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

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	
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12	
13	
14	
15	
TOTAL	

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Section A – Product Analysis

Answer **all** questions in this section.

0 1 **Figures 1** and **2** show two step ladders.

Figure 1
Wooden step ladder

Figure 2
Aluminium step ladder

	Figure 1	Figure 2
Main manufacture process	Wood wastage techniques	Aluminium extrusion
Joining methods	Adhesive and screws	Nuts and bolts
Applied finish	Clear varnish	Self-finishing

Compare and evaluate the two step ladders shown.

In your answer you should refer to:

- design safety
- ergonomic factors.

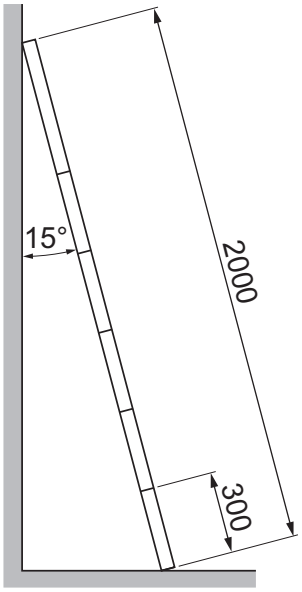
[12 marks]

Do not write outside the box

12

0 2 **Figure 3** shows a 2D view of a 2 metre step ladder.

Figure 3



Not drawn to scale

The step ladder is angled at 15 degrees from the vertical wall and stands on a horizontal floor.

The ladder has 5 steps with even spacing of 300 mm between each step.

The first step is 300 mm from the bottom of the ladder.

Calculate the vertical height of the 5th step from the floor to the nearest mm.

[4 marks]

Do not write outside the box

Answer _____ mm

4

0 3 Describe the testing procedures required during product development to ensure a step ladder is safe for sale.

[6 marks]

6

Turn over ▶

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0 4 **Figure 4** shows a range of safety instructions used on a loft ladder.

Figure 4

Analyse and evaluate how the images shown in **Figure 4** effectively communicate the safety instructions to the user.

[6 marks]

Do not write outside the box

6

0 5 State **two** specific forms of anthropometric data used in the development of a step ladder.

[2 marks]

1 _____

_____

2 _____

_____

2

Turn over for Section B

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Section B – Commercial Manufacture

Answer **all** questions in this section.

0 6 State the **two** types of nutrient associated with the circular economy.

[2 marks]

1 _____

_____

2 _____

_____

2

0 7 Outline how a manufacturer could personalise a mass-produced product to an individual customer's requirements.

[6 marks]

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6

Do not write outside the box

0 8 Explain the benefits of using laser scanning for quality control in mass production.

[6 marks]

6

Turn over for the next question

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0 9 **Figure 5** shows some packaging for biscuits.

Figure 5

Component	Material
Box	Carton board
Polymer wrapper	Low density polyethylene (LDPE) film
Biscuit tray	Polyethylene terephthalate (PET)

Analyse and evaluate the environmental impact of the **three** packaging components shown.

In your answer you should refer to:

- raw materials
- product manufacture
- disposal/end of life.

[12 marks]

Do not write outside the box

12

1 0 State **two** reasons why a barcode is used on packaging.

[2 marks]

1 _____

_____

2 _____

_____

2

Turn over ▶

1 1 **Figure 6** represents the coverage of different printing ink colours on some packaging.

Figure 6

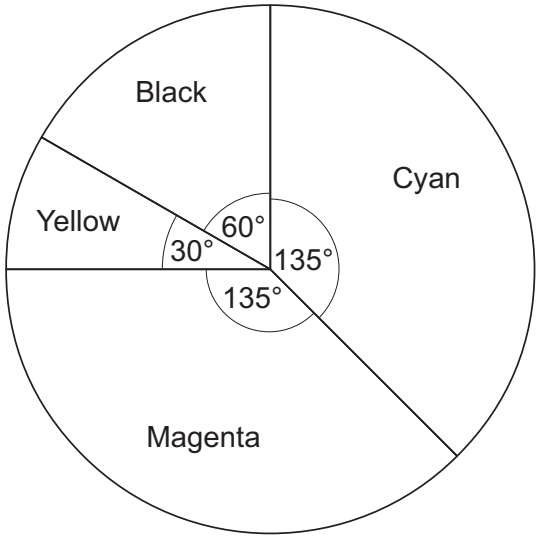

Table 1 shows the cost of different cartridges and the ink areas each cartridge can cover.

Table 1

Colour	Cartridge cost (£)	Surface coverage per cartridge (m^2)
Black	10.50	8 m^2
Cyan	16.00	12 m^2
Magenta	16.00	12 m^2
Yellow	16.00	12 m^2

The packaging has a surface area of 0.6 m^2

1 1 . 1 Show that **five** yellow cartridges will be needed for **1000** packages.

[3 marks]

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1 1 . 2 Calculate the total cost of full cartridges needed for **1000** packages.

[3 marks]

Answer £ _____

6

Turn over for the next question

Do not write outside the box

1 2 . 1 Define the purpose of the RoHS directive.

[2 marks]

_____

_____

_____

_____

1 2 . 2 State **two** specific materials that are restricted under the RoHS directive.

[2 marks]

1 _____

_____

2 _____

_____

4

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1 3 Identify the following labels and state what they mean.

[4 marks]

Figure 7

Figure 8

Figure 7 _____

_____

_____

_____

Figure 8 _____

_____

_____

_____

4

Turn over for the next question

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1 4 Outline the impact of the work of Charles and Ray Eames on furniture design.

You should refer to specific examples in your answer.

[6 marks]

6

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1 5 **Figure 9** shows steel beam supports for a wooden floor.

Give **two** reasons why an I-beam cross-section is ideal for the main support.

[2 marks]

Figure 9

1 _____

_____

2 _____

_____

2

END OF QUESTIONS

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ANSWER IN THE SPACES PROVIDED

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