



Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

AS

**DESIGN AND TECHNOLOGY:
PRODUCT DESIGN**

Paper 1 Written Paper

7551/W

Monday 14 May 2018 Afternoon

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 45 marks in SECTION A and 35 marks in SECTION B.**

ADVICE

Illustrate your answers with sketches and/or diagrams wherever you feel it is appropriate.

DO NOT TURN OVER UNTIL TOLD TO DO SO



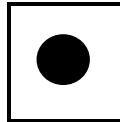
SECTION A – Technical Principles

Answer ALL questions in this section.

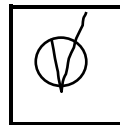
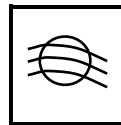
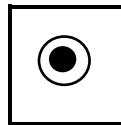
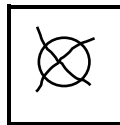
Question 1 is a multiple-choice question. Only ONE answer is allowed.

Completely fill in the circle alongside the appropriate answer.

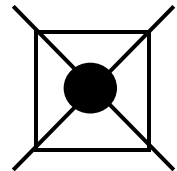
CORRECT METHOD



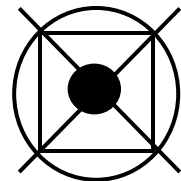
WRONG METHODS



If you want to change your answer you must cross out your original answer as shown.



If you wish to return to an answer previously crossed out, ring the answer you now wish to select as shown.



0 1 FIGURE 1 shows low carbon steel streetlights.

Select the most appropriate applied finish for the streetlight. [1 mark]

FIGURE 1



A Anodising

B Dip-coating

C Galvanising

D Pressure treating

[Turn over]



0 2 Complete the table below to show the appropriate classification for each of the **FOUR** metals by ticking (✓) the correct box. Only **ONE** answer per metal is allowed. [4 marks]

Metal	Ferrous metal or ferrous alloy	Non-ferrous metal	Non-ferrous alloy
Stainless steel			
Copper			
Bronze			
Low carbon steel			



0 3 Define each of the following material working characteristics: [2 marks]

Hardness _____

Toughness _____

[Turn over]



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0 4 Name a ferrous metal and give TWO reasons why hardening has been used to improve its function in a specific product. [4 marks]

11

[Turn over]



05 FIGURE 2 shows a 70 mm long turned aluminium component.

The component has a volume of $200\,000\text{ mm}^3$.

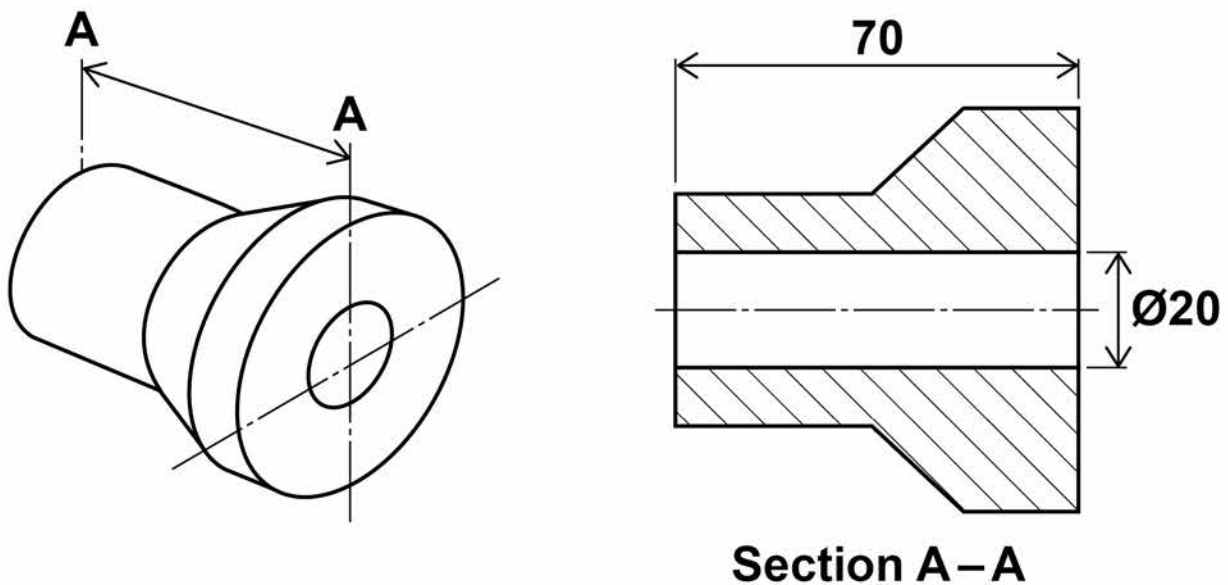
The diameter of the through hole is increased from 20 mm to 25 mm.

