Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2022

Technology and Design

Unit 2

Option C:
Product Design

[GTY23]

GTY23

THURSDAY 16 JUNE, AFTERNOON

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Questions which require drawing or sketching should be completed using an H.B. pencil.
All written questions must be completed using black ink only.
Do not write in pencil or with a gel pen.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.
Quality of written communication will be assessed in Question **8**.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

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Answer **all** questions

1 **(a)** Give **two** examples of standardised components used in industry.

1. _____

2. _____ [2]

(b) Explain what a standardised component is.

_____

_____ [2]

(c) Outline **three** reasons for a manufacturing company to make use of standardised components in its products.

1. _____

_____

2. _____

_____

3. _____

_____ [3]

(d) A manufacturing company is considering relocating its production facility to another country.

Give **three** specific reasons why the manufacturing company would consider such a move.

1. _____

_____

2. _____

_____

3. _____

_____ [3]

2 **Market research**, **market pull** and **technology push** are important influences in the development of new or improved products.

(i) Name **two** types of data sources that are used in market research.

1. _____

2. _____ [2]

(ii) Outline what is meant by Market Pull and Technology Push.

Market Pull _____

_____ [1]

Technology Push _____

_____ [1]

(iii) With reference to a specific product, explain how Market Pull has influenced its development.

Product _____

Market Pull influence _____

_____

_____ [2]

(iv) With reference to a specific product, explain how Technology Push has influenced its development.

Product _____

Technology Push influence _____

_____

_____ [2]

[Turn over

3 In Product Design, a number of techniques are used to help in the design process. Describe each of the following techniques and outline **two** specific features of each technique to show the value of using them in the design process.

(a) Disassembly of existing products

Description _____

_____

_____

Feature 1 _____

_____

Feature 2 _____

_____ [4]

(b) User Trips

Description _____

_____

_____

Feature 1 _____

_____

Feature 2 _____

_____ [4]

(c) Physical Models

Description _____

_____

_____

Feature 1 _____

_____

Feature 2 _____

_____ [4]

[Turn over

4 **Fig. 1** shows the Ella Plain Armchair that is part of the Workhouse soft seating furniture produced and designed by Bethan Gray.

Photograph removed due to copyright

Fig. 1

(a) **(i)** Look at the Ella Plain Armchair in **Fig. 1** and describe **two** features that are associated with its design.

1. _____

_____ [1]

2. _____

_____ [1]

(ii) Discuss why the Ella range is manufactured entirely in the UK.

_____

_____

_____

_____ [2]

(b) **(i)** Describe **two** facts associated with the work of Bethan Gray which explain her successes in various Designer awards.

1. _____

_____

2. _____

_____ [2]

(ii) Discuss **two** facts associated with the work of Bethan Gray which explain why partnerships and collaborations have been important to her.

1. _____

_____

2. _____

_____ [2]

(iii) Name **one** other partnership apart from Workhouse that Bethan Gray has collaborated with.

_____ [1]

5 Radiators are used in the home to provide heat. **Fig. 2** shows a typical household radiator. The radiator has a front and rear panel joined together to form a cavity to allow for the flow of water.

Source: © Getty Images

Fig. 2

(a) **(i)** Suggest a method of producing the radiator panels.

_____ [1]

(ii) Name a suitable material for a modern radiator.

_____ [1]

(iii) The radiator panels are shaped as shown with a series of grooves. Explain why this is so.

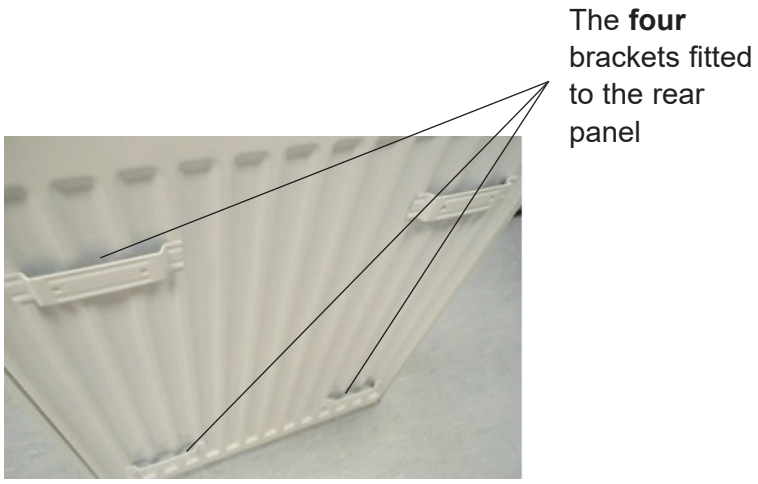
_____

_____

_____ [2]

(iv) Four brackets are attached to the rear panel of the radiator as shown in **Fig. 3**. Suggest how the brackets could be joined to the rear panel of the radiator.

_____ [1]



Source: Principal Examiner

Fig. 3

(v) Why are these brackets fitted on the rear panel?

_____ [1]

(b) A manufacturer mass produces a number of radiators from one specific material referred to as Material **A** and a number of radiators from another specific material referred to as Material **B**. The amount of material used for both radiators is exactly the same. Each radiator has a front and rear panel.

Using the information given below, calculate the difference in cost per radiator between Material **A** and Material **B**.

- Metal Sheet Size (for both Materials): 2400 × 1200 × 1.5 mm
- Radiator Panel size (for both Materials): 600 × 600 × 1.5 mm
- Material **A** Sheet Cost: £150
- Material **B** Sheet Cost: £100

Candidates need to show their working out in the space below.

