AQA

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

A-level

DESIGN AND TECHNOLOGY: PRODUCT DESIGN

Paper 2 Designing and Making Principles

Wednesday 12 June 2024 Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- normal writing and drawing instruments
- a scientific calculator.

Instructions
- Use black ink or black ball-point pen. Use pencil only for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- There are 30 marks for **Section A** and 50 marks for **Section B**.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8–9	
10	
11	
12–13	
14	
15	
TOTAL	

Do not write outside the box

Section A – Product Analysis

Answer **all** questions in this section.

0 1 **Figures 1** and **2** show two chairs.

Figure 1

Figure 2

	Figure 1	Figure 2
Materials	Polypropylene, powder-coated low carbon steel, beech	Beech
Joining methods	Allen key bolts and locking nuts	Traditional wood joints
Applied finish	Self-finishing thermoplastics, powder-coated steel and clear varnished timber	Acrylic paint

Analyse **and** evaluate the suitability of each of the two chairs shown for large-scale production.

[12 marks]

Do not write outside the box

12

Turn over for the next question

Do not write outside the box

0 2 Explain how reliance on global supply chains can affect the development of a product.

In your answer you should refer to:

- materials
- energy
- product cost.

[6 marks]

6

Do not write outside the box

0 3 Outline the key features required in an instruction booklet for self-assembly furniture.
[6 marks]

6

Turn over for the next question

Do not write outside the box

0 4 A shipping container measures 12 m × 2.5 m × 2.5 m and costs £3000 to transport from manufacturer to retail store.

A flat-packed chair is packaged in a single box measuring
600 mm × 600 mm × 600 mm

A full container of flat-packed chairs is shipped.

Calculate in pounds and pence the shipping cost of a single, flat-packed chair.

Show your working.

[3 marks]

Answer £ _____

3

Do not write outside the box

0 5 State **three** ways manufacturers can reduce the environmental impact of the packaging they use.

[3 marks]

1 _____

2 _____

3 _____

3

Turn over for Section B

Do not write outside the box

Section B – Commercial Manufacture

Answer **all** questions in this section.

0 6 **Figure 3** shows an initial Styrofoam prototype model of a hairdryer.

Figure 3

Analyse and evaluate the suitability of **different** prototyping methods for further development of the hairdryer prototype model shown in **Figure 3** for production.

In your answer you should refer to:

- modelling materials
- virtual prototyping
- physical prototyping.

[12 marks]

Do not write outside the box

12

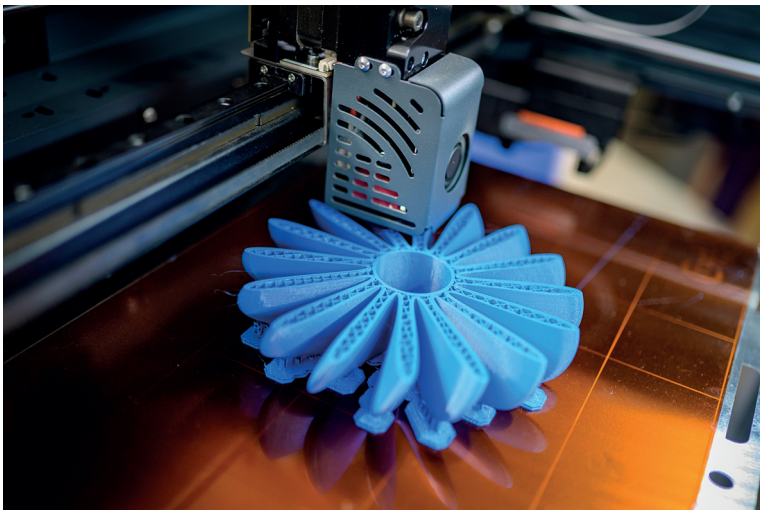
Turn over for the next question

Do not write outside the box

0 7 Describe how a 3D component would be designed and produced using the 3D printing process shown in **Figure 4**.

[6 marks]

Figure 4



6

Do not write outside the box

0 8 Describe the term 'acceptable tolerance'.

[3 marks]

0 9 Describe a quality control check that may be performed on a production line to ensure all products conform to acceptable tolerances.

[2 marks]

5

Turn over for the next question

Do not write outside the box

1 0 Describe how a designer could apply a user-centred design approach when developing a toaster for a family home.

[6 marks]

6

Do not write outside the box

1 1 Consumers increasingly want to repair electronic products rather than replace them.

Discuss what designers and manufacturers are doing to enable consumers to repair their electronic products.

[6 marks]

6

Turn over for the next question

Do not write outside the box

1 2 State **two** methods used when evaluating a prototype product.

[2 marks]

1 _____

2 _____

1 3 Screws are supplied in bags of 200 g (+/−2%)

Each screw has a mass of exactly 3 g

Calculate the maximum and minimum number of whole screws in a bag.

Show your working.

[3 marks]

_____

_____

_____

_____

_____

_____

Maximum number of screws = _____

Minimum number of screws = _____

5

Do not write outside the box

1 4 Name **two** specific eco labels relating to energy use **and** describe their use.

[2 × 3 marks]

Eco label 1 _____

Description of use _____

_____

_____

_____

Eco label 2 _____

Description of use _____

_____

_____

_____

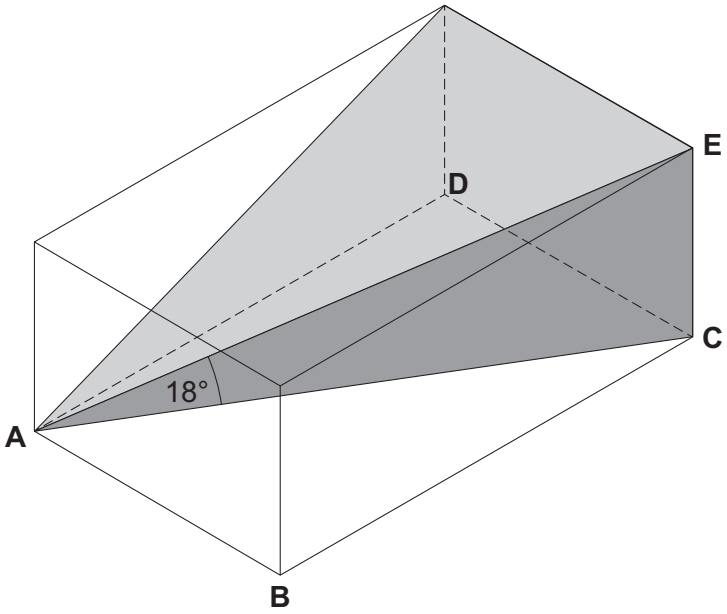
6

Turn over for the next question

Do not write outside the box

1 5 **Figure 5** shows a Styrofoam block.

Figure 5



The Styrofoam block is cut from a cuboid.

The length (**AE**) is 25 cm

(**AE**) makes an angle of 18 degrees with the base of the cuboid (**ABCD**)

The area of the base of the cuboid is 215 cm^2

The volume of the Styrofoam block model is $\frac{1}{3}$ of the cuboid volume.

Calculate the volume of the Styrofoam block model.

Show your working.

[4 marks]

Answer = _____ cm^3

4

END OF QUESTIONS

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**

Do not write outside the box

Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**

Do not write outside the box

Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**