Work out how much aluminium is removed as waste as a percentage of the original component.

Give your answer to two decimal places. Show your working out. [5 marks]

FIGURE 2 – all dimensions in mm

Not drawn to scale



Answer _____

[Turn over]



0	6
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 A logo is to be applied to a gift box using either foil blocking or embossing. Evaluate the suitability of these two processes in terms of:

- aesthetics
- cost
- environmental issues.

[6 marks]



11

[Turn over]

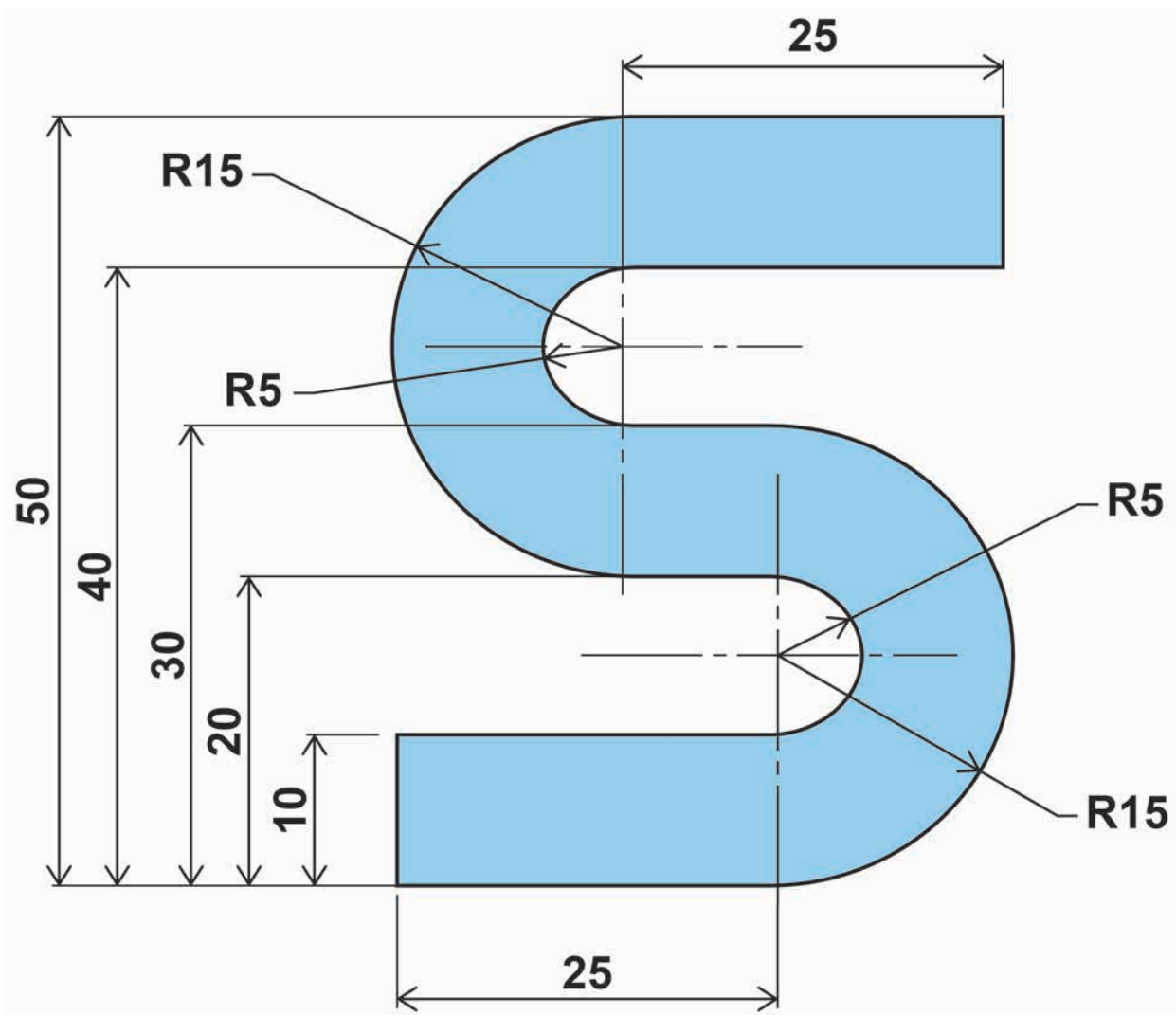


07.1 FIGURE 3 shows a letter to be foil blocked onto packaging. The outline of the letter has straight lines and semi-circular arcs.

