

Surname	Centre Number	Candidate Number
First name(s)		0



GCSE

3603U10-1



MONDAY, 19 JUNE 2023 – MORNING

DESIGN AND TECHNOLOGY

Unit 1

PRODUCT DESIGN

2 hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	10	
2.	20	
3.	25	
4.	15	
5.	20	
6.	10	
Total	100	

ADDITIONAL MATERIALS

In addition to this examination paper, you will need a calculator.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question. You are advised to divide your time accordingly.

The total number of marks available is 100.

You are reminded of the need for good English and orderly, clear presentation in your answers.

The quality of your written communication, including appropriate use of punctuation and grammar, will be assessed in your answer to question **5(c)**.

Answer **all** questions.

1. The auxiliary handle shown below has been designed to fit onto existing garden tools.



Auxiliary handle



Fits existing garden tools

- (a) Describe **one** 'market pull' factor that has resulted in the design of the auxiliary handle. [2]

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- (b) Anthropometrics involves studying human sizes. Explain **two** anthropometric considerations that the designer would need to include for the auxiliary handle to be successful. 2 × [2]

Consideration 1:

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Consideration 2:

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(c) The auxiliary handle retails at £4.00. Explain both the economic and social benefits that this brings the user. [4]

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2. The images below show a bicycle carrier which can be mounted to the roof of most vehicles.



(a) The frame of the bicycle carrier is made from aluminium tubing. Describe **two** benefits of using aluminium for the bicycle carrier. 2 × [2]

Benefit 1:

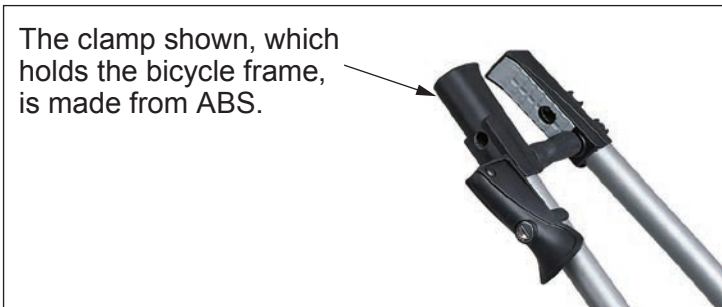
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Benefit 2:

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(b) Explain **two** properties of ABS that make it a suitable material for the clamp of the bicycle carrier. 2 × [2]

Property 1:

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Property 2:

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The two bicycle wheels are secured using a quick release rubber polymer strap as shown below.



(c) Describe the properties of the rubber polymer that make it appropriate for the quick release strap. [4]

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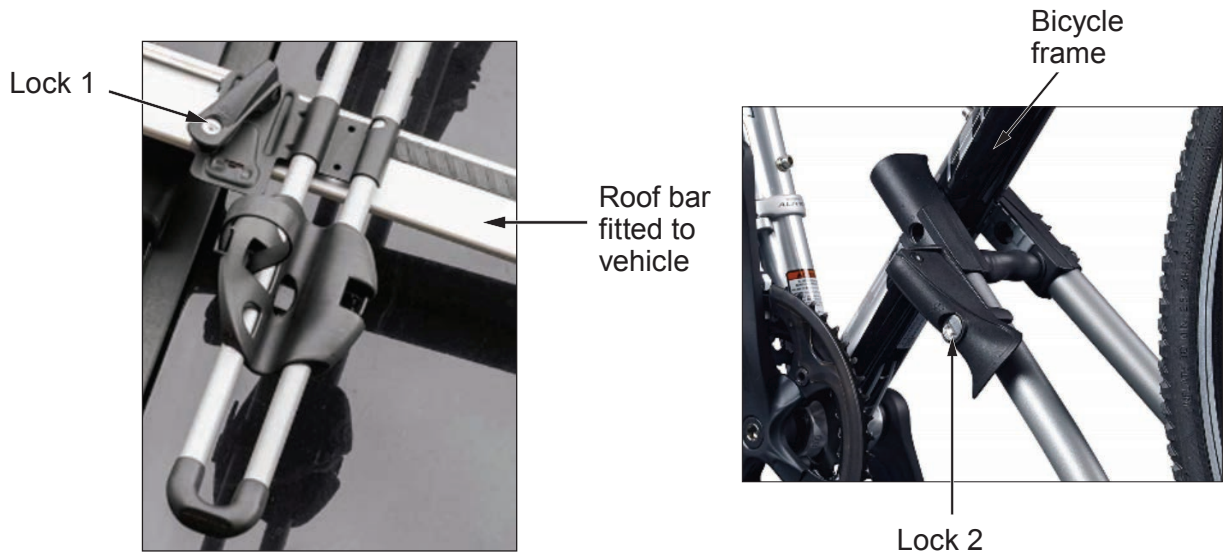
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(d) The bicycle carrier features two separate locks.



Describe why two separate locks are necessary.

[4]

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(e) The roof bar shown below is made from aluminium using the extrusion process.



Explain why extrusion is an effective production method for the roof bar.

[4]

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3. Study the details below of the 'power & play' product.



Features:

- Includes a 4000 mAh power bank with LED display and torch feature.
- 3-in-1 cable compatible with Apple Lightning, Apple 30-pin, and micro USB connections.
- Earbud style in-ear headphones with in-line microphone.

