A2
DESIGN AND TECHNOLOGY (PRODUCT DESIGN)
FOR TEACHING FROM 2017

2022 EXAMINATION

UNIT 3 OER MATERIAL (ANNOTATED)

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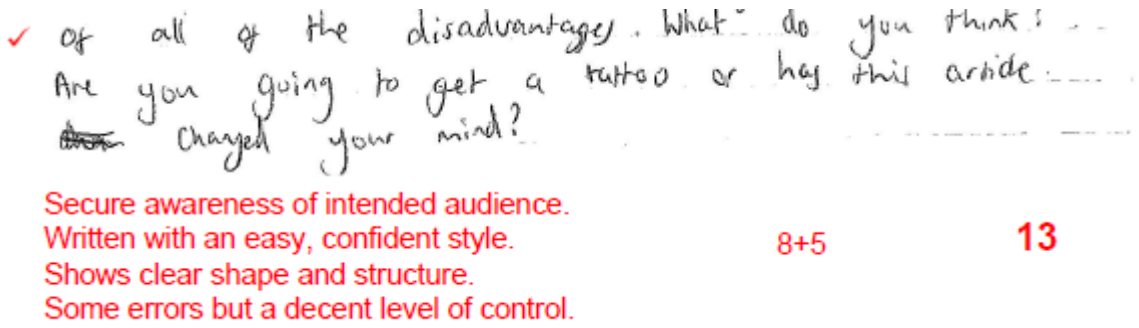

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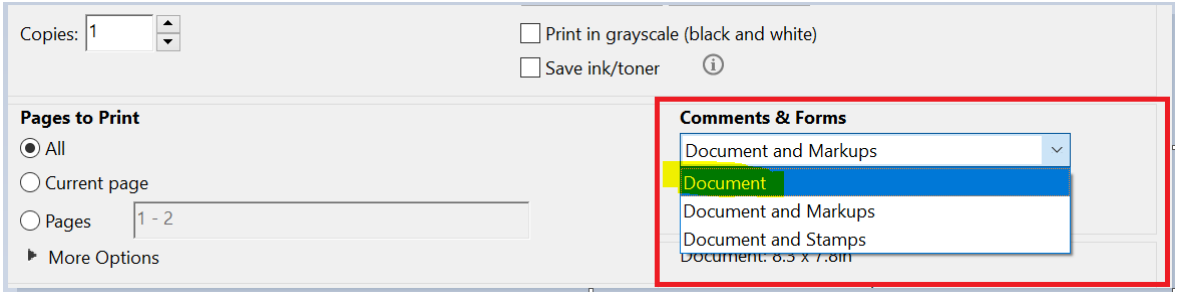

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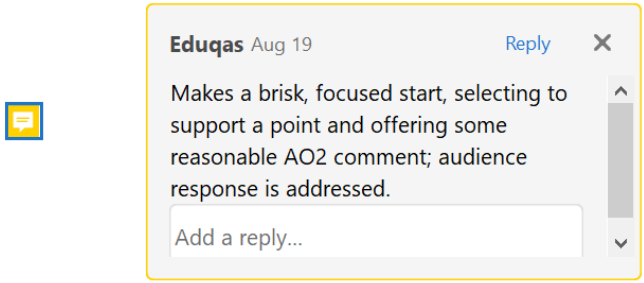

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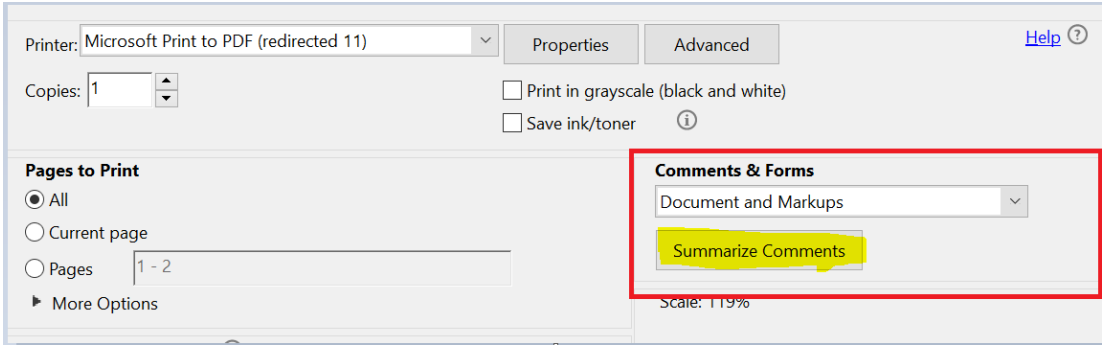

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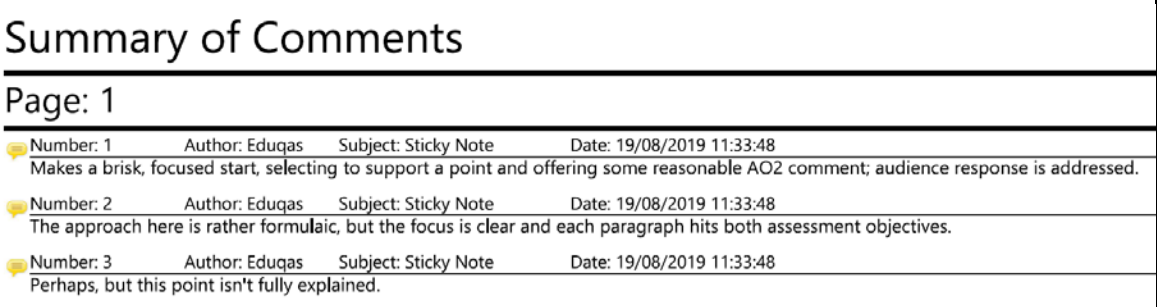


1. Designers use a range of methods for exploring possible solutions to solve problems.

(a) Describe how a designer could use morphological analysis as a method of exploring possible solutions when designing products. [4]

(b) Explain why it is important for the designer to consider the design specification during the development of a product. [4]

Question 1

Designers use a range of methods for exploring possible solutions to solving problems.		AO3	AO4	Mark
(a)	Describe how a designer could use morphological analysis as a method of exploring possible solutions when designing products.		✓	4

*Answers that indicate an understanding of morphological analysis should be awarded up to **4** marks based on:*

- A method of exploring ideas and possibilities using a table, grid or matrix of different attributes and values that can be chosen from.
- Some possible choice combinations may not be feasible. However, this could trigger more creativity in the development stages of a design.
- Dependant on the suitability of what is added to the morphological analysis matrix/table.
- Can be an interesting way to design by forcing you to think in a different way.

Guidance to markers

Incorrect/no answer **0**

Brief description, very little understanding, for example:
Morphological analysis is a table/grid of attributes and values that can be explored and chosen from when creating initial ideas. **1**

Some detail with some understanding, for example:
Morphological analysis is a table/matrix grid that can break down a product into its sub-concepts to allow for multiple options to be explored and incorporated into design ideas. The table would be populated with attributes and values that can be picked from in different combinations. **2**

A more detailed explanation with clear understanding, for example:
Morphological analysis is a table/matrix grid that can break down an idea into its sub-concepts to allow for multiple options to be explored and incorporated into designs. The possibilities are decided upon by using the matrix and choosing different combinations of the attributes, an example of this could be a selection of materials in one column, possible shapes in second column and possible construction methods in another column. When using this method, a larger number of possibilities can be developed, however not all possibilities could be possible. **3**

Fully detailed explanation with clear understanding, for example:
Morphological analysis is a table/matrix grid that can break down an idea into its sub-concepts to allow for multiple options to be explored and incorporated into designs. This method can be an interesting way to design by forcing you to think in a different way. The possibilities are found by using the matrix and choosing different combinations of the attributes and values. When using this method, a larger number of possibilities can be developed, however not all possibilities could be possible. A simple example of this is given in the table below where a design has been developed using the highlighted aspects of the table: **4**

Materials	***Stock***	***Construction***
Copper	***Round***	***Spot welding***
Aluminium	***Square***	***Pop rivets***
Stainless Steel	***Triangle***	***Tig welding***

(b)	Explain why it is important for the designer to consider the design specification during the development of a product.		✓	4

*Answers that indicate an understanding of the design specification should be awarded up to **4** marks based on:*

- Importance to gather views of users to inform the specification of a product.
- Aids design development by ensuring the ideas meet the requirements of the user and target market.
- Allows for ongoing testing and evaluations throughout the iterative design process, which enables constructive changes to be made to meet the needs and wants.
- Enables design decisions to be made in terms of functionality and aesthetics.
- Allows for a set of criteria to be used in a manufacturing specification.
- Using ACCESS FM to judge the effectiveness during the development stages.

Guidance to markers

Incorrect/no answer	***0***
Brief description, very little understanding, for example: When creating a specification, it is important to gather information on the needs and wants of the user to inform the design specification.	**1**
Some detail with some understanding, for example: When creating a specification, it is important to gather information on the needs and wants of the user to ensure their views and opinions are considered within the design proposal to meet their requirements. By creating a design specification, you are able to check against the criteria when designing possible ideas.	***2***
A more detailed explanation with clear understanding, for example: When creating a design specification, it is important to gather information on the needs and wants of the user to ensure their views and opinions are considered within the specification to meet their requirements. The information gathered can allow for the evaluation of positive and negative aspects of a design or prototype throughout the iterative design process and enable further user tests to be carried out. The specification can play a key role in understanding what is required from the product that is to be designed.	**3**
Fully detailed explanation with clear understanding, for example: When creating a design specification, it is important to gather information on the needs and wants of the user to ensure their views and opinions are considered within the design proposal to meet their requirements. The needs and wants of the user will inform the specification and it is vital that these are considered when designing to allow for all the requirements to be met. The information gathered can allow for the evaluation of positive and negative aspects of a design or prototype throughout the iterative design process and enable further user tests to be carried out on the function and aesthetical aspects of the product. This in turn will allow for the product to be more successful before a large manufacturing investment is made to put the product into production and introduced onto the market. The specification can also aid the requirements of manufacture through a manufacturing specification.	**4**

Total	**8**

1. Designers use a range of methods for exploring possible solutions to solve problems.

(a) Describe how a designer could use morphological analysis as a method of exploring possible solutions when designing products. [4]

Morphological analysis is when the designer tries to immitate the target market and explore solutions through their point of view. A succesful design can be made if the designer has ~~the~~ truly experienced the problem that they are trying to solve. An example of this is pregnancy suits, impared vision glasses or noise cancelling headphones. It may bring a new perspective to the design and development of a product.

(b) Explain why it is important for the designer to consider the design specification during the development of a product. [4]

~~The specification gives a set of criteria so that the designer can create a product as close to the brief as possible. The specification is usually written after detailed research, which is important to the designer as they can bring together all the information they have gathered and focus it onto~~

The specification is a set of criteria that is written after the research. When a product is being developed, it can be compared to the specification directly to ~~to~~ make sure the product is as ~~suited~~ suited to the brief as possible. It makes sure that the designer considers every aspect of design (ACCESSFM) in the development process so that ~~#~~ strengths are solidified and weaknesses eliminated.

1. Designers use a range of methods for exploring possible solutions to solve problems.

(a) Describe how a designer could use morphological analysis as a method of exploring possible solutions when designing products.

Morphological Analysis refers to splitting a main problem up into smaller problems and solving each before bringing them all back together into a new design. The method allows the designer to tackle something in smaller parts as it is less overwhelming. This can often be done with a 'aspect table' during a sketching or re-design task.

