A

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

For Examiner's Use

Candidate Signature _____

I declare this is my own work.

A-level
DESIGN AND TECHNOLOGY: PRODUCT DESIGN

7552/2

Paper 2 Designing and Making Principles

Friday 12 June 2020 Morning

Time allowed: 1 hour 30 minutes

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]

JUN207552201

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.**
- **Answer ALL questions.**
- **You must answer the questions in the spaces provided. Do not write on blank pages.**
- **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.**

DO NOT TURN OVER UNTIL TOLD TO DO SO

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
Manu-facture	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]

[Turn over]

[Turn over]

8

12

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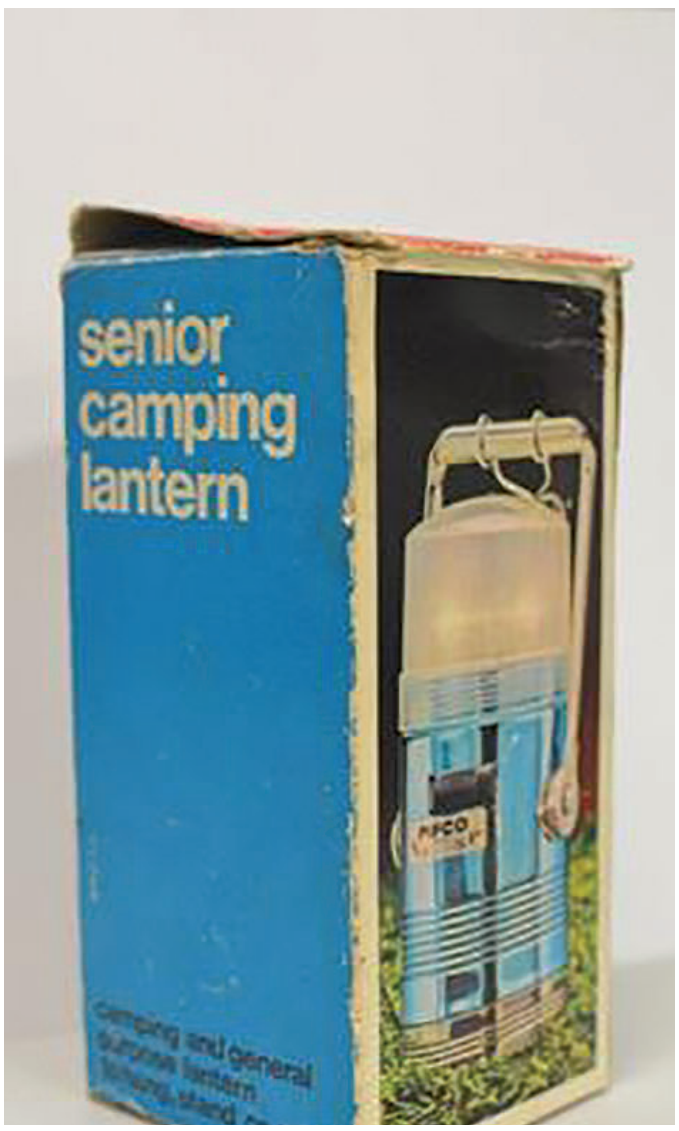
0 2

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]

[Turn over]

12

6

1 2

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[Turn over]

0 3

Explain how the work of Philippe Starck reflects the postmodern design movement. [6 marks]

6

[Turn over]

0 4

FIGURES 5, 6 and 7 show an electric shower.