Calculate the surface area of the letter shown in FIGURE 3. Show your working out.
[2 marks]

FIGURE 3 – all dimensions in mm

Not drawn to scale



Answer _____

[Turn over]



07.2 The dimensions of the letter shown in **FIGURE 3** are all increased by 50%. Work out the surface area of the enlarged letter.

Give your answer to two decimal places. Show your working out. [2 marks]

08 Explain how the use of Just In Time manufacture can improve efficiency within production. [6 marks]



09 FIGURE 4 shows an armchair.

The chair arms shown in FIGURE 4 could be produced either from solid hardwood or from laminated veneers.

Compare the suitability of both materials for the chair arms shown. [4 marks]

FIGURE 4



[Turn over]



1 0

State a specific application for a UV hardening adhesive. Give TWO reasons why it is suitable for the application you have named. [3 marks]

Application _____

Reason 1 _____

Reason 2 _____

7



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[Turn over]



- 1 1** Evaluate the environmental impact of the two coffee packages shown in FIGURES 5 and 6.
[6 marks]

FIGURE 5

Glass coffee jar with polymer screw lid



FIGURE 6

Foil based coffee refill pouch



[Turn over]



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[Turn over]



SECTION B – Designing and Making Principles

Answer ALL questions in this section.

1 2 A manufacturer uses a jig when welding a bike frame together.

**Explain TWO reasons why a jig would be used.
[4 marks]**

Reason 1 _____

Reason 2 _____

10



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[Turn over]



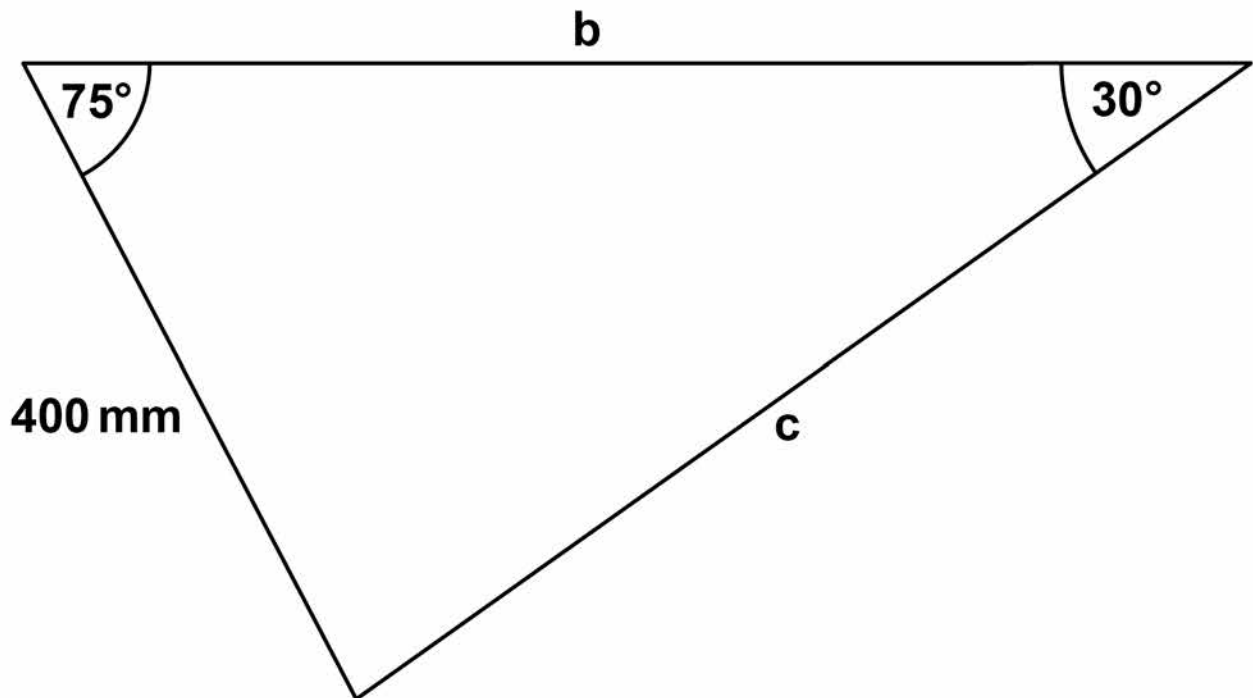
1 3 FIGURE 7 shows three tubes that make the front section of a bike frame.

Work out the total length of tube required to make the front section.