(b) Explain why it is important for the designer to consider the design specification during the development of a product. [4]

The design specification is a list of requirements for a product given in both qualitative and quantative data. These points will have been developed / pulled / made from the design brief and product research. It is important for the designer to consider the specification points because the design / product must meet all of the 'essential' points in order to successfully fulfill the brief and be successful in solving the problem, and if the product doesn't meet the point the designer will be able to develop it so that it does before the product moves on to the next stage

1. Designers use a range of methods for exploring possible solutions to solve problems.

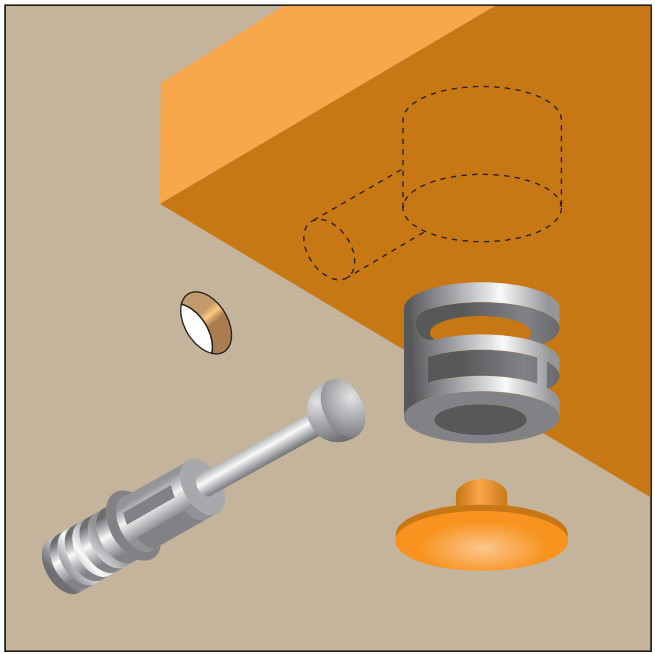
(a) Describe how a designer could use morphological analysis as a method of exploring possible solutions when designing products. [4]

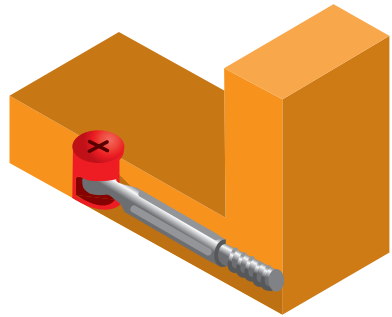
A designer could use morphological analysis to section out multiple idea sectors like client etchnographic, style, function, place / location. Morphological analysis allows designs to explore a wide range of ideas in more than one area. Trough using a table that forces you to look at lots of different areas + come up with designs

(b) Explain why it is important for the designer to consider the design specification during the development of a product. [4]

It is important to consider the design specification as it will ensure that the product is fit for perpose and meets the clients wants and needs. It is important to include measurable quantative data that can be tested as well as qualatative data and to rank spec points in order of "essential" as well as "desirable". The specification is a way to ensure designs don't miss certain important features. The specification will also give you testable factors for when you do testing and prototypes. Also acts as a checklist. you and your client can refer to.

2. Manufacturers use knock-down fittings in the production of flat packed products.





(a) Explain **one** factor that the manufacturer would need to consider when using temporary knock down fittings like the one shown above. [2]

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(b) Discuss the advantages and disadvantages of flat packed products to the consumer. [6]

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Question 2

Manufacturers use knock-down fittings in the production of flat packed products.		AO3	AO4	Mark
(a)	Explain one factor that the manufacturer would need to consider when using temporary knock down fittings like the one shown above.		✓	2

*Answers that indicate an understanding of knock-down fittings should be awarded up to **2** marks based on:*

- The quality control of the alignment of holes to fit the knock down fitting.
- Availability of bought in components and the advantage of the consistency.
- Skill level of the consumer to be able to fit the fittings correctly.
- Manufacturer would need to provide clear instructions to construct the product with the knock down fittings.
- Ease of use/fitting by the consumer.
- Suitability of materials.
- How it can affect the finish of the product.
- The location of the joints to ensure the ease of assembly.

Guidance to markers

Incorrect / no answer **0**

Brief description, a simple fact, for example:
The manufacturer will need to consider the alignment and correct fitting of the knock-down fittings. **1**

More detailed description with understanding, for example:
The manufacturer will need to consider the quality control of the product to ensure the alignment of the holes and correct fitting of the knock-down fittings when assembled by the consumer. **2**

Credit for a named knock down fitting – 1 mark only.

(b)	Discuss the advantages and disadvantages of flat packed products to the consumer.		✓	6

*Answers that indicate an understanding of advantages and disadvantages of flat packed products to the consumer should be awarded up to **6** marks based on:*

Advantages:

- Minimal skills required to construct the product.
- Reduced price of the product as manufacturer doesn't have to assemble the product.
- Easily transported as the product is packed into manageable pieces.
- Ability to disassemble to move if needed.
- Products can be customisable.
- Missing components can be collected.
- Range of tools provided by manufacturer to be able to assemble.

Disadvantages:

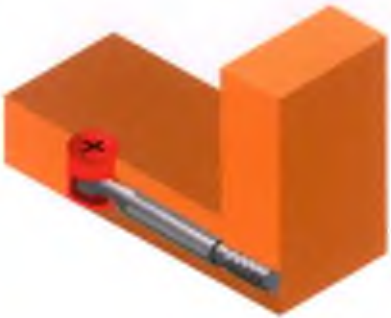
- Products have limited designs as the customer is assembling so the designs are more often simpler.
- Products are much more fragile than solid furniture, as they are usually made from cheaper materials.
- Dismantling the products a few times will make their durability drop significantly.
- They won't last as long as ready-to-use furniture.
- Parts can sometimes be missing, which makes assembly more complicated.
- Consumer struggling to assemble with ease.
- No tools available to assemble.

Guidance to markers

Incorrect/no answer	**0**
Brief description of advantages and disadvantages to flat packed products, for example: Products that are flat packed allow for easier transportation. However, these products are sometimes less quality that don't last as long as ready assembled products.	**1-2**
More detailed description of advantages and disadvantages to flat packed products for the consumer, for example: Products that are flat packed allow for easier transportation due to the product being packed into manageable pieces. Another advantage to the customer would be the reduced price of the product as manufacturer doesn't have to assemble the product and this saving in cost can be passed on. These products do have their disadvantages such as; they are sometimes less quality that don't last as long as ready assembled products due to them being made from manufactured materials rather than quality natural materials. Although the products are easily dismantled their durability can drop significantly if this is done several times.	**3-4**

	Fully detailed discussion and explanation of advantages and disadvantages to flat packed products for the consumer, for example: Products that are flat packed allow for easier transportation for the customer from the supplier and into the customers houses due to the product being packed into manageable pieces. Another advantage to the customer would be the reduced price of the product as manufacturer doesn't have to assemble the product and this saving in cost can be passed on. There is an increasing trend that these flat packed products are customisable, which appeals to the customer to purchase. Along with this customisable aspect the products often are modular and allow multiple design combinations. These products do have their disadvantages such as; they are sometimes less quality that don't last as long as ready assembled products due to them being made from manufactured materials rather than quality natural materials. Although the products are easily dismantled their durability can drop significantly if this is done several times due to the knock-down fittings being damaged. On a whole assembling these products can be simple but on occasions parts and fittings can sometimes be missing, which makes assembly more complicated and more time consuming.	**5-6**
		Total **8**

2. Manufacturers use knock-down fittings in the production of flat packed products.



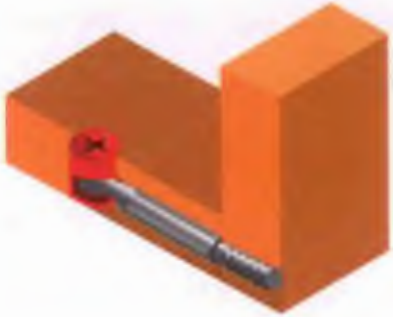
(a) Explain **one** factor that the manufacturer would need to consider when using temporary knock down fittings like the one shown above. [2]

ensure the screw part does not petrude out the back of the joining piece.

(b) Discuss the advantages and disadvantages of flat packed products to the consumer. [6]

It is cheaper to ship, it is easier for the consumer to transport the box, if one part breaks they can order a replacement for just that part, it is cheaper to buy. Disadvantages would be that they have to build it themselves, they could put it together wrong and the product wont work properly, parts could go missing.

2. Manufacturers use knock-down fittings in the production of flat packed products.



(a) Explain **one** factor that the manufacturer would need to consider when using temporary knock down fittings like the one shown above. [2]

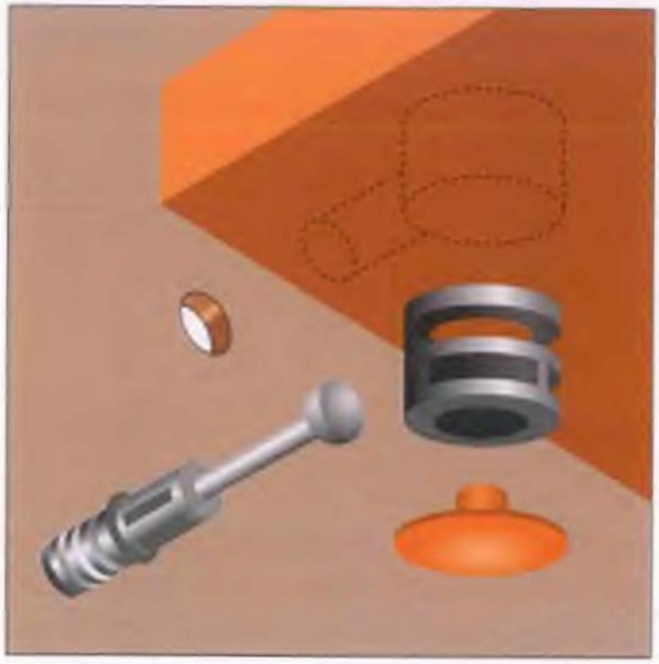
They will have to consider the materials at what places the fittings should be placed for the knock-down fittings to be firm when fitted and successful.

(b) Discuss the advantages and disadvantages of flat packed products to the consumer. [6]

Firstly, the product is more affordable and easy to transport and therefore they can take the product home and assemble it themselves, which saves money for them. Also they can disassemble and reassemble the product whenever they need or want.

However, the disadvantages are that the consumers may not be able to assemble the flat pack products as they may not have the tools or skills to do so. Additionally, it will be time consuming for the clients to assemble these products and they could make mistakes that may break or damage the product.

2. Manufacturers use knock-down fittings in the production of flat packed products.



(a) Explain **one** factor that the manufacturer would need to consider when using temporary knock down fittings like the one shown above. [2]

As the knock-down fittings are temporary the manufacturer would need to consider how the parts will be disposed of after the user is done with the product. To ensure good environmental practices/ consideration.

✓ transport
✓ Storage
✓ cost

X Not built to last
X Made with cheaper materials
X Parts could go missing during assembling

5

(b) Discuss the advantages and disadvantages of flat packed products to the consumer. [6]

Advantages of flat packed products to the consumer include easy transport as product can be packed flat if the consumer was to move house the product could easily be transported Also Storage when the product is no longer needed the product can be flat packed and put away until its needed again. For example a babies cot once the baby out grows the cot it can be put away and stored if the family wants more children in the future. Also cost flat pack products are usually cheaper.