FIGURE 5

FIGURE 6

FIGURE 7

Discuss how well the shower has been designed to be inclusive to all users. [6 marks]

6

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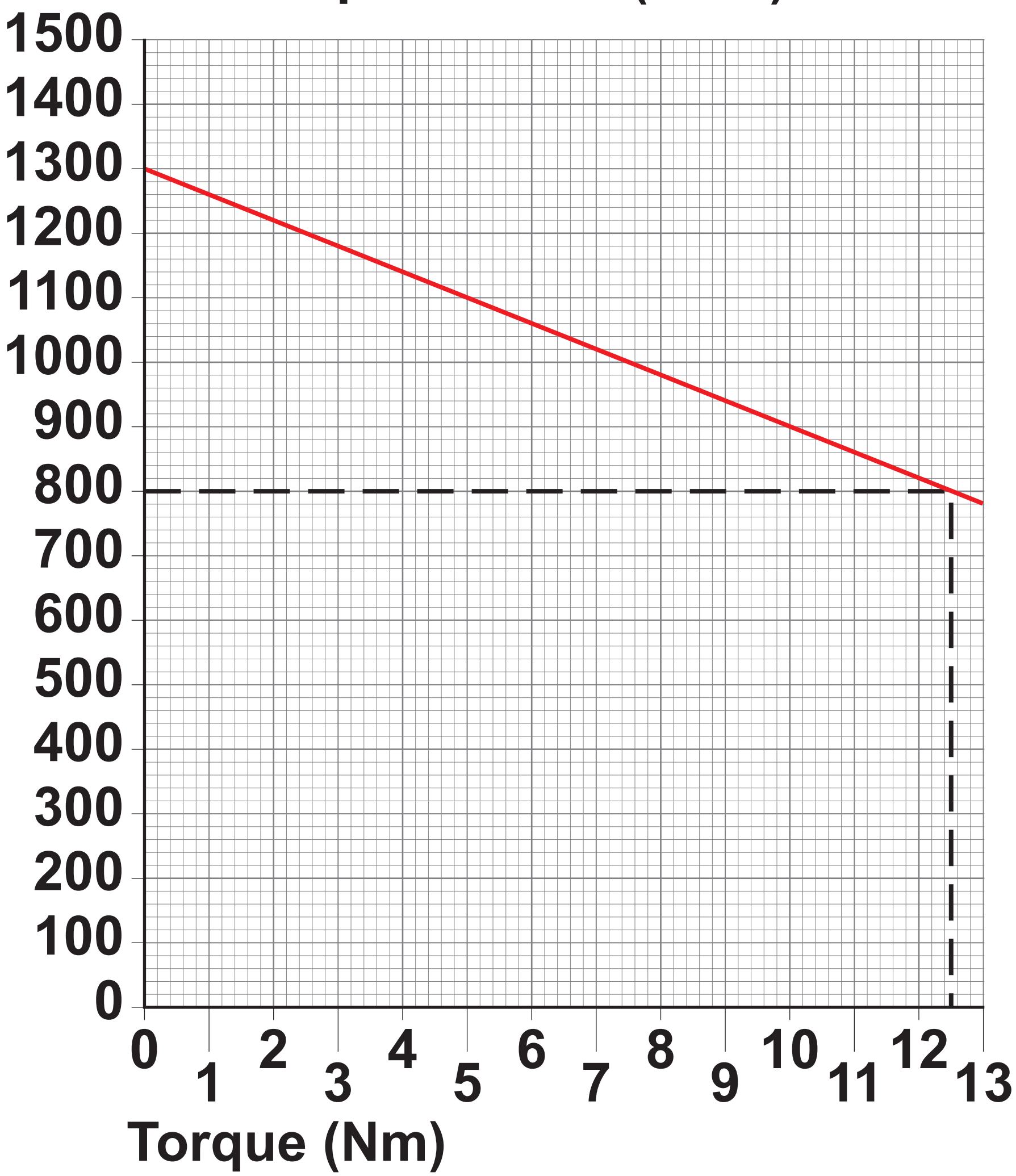
SECTION B – Commercial Manufacture

Answer ALL questions in this section.

FIGURE 8



0 5

FIGURE 8, on page 20, shows the performance of a Direct Current (DC) motor under different loads (torque).

