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

Friday 12 June 2020 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	
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11	
12	
13	
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15	
TOTAL	

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Section A – Product Analysis

Answer **all** questions in this section.

0 1 **Figures 1** and **2** show two camping lanterns.

Figure 1

Metal and glass oil lantern

Figure 2

Thermoplastic LED lantern

	Figure 1	**Figure 2**
Power source	Burning oil	Solar panel
Operation of light	Match	Button
Materials	Low carbon steel sheet and glass	Acrylonitrile Butadiene Styrene (ABS), Thermoplastic Elastomer (TPE) and Polycarbonate
Manufacture	Deformation and fabrication	Redistribution and fabrication

Compare the two camping lanterns.

In your answer you should refer to:

- suitability of materials
- manufacturing processes
- power sources.

[12 marks]

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12

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0 2 **Figures 3** and **4** show two packages for camping lanterns.

Figure 3

1970s Camping lantern packaging

Figure 4

2017 Camping lantern packaging

Explain how the packaging for electronic products has changed over time and possible reasons for this.

[6 marks]

6

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0 3 Explain how the work of Philippe Starck reflects the postmodern design movement.

[6 marks]

6

Turn over for the next question

0 4 **Figures 5**, **6** and **7** show an electric shower.

Figure 5

Figure 6

Figure 7

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Discuss how well the shower has been designed to be inclusive to all users.

[6 marks]

6

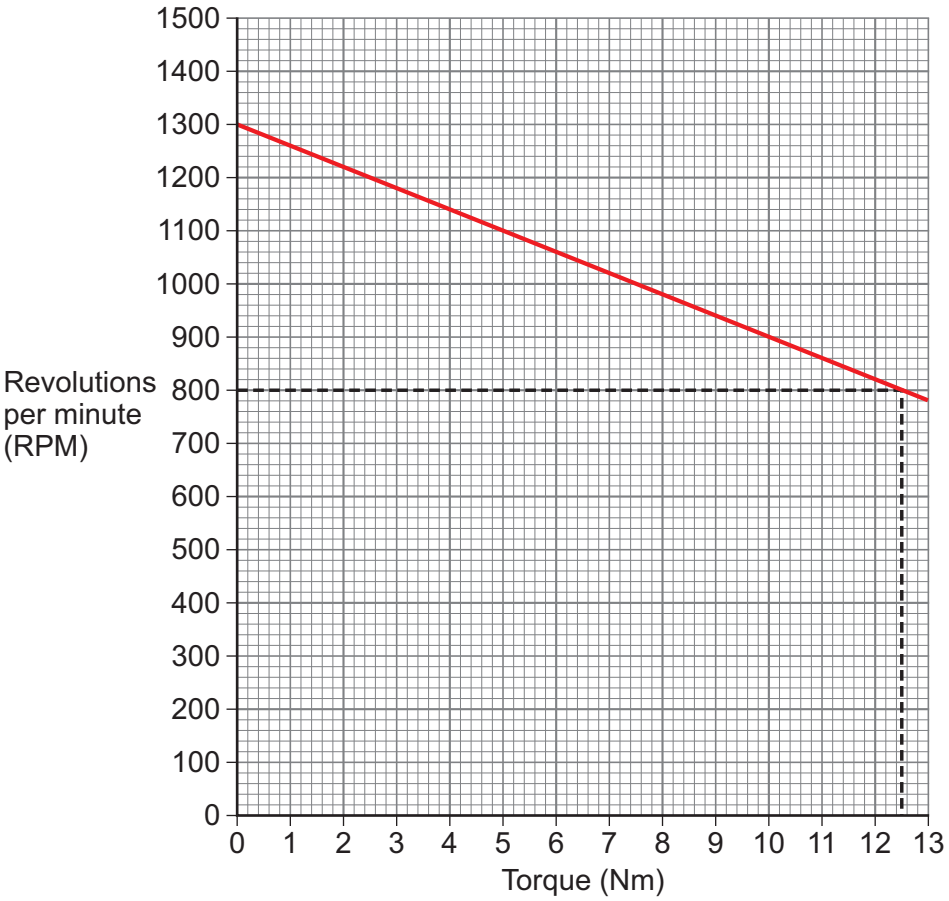
Turn over for Section B

Section B – Commercial Manufacture

Answer **all** questions in this section.