Disadvantages to the consumer include them not being built to last as many come with tempory knock down fittings Also parts could go missing when assembling the product meaning the consumer has to re order a screw. Also they are made with cheap materials like manufactured board like MDF which often become worn quickly.

3. The aluminium chair shown below has been finished using the process of anodising.

(a) Explain the benefits of anodising the aluminium chair. [4]

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(b) Using annotated sketches, explain the process of anodising the aluminium chair. [8]

Question 3

The aluminium chair shown below has been finished using the process of anodising.		AO3	AO4	Mark
(a)	Explain the benefits of anodising the aluminium chair.		✓	4

Answers that indicate an understanding of the benefits of anodising the chair *should be awarded up to **4** marks based on:*

- Protection of the materials/products.
- To improve aesthetical appearance.
- To change the colour of a material to enhance its appearance.
- To increase the products value.
- No risk of fading.
- Corrosion resistance of the surface as it prevents further oxidisation.
- Helps to protect against scratching.
- Easier to clean.

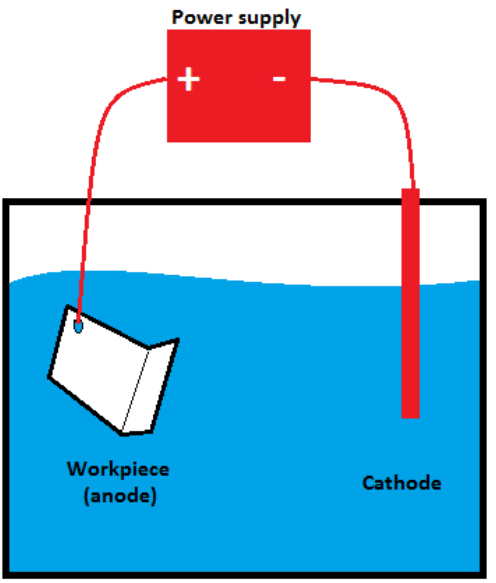
Guidance to markers

Incorrect / no answer	**0**
Brief description, very little understanding, for example: The chair has been anodised to protect it from the environment and allow the product to last longer.	**1**
Some detail with some understanding of the importance of anodising, for example: The chair has been anodised to protect it from the environment and allow the product to last longer. Another important reason to apply this finish is to improve the physical appearance of a product in terms of aesthetics.	**2**
A more detailed explanation with clear understanding of the importance of anodising, for example: The chair has been anodised to protect it from the environment and allow the product to last longer. Another important reason to apply this finish is to improve the physical appearance of a product in terms of aesthetics. This can be done by the manufacturer to help increase the value of a product.	**3**
Fully detailed explanation with clear understanding of the importance of anodising the chair, for example: The chair has been anodised to protect it from the environment and allow the product to last longer. Another important reason to apply this finish is to improve the physical appearance of a product in terms of aesthetics. This can be done by the manufacturer to help increase the value of a product. The anodising process allows for better corrosion resistance as it prevents further oxidisation.	**4**

(b)	Using annotated sketches explain this process of anodising the aluminium chair.		✓	8

Answers that indicate an understanding of anodising aluminium *should be awarded up to 8 marks based on:*

- Anodising aluminium is a method of increasing the corrosion resistance by forming a layer of oxide on its surface.
- The part that is being treated forms the anode electrode of an electrical circuit.
- Anodising increases resistance to corrosion and wear and provides better adhesion for paint primers and glues than bare metal does.
- The process of creating this protective oxide coating is achieved electrolytically.
- The aluminium part is first submerged in an electrolytic solution bath along with a cathode.
- When a current is passed through the acid solution hydrogen is released from the cathode and oxygen forms on the surface of an anode.
- This results in a metal oxide film growing on the surface of the part being treated.



Guidance to markers

Incorrect/no answer	**0**
A basic method explained with basic sketches, lacking detail to show understanding of the process.	**1-2**
A clear method explained with clear annotated sketches. Main details identified to show understanding of the process.	**3-4**
A detailed method explained with detailed annotated sketches. Most key details identified to show a clear understanding of the process.	**4-6**
A fully explained method with very detailed annotated sketches. All key details identified to show a full understanding of the process.	**6-8**

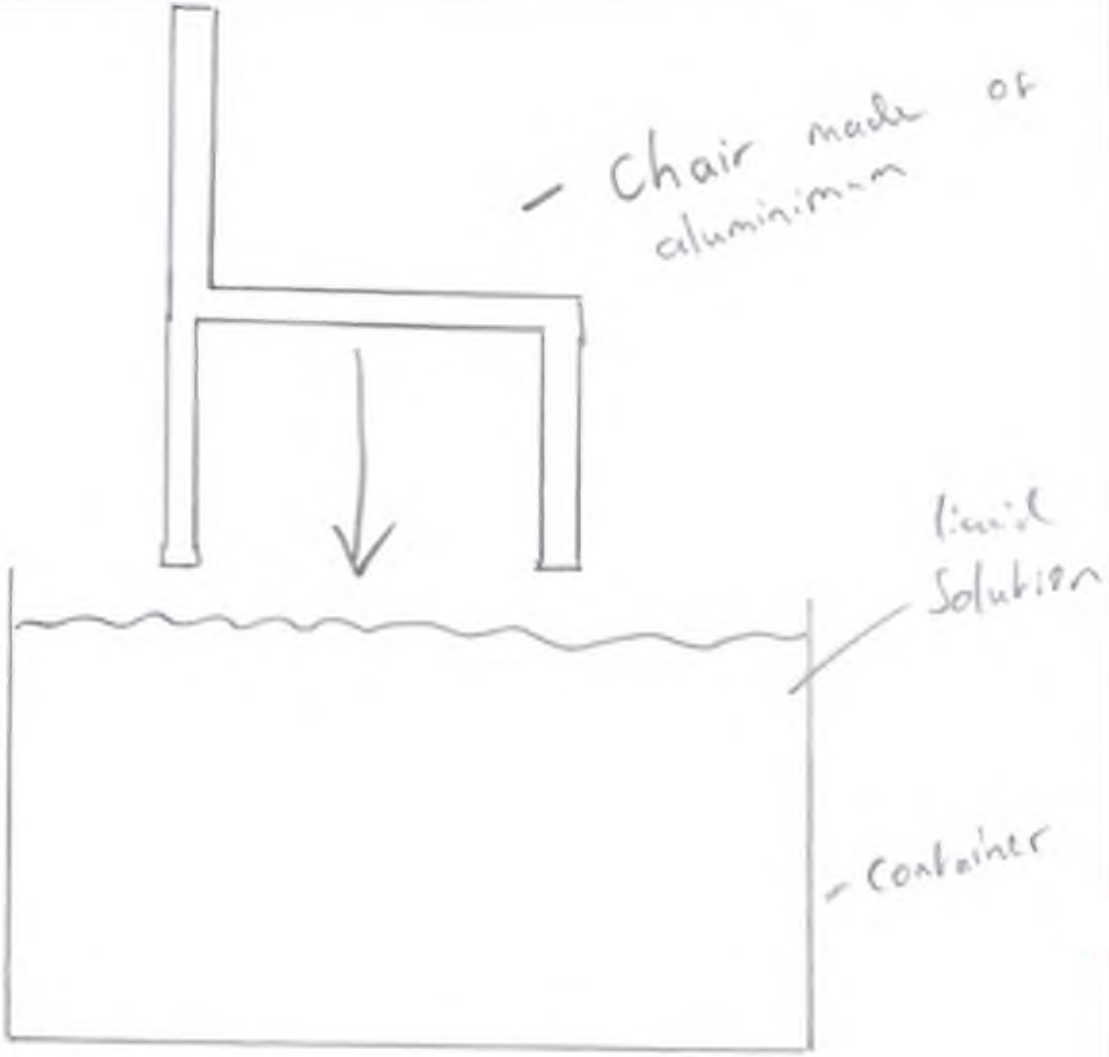
Total	**12**

3. The aluminium chair shown below has been finished using the process of anodising.

(a) Explain the benefits of anodising the aluminium chair. [4]

Anodising a ~~aluminium~~ aluminium chair protects it from oxidising as well improving the aesthetics of the chair by making it look smoother with a better finish. Because of this it improves the durability of the chair

(b) Using annotated sketches, explain the process of anodising the aluminium chair. [8]



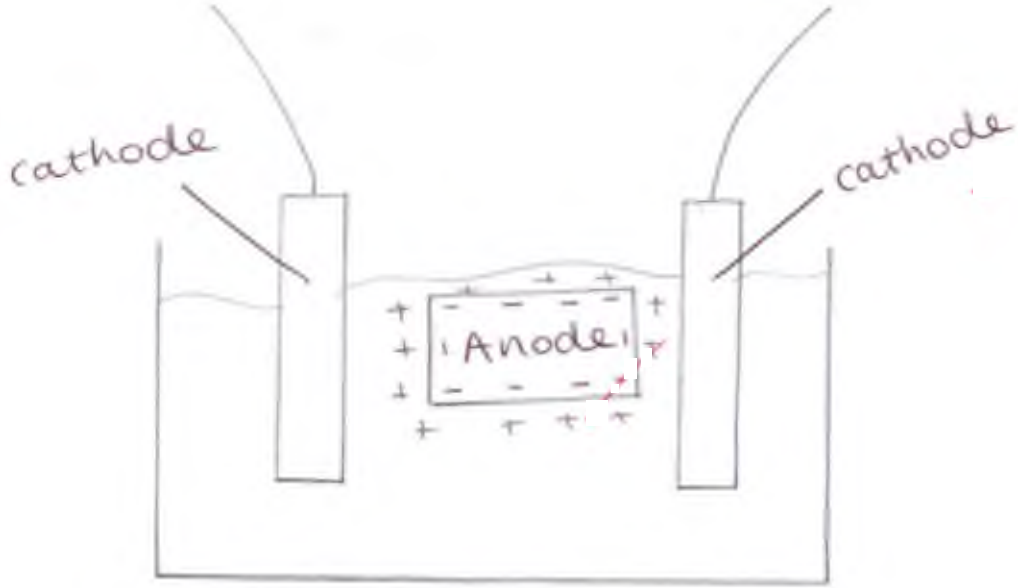
The chair is dipped in to liquid solution then is allowed to sit in there which anodises the chair it is then removed and left to dry

3. The aluminium chair shown below has been finished using the process of anodising.

(a) Explain the benefits of anodising the aluminium chair. [4]

Anodising can provide a protective, as well as aesthetic, coating on the chair. The use of anodising ensures that the chair has a smooth surface over all and is coloured consistency. The use of anosing will prevent corrosion and will allow the chair to be used outdoors. The matte finish improves the aesthetics of the chair.

(b) Using annotated sketches, explain the process of anodising the aluminium chair. [8]



Anode is negatively charged
Cathode is positively charged.

The aluminium chair is the anode.

Electrochemical reaction.

3. The aluminium chair shown below has been finished using the process of anodising.

(a) Explain the benefits of anodising the aluminium chair. [4]

Once anonised, the chair will be corrosion resistant, will be imbued with an aesthetically pleasing surface finish, and will be appropriate for outdoor usage. Anodised objects are more hygenic than ~~others~~ solely aluminium products as they are easier to clean, making ~~them~~ anodised aluminium chairs appropriate for restaurant usage.

