



Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

GCSE

DESIGN AND TECHNOLOGY

Unit 1 Written Paper

8552/W

Friday 24 May 2019 Afternoon

Time allowed: 2 hours

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

[Turn over]



For this paper you must have:

- **normal writing and drawing instruments**
- **a calculator**
- **a protractor.**

INSTRUCTIONS

- **Use black ink or black ball-point pen. Use pencils only for drawing.**
- **Answer ALL questions.**
- **You must answer the questions in the spaces provided. Do not write 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

- **All dimensions are in millimetres.**
- **The marks for questions are shown in brackets.**
- **The maximum mark for this paper is 100.**
- **There are 20 marks for Section A, 30 marks for Section B and 50 marks for Section C.**

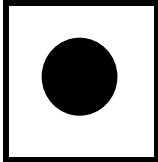
DO NOT TURN OVER UNTIL TOLD TO DO SO

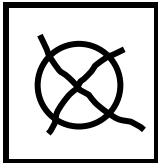
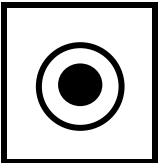
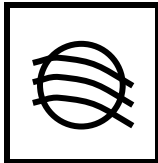
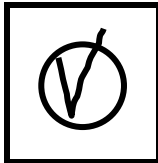
SECTION A – CORE TECHNICAL PRINCIPLES

Answer ALL questions in the spaces provided.

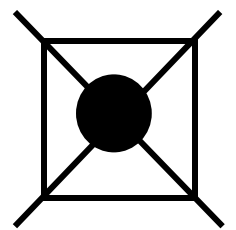
Each of Questions 01 to 10 is followed by four responses, A, B, C and D.

For each question completely fill in the circle alongside the appropriate answer.

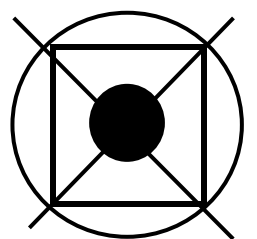
CORRECT METHOD 

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
---	---

A co-operative is

- ☐ **A a business that is owned and managed by its workers.**
- ☐ **B a method that businesses use to trade with each other.**
- ☐ **C an organisation that helps workers have fair trading conditions.**
- ☐ **D a way of raising money from large numbers of people.**

[1 mark]

[Turn over]

0	2
---	---

Identify the source of renewable energy.

☐

A Coal

☐

B Hydro-electrical

☐

C Natural gas

☐

D Oil

[1 mark]

0	3
---	---

Which ONE of the following is a feature of a product designed for maintenance?

☐

A Biodegradable materials

☐

B Complex electronics

☐

C Planned obsolescence

☐

D Repairable components

[1 mark]

[Turn over]

0	4
---	---

Which ONE of the following is a biodegradable material?

☐

A Acrylic

☐

B Nylon

☐

C Polythene

☐

D Silk

[1 mark]

0	5
---	---

Identify the card or board which is most suitable for packaging hot food.

☐

A Duplex board

☐

B Foam core board

☐

C Foil lined board

☐

D Solid white board

[1 mark]

[Turn over]

0	6
---	---

A lamp is designed to automatically switch on in dark conditions.

What is the input in this system?

☐

A Light sensor

☐

B Microcontroller

☐

C Pressure sensor

☐

D Switch

[1 mark]

0	7
---	---

Which of the following timbers is a softwood?

☐

A Ash

☐

B Beech

☐

C Mahogany

☐

D Pine

[1 mark]

