Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

AS
DESIGN AND TECHNOLOGY: PRODUCT DESIGN

Paper 1 Written Paper

Monday 14 May 2018 Afternoon 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.
- 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.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
TOTAL	

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 

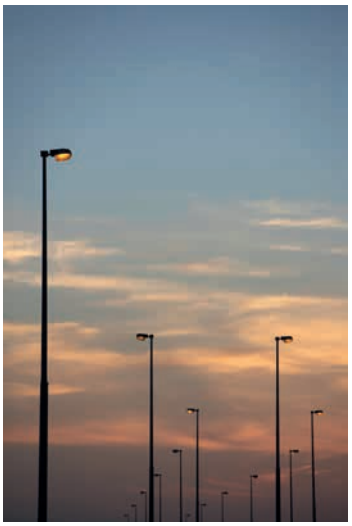
If you want to change your answer you must cross out your original answer as shown. 

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.

Figure 1



A Anodising ⬭

B Dip-coating ⬭

C Galvanising ⬭

D Pressure treating ⬭

[1 mark]

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 _____

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]

0 5 **Figure 2** shows a 70 mm long turned aluminium component.

The component has a volume of 200 000 mm^3.

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

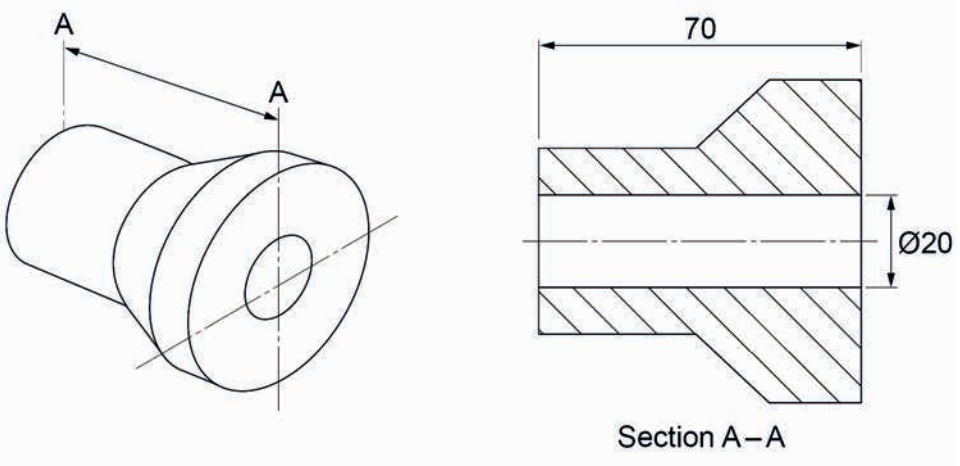
Work out how much aluminium is removed as waste as a percentage of the original component.

Give your answer to two decimal places. Show your working out.

[5 marks]

Figure 2 – all dimensions in mm

Not drawn to scale



Answer _____

0 6 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 for the next question

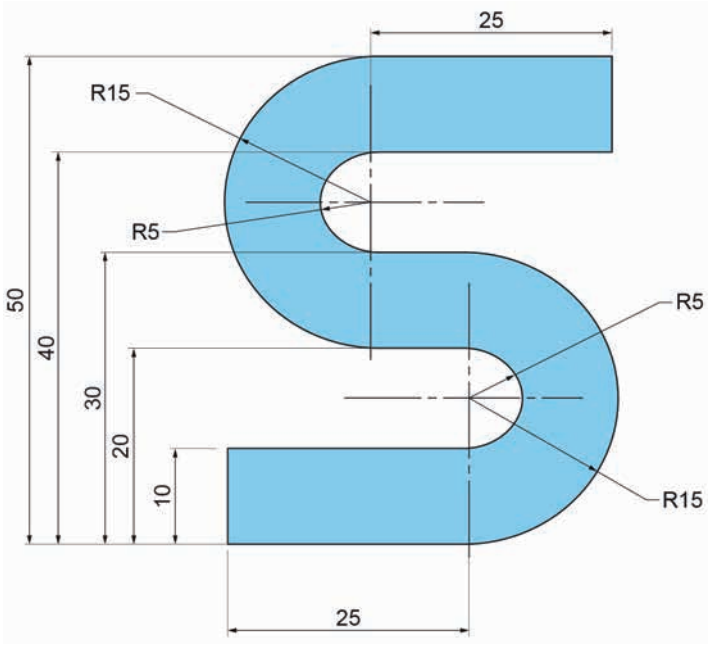
0 7 . 1 **Figure 3** shows a letter to be foil blocked onto packaging. The outline of the letter has straight lines and semi-circular arcs.

