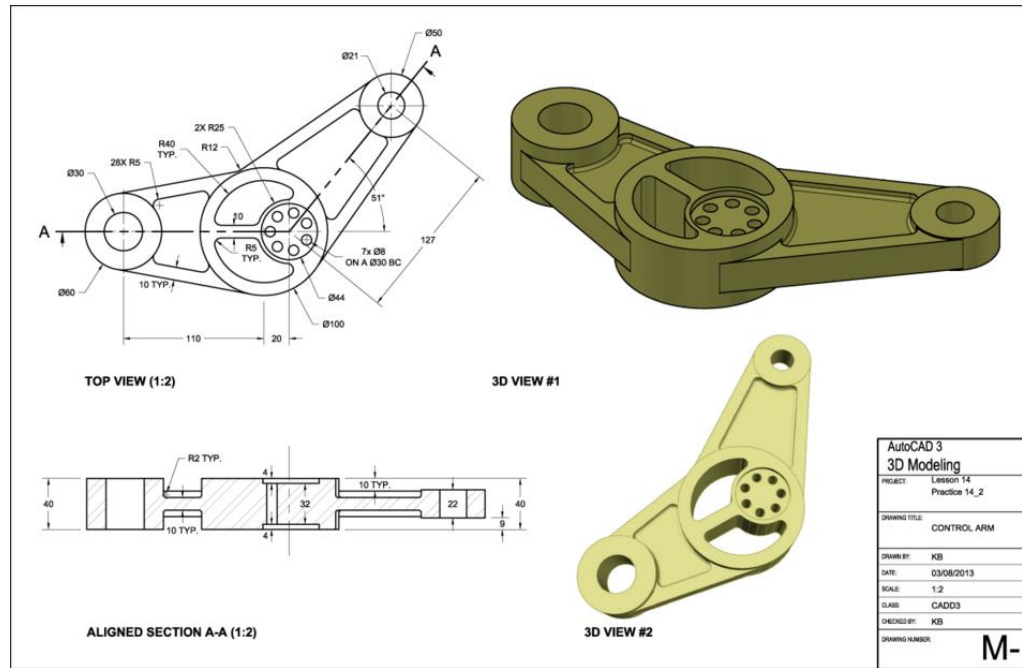
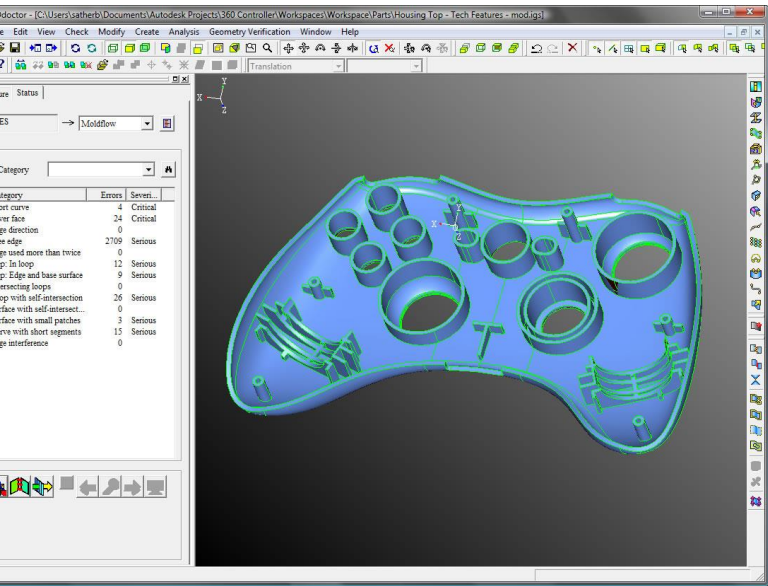
**Safety:** I must take in consideration work shop safety rules as some materials have dangerous properties when working with them.

**Why:** The spider diagram above and the analysis around gave me a better understanding of the different aspects of the project and the main issues I need to take in to consideration.