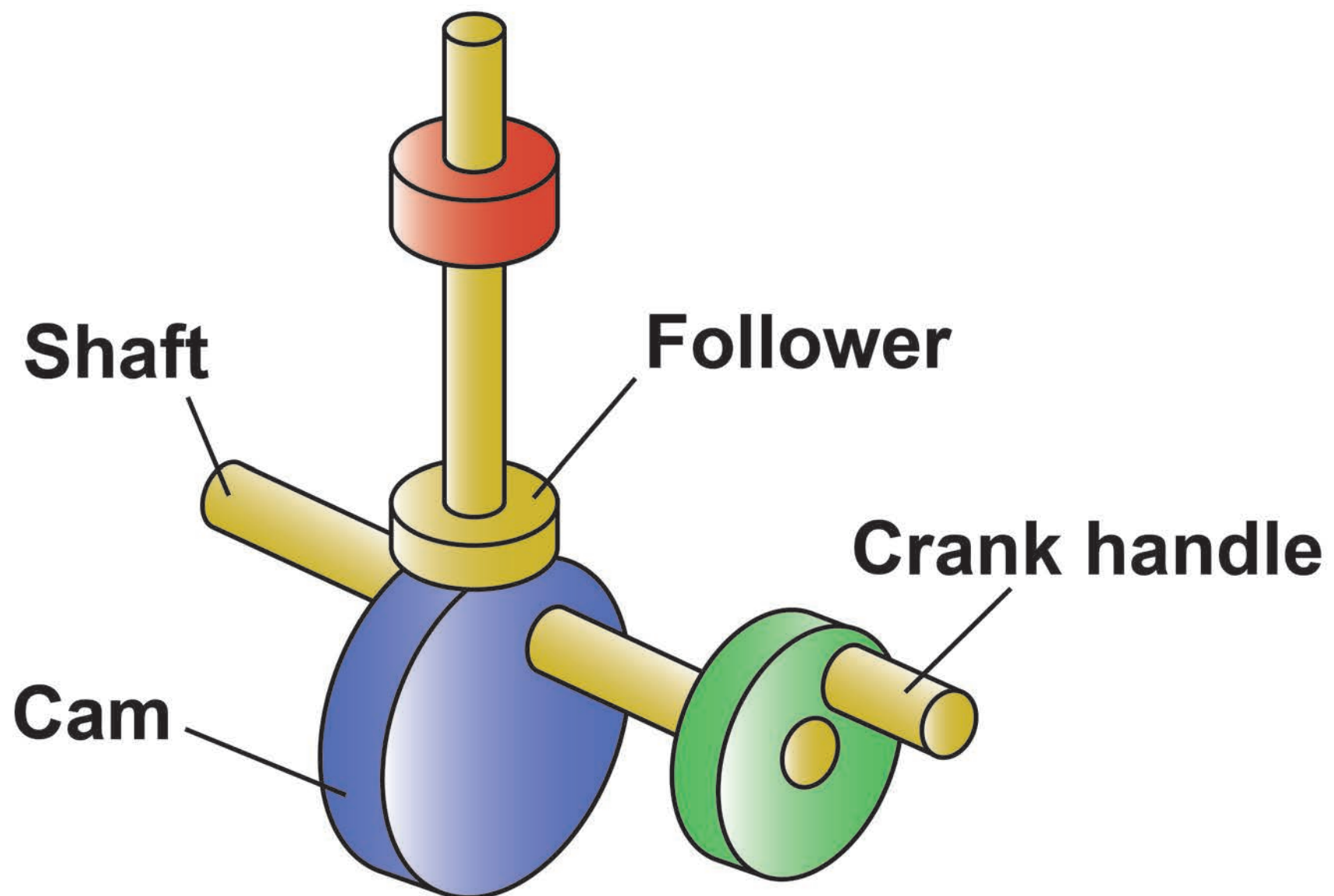
[Turn over]



08

What change in motion takes place in the mechanism in FIGURE 1 when the crank handle is turned?

FIGURE 1



☐

A Linear to reciprocating

☐

B Oscillating to rotary

☐

C Reciprocating to linear

☐

D Rotary to reciprocating

[1 mark]

[Turn over]

0	9
---	---

Which ONE of the following contributes to global warming?

- ☐ **A Using renewable sources of energy**
- ☐ **B Using fossil fuels**
- ☐ **C Improving efficiency in manufacturing**
- ☐ **D Increasing the use of nuclear power generation**

[1 mark]

1	0
---	---

A designer needs to know the area of an A4 sheet of paper to know how much ink would be used when printing a design.

