OCR
Oxford Cambridge and RSA

Wednesday 7 June 2023 – Afternoon

A Level in Design and Technology: Product Design

H406/01 Principles of Product Design

Time allowed: 1 hour 30 minutes

*H406031*0926*

You can use:
- a ruler (cm/mm)
- a scientific calculator
- geometrical instruments

H406/01

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number | | | | | | Candidate number | | | | |

First name(s) _____

Last name _____

INSTRUCTIONS
- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. You can use extra paper if you need to, but you must clearly show your candidate number, the centre number and the question numbers.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.

INFORMATION
- The total mark for this paper is **80**.
- The marks for each question are shown in brackets **[ ]**.
- Quality of extended response will be assessed in questions marked with an asterisk (*****).
- This document has **20** pages.

ADVICE
- Read each question carefully before you start your answer.

1 A controller is a handheld input device used with video games on a computer or console.

Fig. 1.1 shows a controller with push and toggle buttons.

Fig. 1.2 shows a controller in use and from different viewpoints.

Fig. 1.1

Fig. 1.2

(a) Explain **two** ways in which anthropometric data has been used in the design of the controller.

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[4]

(b) Identify **two** ways in which the design of the controller is inclusive.

Justify **each** of your answers.

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[4]

(c) A new design for a controller is being launched.

(i) Identify and describe **two** methods companies use to predict future trends.

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[4]

(ii) Describe how the design of products, like the controller, are influenced by brand identity.

Use specific product examples in your answer.

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(iii) Discuss the importance of using a marketing strategy when launching new products such as the controller.

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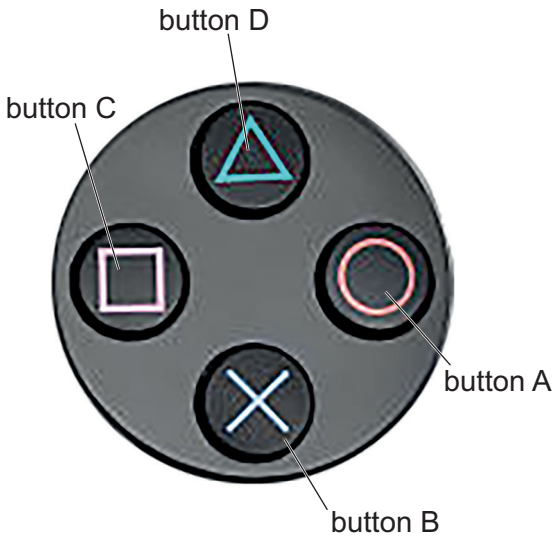
..... **[6]**

(d) **Fig. 1.3** shows the design of the controller buttons in a circular array.

Fig. 1.4 shows how the designer has mapped out one of the buttons onto a grid.



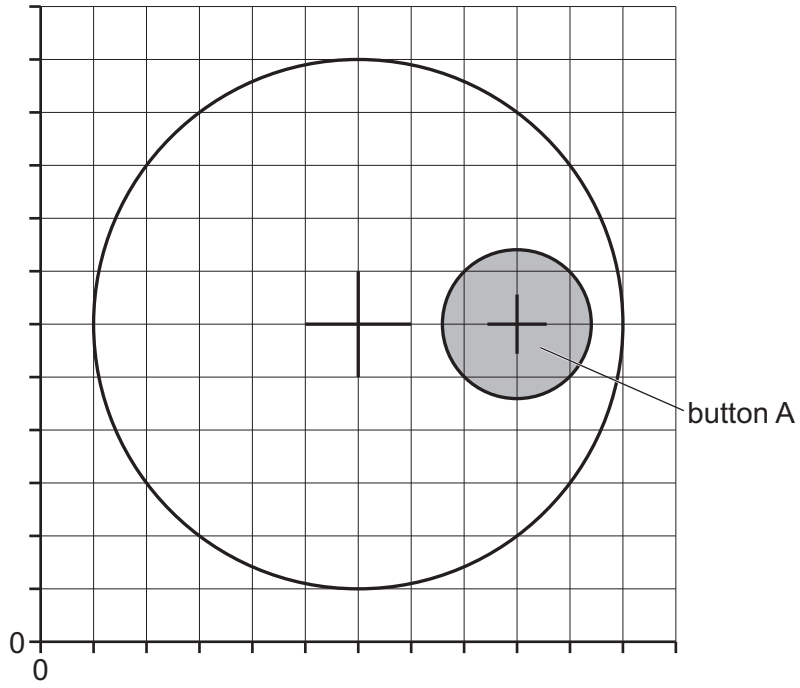


Fig. 1.3 **Fig. 1.4**

(i) Plot buttons B, C and D onto the grid to complete the circular array. **[3]**

(ii) Use the grid to state the coordinates for the centre point of buttons A, B, C and D. **[3]**

Button A centre point = (,)