**Design and Technology**

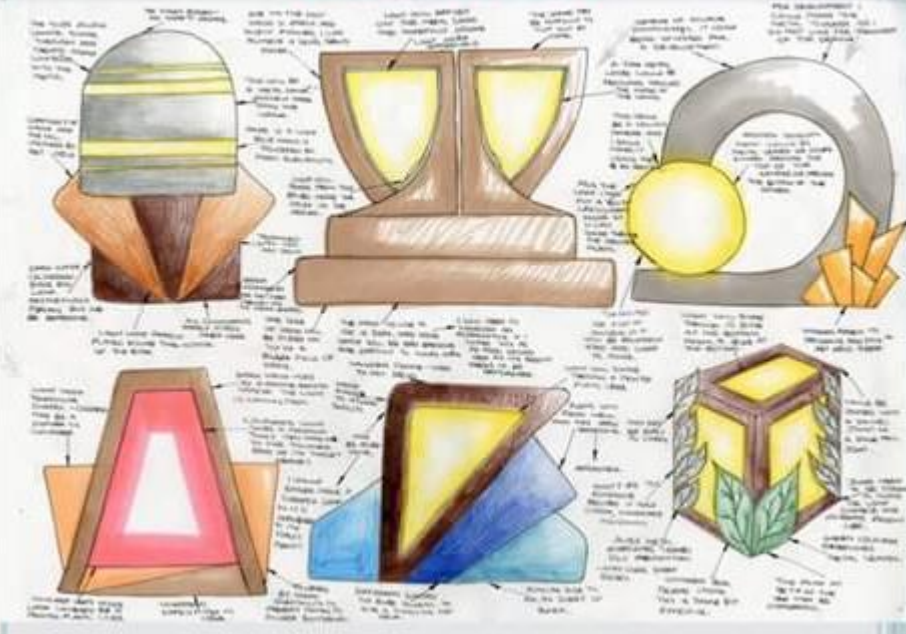
# Analysis and Evaluation Skills





# CAD Skills

## DESIGN IDEAS 1



## DESIGN IDEAS 2



## CONSTRUCTIONAL DEVELOPMENT 3



## PRODUCT PHOTOS









## CONCEPT 6 - CABBAGE TREE

This concept is based on the long, thin leaves of a cabbage tree, that curve and hang down. Cabbage trees are a native New Zealand native and are found in the bushlands around the playground.



(Cabbage trees found around the playground)

Concept model.



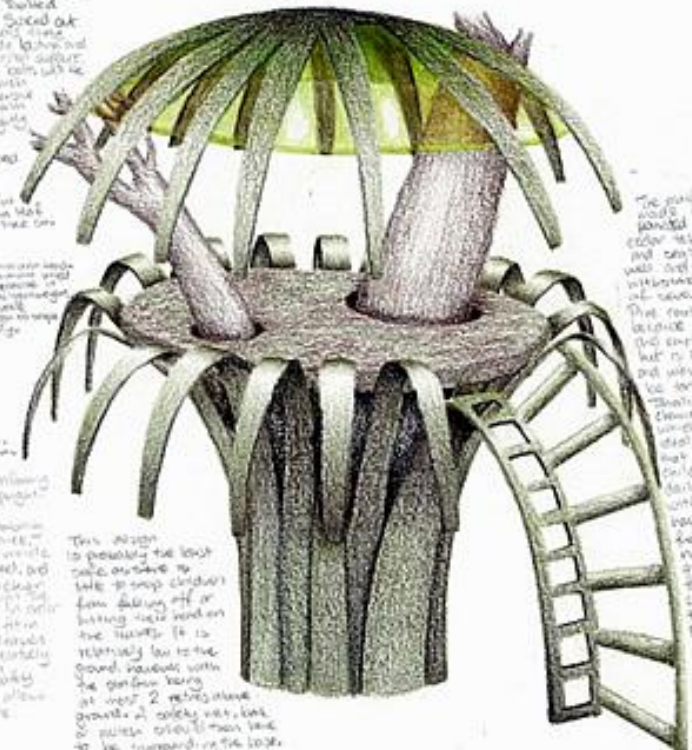
The platform is held up by several horizontal steel poles, bolted to the top. Spaced out evenly around the base, these poles support the platform, which will be attached to the end of the tree trunk.



For safety, the platform will be surrounded by a railing, and the railing will be made of wood, not metal, to be safe.



Platform will be made of wood, not metal, to be safe.



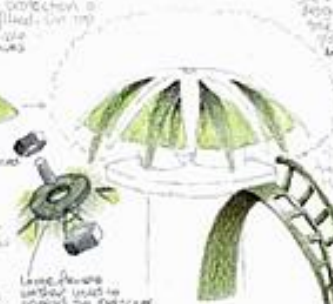
The platform could be made of wood, not metal, to be safe. The railing could be made of wood, not metal, to be safe. The railing will be made of wood, not metal, to be safe.

The railing could be made of wood, not metal, to be safe. The railing will be made of wood, not metal, to be safe.

In order to provide good rain protection, a semi-circular awning is fitted on top of the platform. The awning is made of wood, not metal, to be safe.



One long piece of plastic, the size of the leaves, would be used to make the awning. The plastic would be cut out of a sheet of plastic. It is difficult to recycle plastic sheets, but this is a temporary structure, so it could be made from a material that is not recycled, although there would be some loss of quality.



Long, thin leaves would be used to make the awning. The leaves would be cut out of a sheet of plastic. It is difficult to recycle plastic sheets, but this is a temporary structure, so it could be made from a material that is not recycled, although there would be some loss of quality.

The structure is made of wood, not metal, to be safe. The railing will be made of wood, not metal, to be safe.

This design is possibly the best one, as it is the most fun. It is also the most interesting, and it is the most interesting. It is the most interesting, and it is the most interesting.

## Careers/work this can lead to:

Product Designer  
Engineering  
Commercial Designer  
Teaching Design & Technology  
Marketing & Promotion  
Advertisement  
Product Buyer  
Architecture  
Building Technician  
Mechanical Engineering  
Measurement & Control  
Fashion Design  
Backstage Theatre Work  
Armed Services  
Technical & Engineering  
Careers in Radio & TV  
Carpenter & Joiner  
Aircraft Engineering  
Cabinet & Furniture Making  
Agricultural Engineering

## Related Further Education Courses:

### AS/A2 LEVEL(S):

Art and Design  
Product Design  
Graphic Design  
3D Design  
Engineering

### OTHER:

Architecture  
Advertising  
Media  
Agricultural Engineering  
Construction and the Built Environment  
Construction and Engineering  
Furniture Crafts  
Jewellery Design  
Fashion Design  
Carpentry and Joinery  
Motor vehicle engineering  
Interior Design