An A4 sheet of paper measures 210 x 297 mm. What is the area of the A4 sheet of paper?

☐ **A 62 255 mm²**

☐ **B 62 370 mm²**

☐ **C 62 407 mm²**

☐ **D 62 485 mm²**

[1 mark]

[Turn over]



1	1
---	---

A smoke alarm needs either four 1.5 volt alkaline batteries or five 1.2 volt re-chargeable batteries to work.

Complete TABLE 1, on the opposite page, to show the total costs to the customer of five battery changes or five re-charges.

This information will be used to decide a suitable way to power the device.
[2 marks]

TABLE 1

	Alkaline batteries	Re-chargeable batteries
Cost of batteries and charger if required	£2.45 for 4 batteries	£17.00 for 5 batteries and a charger
Cost per re-charge of 5 batteries	£0	£0.03 for 5 batteries to be re-charged
Cost to customer after 5 battery changes or 5 re-charges		

[Turn over]



1	2
---	---

Explain how Kevlar fibres are processed and arranged to give this material its unique properties. [2 marks]

1	3
---	---

Give TWO properties of manufactured boards. [2 marks]

Property 1 _____

Property 2 _____

[Turn over]



1	4
---	---

Explain TWO ways how just in time (JIT) production can help manufacturers improve efficiency. [4 marks]

1 _____

2 _____



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[Turn over]



SECTION B – SPECIALIST TECHNICAL PRINCIPLES

Answer ALL questions in the spaces provided.

1	5
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Study the high chair in FIGURE 2, on the opposite page.

Identify the force acting upon each of the following THREE parts of the high chair when in use. [3 marks]

Legs

Seat

Straps



FIGURE 2



[Turn over]



1	6
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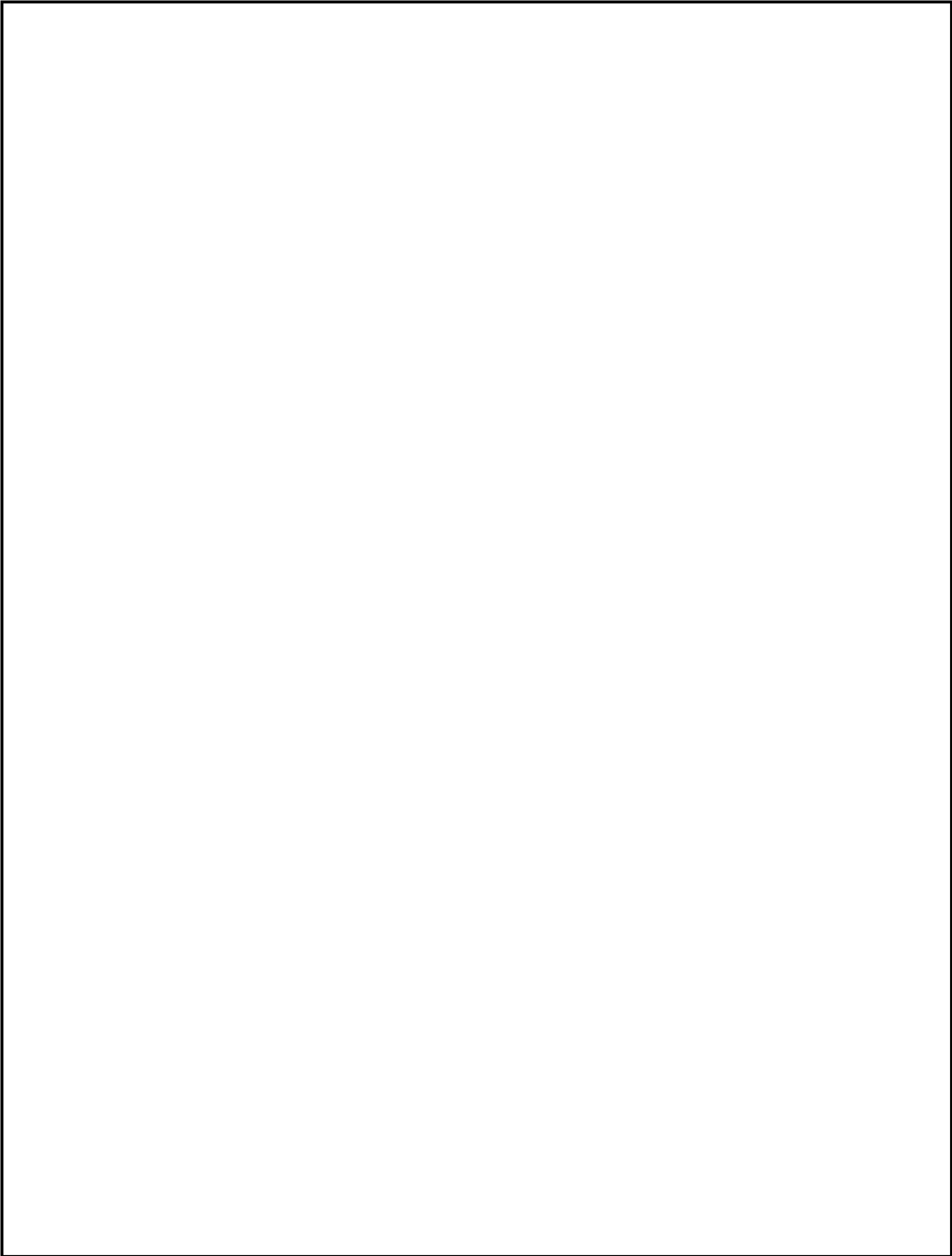
Choose ONE of the addition processes in the list below.

