Surname	Centre Number	Candidate Number
First name(s)		2

GCE AS

B602U10-1

Z22-B602U10-1

MONDAY, 16 MAY 2022 – AFTERNOON

DESIGN AND TECHNOLOGY – AS component 1
Product Design

2 hours 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**10**	
2.	**15**	
3.	**8**	
4.	**10**	
5.	**7**	
6.	**10**	
7.	**10**	
8.	**9**	
9.	**9**	
10.	**12**	
Total	**100**	

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ADDITIONAL MATERIALS

You will need a ruler and a calculator.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

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(s) at the back of the booklet, taking care to number the question(s) correctly

INFORMATION FOR CANDIDATES

When and where appropriate, answers should be amplified and illustrated with sketches and/or diagrams.

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 100.

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

You may use a calculator in this examination.

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Answer **all** questions.

1. The images below show a soap dispenser made from brushed aluminium.



(a) Describe **two** properties of brushed aluminium that make it a suitable material for the soap dispenser.

Property 1: [2]

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Property 2: [2]

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(b) Describe **two** different aesthetic features evident in the soap dispenser.

Aesthetic feature 1: [2]

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Aesthetic feature 2: [2]

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(c) Explain **one** advantage of obtaining a 'registered design' to the manufacturer of the soap dispenser. [2]

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2. A 3D printed rapid prototype of a can holder is shown below.



(a) Justify **two** advantages to the manufacturer of using a 3D printer to rapid prototype the can holder.

Advantage 1: [2]

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Advantage 2: [2]

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(b) Name a material used to 3D print the can holder and explain why this material is suitable. [2]

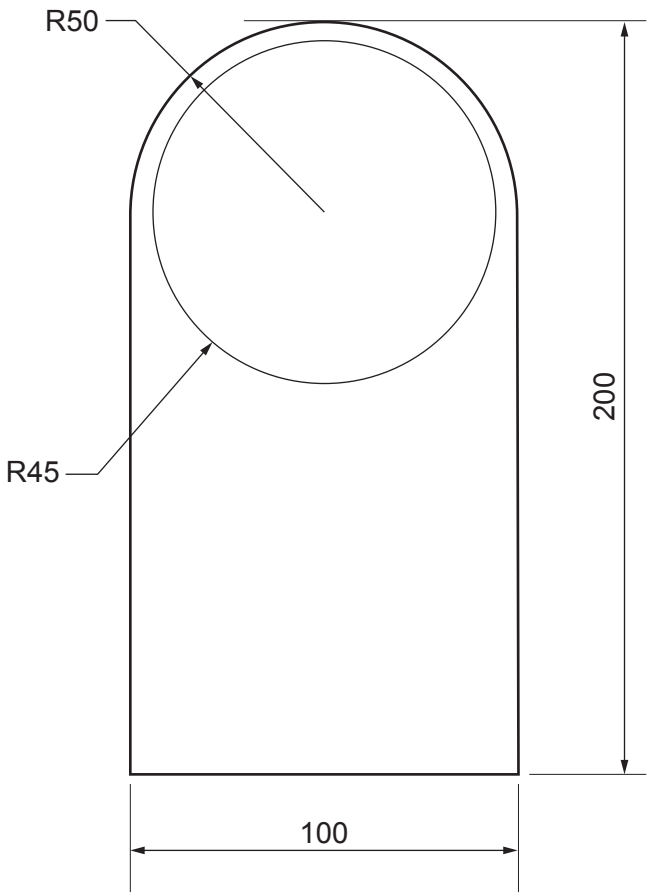
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(c) The diagram below is a front view of the product showing measurements in millimetres. Diagram not to scale.



Calculate the total surface area of the front view of the product. [4]
(Show all workings.)

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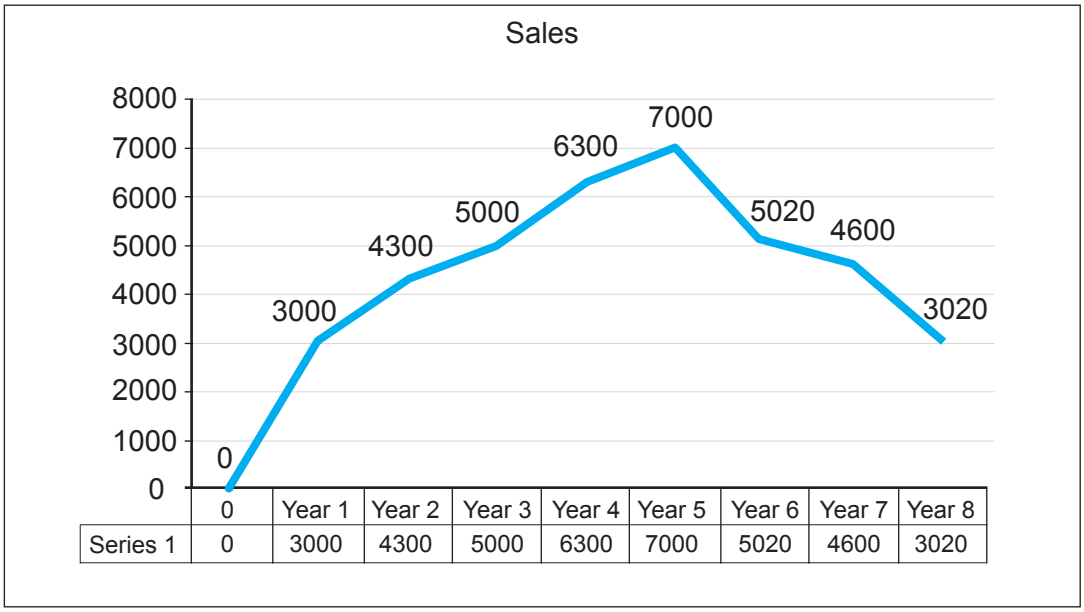
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(d) The graph below shows the number of annual sales of the can holder over an eight-year period.