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 _____

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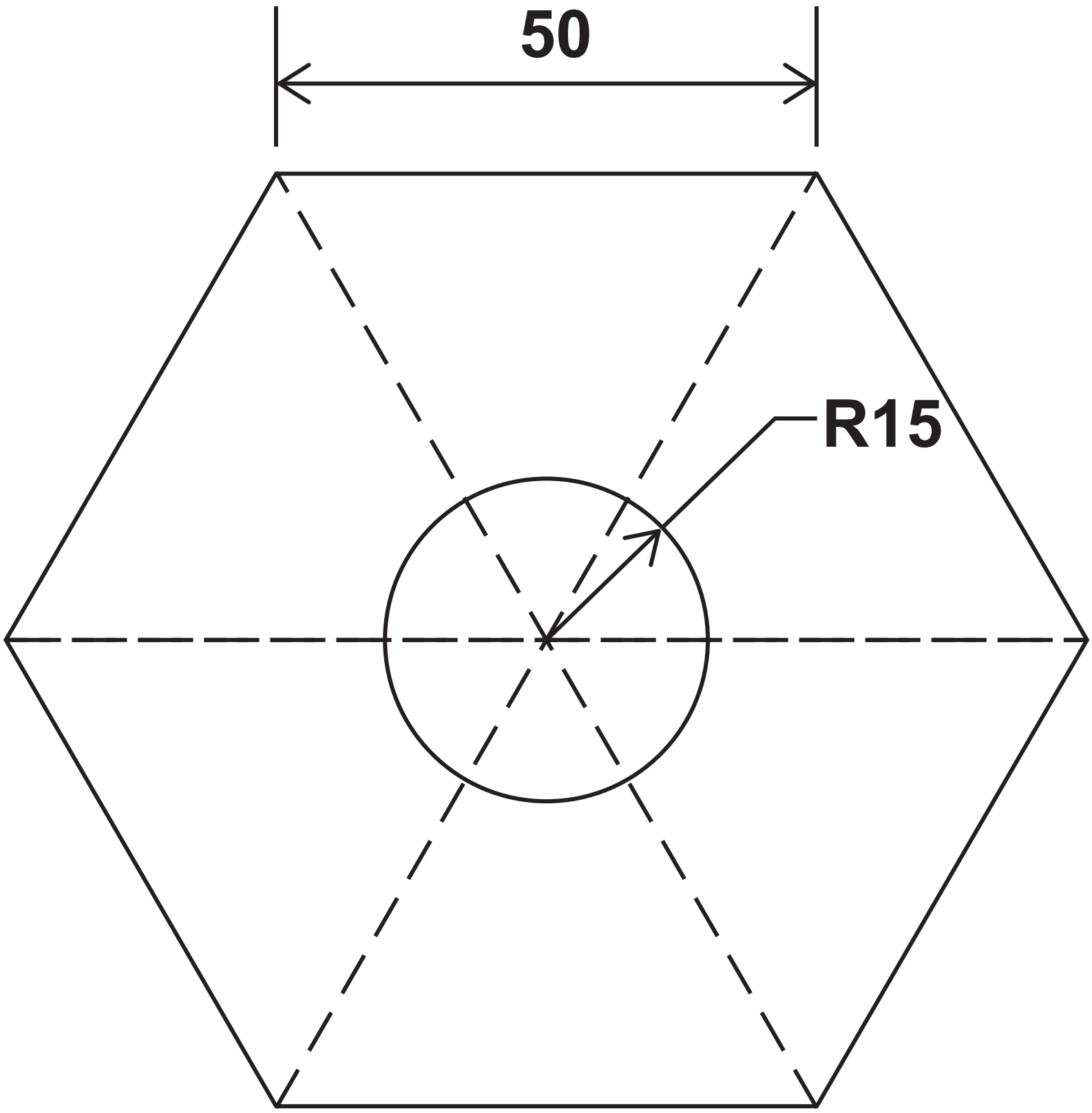
0	6