- **Lamination**
- **Printing**
- **Sewing**
- **Soldering**
- **Welding**

My chosen process is _____

In the box, on the opposite page, use notes AND sketches to describe your chosen process.

Identify the equipment used in your chosen process. [6 marks]



[Turn over]



1	7
---	---

Name ONE process used to remove waste material to make different parts of a prototype. Describe the process you have chosen. [3 marks]

Name of process

Description of chosen process

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

[Turn over]

18.1

Explain the purpose of ‘quality control’.
[2 marks]

1	8	.	2
---	---	---	---

Describe ONE method of ‘quality control’ that is used when making prototype products. [2 marks]

[Turn over]



1	9
---	---

Choose ONE of the material categories in the list below.

- **Metal based materials**
- **Paper and boards**
- **Polymers**
- **Textile based materials**
- **Timber based materials**

My chosen material category is

1	9	.	1
---	---	---	---

Give the source or origin of your chosen material category. [1 mark]

1	9	.	2
---	---	---	---

Name ONE process used to convert your chosen material category into a workable form. [1 mark]

[Turn over]



BLANK PAGE



1	9	.	3
---	---	---	---

Using notes and/or sketches describe the process you have named on page 31.
[4 marks]

[Turn over]



2	0
---	---

The design and manufacture of products has an effect on our planet and environment.

Analyse and evaluate the issues a consumer may consider before deciding to purchase products.

Give examples in your answer. [8 marks]

[illegible]

[Turn over]

30



SECTION C – DESIGNING AND MAKING PRINCIPLES

Answer ALL questions in the spaces provided.

2	1
---	---

Study the picture in FIGURE 3 and the specification below.

FIGURE 3



Specification for playground equipment

- **For use by children age 4-12.**
- **Designed for external use.**
- **Recessed/flush fitting construction fittings used.**
- **All fittings are tamper proof.**
- **Use of weatherproof materials.**
- **Suitable for installation on a flat surface.**
- **Use of non-slip surfaces.**
- **Tough, durable and wear resistant finish applied to all parts.**
- **Parts designed to be bolted together.**

[Turn over]

BLANK PAGE



2	1	.	1
---	---	---	---

Analyse and evaluate the playground equipment in terms of suitability for the user. [4 marks]

[Turn over]



BLANK PAGE



2	1	.	2
---	---	---	---

Analyse and evaluate the playground equipment in terms of inclusion of safety features. [4 marks]

[Turn over]



21.3

Study the data in TABLE 2.