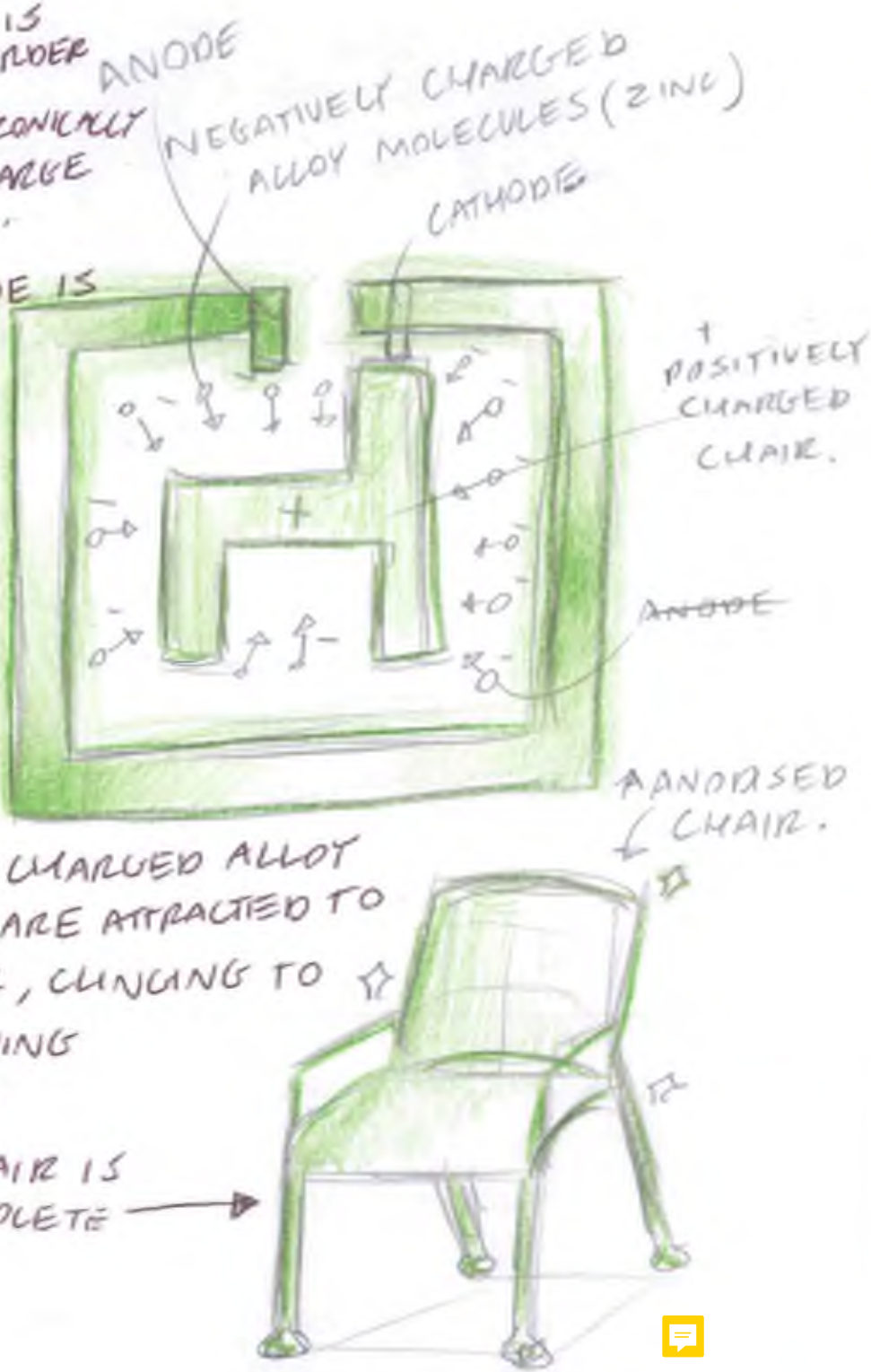
(b) Using annotated sketches, explain the process of anodising the aluminium chair. [8]

1. A CATHODE IS UTILISED IN ORDER TO ELECTRONICALLY POSITIVELY CHARGE THE CHAIR.

2. AN ANODE IS UTILISED IN ORDER TO NEGATIVELY CHARGE THE ALLOY MOLECULES IN THE WATER.

3. THE NEGATIVELY CHARGED ALLOY MOLECULES ARE ATTRACTED TO THE CHAIR, CLINGING TO AND REMAINING ATTACHED.

4. THE CHAIR IS COMPLETE →



4. The balance trike shown below is manufactured from a range of components and materials.

(a) Describe **one** reason why plywood has been used instead of natural wood for the frame of the balance trike. [2]

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(b) Explain the advantages to the manufacturer of using standard bought in components for parts of the balance trike. [4]

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(c) The manufacturer has decided to use batch production. Discuss the benefits of using batch production to manufacture the balance trike. [6]

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Question 4

The balance trike shown below is manufactured from a range of components and materials.		AO3	AO4	Mark
(a)	Describe one reason why plywood has been used instead of natural wood for the frame of the balance trike		✓	2

*Answers that indicate an understanding of reasons for choice of plywood should be awarded up to **2** marks based on:*

- Plywood can be supplied in bigger boards resulting in cheaper material costs.
- The strength of the plywood can be stronger due to the lamination of layers.
- Pre-finishing can take place to add different colour variations.
- More sustainable as waste can be limited by tessellating parts on a manufactured board.
- Can be easily machine using CAM.
- Less imperfections in the plywood.
- The use of waterproof marine plywood.

Guidance to markers

Incorrect/no answer	**0**
Brief description of reason, for example: Plywood is used rather than natural as it can be stronger due to is structure.	**1**
Detailed description of reason, for example: Plywood is used rather than natural as it can be stronger due to is structure. This is because alternating layers result in a stronger product.	**2**

(b)	Explain the advantages to the manufacturer of using standard bought in components for parts of the trike.		✓	4

*Answers that indicate an understanding of bought in components should be awarded up to **4** marks based on:*

- A bought in component is usually an individual part or component, manufactured in thousands or millions, to the same specification such as size and weight. E.g steel bolt.
- Bolts are available in a vast range of standard sizes. Each size is manufactured to an internationally accepted standard.
- Standard components can be manufactured in vast quantities, keeping costs down.
- Safety / quality testing is easier when dealing with standard components. Often a number of standard components, from a batch will be tested.
- Setting up a production line is easier if standard components are used. It is easier to train staff / the workforce, as they are dealing with the same standard components, when assembling products.
- Allows for the development of the product, rather than having to design each individual component. This speeds up product development.
- Don't need to manufacture these parts so reduces tooling costs.
- Can be used with JIT manufacturing.
- Allows the product to be repairable to attract more consumers.

Guidance to markers

Incorrect / no answer	**0**
Brief description, limited understanding, for example: Standard components have been used to the reduce costs of manufacturing the product as these components can be bought in larger quantities.	**1**
Some detail with some understanding of bought in components, for example: Standard components have been used to reduce the costs of manufacturing the product as these components can be bought in larger quantities. An example of this can be seen in the trike, where the manufacturer has used standard size fixings such as bolts to join the main body together.	**2**
A more detailed explanation of more than one reason with clear understanding of bought in components, for example: Standard components have been used to reduce the costs of manufacturing the product as these components can be bought in larger quantities. An example of this can be seen in the trike, where the manufacturer has used standard size fixings such as bolts to join the main body together. Another advantage would be that the safety and quality testing is easier when dealing with standard components. Often a number of standard components, from a batch will be tested.	**3**
Fully detailed explanation of more than one reason with clear understanding of bought in components with clear understanding, for example: Standard components have been used to reduce the costs of manufacturing the product as these components can be bought in larger quantities. An example of this can be seen in the trike, where the manufacturer has used standard size fixings such as bolts to join the main body together. These components are available in a vast range of standard sizes where each size is manufactured to an internationally accepted standard. Another advantage would be that the safety and quality testing is easier when dealing with standard components. Often a number of standard components, from a batch will be tested before the manufacturer uses the component in their product development, this also speeds up the manufacturing process as these components are bought in rather than manufactured by themselves.	**4**

(c)	The manufacturer has decided to use batch production. Discuss the benefits of using batch production to manufacture the balance trike.		✓	6

*Answers that indicate an understanding of reasons why batch production has been used should be awarded up to **6** marks based on:*

- Batch production is easier to change, the manufacture parts of the trike for example, change of colour and design shape of main body.
- Allow for market changes otherwise there might be too much stock in storage if manufactured in mass.
- Less initial investment needed for equipment and production lines.
- As the work is concentrated on a specific unit, supervision and inspection of work is relatively simple therefore work is generally of a high quality.
- The manufacturer is reducing its risk on simply concentrating on one product as it produces a variety of different ones of the same type such as different types of trikes.
- Can be batch produced at different times throughout the year dependant on needs and trends.
- Less monotonous to staff manufacturing the product.

Guidance to markers

Incorrect/no answer	**0**
Brief justification of using batch production, for example: The manufacturer has decided to use batch production due to the flexibility of being able to change the design during the manufacturing process. This could include different variations and colour options.	**1-2**
More detailed justification for using batch production, for example: The manufacturer has decided to use batch production due to the flexibility of being able to change the design during the manufacturing process. This could include different variations and colour options. Batch production allows for market changes as the manufacturing line can be altered and changed easily, which results in less stock having to be stored compared to large amounts in mass production. Another advantage would be that the initial investment can be significantly less compared to mass production.	**3-4**
Fully detailed justification and explanation of why batch production has been used, for example: The manufacturer has decided to use batch production due to the flexibility of being able to change the design during the manufacturing process. This could include different variations and colour options. Batch production allows for market changes as the manufacturing line can be altered and changed easily, which results in less stock having to be stored compared to large amounts in mass production. Another advantage would be that the initial investment can be significantly less compared to mass production. Batch production can also sometimes result in higher quality products as the work is concentrated on a specific unit meaning supervision and inspection of work is relatively simple. This in turn can help to improve quality control and quality assurance processes during the batch production process.	**5-6**

Total	**12**

4. The balance trike shown below is manufactured from a range of components and materials.

strong cheap

(a) Describe **one** reason why plywood has been used instead of natural wood for the frame of the balance trike. [2]

Plywood has been used because of its strength and durability. Plywood is lots of layers of wood squished together which creates strength

Not responsible efficient reliable

(b) Explain the advantages to the manufacturer of using standard bought in components for parts of the balance trike. [4]

~~Using bought in components for this trike~~

The advantages of bought in components are, you are not responsible if one of those bought in components break also these parts are reliable because they have been tested on other products. Bought in components also means not as many jobs will be needed.

Gather input Good distribution

(c) The manufacturer has decided to use batch production. Discuss the benefits of using batch production to manufacture the balance trike. [6]

Batch production is a good way of producing products because it is very efficient and big batches of them are made only when they are in demand so the manufacturer doesn't have to pay for the machines to run constantly.

4. The balance trike shown below is manufactured from a range of components and materials.

(a) Describe **one** reason why plywood has been used instead of natural wood for the frame of the balance trike. [2]

Plywood is cheaper than most natural woods therefore will lower the overall cost of the product and that will ~~to make~~ expand the market.

(b) Explain the advantages to the manufacturer of using standard bought in components for parts of the balance trike. [4]

Using bought in components will lower costs of machinery, materials and personal to make the components. Also there will be no extra space needed for ~~manufacturing~~ manufacturing the components. Also using bought in components means that the company can focus on the product that they are making and will thus increase quality.