FIGURE 9



Not drawn to scale
All dimensions in mm

FIGURE 9, on page 24, 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

Calculate the thickness of the blank to TWO decimal places. [4 marks]

Answer

4

0 7

Explain how increased accuracy within production processes can reduce waste and improve efficiency. [6 marks]

28

6

2 8

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

[Turn over]

0	9

Explain how developments in manufacturing techniques affected the work of Bauhaus designers. [6 marks]

6

[Turn over]

1	0

Give FOUR effective uses of project management systems that can benefit designers and manufacturers. [4 marks]

1 _____

2 _____

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4

[Turn over]

1	1

Define what is meant by an iterative design process. [2 marks]

2

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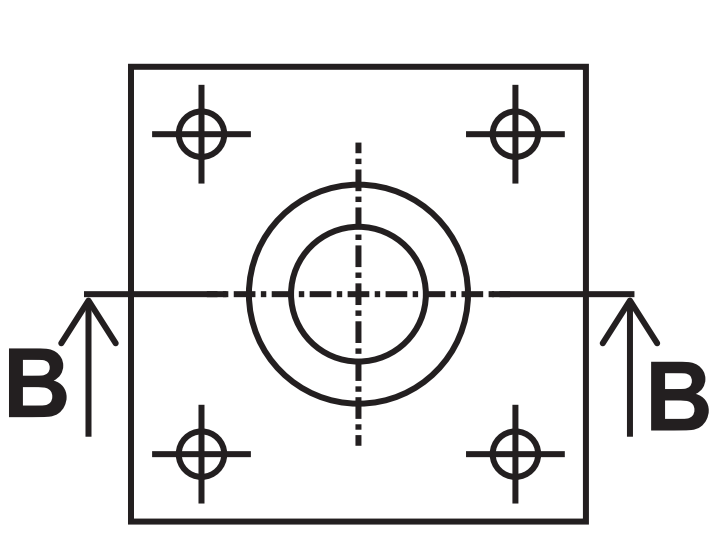
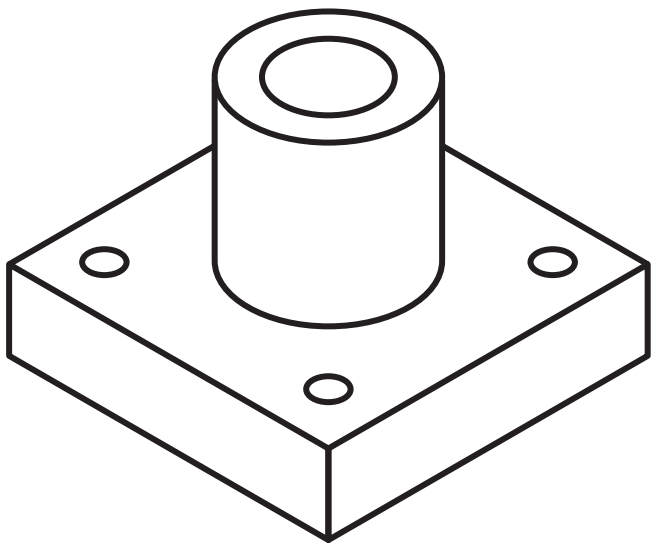
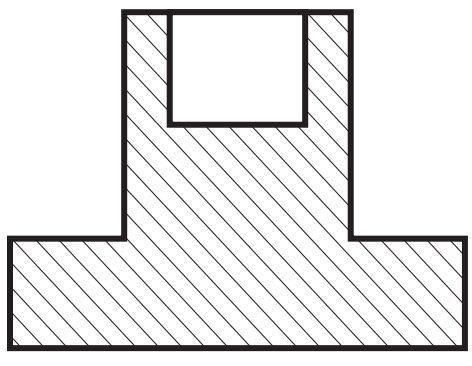
1 2