TABLE 2

Part of body measured in millimetres	Age of Child		
	4 years	8 years	12 years
Height	1040	1270	1480
Arm length	420	545	650
Hand width	55	60	65

Analyse and evaluate how a designer would use the anthropometric data in TABLE 2 to design the playground equipment. [4 marks]

[Turn over]

2	2
---	---

The step ladder in FIGURE 4 has 12 steps. Each step is 275 mm long, 100 mm wide and 25 mm thick.

FIGURE 4



2	2	.	1
---	---	---	---

Each step should be 275 mm long.

The manufacturing tolerance is $\pm 0.5\%$

**Calculate the maximum and minimum length of each step to two decimal places.
[2 marks]**

[Turn over]



2	2	.	2
---	---	---	---

12 steps of exactly 275 mm will be cut from one piece of material 3.6 metres in length.

What is the percentage of waste material created after cutting the steps?

Calculate your answer to two decimal places. [3 marks]

[Turn over]

2	3
---	---

Designers often collaborate.

Discuss the importance of collaboration in creating effective design solutions.

**Give examples to support your answer.
[6 marks]**



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[Turn over]



2	4
---	---

Give FIVE safety precautions a user needs to consider when using any cutting tools. [5 marks]

1 _____

2 _____

3 _____

4 _____



5

[Turn over]

25.1

Explain why surface finishes are applied to materials and fabrics for aesthetic reasons.

Give examples in your answer. [3 marks]

[illegible]

2 5 . 2

Explain why surface finishes are applied to materials and fabrics for functional reasons.

Give examples in your answer. [3 marks]

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[Turn over]



2	6	.	1
---	---	---	---

Three dimensional (3D) drawings communicate information in different ways to two dimensional (2D) drawings.

Describe TWO advantages 3D drawing has over 2D drawing. [2 x 2 marks]