~~• components off the shelf~~

- less machinery and people material
- focus on the product
- no extra people being hi
- no extra space needed

(c) The manufacturer has decided to use batch production. Discuss the benefits of using batch production to manufacture the balance trike. [6]

Batch production is producing units in groups. They could be a small or large quantity being produced. Batch production is useful if a product sells poorly or doesn't do as well as the company thought and they can re-evaluate. Also if the products are seasonal they would do a production run leading up to the time for the trike it would be a summer item therefore they would do a production run leading up to Summer.

- Seasonable
- make sure product sells well
- Batch

Plywood = stronger - 90° grains
adhesive + pressure

8

4. The balance trike shown below is manufactured from a range of components and materials.

(a) Describe **one** reason why plywood has been used instead of natural wood for the frame of the balance trike. [2]

Plywood is extremely strong due to the grains being layered at 90 degrees to each other whereas typical natural wood frames would not have this same strength which is crucial for this product which could undergo force and sudden

(b) Explain the advantages to the manufacturer of using standard bought in components for parts of the balance trike. [4]

The manufacturer would no longer need to make the components themselves, saving costs (for machinery, parts and workers) and time, allowing them to spend more time, money and attention on the main product itself. Bought-in components can be purchased in bulk / extremely large quantities, making them very cost effective and even more to discounts and improved company relations. These components may be accredited with certain standards like BSI or ISO, meaning the manufacturer is purchasing high quality items, improving their own final product. This also allows the manufacturer to use Just in Time manufacturing methods, which further saves costs.

more attention

use of jigs fixtures

skilled workers - not too skilled - cost effective

Change

Examiner only

(c) The manufacturer has decided to use batch production. Discuss the benefits of using batch production to manufacture the balance trike. [6]

Batch production allows the workers to be more focused on the products due to there being lower quantities and the workshop environment, leading to greater quality and care. Jigs and fixtures may be used ~~to~~ to ensure better accuracy and quality in products, allowing components to be properly aligned. Workers may be relatively highly skilled and can produce many high quality products and still be cost effective. The use of batch production means that there is flexibility in both the workers and the workshop environment to be able to change and improve the components and layout. Furthermore, the manufacturer is able to change products quickly, giving them freedom to create products after the bike. Higher quality and care for the materials also comes with batch production, as opposed to the likes of mass production yet they are not bespoke.

to newer improved parts

5. The logo shown below is the registered trademark of a watersports company.

(a) Describe the features of a registered trademark and explain how this benefits the company. [4]

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(b) The company has developed an innovative product. Explain in detail how the innovative product is protected using a specific intellectual property right. [4]

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Question 5

The logo shown below is the registered trademark of a watersports company.		AO3	AO4	Mark
(a)	Describe the features of a registered trademark and explain how this benefits the company.		✓	4

*Answers that indicate an understanding of the features and benefits of trademarks should be awarded up to **4** marks based on:*

- A symbol/sign that identifies your products or services.
- Is often relating to a company logo.
- A fee is paid to the Intellectual Property Office, who decide whether a symbol/logo can be regarded as a protected trademark.
- Often used to advertise products or services.
- A trademark must be distinctive and distinguish your goods from those of others so can prevent other similar trademarks.
- It grants the right to file a trademark infringement lawsuit.
- Every 10 years to renew.
- A registered trademark is denoted by ®.

Guidance to markers

Incorrect / no answer	**0**
Brief description, a simple fact, for example: A registered trademark is a symbol or sign that can identify a product or service.	**1**
More detailed description with understanding of benefit, for example: A registered trademark is a symbol or sign that can identify a product or service. A registered trademark is related to the logo of the watersports company. The benefit of the trademark is to grant the right to file an infringement suit if others try to use a similar symbol/sign.	**2**
Very detailed description with understanding of benefit, for example: A registered trademark is a symbol or sign that can identify a product or service. A registered trademark is related to the logo of the watersports company. The benefit of the trademark is to grant the right to file an infringement suit if others try to use a similar symbol/sign. A trademark must be distinctive and distinguish your goods from those of others so can prevent other similar trademarks. A registered trademark is denoted by ®.	**3-4**

(b)	The company has developed an innovative product. Explain in detail how the innovative product is protected using a specific intellectual property right.		✓	4

*Answers that indicate an understanding how an innovative product can be protected should be awarded up to **4** marks based on:*

- Identification of using a patent to protect innovative product.
- A patent protects a person or company that invents something new.
- This should prevent anyone or another company from stealing your idea and manufacturing it.
- A patent protects your design for the first five years and then you must apply annually for the next fifteen years (twenty years in total).
- Invention or product must never have been made public in any way, anywhere in the world.
- Patents must be applied for and can sometimes be a costly and long process.
- Patents can be applied for by others on your behalf. The licence can be hired or sold to someone else.
- To avoid wasting time, effort and money you should carry out a search through published patents and other documents such as trade catalogues before thinking about applying.

Guidance to markers

Incorrect / no answer	**0**
Brief description, limited understanding, for example: An innovative product can be protected *by applying for a patent.*	**1**
Some detail with some understanding of patents, for example: An innovative product can be protected by applying for a patent. A patent protects a person or company that invents something new. This should prevent anyone or another company from stealing your idea and manufacturing it.	**2**
A more detailed explanation of patents with clear understanding of the process of protecting an innovative product, for example: An invention or innovative product can be protected by applying for a patent. A patent protects a person or company that invents something new. A patent will usually last 20 years once granted and this should prevent anyone or another company from stealing your idea and manufacturing it. To be able to apply for a patent the Invention or product must never have been made public in any way, anywhere in the world.	**3**
Fully detailed explanation of patents with clear understanding of the process of protecting an innovative product, for example: An innovative product can be protected by applying for a patent. A patent protects a person or company that invents something new. A patent will usually last 20 years once granted and this should prevent anyone or another company from stealing your idea and manufacturing it. To be able to apply for a patent the Invention or product must never have been made public in any way, anywhere in the world. The process of applying for a patent can be a costly and time-consuming process and it is important that you carry out a search through published patents and other documents such as trade catalogues before thinking about applying to prevent wasting valuable time and money as the product or invention may already exist.	**4**

Total	**8**

5. The logo shown below is the registered trademark of a watersports company.

(a) Describe the features of a registered trademark and explain how this benefits the company. [4]

Registered trademarks are the rights to a companies logo. It lasts for 10 years after purchase, until it needs to be paid for again. This means that the specific logo is directly associated with that watersports company, and that nobody else is allowed to use that logo for themselves. This therefore protects the company.

(b) The company has developed an innovative product. Explain in detail how the innovative product is protected using a specific intellectual property right. [4]

Products can have copy-rights. Copyrights last for 70 years, and is an automatic right. This means that nobody else is allowed to sell that product. Only "the" company is allowed to sell the product.

5. The logo shown below is the registered trademark of a watersports company.

(a) Describe the features of a registered trademark and explain how this benefits the company. [4]

A registered trademark protects a logo or graphical brand name of a product. A registered trademark prevents a companies logo or brand name being copied within the United Kingdom. A registered trademark has to be applied for. It will last for an initial 10 years.

(b) The company has developed an innovative product. Explain in detail how the innovative product is protected using a specific intellectual property right. [4]

An innovative product is protected using a patent. An innovative product can be patented as long as the idea or invention is new, not copying any parts of similar products and has the potential to be made into a product. A patent is not automatic and therefore has to be applied for.

5. The logo shown below is the registered trademark of a watersports company.

(a) Describe the features of a registered trademark and explain how this benefits the company. [4]

Trademarks are awarded with an ® symbol when registered. Registering your trademark allows for a company to ensure their brand identity is not plagerised by someone else. A trademark is produced and protects the name, style and colour scheme that the trademark has. This will prevent competition from producing a relatively similar design. This is useful as can help a company keep their brand identity making their logo instantly recognisable to that one company, trademarking your logo allows you to be able to sue anyone who has made an attempt to replicate your

(b) The company has developed an innovative product. Explain in detail how the innovative product is protected using a specific intellectual property right. [4]

A company may produce a patent for their design, this can stop competing companys from replicating their product to sell at a lower price. A patent must be registered and is protected for five years, you must then re-registered your patent annually for the following 15 years (20 years total). This could be applied to new medicines, literature, musical ect. For a company to replicate a product using, for example a patented new technology or mechanism, would be in serious trouble and can break legislative laws if attempt is made to copy this design without agreement.

6. The regulatory and legislative framework for health and safety has a big impact when manufacturing products in a workshop environment.

(a) Describe **two** key features of the Health and Safety at Work Act that need to be adhered to in a workshop environment. [4]

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(b) The British Standards Institute (BSI) kitemark has been awarded to a new product. Explain what this tells the consumer. [4]

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Question 6

The regulatory and legislative framework for health and safety has a big impact when manufacturing products in a workshop environment.		AO3	AO4	Mark
(a)	Describe **two** key features of the Health and Safety at Work Act that need to be adhered to in a workshop environment.		✓	4

Answers that indicate an understanding of the Health and Safety at Work Act *should be awarded up to **4** marks based on:*

Employers responsibilities:

- Must make sure the workplace is safe and without risks to health by assessing risks.
- Ensure plant and machinery are safe/hygienic and that safe procedures of work are set and followed.
- Provide adequate welfare facilities including first aid arrangements.
- Provide the information, instruction and training.
- Make sure that work equipment is suitable for intended use, and that it is properly maintained.
- Provide correct PPE.
- Ensure that appropriate safety signs are provided and maintained.

Employees responsibilities:

- Take reasonable care for their own health and safety and that of others who may be affected by their actions.
- Correctly use work items provided by their employer, including personal protective equipment (PPE).
- Using anything provided for health, safety or welfare correctly.
- Use extraction when using machines that can create dust.

Guidance to markers

Incorrect / no answer	**0**
*Brief description of **one** feature, very little understanding, for example*: A key feature of the Health and Safety at Work Act is the importance of using the correct PPE when in the workshop.	**1**
*Detailed description of **one** feature, for example:* A key feature of the Health and Safety at Work Act is the importance of using the appropriate PPE that has been provided, such as the use of eye protection when using the machinery.	***2***
*A more detailed description of **two** features, with clear understanding, for example:* The Health and Safety at Work Act is the key piece of legislation covering occupational health and safety in the UK. A key feature of the Health and Safety at Work Act is the importance of employers to follow the requirements and guidelines set out by the act, such as supplying appropriate PPE and training to their employees to minimise the risks of accidents. Along with this requirement it is vital that they ensure appropriate safety signs are provided and maintained. The act doesn't just relate to employers. The employee's actions are also key for the success of the act as they would need to ensure they take reasonable care for their own health and safety and that of others who may be affected by their actions. This can be achieved by correctly using work items provided by their employer, including personal protective equipment.	**3-4**

(b)	The British Standards Institute (BSI) kitemark has been awarded to a new product. Explain what this tells the consumer.		✓	4

*Answers that indicate an understanding of BSI should be awarded up to **4** marks based on:*

- The British Standards Institution (BSI) is a service organisation that produces standards across a wide variety of industry sectors.
- The standards are an agreed way of doing something. It could be about making a product, managing a process, delivering a service or supplying materials.
- The BSI assists organisations wishing to achieve the European CE mark certification.
- The BSI also awards the BSI Kitemark to products that meet its quality standards.
- Tells the consumer it is safe.
- Organisations may apply for the BSI Kitemark to certify a product has met certain standards.