(i) Calculate the mean sales figures between Year 2 and Year 5 inclusive. [2]
(Show all workings.)

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(ii) Calculate the predicted sales figure for Year 9 if sales continue to drop at the same rate as Year 8. [3]
(Show all workings and round your answer to the nearest whole number.)

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3. Study the image below showing a water bottle spray.



(a) Use notes and diagrams to describe how the water spray nozzle has been manufactured using injection moulding. [4]

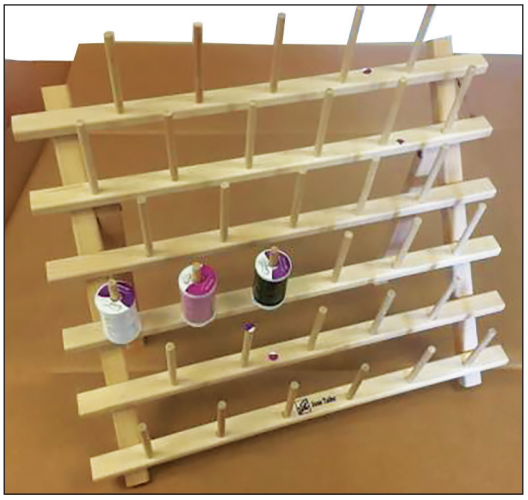
(b) Justify why polypropylene is a suitable material for the water spray nozzle. [4]

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4. The cotton reel storage stand below is made from beech.





(a) Explain why beech is a suitable material for this product. [2]

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(b) (i) The cotton reel storage stand costs £2.43 to manufacture. Calculate the selling cost of the cotton reel storage stand if the manufacturer makes 30% profit. (Show all workings.) [2]

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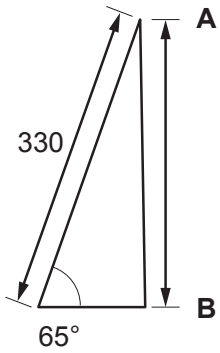
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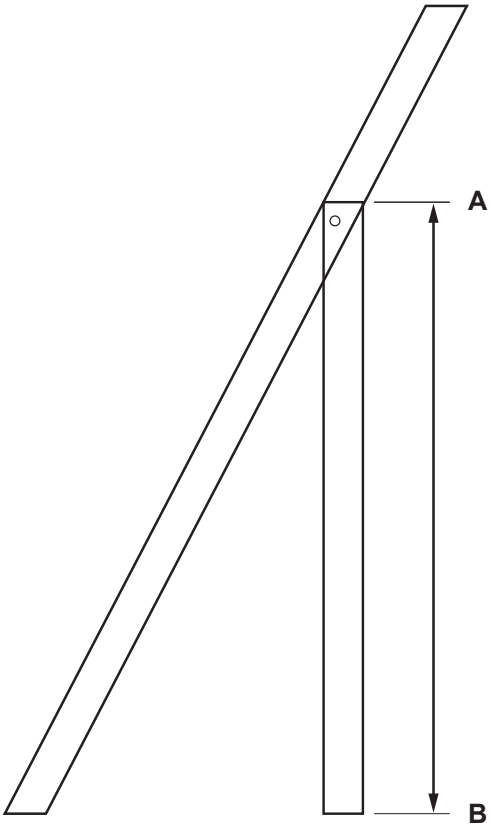
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(ii) Below is a working drawing of the adjustable leg to enable the product to stand. Calculate the length of the leg labelled A–B. [4]
(Show all workings.)





All dimensions in mm not to scale.

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(c) The manufacturer uses a jig to drill the holes in the beech cotton reel stand. Explain **one** advantage to the manufacturer of using a drilling jig. [2]

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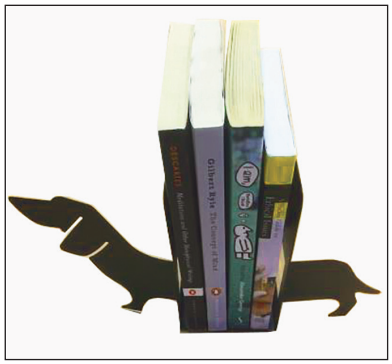
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5. The images below show bookstands made from sheet steel.





(a) Describe **one** reason why stamping the shape out of the sheet steel is a suitable manufacturing method for this product. [2]

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(b) Explain the benefits of using standard steel stock forms to the manufacturer of the bookstands. [5]

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6. (a) Explain what primary and secondary research strategies a designer could use prior to redesigning the cordless drill shown below. [5]



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(b) Analyse how the international standards information used on the drill offers protection to the consumer. [5]



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7. Composite materials such as fibreglass, carbon fibre and kevlar/aramid are used in many ways on modern bikes.





(a) Analyse how composite materials are used when manufacturing modern bikes. [5]

(b) Evaluate the impact of using bought-in or standardised part-assembled components to the manufacturer of modern bikes. [5]

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8. Quality Control (QC) and Quality Assurance (QA) are critical when manufacturing products.



Explain the difference between Quality Control (QC) and Quality Assurance (QA) when manufacturing the hair straighteners shown. [9]

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9. Below are images of two kitchen work surfaces.



Block Hardwood



Veneered Chipboard

Evaluate the environmental advantages and disadvantages of using hardwoods compared to manufactured materials for products such as kitchen work surfaces. [9]

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10. Ergonomics and anthropometrics play a key role in the design of products such as those shown below.







Discuss how ergonomic principles and anthropometric data are used to successfully design effective products. [12]

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END OF PAPER

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