0 5 **Figure 8** shows the performance of a Direct Current (DC) motor under different loads (torque).

Figure 8



Calculate the equation of the red line in **Figure 8**.

Use this to calculate the stall torque (torque when the motor stops spinning) in Nm.

[3 marks]

Answer _____

3

Turn over for the next question

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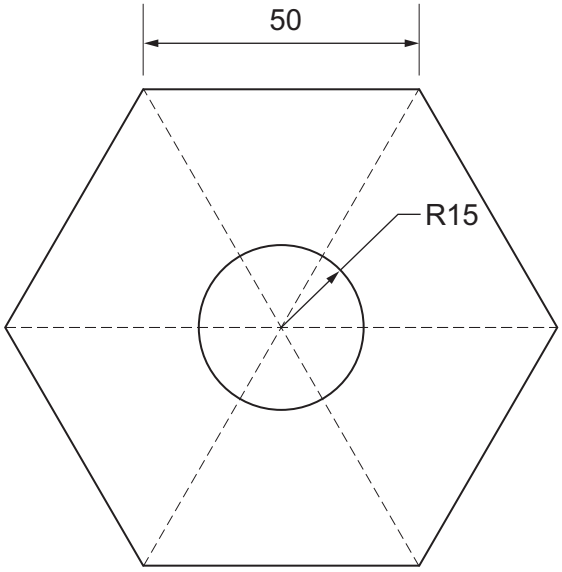
0 6 **Figure 9** shows the cross section of a low carbon steel blank used to press form a section of a motor casing.

The blank is a regular hexagon with a central through hole.

The blank has a volume of 12 500 mm^3

Figure 9



All dimensions in mm
Not drawn to scale

Calculate the thickness of the blank to **two** decimal places.

[4 marks]

Answer _____

4

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0 7 Explain how increased accuracy within production processes can reduce waste and improve efficiency.

[6 marks]

6

Turn over for the next question

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0 8 Give **two** reasons why X-ray testing would be a suitable post-production test for a welded bridge structure.

[2 marks]

Reason 1 _____

_____

Reason 2 _____

_____

2

0 9 Explain how developments in manufacturing techniques affected the work of Bauhaus designers.

[6 marks]

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6

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1 0 Give **four** effective uses of project management systems that can benefit designers and manufacturers.

[4 marks]

1 _____

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4

1 1 Define what is meant by an iterative design process.

[2 marks]

_____

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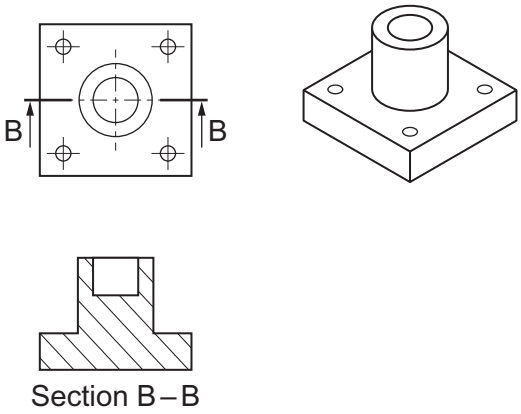
2

Turn over ▶

1 2 **Figure 10** shows drawing views of a zinc alloy component.

Figure 10



Section B – B

Describe the pre-production procedures a manufacturer would go through to prepare for die casting 100 000 copies of the component.

In your answer you should refer to:

- design modifications
- machinery preparation
- how a manufacturer would use computer modelling for quality assurance (QA).

[6 marks]