Guidance to markers

*Incorrect / no answer **0 marks***

Brief description, limited understanding, for example:
BSI kitemarks tells the consumer that the product has been tested and meets standards. **1**

Some detail with some understanding of BSI, for example:
BSI kitemarks tells the consumer that the product has been tested and meets standards. They play a big role in setting standards for products such as children's toys. For a product to achieve these standards they must apply for the BSI kitemark. **2**

A more detailed explanation of BSI with clear understanding of the role, for example:
BSI kitemarks tells the consumer that the product has been tested and meets standards. The standards outlined by BSI are an agreed way of doing something. It could be about making a product, managing a process, delivering a service or supplying materials. These standards are designed for voluntary use. However, they play a big role in setting standards for products such as children's toys. For a product to achieve these standards they must apply for the BSI kitemark. **3**

Fully detailed explanation of BSI with clear understanding of the role, for example:
BSI kitemarks tells the consumer that the product has been tested and meets the required safety standards. The standards outlined by BSI are an agreed way of doing something. It could be about making a product, managing a process, delivering a service or supplying materials. These standards are designed for voluntary use. However, they play a big role in setting standards for products such as children's toys. For a product to achieve these standards they must apply for the BSI kitemark and this can give the product or service an advantage over other competitors that do not hold the BSI kitemark as it can tell the consumer that the product is of better quality. **4**

Total	**8**

6. The regulatory and legislative framework for health and safety has a big impact when manufacturing products in a workshop environment.

(a) Describe **two** key features of the Health and Safety at Work Act that need to be adhered to in a workshop environment. [4]

It coveres workers who have been injured in the result of an accident. It requires the workshop to have a basic level of safety and equipment to be considered safe.

(b) The British Standards Institute (BSI) kitemark has been awarded to a new product. Explain what this tells the consumer. [4]

This means that the product is up to British safety standards. It shows that the product is safe to use. It acts as a mark of good quality for a product. It shows that the product is made frome non-hazardus materials.

6. The regulatory and legislative framework for health and safety has a big impact when manufacturing products in a workshop environment.

(a) Describe **two** key features of the Health and Safety at Work Act that need to be adhered to in a workshop environment. [4]

Personal Protective Equipment must be adhered to. This includes gloves, masks and protective goggles/glasses need to be used when handing harsh, abrasive, toxic and corrosive materials or substances. this will help protect workers from toxic fumes or splashes from harmful chemicals *Continued on back page.

(b) The British Standards Institute (BSI) kitemark has been awarded to a new product. Explain what this tells the consumer. [4]

If a product has the BSI kitemark, this means that the product has met the BSI's standards and regulations for safety ~~each~~. Once this product has this mark, it can be ~~the~~ legally be traded in the UK and Europe. This kitemark is a sign * Continued on back page

*6a) Following on from this, Health materials or tools used in a workshop environment should be stored safely and securely. Hazardous materials or tools must be detected, evaluated and locked away until needed to ensure the safety of the workers.

*6b) ... of safety and tells customers that it is safe to use. For example, an extension lead or other electronic device should have a kitemark if purchased from Europe as this will mean the product has passed the BSI requirements and is safe to use.

only

6. The regulatory and legislative framework for health and safety has a big impact when manufacturing products in a workshop environment.

(a) Describe **two** key features of the Health and Safety at Work Act that need to be adhered to in a workshop environment. [4]

a When the health and safety act was introduced in 19?? to protect workers from poor workplace conditions this made it so workers had to provide appropriate PPE to all staff, ensure they get the relevant training so theres no injuries but if there is there needs to be some one which first aid training and a first aid pack withing close proximity, this health concern relates to the need for a risk assessment so it all ties together around prevention of risk and how to deal with it.

(b) The British Standards Institute (BSI) kitemark has been awarded to a new product. Explain what this tells the consumer. [4]

BSi is responsible for laying out criteria for products to pass which enables them to use a kitemark on their product. These are high standards which can be seen as quality checks/assurances on the quality of the product and the health and safety concerns, like material use, quality of product and safety. This ~~tells the~~ provides the customer with assurances that the product is safe, was made in an environmentally safe way, working conditions were met, the product is to a high standard. This provides the customer with trust as BSi is an internationally recognised high quality institution. Customer is more likely to buy something with than without it. Product has been tested for multiple criteria, this must get renewed with different products.

7. 3D printing uses a polymer heated to its melting point and then extruded, layer by layer, to create a three-dimensional object.

(a) Explain a drawback to this method of 3D printing. [2]

(b) Evaluate the benefits and limitations of 3D printing prototypes when designing products. [10]

Question 7

3D printing uses a polymer heated to its melting point and then extruded, layer by layer, to create a three-dimensional object.		AO3	AO4	Mark
(a)	Explain a drawback to this method of 3D printing.		✓	2

*Answers that indicate an understanding of drawbacks should be awarded up to **2** marks based on:*

- 3D prints can be difficult to bond to printer build plate.
- Long processing time for high quality prints.
- Post production cleaning is needed to remove supports.
- Layer lines on final parts are often visible.
- The quality of layer adhesion can influence the mechanical strength of the part.
- Supports need to be used for overhangs or more complicated designs which leads to more material being used.
- Polymer reals can run out mid print.
- Nozzles can become blocked and cause failed prints.

Guidance to markers

Incorrect/no answer	**0**
*Brief description of **one** drawback, little detail, for example:* This type of 3D printing can take a long time for high quality parts.	**1**
*More detailed explanation of **one** drawback with clear understanding, for example:* 3D printing can be a time-consuming process due to the thin layers of filament building up. For higher quality prints thinner layers are needed which in some cases can be as little as 0.2mm.	**2**

(b)	Evaluate the benefits and limitations of 3D printing prototypes when designing products.	✓		10

Answers that indicate an understanding of benefits and limitations of 3D printing prototypes *should be awarded up to **10** marks based on:*

Benefits include:

- It enables quick production with a high number of prototypes or a small-scale version of the real object in less time than using conventional methods.
- Helps designers to improve their prototypes, for any design flaws that may affect the quality of the product.
- The initial cost for setting up a 3d printing facility can be high; however, it is much cheaper compared to labour costs and manufacturing costs while using the conventional way.
- Can allow clients and users to have a 3D prototype to test throughout the design process.
- Ability to print functional and moving parts for prototypes to test function.
- Using sustainable 3d printing polymers.

Limitations include:

- The time for prototypes to print can take a long time.
- The decrease in manufacturing jobs will greatly affect the economy of countries that rely on a large number of low skill jobs.
- The size of objects created with 3d printers can be limited.
- Limited materials to print prototypes from.
- Production of Dangerous Items – With 3d printers, plastic knives, guns and any other hazardous objects can be created.
- Printer reels run out of polymers.

Both benefits and limitations need to be evaluated for higher band marks.

Guidance to markers

• Incorrect/no answer	**0**
• Candidate has a simplistic knowledge. • The use of terminology and technical language is basic. • Brief description of the benefits and limitations of 3D printing prototypes; little understanding evident; basic or no example.	**1-2**
• Candidate has some basic understanding of the issues associated with the question. • The use of terminology and technical language is variable. • Some detail with some understanding of the benefits and limitations of 3D printing prototypes which have been briefly explained.	**3-4**
• The candidate has a clear understanding of the issues associated with the question. • The use of terminology and technical language is mostly accurate. • More detailed evaluation of the benefits and limitations of 3D printing prototypes with clear knowledge and understanding evident; appropriate examples included to aid evaluation.	**5-6**
• The candidate has a very clear understanding of the issues associated with the question. • The use of terminology and technical language is accurate. • More detailed evaluation of the benefits and limitations of 3D printing prototypes with detailed knowledge and understanding evident; detailed examples included to aid evaluation.	**7-8**
• The candidate demonstrates an excellent understanding of the issues associated with the question. • Uses correct terminology and technical language including types of materials and processes. • Full and detailed description and understanding of the benefits and limitations of 3D printing prototypes with full and detailed explanation with highly relevant exemplars included.	**9-10**

Total	**12**

7. 3D printing uses a polymer heated to its melting point and then extruded, layer by layer, to create a three-dimensional object.

(a) Explain a drawback to this method of 3D printing. [2]

There is a ~~loss~~ loss of jobs and of the traditional techniques as the printer can print more complex shapes and objects in a more cost effective and time efficient way than traditional techniques

(b) Evaluate the benefits and limitations of 3D printing prototypes when designing products. [10]

Firstly, it can print high quality complex objects or shapes in a more cost effective and time-efficient way with great detail and finishes with no mistakes as the 3D printers have been programmed to print ~~or fuse~~ specific lengths, width, height and forms. They can also print several different prototypes with different features and aesthetic in a shorter time and allow manufacturers and companies to see the diversity, but there are a limited amount of sizes and materials that the 3D printers can use. ~~such~~ However, such as the SLS and SLA rapid prototyping and manufacturing methods the prototypes and objects can be printed with great detail and surface finishes in a more faster and cost effective and time efficient process than traditional techniques. On the other hand it can't produce big objects such as vechiles and houses fully as humans can (until now).
But it saves a lot of materials, time and money and can produce complex objects and display different techniques with them.

For continuation only.

7) b) = There are not many limitations of 3D printing as it can print everything that is small sizes (prototypes) in a more effective way than any other techniques, when trying to produce a real life model to show customers.

7. 3D printing uses a polymer heated to its melting point and then extruded, layer by layer, to create a three-dimensional object.

(a) Explain a drawback to this method of 3D printing. [2]

~~The mac~~ Due to the thin layers that are created combined with the strength of the product, it will be quite fragile.

(b) Evaluate the benefits and limitations of 3D printing prototypes when designing products. [10]

3D printing can be a cost effective method of rapid prototyping as the actual manufacture of it requires minimal labour costs and the polymeres such as ABS that are used ~~are~~ have value for the amount per reel. Although the CAD software and CAM machines can be costly as well as the time needed to set out the design on CAD software.

3D printing allows a physical shape to be communicated to the target market/client so they can visualise it easier and provide accurate feedback. Additionally, ABS is available in many colours which would enable the designer to test qualitative points on the specification. 3D printing may not be needed for this as it would be possible to conduct aesthetic tests through software.

Conducting physical or motion tests would be difficult with 3D printing due to fragility and roughness.

Prototypes can only be printed to the size of the printing area which can be costly for large pieces.

7. 3D printing uses a polymer heated to its melting point and then extruded, layer by layer, to create a three-dimensional object.

(a) Explain a drawback to this method of 3D printing. [2]

It is a very time consuming process, specifically for larger projects that may take days to be produced and even smaller projects can take hours, therefore increases the time put during testing and developing leading to an increase in the cost you would spend on this process.

(b) Evaluate the benefits and limitations of 3D printing prototypes when designing products. [10]

3D printing prototypes allows the manufacturer to show the potential consumer or client their product. This helps with the research and development of a product as you can undergo testing. Testing could be as simple as getting a focus group to use your product or could be destructive to allow the manufacturer to identify the possible weak areas of a design before introducing it to the marketplace, this increasing the chance of success of a product. However, this testing may not be as effective as 3D printing would usually produce with polymer materials which may be weaker than the materials you as a designer intend to use, therefore the testing may not be as effective. As well as this your a limited to the types of product you could produce to test using a 3D printer, as for example it could be considered ineffective to produce a 3D printed bike, however this idea could be effective for smaller areas of the design such as grips for the handlebars. 3D printing prototype is accurate and precise so will give the client a good idea for the possible product, it is also repeatable which is an added benefit. As this design will be produced using CAD software you can make small changes to your product before eventually generating your final prototype. Having a visual prototype helps to identify obvious adjustments nessisary for your product, however it may required a skilled worker who knows how to use the CAD software to produce the design. It also allows for the manufacturer to send this file to their client around the world to print off and view without being in the same room as them. However 3D printing machinery is expensive to buy.