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

38

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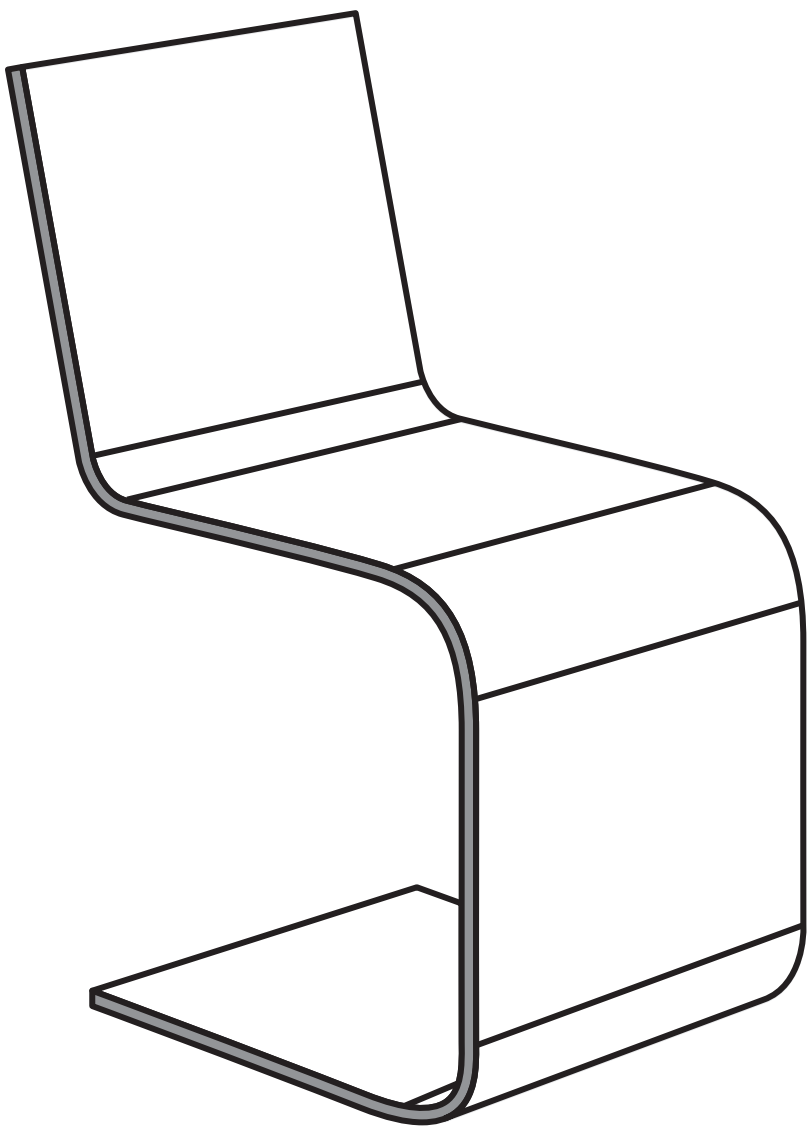
1	3

FIGURES 11 and 12 show a cantilever chair component formed from laminated veneers.