6

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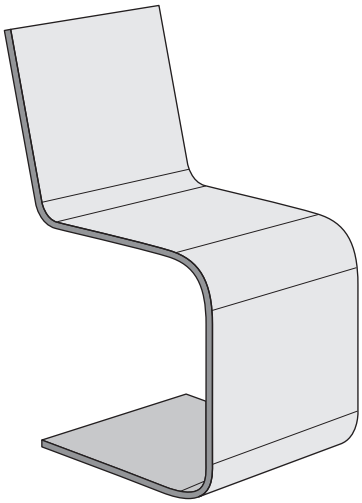
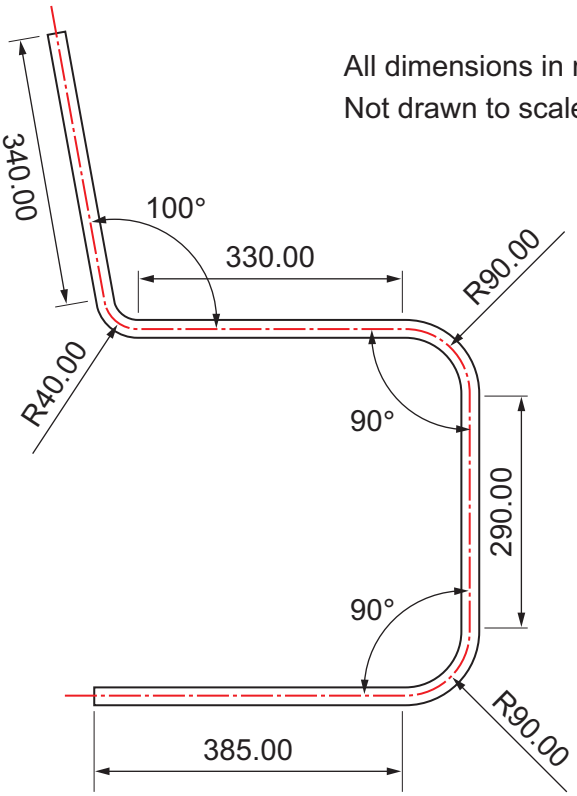
1 3 **Figures 11** and **12** show a cantilever chair component formed from laminated veneers.

Figure 11



3D CAD representation

Figure 12



2D side view

When forming the chair an allowance of 5% must be added to the length.

Calculate the length of laminated veneer (represented by the red line) needed to form the chair in a single piece to the nearest mm.

For this calculation you should ignore material thickness.

The component is constructed from straight lines and circular arcs.

[3 marks]

Answer _____

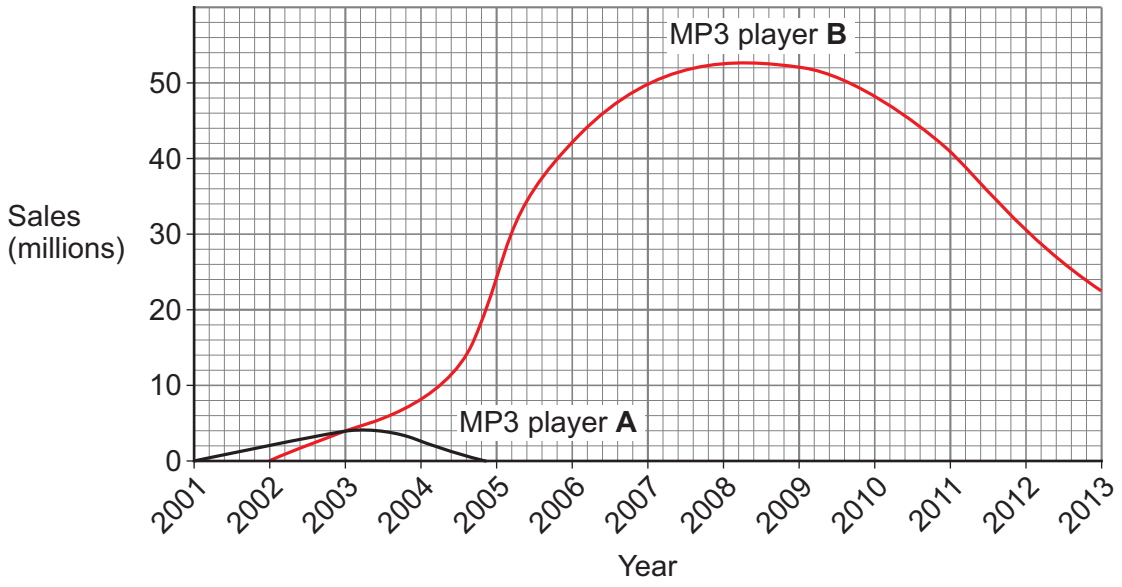
3

Turn over ▶

1 4 . 1 Analyse and evaluate the success of two portable MP3 players using the data shown in the Product Life Cycle (PLC) graph in **Figure 13**.

[6 marks]

Figure 13



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1 4 . 2 Explain how a manufacturer of music players can prevent the decline in sales of their product.

[6 marks]

12

Turn over for the next question

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1 5 Give **two** reasons why companies conform to International Standards Organisation (ISO) standards.

[2 marks]

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2 _____

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2

END OF QUESTIONS

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