8. The role of marketing, enterprise and innovation can influence the development of products.

(a) Promotion is one of the four Ps of marketing. Explain the impact of effective promotion on a new product entering the market. [4]

(b) Explain how the development of smartphones can be attributed to technology push. [4]

(c) Explain how market pull is often the driving force behind revitalising products. [4]

Question 8

The role of marketing, enterprise and innovation can influence the development of products.		AO3	AO4	Mark
(a)	Promotion is one of the four P's of marketing. Explain the impact of effective promotion on a new product entering the market.		✓	4

*Answers that indicate an understanding of promotion should be awarded up to **4** marks based on:*

- Promotion: The activities that communicate the product's features and benefits and persuade customers to purchase the product.
- Promotion can help determine a clear and effective strategy to bring a product to market.
- Promotion of a product can help you differentiate your product from others on the market.
- Promotion can create brand awareness and drive sales of the product.
- Promotion can create word of mouth opportunities.
- Location of promotions taking into considerations such as ethnical factors.
- Using influencers to help promote.
- Pre-launch advertising to help with presales.

Guidance to markers

Incorrect/no answer	**0**
Brief identification of why promotion is important, little detail, for example: Promotion of a product can help drive sales of a product and increase profits.	**1**
Identification of why promotion is important with limited explanation, for example: Promotion of a product can help drive sales of a product and increase profits. This is because the activities that communicate the product's features and benefits such as online promotions can help persuade customers to purchase the product.	**2**
Identification of why promotion is important and effective with a more detailed explanation and clear understanding of the topic, for example: Promotion of a product can help drive sales of a product and increase profits. This is because the activities that communicate the product's features and benefits such as online promotions can help persuade customers to purchase the product. Effective promotion of a product can help you differentiate your product from others on the market and this can give you an advantage over competitor products.	**3**
Identification of why promotion is important and effective with a fully detailed explanation and full understanding of the topic, for example: Promotion of a product can help drive sales of a product and increase profits. This is because the activities that communicate the product's features and benefits such as online promotions can help persuade customers to purchase the product. Effective promotion of a product can help you differentiate your product from others on the market and this can give you an advantage over competitor products. Another reason why promotion can affect the sales of a product would be the ability to build brand awareness and drive sales of the product when entering the market.	**4**

(b)	Explain how the development of smartphones can be attributed to technology push.		✓	4

*Answers that have fully explained technology push should be awarded up to **4** marks based on:*

- Technology Push is when research and development in new technology drives the development of new products.
- Smartphones are re-designed because of changes in materials or manufacturing methods.
- Technology Push usually does not involve market research. It tends to start with a company developing an innovative technology and applying it to a product.
- Technology developments have resulted in smaller handsets.
- Function of smartphones have developed over time. i.e. More storage, internet access, cameras, finger print access and voice recognition.
- Development of new materials have influenced the aesthetics of smartphone. i.e. aluminium casing for iPhone.
- New manufacturing techniques and processes developed through technology push.

Guidance to markers

Incorrect/no answer	**0**
Brief identification of the development from technology push, little detail, for example: *Smartphones have been developed over time because of the new developments in technology capabilities and material development, such as increased storage and internet capabilities.*	**1**
Some detail with some understanding of how technology push has been used to develop smartphones, for example: Technology Push is when research and development in new technology drives the development of new products. Products are re-designed because of changes in materials or manufacturing methods. Smartphones have benefited from this technology push by increasing storage capabilities along with the development of the smartphones becoming smaller in size.	**2**
A more detailed explanation of how smartphones have been developed from technology push with clear understanding of the topic, for example: Technology Push is when research and development in new technology drives the development of new products. Smartphones have benefited from this technology push by increasing storage capabilities along with the development of the smartphones becoming smaller in size due to new developments in nanotechnology. Products are also often re-designed because of changes in materials or manufacturing methods. This has led to the smartphones being made from more aesthetically pleasing materials such as aluminium in the case of an iPhone. The technology Push usually does not involve market research and it tends to start with a company developing an innovative technology. This is also evident though the development of the iPhone over time as it has led the development of other companies' products.	**3**

	A fully detailed explanation of how smartphones have been developed from technology push with full understanding of the topic, for example: Technology Push is when research and development in new technology drives the development of new products. Smartphones have benefited from this technology push by increasing storage capabilities along with the development of the smartphones becoming smaller in size due to new developments in nanotechnology. Other developments of smartphones are internet capabilities, camera functions, finger print safety and voice recognition. All of these functions have been led from the technology push over time. Products are also often re-designed because of changes in materials or manufacturing methods. This has led to the smartphones being made from more aesthetically pleasing materials such as aluminium in the case of an iPhone. The technology Push usually does not involve market research and it tends to start with a company developing an innovative technology. This is also evident though the development of the iPhone over time as it has led the development of other companies' products.	**4**

(c)	Explain how market pull is often the driving force behind revitalising products.		✓	4

Answers that have fully explained market pull *should be awarded up to **4** marks based on:*

- A need/requirement for a new product or a solution to a problem, which comes from the market place.
- The need is identified by potential customers or market research.
- A product or a range of products are developed, to solve the original need.
- Market pull sometimes starts with potential customers asking for improvements to existing products.
- Focus groups are often central to this, when testing a concept design or an existing product.
- Reference made to an example product.

Guidance to markers

Incorrect/no answer	**0**
Brief identification of what market pull is, little detail, for example: The term market pull refers to a need/requirement for a new product or a solution to a problem, which comes from the market place. An example of this could be the digital camera.	**1**
Some detail with some understanding of market pull with reference to revitalisation, for example: The term market pull refers to a need/requirement for a new product or a solution to a problem, which comes from the market place. An example of this could be the digital camera as years ago, there was a market requirement for a camera that could take more photographs, that could be viewed almost immediately. This market pull then led to electronics companies revitalising digital cameras to solve this problem.	**2**
A more detailed explanation of market pull with reference to a revitalised product with clear understanding of the topic, for example: The term market pull refers to a need/requirement for a new product or a solution to a problem, which comes from the market place. The need is identified by potential customers or market research. An example of this could be the digital camera as years ago, there was a market requirement for a camera that could take more photographs, that could be viewed almost immediately. This market pull then led to electronics companies revitalising digital cameras to solve this problem and creating digital storage, better processing power and improved battery performance to meet the requirements of the customers.	**3**
A fully detailed explanation of market pull with reference to a product with full understanding of the topic, for example: The term market pull refers to a need/requirement for a new product or a solution to a problem, which comes from the market place. The need is identified by potential customers or market research. Focus groups are often central to this, when testing a concept design or an existing product. An example of this could be the digital camera as years ago, there was a market requirement for a camera that could take more photographs, that could be viewed almost immediately. This market pull then led to electronics companies developing digital cameras to solve this problem. From market research they realised that customers wanted a range of better digital cameras with bigger storage, better processing power and improved battery performance. This can also link with technology push as at the time the technology is also a factor that needs to be taken into account when products are revitalised.	**4**

	Total	**12**

8. The role of marketing, enterprise and innovation can influence the development of products.

(a) Promotion is one of the four Ps of marketing. Explain the impact of effective promotion on a new product entering the market. [4]

Promoting a product will increase the amount a product is sold to consumers. Promoting a product correctly will increase the production of the product which means that the company will have increased revenue and profit from the product.

(b) Explain how the development of smartphones can be attributed to technology push. [4]

~~Techo~~ Technology push is the encouragement of new technology in products for example smartphones being developed to only have simple features, ~~they not been~~ in the past, currently smartphones are containing very new ~~techo~~ technologies like facial recognition this is due to consumers and their target marketencouraging these features.

(c) Explain how market pull is often the driving force behind revitalising products. [4]

market pull is the demand for desirable features on a product to increase sales ~~of~~ of a product. market pull pressures companies to implement new ~~products~~ features in products meaning the product is redesigned to feature new ~~techo~~ technology.

8. The role of marketing, enterprise and innovation can influence the development of products.

(a) Promotion is one of the four Ps of marketing. Explain the impact of effective promotion on a new product entering the market. [4]

Effective promotion has a big impact on the growth phase of a product lifecycle as it often increases sales. Promotion allows the product to reach more members of the target audience which will help to increase sales. Promotion of a product may influence people to try the product if they hear good reviews about the product.

(b) Explain how the development of smartphones can be attributed to technology push. [4]

Technology push is the development of existing products due to advancement in technology. Features of smartphones, such as face ~~rec~~ recognition, are due to advancement in technology. Smartphones have developed by the use of new materials which have been improved due to new technology.

(c) Explain how market pull is often the driving force behind revitalising products. [4]

Market pull is the development of products due to change in market / consumer needs. As times have advanced, the needs and desires for products have adapted, therefore revitalising existing products is essential to ensure sales of the product. An example of this is the Mini which has been revitalised over many years to suit the needs of consumers, like the use of an electric engine.

only

8. The role of marketing, enterprise and innovation can influence the development of products.

(a) Promotion is one of the four Ps of marketing. Explain the impact of effective promotion on a new product entering the market. [4]

4 ✓

Promotion increases brand awareness. for example Social media advertising means consumers are seeing the product all over the world. Promotion helps win over competitors sales / customers. for example above the line promotion may make a consumer decide to buy the new product as they like what they see. Promotion creates a USP for a product for example creating a innovative marketing campaign may show the new and uniqueness of the product. Promotion helps gain a positive public image. for example it gives them a chance to show their CSR - which would attract environmentally concious customers

(b) Explain how the development of smartphones can be attributed to technology push. [4]

Technology push is an extention to product life strategy. It dosent necessarily respond to consumer needs. ~~rather~~ Smartphones includ new technology such as fingerprint to open the phone - consumers wouldent demand this feature as they may not know such technology is posible. - ~~The~~ ~~Samsu~~ Smartphones use the price skimming strategy meaning →

(c) Explain how market pull is often the driving force behind revitalising products. [4]

~~Technology push~~ market pull is used as an extension strategy to meet customer demands for desirable products. ~~Technology~~ market pull may incole selling a new colour of a product. ~~a~~ customers may be attracted to this revitalised feature increasing sales. ~~Technology~~ market pull may include adding a new feature to a product, for example adding lights onto a bike. This revitalisation may target a new segment of the market who prioritises safety. market pull may inclue ~~copyin~~ improving competitors products. for example ~~the~~ a added extended ~~so~~ storage space on a Samsung version of the apple IPad. This attracts more customers who prioritise this ~~new~~. feature.

They start at lower higher prices then lower the price as over time. They can do this because of the recognised ~~new tech~~ the popularity an innovative aspect of the phone is what sells it. Smartphones use R + D to introduce new features, for example the use of face id was developed through technological advancements. These features make Phones technology push Products.