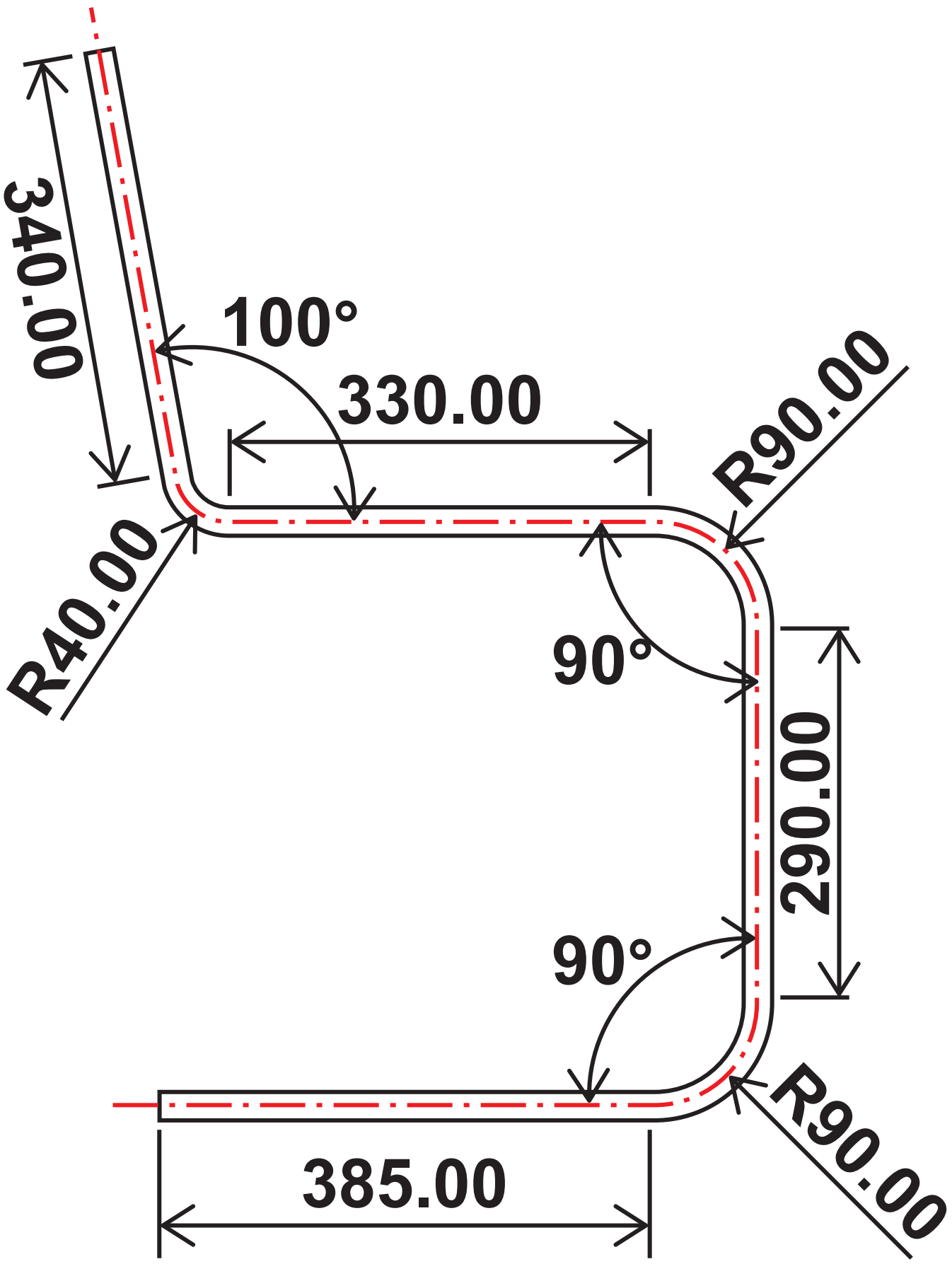
Not drawn to scale
All dimensions in mm

FIGURE 11



3D CAD representation

FIGURE 12



2D side view

[Turn over]

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.