Advantage 1 _____

Advantage 2 _____



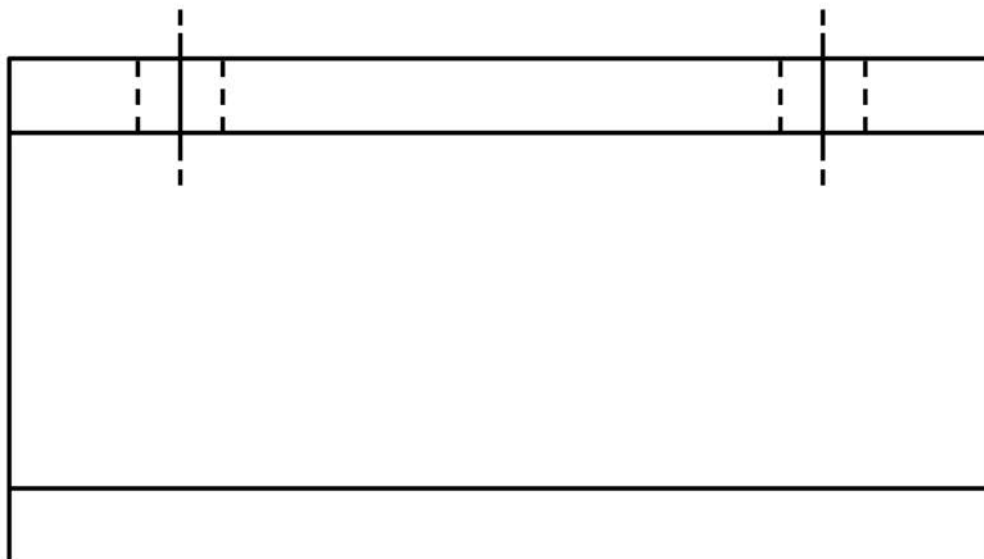
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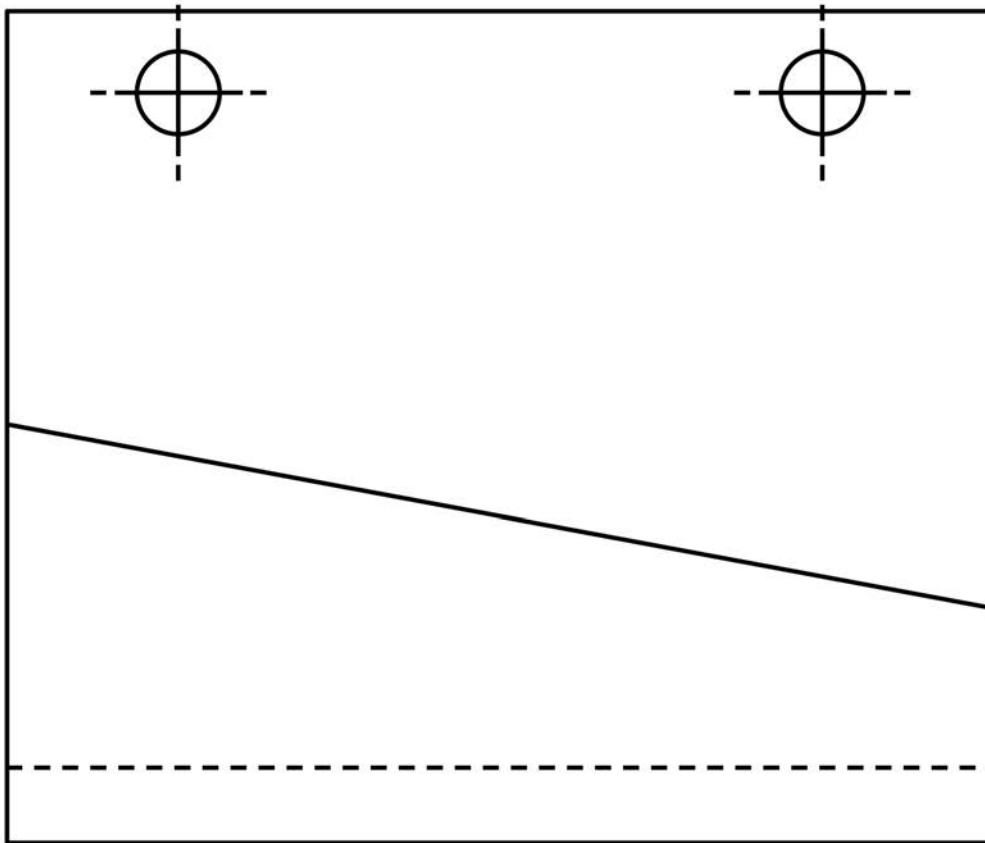
2	6	.	2
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Below is a drawing of a storage rack for letters.

Complete the third angle orthographic projection by adding a SIDE VIEW and ISOMETRIC DRAWING of the shape in the boxes provided. [5 marks]