Answer _____ [4]

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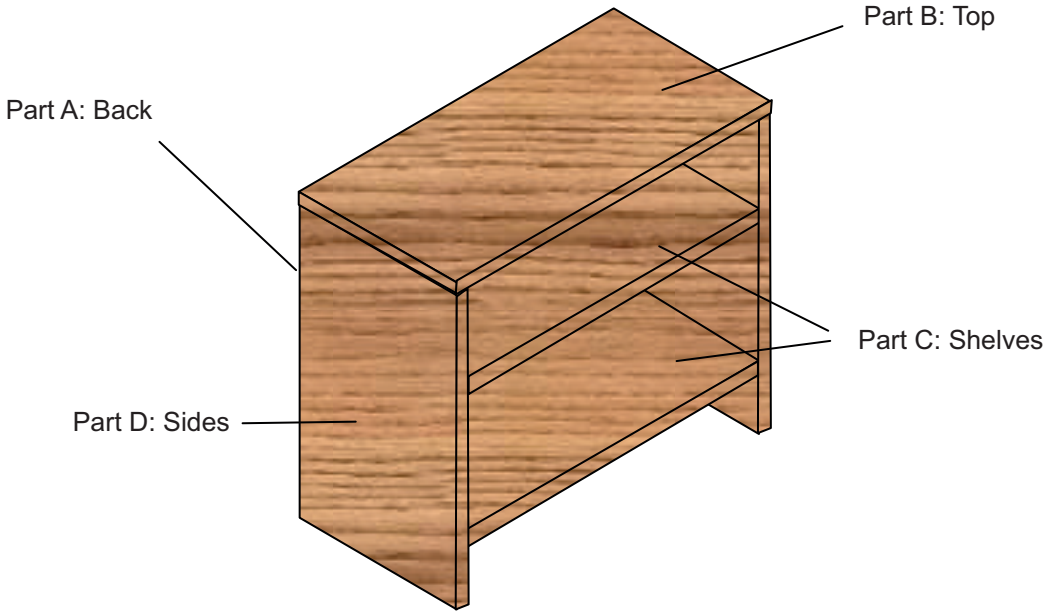
(c) Many households use the radiators in the home to dry clothes, especially when the weather is unsuitable to dry clothes outside. Using clear annotated sketches and construction detail, in the space below:

- Design an attachment which could be fitted to the radiator to allow clothes to be dried.
- The attachment must have the capacity to hold **4** rows of clothes.
- The attachment must enable the clothes to sit at a distance of 30 mm from the next row.
- Show how the attachment could be secured to the radiator.
- Reference should be made to all materials used.

[10]

[Turn over

6 **Fig. 4** shows a bookcase made from veneered chipboard.



Source: Principal Examiner

Fig. 4

(a) Complete the chart in **Table 1** for the cost of materials and components needed for the manufacture of the bookcase, including the overall total.

Table 1

Part	Material	Sizes in mm	No. off	Price/unit	Cost £
A	Veneered chipboard	870 × 600	1	£10 per m²	5.22
B	Veneered chipboard	900 × 200	1	£10 per m²	
C	Veneered chipboard	870 × 185	2	£10 per m²	
D	Veneered chipboard	600 × 200	2	£10 per m²	
E	Cam locks	Ø16	12	10p each	1.20
F	M4 dowels	35	24	£4 per 100	
G	Iron on veneer edging	5000	1	48p per metre	
H	Tin of varnish	250 ml	1	£4.50 per tin	4.50
				Total Cost	

[6]

[Turn over

(b) Each bookcase is sold, fully assembled, at a cost of £60 plus VAT (Value Added Tax). If VAT is 20%, calculate the overall cost of the bookcase.

Candidates need to show their working out in the space below.

Answer _____ [2]

(c) In the first month of production 1500 bookcases were sold. Each bookcase gains an overall 30% profit for the company based on the sale price of £60.

What is the overall profit for that month?

Candidates need to show their working out in the space below.

Answer _____ [3]

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(Questions continue overleaf)

7 **Fig. 5** shows a plastic chair. The chair is manufactured by the injection moulding process.

Source: © Getty Images

Fig. 5

(a) State **two** design features of the chair shown in **Fig. 5**.

1. _____

_____ [1]

2. _____

_____ [1]

(b) Outline **three** reasons for using the injection moulding process in the production of the chair.

1. _____

_____

_____ [2]

2. _____

_____

_____ [2]

3. _____

_____

_____ [2]

(c) State **two** anthropometric features that need to be considered when designing the chair in **Fig. 5**.

1. _____

_____ [1]

2. _____

_____ [1]

8 **Fig. 6** shows a layout of a baby's bedroom. A night light is required for the bedroom. The night light is to be designed to illuminate the room with a soft glow, using LEDs, to enable the baby to sleep. The light must have an on/off switch and a timer switch. Using an annotated sketch or sketches, design a free-standing night light that is powered by a 9 volt battery.

Details of circuit/electronic systems are not required.

Source: © Getty Images

Fig. 6

The design solution should show evidence of the following features:

- Good quality annotated sketches, giving consideration to line, shape, form and proportion.
- It should be free-standing, aesthetically pleasing and suitable for a baby's bedroom.
- It must have an on/off switch and a timer switch. The 9 volt battery must have its own compartment to enable it to be safely removed and allow the battery to be changed.
- It should identify and justify the choice and thickness of material(s).
- It should identify and justify the main manufacturing techniques used in the construction of the night light.
- It should include three key dimensions to indicate size and proportion.

Use the following two pages for your answer. [20]

Quality of written communication will be assessed in this question.

[Turn over

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THIS IS THE END OF THE QUESTION PAPER

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

Examiner Number

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