

Surname	Centre Number	Candidate Number
First name(s)		2



GCE AS/A LEVEL

2603U10-1



S23-2603U10-1

MONDAY, 15 MAY 2023 – AFTERNOON

DESIGN AND TECHNOLOGY – AS unit 1

Product Design

2 hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	8	
2.	8	
3.	8	
4.	8	
5.	8	
6.	40	
Total	80	

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ADDITIONAL MATERIALS

A calculator, ruler, pencil and coloured pencils.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Answer **ALL** questions.

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

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

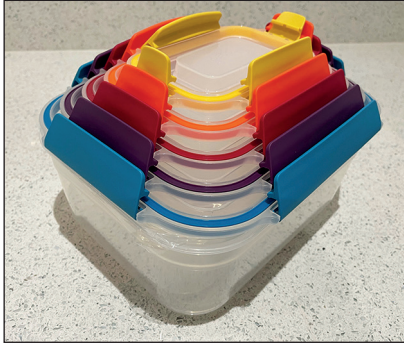
The number of marks is given in brackets at the end of each question or part-question. You are advised to divide your time accordingly.

The number of marks available is 80.

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**.

Answer **all** questions.

1. The set of polymer food storage boxes below includes a box and lid.



- (a) Discuss how the design of the polymer food storage boxes uses space effectively. [4]

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- (b) The food storage containers have been injection moulded.

- (i) Explain **one** essential requirement of the surface finish of the containers for the user. [2]

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- (ii) Describe a critical feature of the mould for the manufacture of the containers. [2]

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2. Material development is advancing, and designers have access to a range of new smart materials.

(a) Explain the term 'smart materials'.

[2]

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(b) Name a smart material that could be used in the lenses of the product shown below. [1]

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(c) The frames are made from a shape memory alloy. Discuss how this smart material will improve the functionality and lifespan of the frame. [5]

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4. The aluminium case for a laptop computer is CNC milled from one piece of solid aluminium.



- (a) Describe the benefits to the manufacturer of using a CNC miller to make the aluminium case. [4]

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- (b) Justify the use of aluminium for the case. [4]

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5. The trainer shown below has been made from ocean waste.



Evaluate the ethical and moral reasons for developing products from ocean waste.

[8]

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

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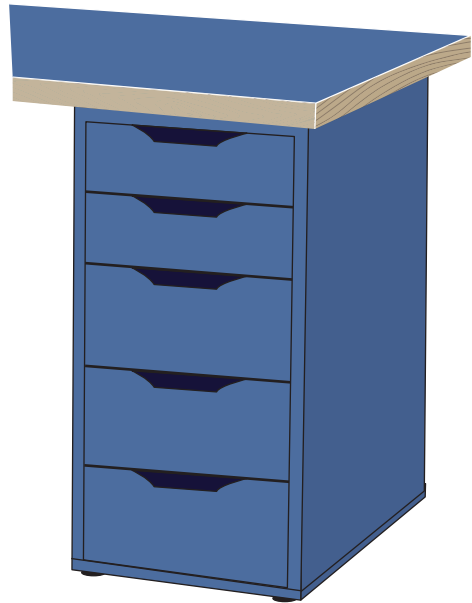
6. Drinks can easily be spilt in many different locations both indoors and outdoors.

(a) Design Brief

You are asked to design a product that will securely hold a drinking cup like the one below which will prevent spillage of liquid. The product must attach to the edge of a table or desk.



Drinking cup



Desk



Outdoor table

Specification

Your design proposal must:

- Securely attach to any fixed surface up to 40 mm in thickness
- Hold a container up to 75 mm in diameter
- Be easily attached and removed with one hand
- Be strong and lightweight for ease of transportation
- Include appropriately named materials

On page 12 produce a design for your product.

You are required to use a mixture of 2D and 3D annotated freehand drawings.

Marks will be awarded for:

- | | | |
|-------|---|------|
| (i) | An innovative functioning product that meets the design brief and specification. | [6] |
| (ii) | Annotating your product to show how it can be easily attached, removed, hold the cup securely and be transportable. | [10] |
| (iii) | Justification of two appropriately named materials. | [4] |
| (iv) | The quality/presentation and communication of your 2D/3D drawings. | [4] |

Design Proposal

You are not expected to render, colour or shade your design.

Justification of named materials:

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- (b) In the space below produce a working drawing of your design proposal.
Note: You must include all dimensions and specific details.

[8]

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(c) Modelling and testing of ideas are an essential part of the iterative design process.

- (i) Discuss the benefits of modelling and testing ideas in the development of a product.

[4]

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- (ii) Explain **two** benefits of user trials prior to commercial manufacture.

[4]

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END OF PAPER