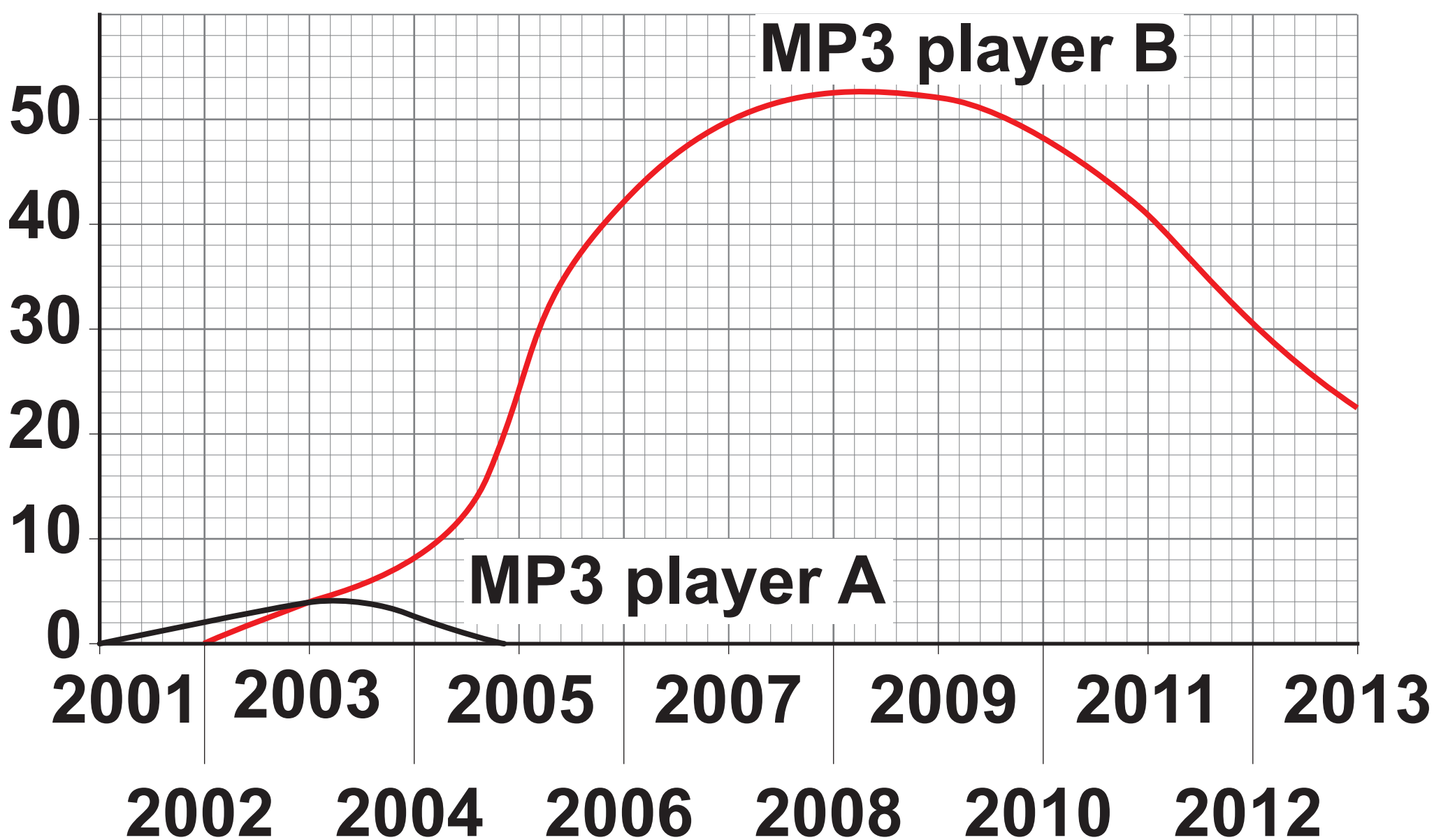
The component is constructed from straight lines and circular arcs. [3 marks]