Plan view



Front view

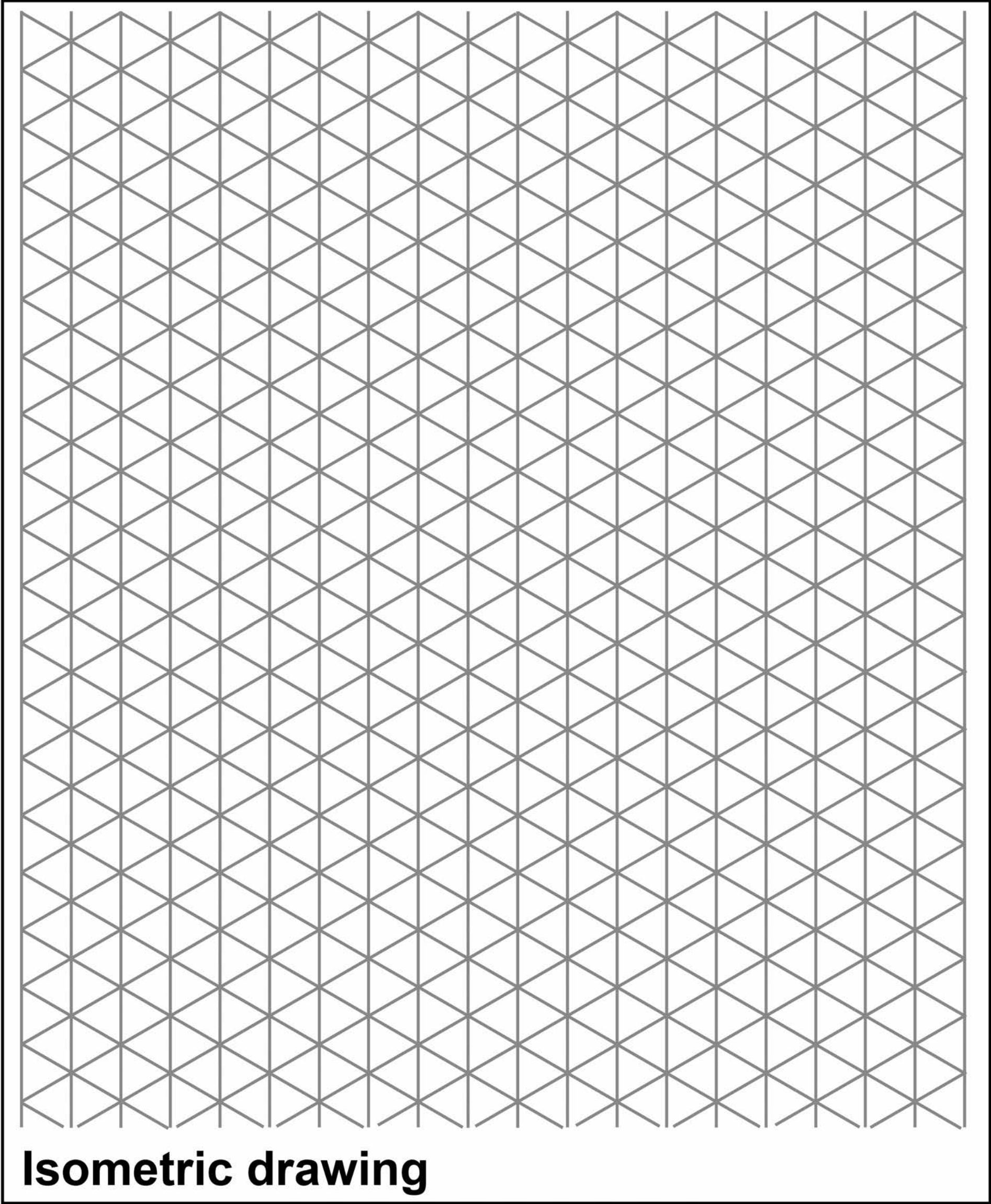
Side view

[Turn over]



