



Surname _____

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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

For this paper you must have:

- normal writing and drawing instruments
- a scientific calculator.

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

[Turn over]



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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
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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]

[Turn over]

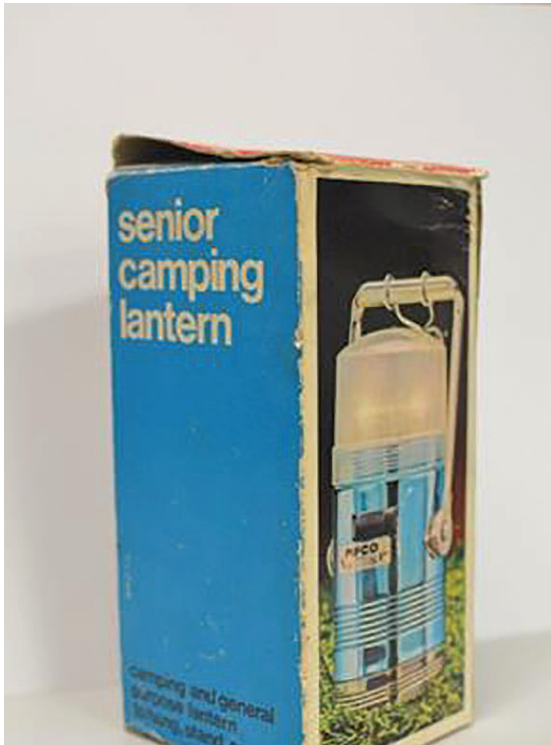


[illegible]

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]



[illegible]

6

[Turn over]



0	3
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Explain how the work of Philippe Starck reflects the postmodern design movement. [6 marks]

[illegible]

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[Turn over]



0	4
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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]

[illegible]

6

[Turn over]



SECTION B – Commercial Manufacture

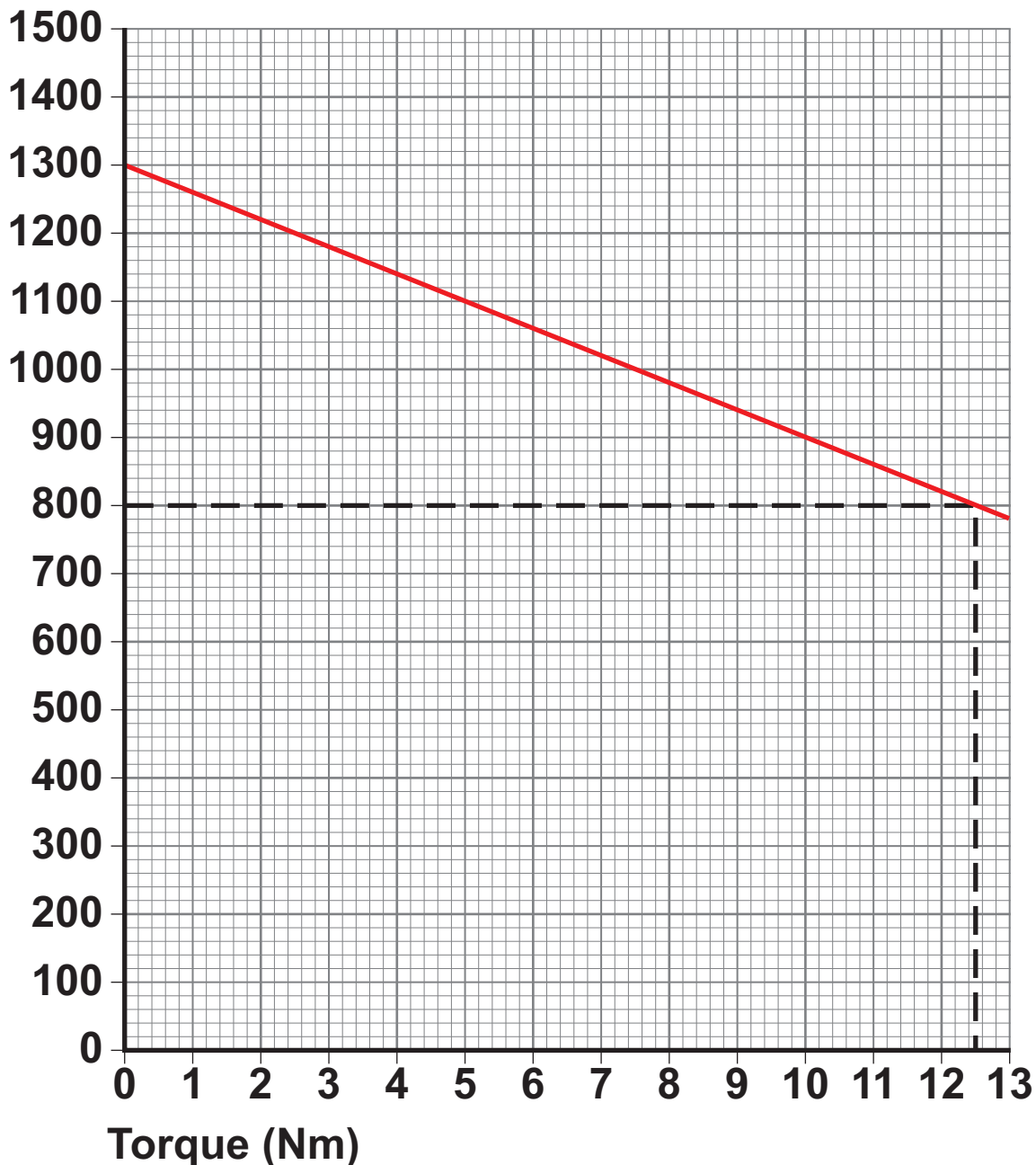
Answer ALL questions in this section.