Answer _____

3

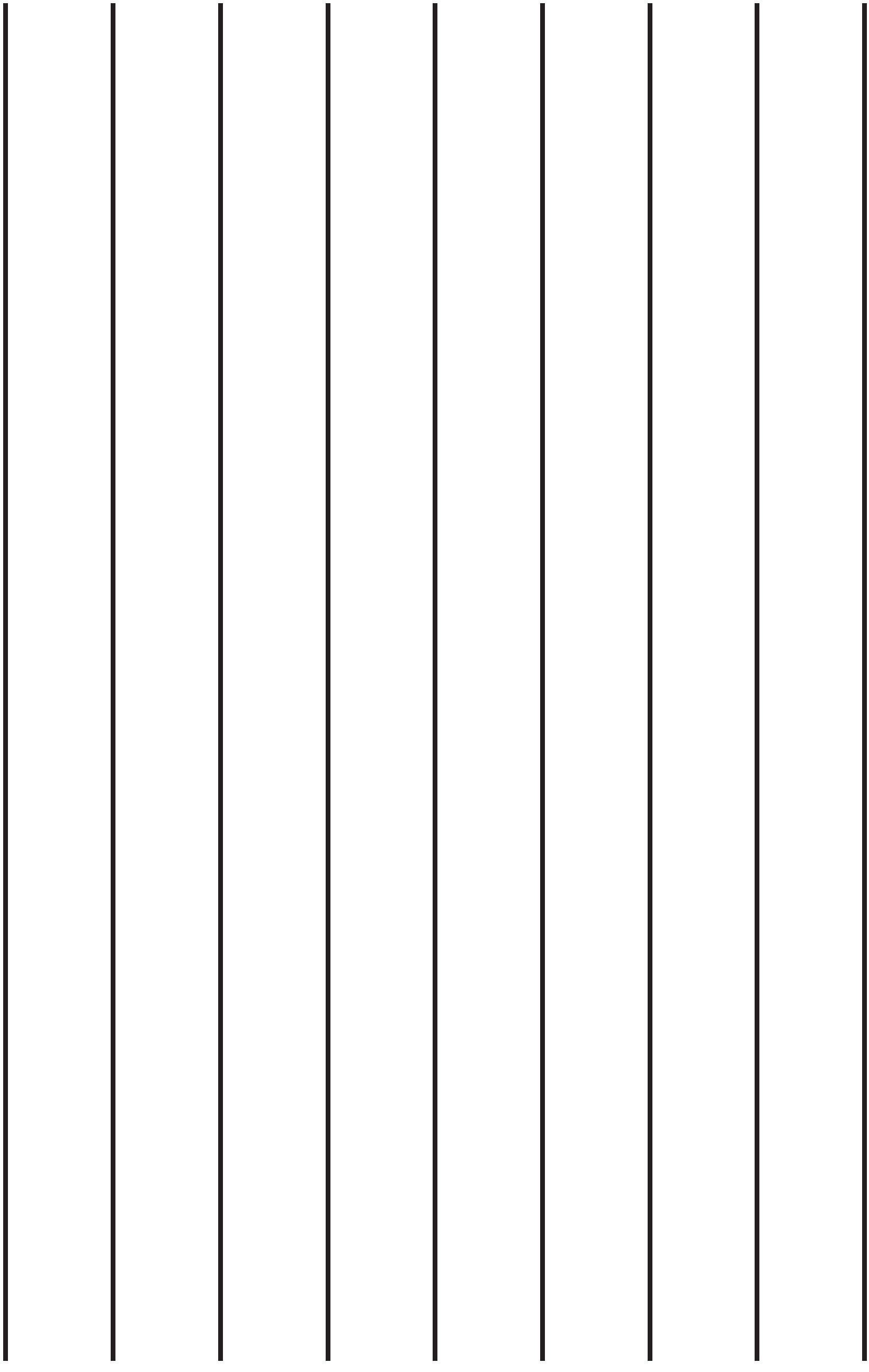
[Turn over]

FIGURE 13


Sales
(millions)
MP3 player B
MP3 player A
50
40
30
20
10
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

14.1 Analyse and evaluate the success of two portable MP3 players using the data shown in the Product Life Cycle (PLC) graph in FIGURE 13, on page 44.
[6 marks]

46



4 6

[Turn over]

1 4 . 2

Explain how a manufacturer of music players can prevent the decline in sales of their product. [6 marks]

[Turn over]

1	5

Give TWO reasons why companies conform to International Standards Organisation (ISO) standards. [2 marks]

1 _____

2 _____

2

END OF QUESTIONS

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For Examiner's Use	
Question	Mark
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TOTAL	