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 _____

0 7 . 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]

0 8 Explain how the use of Just In Time manufacture can improve efficiency within production.

[6 marks]

10

Turn over for the next question

0 9 **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

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

Turn over for the next question

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

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

Turn over for the next question

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

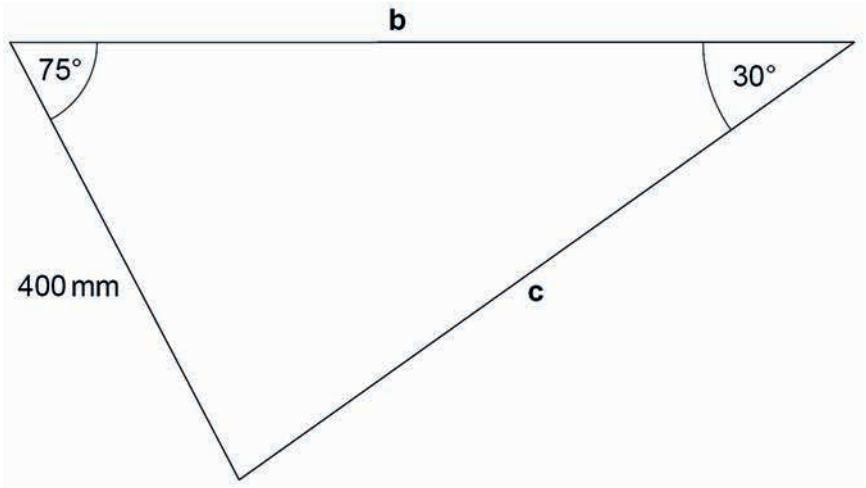
Work out the total length of tube required to make the front section.

Give your answer to the nearest mm. Show your working out.

[3 marks]

Figure 7

Not drawn to scale



Answer _____

1 4 Evaluate the impact of Kevlar fibres on the development of sporting products.

[6 marks]

9

Turn over for the next question

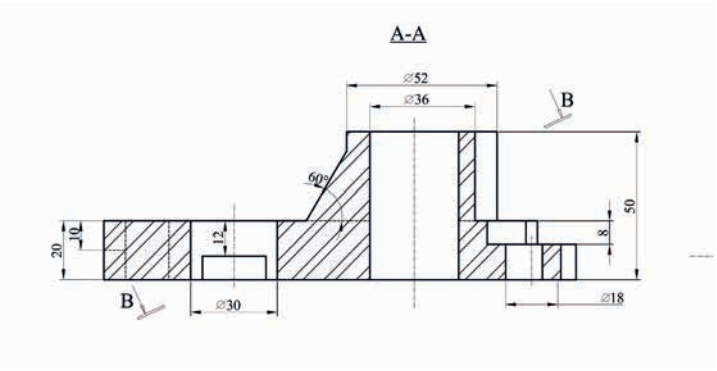
1 5 **Figures 8** and **9** show two different design communication techniques.

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



1 6 State **four** of the main concepts of a circular economy.

[4 marks]

Concept 1 _____

Concept 2 _____

Concept 3 _____

Concept 4 _____

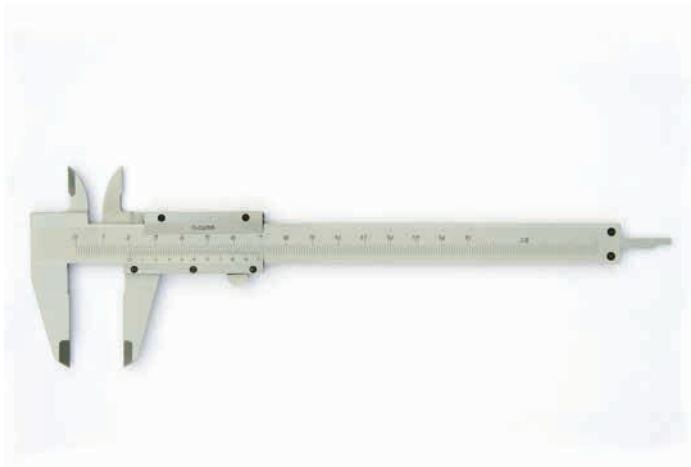
10

Turn over for the next question

1 7 Name the measuring device shown in **Figure 10** and give a specific Quality Control application for it.

[2 marks]

Figure 10



1 8 Explain **four** reasons why third party feedback is important in the development of a product.

[4 marks]

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

END OF QUESTIONS

12

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