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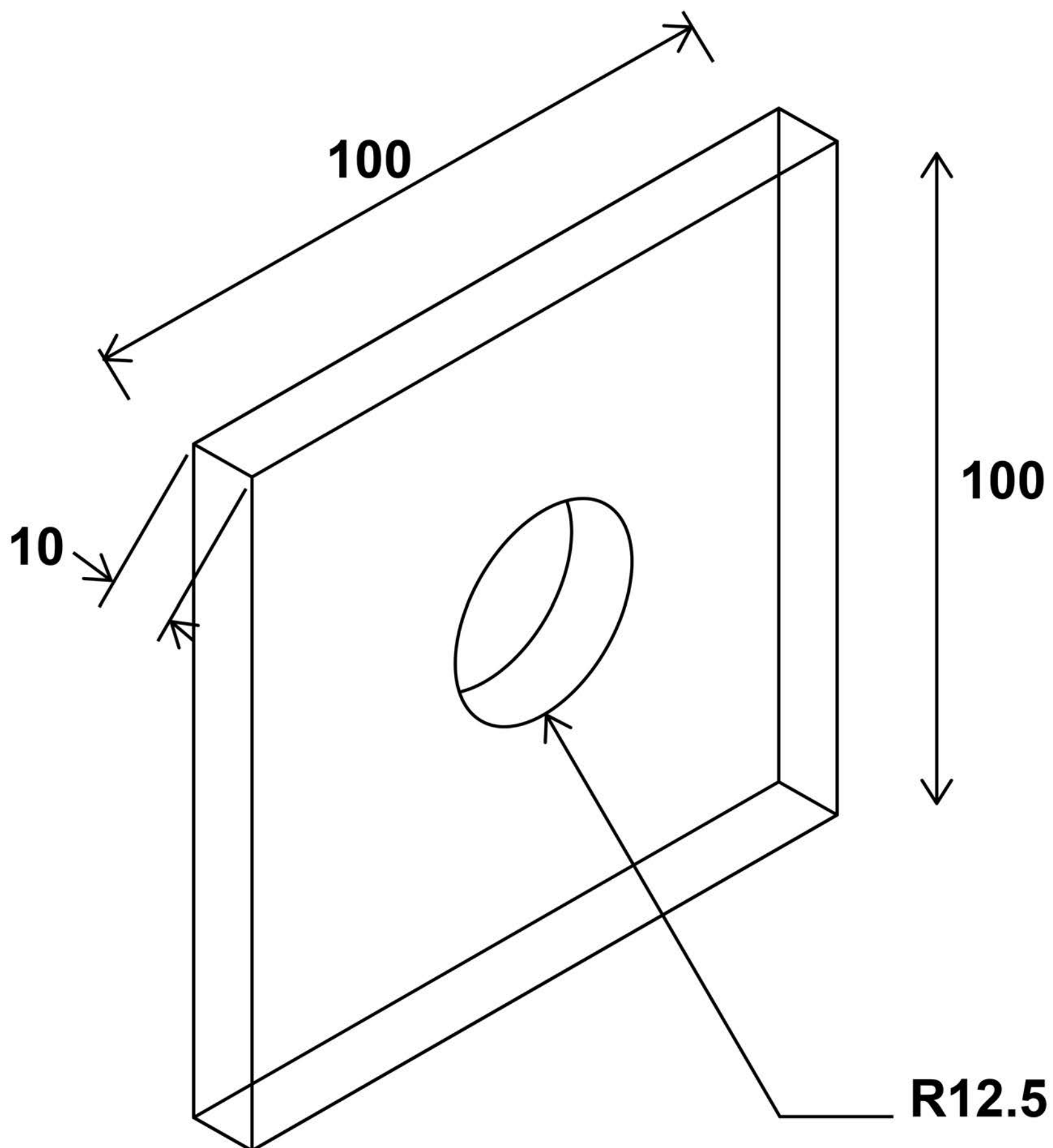


[Turn over]

2	7
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The component in FIGURE 5 is to be made by pouring a liquid material into a mould.

FIGURE 5



All dimensions are in millimetres.

Calculate the volume of material required to make ONE component.

Show your working and give your answer to the nearest mm^3 [3 marks]

[Turn over]



2	8
---	---

Explain why modelling is an important tool used by designers to develop prototypes. Give specific examples in your answer. [4 marks]

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50

END OF QUESTIONS

Additional page, if required.

Write the question numbers in the left-hand margin.

This image shows a blank sheet of white paper with horizontal ruling lines. A single vertical line runs down the left side, creating a narrow margin. There are 20 horizontal lines in total, evenly spaced across the page. The lines are thin and black. The overall appearance is that of a clean, unused piece of stationery or notebook paper.

Additional page, if required.

Write the question numbers in the left-hand margin.

[illegible]

Additional page, if required.
Write the question numbers in the left-hand margin.

Additional page, if required.

Write the question numbers in the left-hand margin.

This image shows a blank sheet of white paper with horizontal ruling lines. A single vertical line runs down the left side, creating a margin. There are 20 horizontal lines in total, evenly spaced across the page. The lines are thin and black.

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For Examiner's Use	
Section	Mark
A	
B	
C	
TOTAL	

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