(a) (i) Explain why this product has been developed. [2]

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(ii) Describe the target market that the 'power & play' product was designed for. [2]

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(iii) Explain the reason for including the 3-in-1 charging cable. [3]

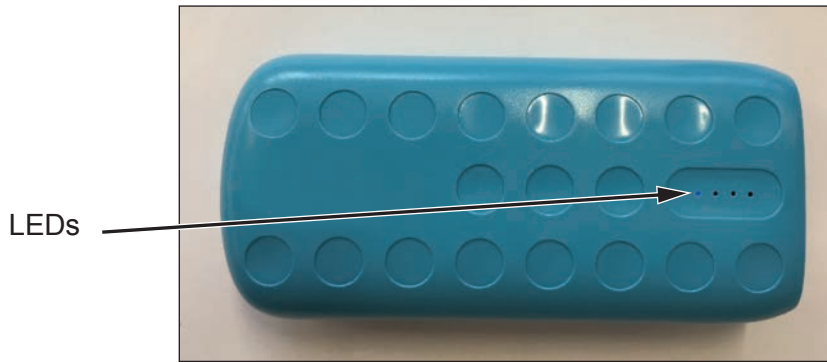
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(b) The LEDs shown in the image below indicate the charge in the power bank.



(i) Explain **one** benefit for including the indicator in the power bank. [2]

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(ii) Explain **one** limitation for including the indicator in the power bank. [2]

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(c) The 'power & play' is sold in a casing consisting of a two-part transparent outer shell.



(i) Give **one** reason why the manufacturer would choose to make the two-part casing transparent. [2]

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- (ii) Explain why transparent polycarbonate is a suitable material for injection moulding the two-part casing. [2]

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- (d) The white opaque insert fits inside the casing and securely holds the component parts of the 'power & play' product.



- (i) State the name of a suitable thermoplastic sheet for making the insert. [1]

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- (ii) Name and describe in detail a suitable manufacturing process that could be used to make the insert in a school workshop.

Manufacturing process: [1]

Detailed description of the named process: [4]

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The power bank displays important information for the user. The RoHS symbol shown on the product refers to Restriction of Hazardous Substances.



(e) Explain the reason for the symbol and the impact that this has on the manufacturer. [4]

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4. The portable self-assembly hockey goals shown below have been designed for primary school indoor games lessons.



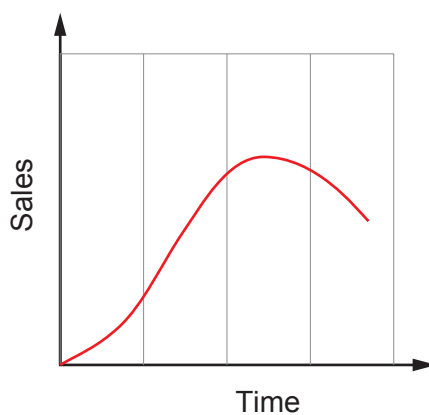
- (a) Explain **one** advantage to the primary school for purchasing the self-assembly hockey goals. [2]

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- (b) The product life cycle graph below shows how the sales of the self-assembly hockey goals occur over time.



- (i) Describe what happens to product sales at **each** of the 4 stages in the graph. 4 × [1]

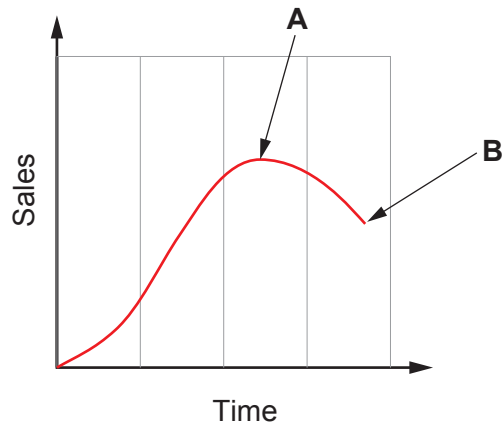
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(ii) Explain the impact on the manufacturer of the hockey goals at point **A**. [3]

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(iii) Explain **one** possible benefit to the consumer of purchasing the product at point **B**. [2]

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(iv) Explain what options the manufacturer has once the product has reached point **B** on the life cycle graph. [4]

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5. Study the images of Dyson products shown below.



(a) Analyse how the features of Dyson products have made them popular and successful, achieving market leader status. [5]

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(b) Analyse how Dyson products reflect a 'form follows function' design approach. [5]

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(c) The Design Council encourages designers to 'Discover, Define, Develop and Deliver'.

Evaluate how this is reflected in the iterative design process. [10]

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



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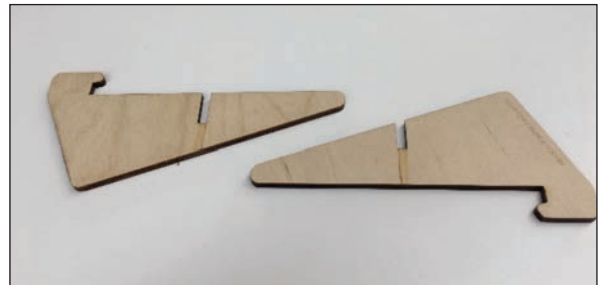
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6. The images below show the final prototype of an eco menu holder designed and made by a student.



- (i) The back of the menu holder is made from reclaimed laminate flooring. Explain how this can be considered sustainable. [4]

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- (ii) The legs of the menu holder are made using a laser machine and from 3 mm plywood. Describe **two** advantages to the designer of using laser cutting to make the legs. 2 × [2]

Advantage 1:

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Advantage 2:

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- (iii) Describe how a restaurant's logo could be added to the legs when laser cutting. [2]

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END OF PAPER

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