9. Customer support can be a key selling point for a person to choose a product over a competitor product.

Discuss possible methods of customer support that a company would need to consider when launching a product and the impact this could have on the company's reputation. [8]

Question 9

Customer support can be a key selling point for a person to choose a product over a competitor product.	AO3	AO4	Mark
Discuss possible methods of customer support that a company would need to consider when launching a product and the impact this could have on the company's reputation.		✓	8

*Answers that indicate an understanding of technical support should be awarded up to **8** marks based on:*

- Support can be a key selling point, a reason for a person to choose the product over the competition.
- **Phone support** – Supporting users by phone is time-consuming, but for some types of products, it can reassure potential buyers, particularly if they are not Internet-savvy or if the product handles sensitive information. Users might trust the product more if they know they can speak to a real person.
- **E-mail support** – The advantages are that you don't need any additional software, and everyone uses email. Relies heavily on personnel to respond to support requests.
- **Social Media support** - Ability to quickly respond to someone who is having a problem or has a question about your product. Relies heavily on personnel to respond to support requests. Popular method these days as most people use social media.
- **Ticketing system** – Ticketing systems make the process of providing support easier when multiple staff members are involved, because you can see whether a request is being responded to and who is working on it. They also make it far easier to keep track of the support requests coming in and how much time they are taking up.
- **Real time chat support** – Real-time support on websites can be helpful for companies that offer a service. You can chat to someone on your website, so guiding someone through a potentially confusing process would be simple. It does, however, require that someone be available to provide this support should users come to rely on it.
- Reference made to the impact of the customer support such as increased brand loyalty, faith in the product, word of mouth reputation.
- Warranties used as a customer support mechanism offering returns, repairs, refunds, replacements.
- Consumer protection act to protect the consumer after purchase.
- Using FAQ's and step by step guides to support.

Guidance to markers

• Incorrect/no answer	**0**
• Candidate has a simplistic knowledge. • The use of terminology and technical language is basic. • Brief description of one to two methods of technical support; little understanding evident; basic examples.	**1-2**
• Candidate has some basic understanding of the issues associated with the question. • The use of terminology and technical language is variable. • Some detailed discussion of three to four methods of technical support with some explanation and examples.	**3-4**

• The candidate has clear understanding of the issues associated with the question. • The use of terminology and technical language is mostly accurate. • More detailed discussion of three to four methods of technical support with more detailed knowledge and understanding evident; appropriate examples included.	**5-**	
• The candidate demonstrates very clear understanding of the issues associated with the question. • Uses correct terminology and technical language. • Full and detailed discussion of four methods of technical support with full and detailed explanation with highly relevant exemplars included.	**7-8**	
	Total	**8**

9. Customer support can be a key selling point for a person to choose a product over a competitor product.

Discuss possible methods of customer support that a company would need to consider when launching a product and the impact this could have on the company's reputation. [8]

- Customer support is useful for launching new products.
- Customer support can be used for customers to contact a company regarding how to work a product or if they have negative / positive feed back to provide
- if a customer sees they can contact you regarding a product they're sure about have question you can then for them. where if a product didn't have that option it can help a company sell products and help push them to buy their product over a competitor.
- the impact this can have can be beneficial or be a draw back as if you have a good quality and friendly customer support this can build trust between a customer and the company meaning them more likely to return to them. Where as if they had a poor customer support that was unfriendly this can make the customer dislike that company and their customers or the customer pushing them away.

9. Customer support can be a key selling point for a person to choose a product over a competitor product.

Discuss possible methods of customer support that a company would need to consider when launching a product and the impact this could have on the company's reputation. [8]

Having a website for the product or brand is a modern option for customer support which can allow the customer to access support when it suits them. The convenience of this would benefit the companies reputation as ~~the~~ ~~customer~~ they would be known ~~for~~ for their easy access help. Having a phoneline ~~may also benefit the company~~ is also a method a company should consider. This may be prefered by customers as talking to an actual person provides more information and interaction than reading online. However a phonecall where the operator and customer disagree may tarnish the reputation of the company and put people off choosing them over other competitors. A real life location for customer support such as ~~company HQ~~ at the shops or warehouse could be considered. This would give off the impression that the company is personable and openly happy to help people.

9. Customer support can be a key selling point for a person to choose a product over a competitor product.

Discuss possible methods of customer support that a company would need to consider when launching a product and the impact this could have on the company's reputation. [8]

Any interaction a consumer or customer has with a company can effect their view on the company, but so can any lack of interaction. Customer support is one of the key aspects of consumer relations and it must be designed with the target market in mind.

One of the main methods used by companies depending on the product is a customer help line, whether this be by phone, text or online. This can be really helpful for products that have a more complicated user interface. However the type of help line must be considered for example if it was an older/elderly target market the company may lean more towards the phone rather than online but if it was a young adult market they would choose online. The company would then also have to consider the people they would employ to communicate with their consumers as their attitude will effect the company reputation.

Another customer service method is, an instruction book or manual. The company must be careful to ensure it is clear but not demeaning to the market, because if a consumer didn't like it they may take to the internet to complain about the company. If this was to happen potential consumers may see. The company may also consider using their website as a means of support or labels on a product itself. The choices a company makes will be effected by the target market of the Product and feasibility studies that are conducted about them

10. Analyse the importance of testing and evaluating a product throughout the iterative design process and on completion of the product. [12]

Marks will be awarded for the content of the answer and the quality of written communication.

Question 10

Analyse the importance of testing and evaluating a product throughout the iterative design process and on completion of the product. *Marks will be awarded for the content of the answer and the quality of written communication.*	**AO3**	**AO4**	**Mark**
	✓ (10)	✓ (2)	12

*Candidates should demonstrate knowledge and understanding and apply it to designing and making principles to be awarded up to **12** marks based on:*

- Testing and evaluation throughout the iterative design process can confirm that the product will work as it is supposed to, or if it needs refinement.
- Allows the client to assess the viability of a design.
- Testing and evaluation allows the client to view the prototype and to give their views. Changes and improvements can be agreed with further work carried out if needed.
- Testing also helps identify potential faults, which in turn allows the designer to make improvements.
- Safety issues can be identified.
- Evaluating and testing allows the production costs to be assessed and finalised.
- Production methods can be explored and decided upon through testing and evaluation.
- Testing against the design specification throughout and at completion of a product, helps ensure a full and relevant evaluation of a product is carried out.
- Evaluations of finished products are completed in order to test whether they work well and if the design can be corrected or improved.
- Final testing with end users.
- Testing materials and performance attributes throughout the development processes.
- CAD simulation testing to help identify flaws.

Guidance to markers

• Incorrect / no answer	**0**
• Limited understanding and application of knowledge and understanding of the testing and evaluation processes. • There is limited evidence of relevant examples. • Quality of Written Communication is limited, presenting material with limited coherence, many errors of grammar, punctuation and spelling.	**1-3**
• Generally good understanding and application of knowledge and understanding of the testing and evaluation processes. • There is a line of reasoning which is generally coherent and relevant. • Quality of Written Communication is basic, presenting occasional appropriate material with some coherence, some errors of grammar, punctuation and spelling.	**4-6**

	• Very good understanding and application of knowledge and understanding the testing and evaluation processes, links with the iterative design process. • There is a sustained line of reasoning which is generally coherent, relevant and substantiated. • Quality of Written Communication is good, presenting mainly appropriate material in a coherent manner, few errors of grammar, punctuation and spelling.	**7-9**	
	• Excellent understanding and application of knowledge and understanding of the testing and evaluation processes, links with the iterative design process. • There is a sustained line of reasoning which is coherent, relevant and substantiated. • Quality of Written Communication is excellent, presenting wholly appropriate material in a coherent and logical manner, hardly any errors of grammar, punctuation and spelling.	**10-12**	
		Total	**12**

10. Analyse the importance of testing and evaluating a product throughout the iterative design process and on completion of the product. [12]

Marks will be awarded for the content of the answer and the quality of written communication.

The testing and evaluating of a product is one of the most important parts as you can reflect on your product and wheather or not it is good. testing your product is important as you need to know if it forfills the job it was meant to do eg a lawn mowe should be able to cut grass. One way inwhich you are able to test your product is to ash a number of strangers to have a go so that it is not biased and kindly asking for feedback which you can use to evaluate on. Having feedback will allow you to make any improvements to your product so it is the best it can be before selling. A final evaluation of the product is always important as you can look back on the whole process and reflect on if you are satisfied with what you have made. In the evaluation you should refect on previous designs and ideas and see how the final product came togethe. overall testing and evaluating your product is a very important process as you are able

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to reflect on the products development and with your feedback you are able to make any end adjustments or modifications to improve it. This means that hopfully the customers are happy and satisfied with their product.

some more ways that you are able to get feedback and test your product is by going to people who fit into your client profile and asking them to test it, once it has been tested ask for feedback, some questions to ask are "do you think my product is aesthetic pleasing?" "would you consider buying my product?" "is there anything you would do to improve my product and if yes, what?"

any sort of feedback will help you to evaluate your product and potentialy improve it. for your product to sell it is important that the people most likely going to buy it like it, so this final stage of the whole process is one of the most important.

10. Analyse the importance of testing and evaluating a product throughout the iterative design process and on completion of the product. [12]

Marks will be awarded for the content of the answer and the quality of written communication.

The ~~interati~~ iterative design process is carried out in a cyclical form with ~~only~~ on-going changes being made throughout the design process. During iterative design, testing is a continuous element. Testing can involve the performance of different materials and finishes ~~and how appropriate they are for the~~ and also the function of the product and how well it meets the needs of the user.* After these aesthetic and function tests are carried out, they can then be evaluation. When evaluating a product, it can be compared to the design speciticification where all elements of the product can be analysed. During the stages of testing and analysing, the designer can recieve feedback from the client or members of the target audience, which will help to evaluate the design. After evaluation, any changes ~~that it~~ needed that have been identified can be implemented into the design process. The new prototype will then be tested and analysed again. Tests can be ~~both quati~~ either qualitative or ~~quantan~~ quantitative and will be identified in the design specification so that they can be

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* The strength of a model can be tested using a tensileometer.

evaluated appropriately. Testing and evaluating ~~throughout~~ are important throughout the design process as they are essential for one another and allow for the necessary action to be taken.* Testing and evaluating are important for the completition of a product as they ensure that the highest standard of product possible is available.

*, allowing the iterative design cycle to continue.

~~Focus groups~~
~~Consumer focused - presets~~
~~material charts~~
~~CAD simulations~~

• Catch errors early - not embedded

10. Analyse the importance of testing and evaluating a product throughout the iterative design process and on completion of the product. [12]

Marks will be awarded for the content of the answer and the quality of written communication.

It is crucial to test and assess products throughout their development to identify and remove any errors as soon as possible as a means of ensuring the product is the best it can possibly be. Frequently, products should have models and prototypes made to experiment and interact with the product in the real world. This could identify issues with material choices, sizes or features and feedback should be given to the designers to counter these, as well as include new ideas and point out successful features which shall remain. ~~CAD simulations~~

CAD simulations could offer insight to how the product and its construction withstand certain elements of force. This can be done alongside real-world testing like mentioned before.

Material tests can be conducted such as the Izod test or corrosion testing to evaluate the material selection and whether it is suitable for the product and its environment to ensure it doesn't fail.

Focus groups offer an incredibly useful insight to how potential customers perceive your product. This is often done later in development but can certainly be implemented earlier once ideas and prototypes are ready. They may also provide useful feedback.

Releasing the product into a small model market

10) may reflect how the product performs financially. This is theoretically important as testing a products success before release can ensure there are not unexpected outcomes upon release.

Consumer-centered design may also be a method adapted by the designers to receive insight on what consumers want from the product and they can evaluate and assess the work of the designers as it is happening to save time and wasted resources.

Implementing a range of the methods I have mentioned can lead to potentially very successful products, given the consumer is listened to and tests indicate the strong areas and weaknesses of the design. If this is done throughout development, issues may be avoided and resolved instead of having them remain and become embedded in the product, causing it to fail. Testing is absolutely crucial for a products development and success.