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

FIGURE 8

Revolutions per minute
(RPM)



**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]



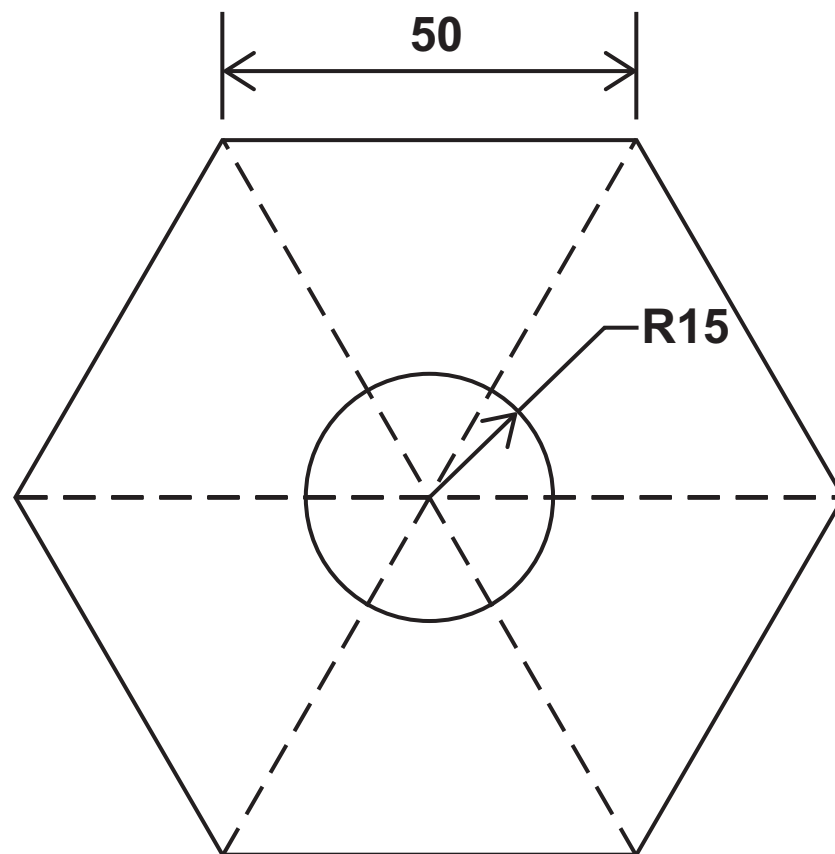
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FIGURE 9 shows the cross section of a low carbon steel blank used to press form a section of a motor casing.