Give your answer to the nearest mm. Show your working out. [3 marks]

FIGURE 7

Not drawn to scale





Answer _____

[Turn over]



1 4 Evaluate the impact of Kevlar fibres on the development of sporting products. [6 marks]

9

[Turn over]



1 5 FIGURES 8 and 9 show two different design communication techniques.

Discuss why a designer may use each technique to communicate information. [6 marks]

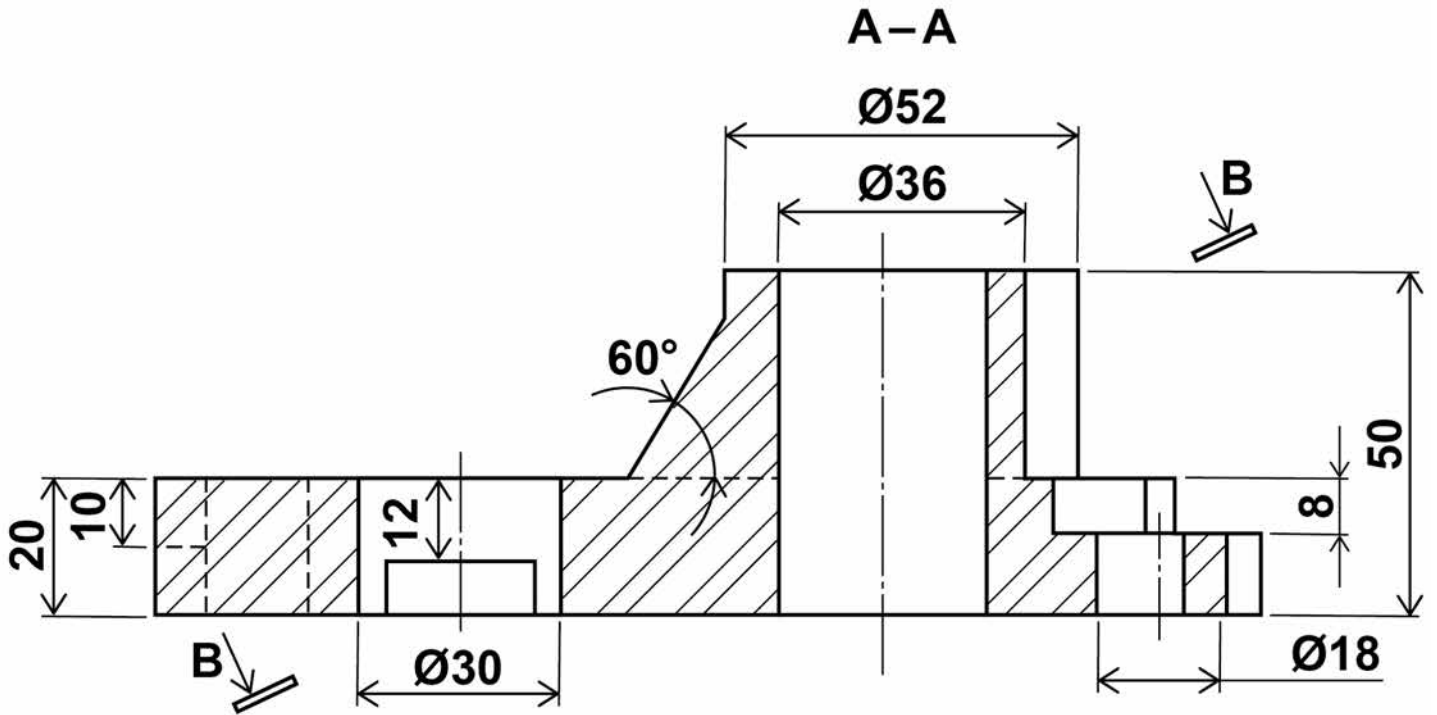
FIGURE 8

Exploded view of a product



FIGURE 9

Sectional view of a product





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[Turn over]



1 6 State FOUR of the main concepts of a circular economy. [4 marks]

Concept 1 _____

Concept 2 _____

Concept 3 _____

Concept 4 _____

10



17 Name the measuring device shown in FIGURE 10 and give a specific Quality Control application for it. [2 marks]

FIGURE 10



[Turn over]



1	8
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 Explain **FOUR** reasons why third party feedback is important in the development of a product.
[4 marks]

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[Turn over]



1 9 FIGURE 11 shows the control panel for a microwave oven.

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

FIGURE 11



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For Examiner's Use	
Pages	Mark
5-9	
10-13	
14-17	
18-20	
21-26	
28-31	
32-36	
37-41	
TOTAL	

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