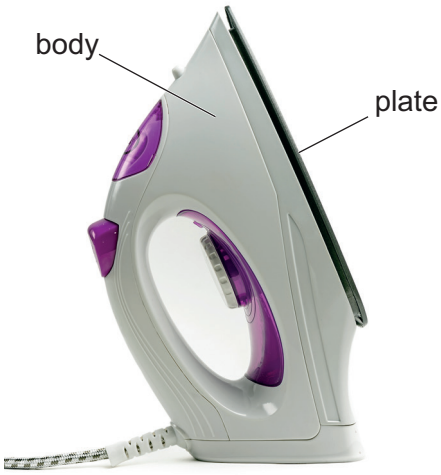
Button B centre point = (,)

Button C centre point = (,)

Button D centre point = (,)

2 An electric iron is used to smooth creases in clothes using a hot plate.

These are images of an electric iron.



(a) Identify a suitable thermopolymer for the body of the iron.

..... **[1]**

(b) Identify a suitable method of commercial manufacture for the body of the iron.

Justify your answer.

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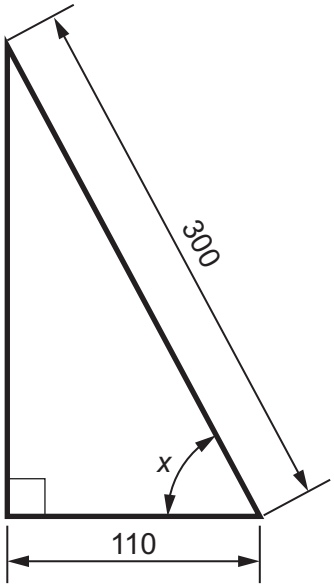
..... **[2]**

These images show the angle of the plate when the electric iron is safely stood up on a flat surface.

All measurements are given in mm.



(not to scale)

(c) Calculate angle *x*. Give your answer to the nearest degree and show your working. **[5]**

x ..... °

(d) A shop buys 240 electric irons for £10.00 each.

The shop sells 90% of these irons for £24.99 each. **The remaining irons are not sold.**

(i) Calculate the total profit that the shop would make from the sale of the electric irons. Give your answer in £ and show your working.

You **must** take into account the initial stock that was purchased. **[4]**

Total profit £ .....

(ii) Use your answer to **part (d)(i)** to calculate the overall percentage profit that would be made. **[1]**

Overall percentage profit ..... %

(e) During routine quality control checks of a new batch of irons a fault is identified. Of the 1500 irons tested the fault occurs 3 times. Calculate the probability of an iron having the identified fault. **[1]**

Probability .....

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3 Developments in design practice and thinking have been influenced by the consideration of a wide range of factors.

(a) Identify and explain **two** effects of using depleting raw materials in design.

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[4]

(b)* Discuss the implications and opportunities of considering planned obsolescence when designing products.

Use specific examples of products in your answer. **[8]**

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4 **Fig. 4.1** shows a basketball hoop in use.

Fig. 4.2 shows a diagram of the basketball hoop key dimensions. All dimensions are given in mm.

Fig. 4.3 shows the components of the basketball hoop which include:

- the ring
- bracket part A which attaches to the ring
- bracket part B which houses a mechanism
- bracket part C that is used to attach the bracket to the wall.