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

The blank has a volume of $12\,500\text{ mm}^3$

FIGURE 9



Not drawn to scale
All dimensions in mm



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

[illegible]

Answer

4

[Turn over]



0	7
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Explain how increased accuracy within production processes can reduce waste and improve efficiency. [6 marks]

[illegible]

6



0	8
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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]

[illegible]

1	0
---	---

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

1 _____

2 _____

3 _____

4 _____

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1	1
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Define what is meant by an iterative design process. [2 marks]

2



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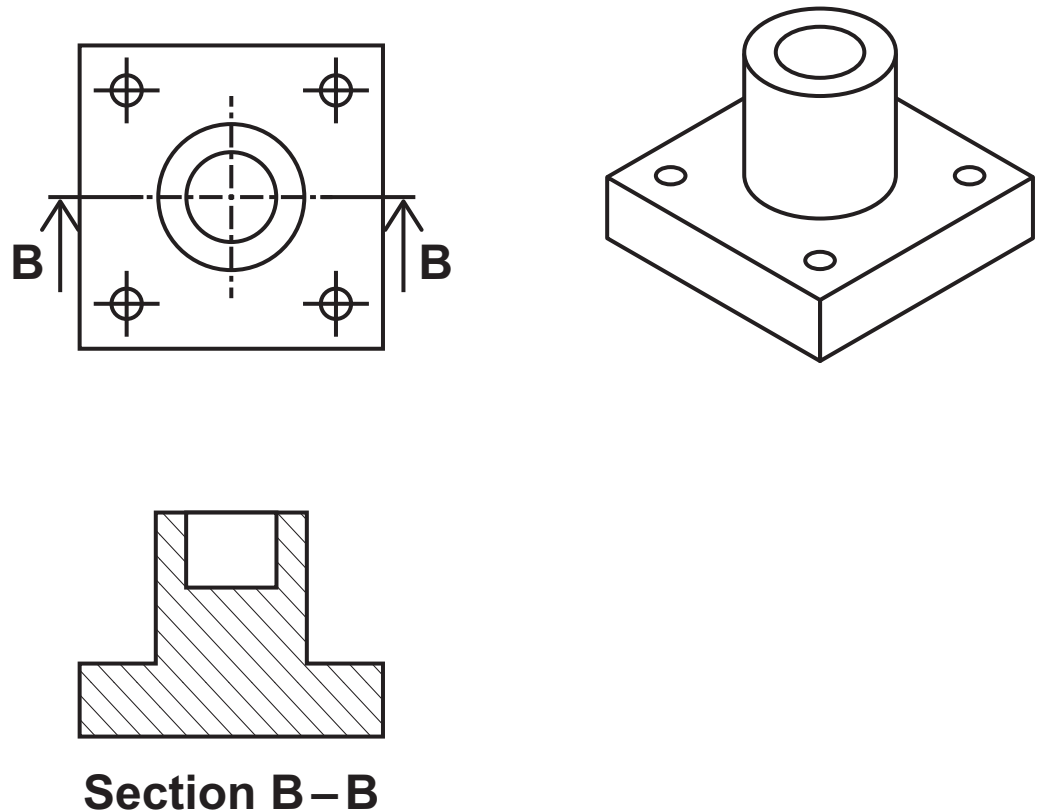
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1	2
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FIGURE 10 shows drawing views of a zinc alloy component.

FIGURE 10



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]

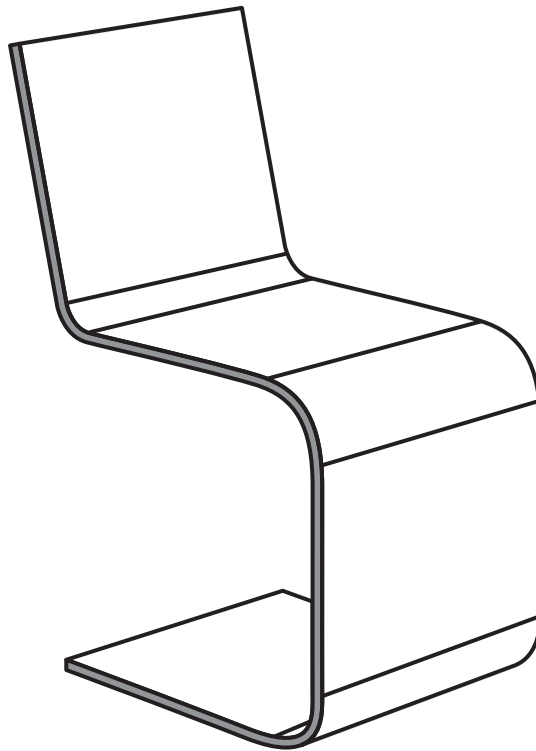


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FIGURES 11 and 12 show a cantilever chair component formed from laminated veneers.

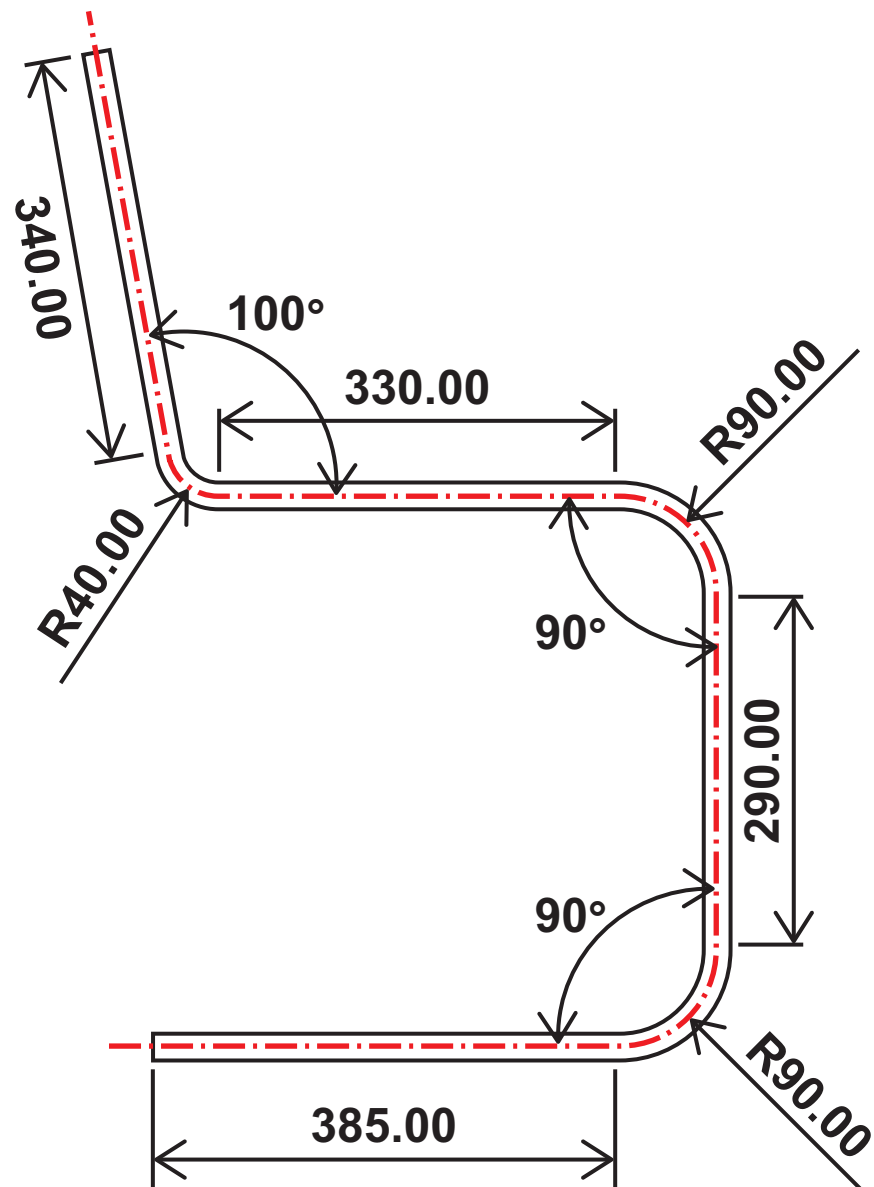
**Not drawn to scale
All dimensions in mm**