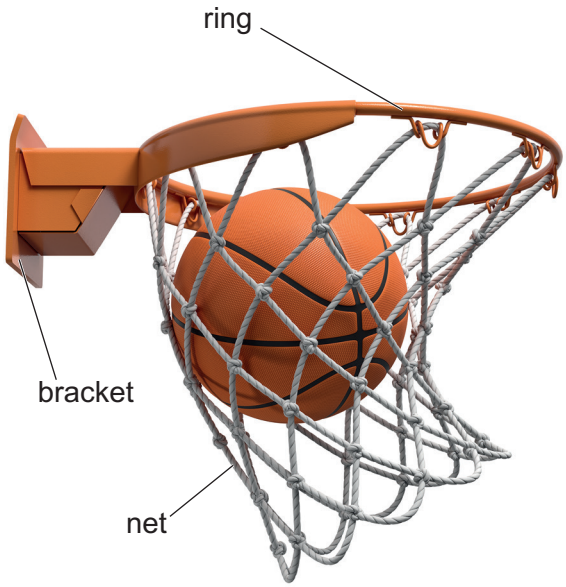

Fig. 4.1

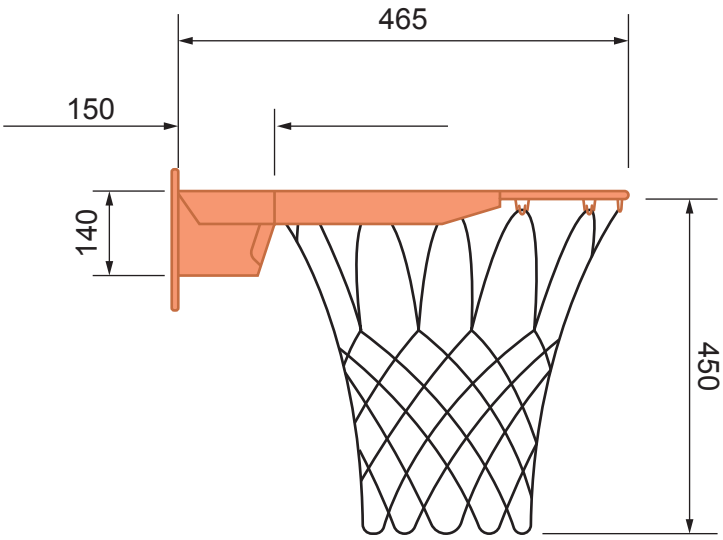

Fig. 4.2
(not to scale)

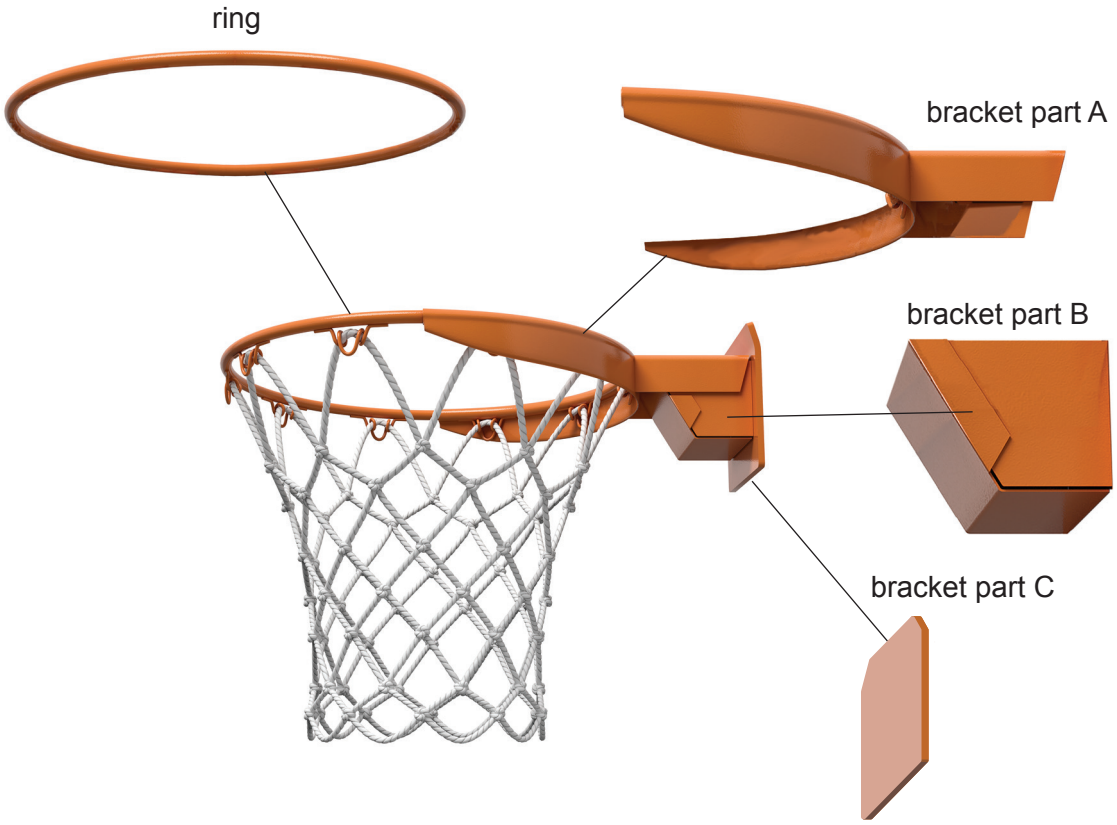

Fig. 4.3

(a) (i) Identify a suitable ferrous metal for the ring.

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(ii) Explain why a ferrous metal has been used.

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..... **[2]**

(b) (i) Identify a suitable synthetic fibre for the net.

..... **[1]**

(ii) Explain why a synthetic fibre has been used.

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..... **[2]**

(c) Identify and explain **two** ways in which the design of the basketball hoop could be optimised.

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[4]

(d) The ring and bracket components shown in **Fig. 4.3** are manufactured as a batch of 1000 from metal.

(i) Use annotated sketches and/or notes to show how the **ring** could be manufactured.

Identify any relevant specialist tooling and quality control checks. **[5]**

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(ii) Use annotated sketches and/or notes to show how the **bracket** shown in **Fig. 4.3**, comprising of part A, part B and part C, could be manufactured and attached to the ring.

Identify any relevant specialist tooling and quality control checks. **[8]**

(e) Identify a suitable surface finish for the ring and bracket components.

Justify why this surface finish would be used.

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END OF QUESTION PAPER

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