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 _____



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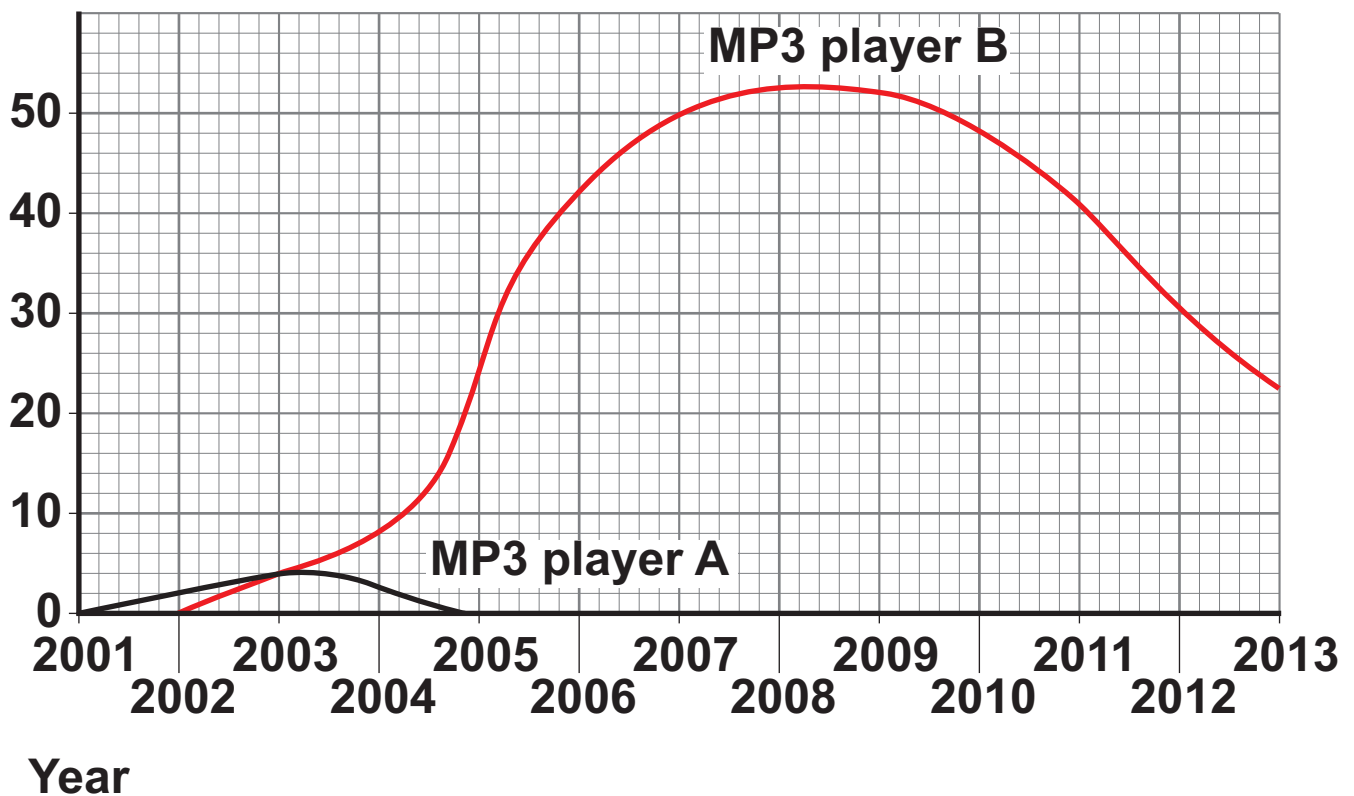


1 4 . 1

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

Sales
(millions)





1 4 . 2

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

[illegible]

1	5
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Give TWO reasons why companies conform to International Standards Organisation (ISO) standards. [2 marks]

1 _____

2 _____

2

END OF QUESTIONS



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Question	Mark
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