Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____
I declare this is my own work.

GCSE
DESIGN AND TECHNOLOGY

Unit 1 Written Paper

Monday 19 June 2023 | Morning | Time allowed: 2 hours

Materials
For this paper you must have:
- normal writing and drawing instruments
- a calculator
- a protractor.

For Examiner's Use	
Section	Mark
A	
B	
C	
TOTAL	

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.
- 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
- 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 write outside the box

Section A – Core technical principles

Answer **all** questions in this section.

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 Which **one** of the following is a composite material?

A Carbonfibre reinforced plastic (CRP) ⬭

B Graphene ⬭

C High impact polystyrene (HIPS) ⬭

D Titanium ⬭

[1 mark]

0 2 Which **one** of the following statements is true?

A Coal is used to generate hydro-electric power. ⬭

B Fossil fuels produce argon when they burn. ⬭

C Gas is a renewable resource extracted from the ground. ⬭

D Oil is extracted from the ground to produce petroleum. ⬭

[1 mark]

Do not write outside the box

0 3 Which **one** of the following statements is true?

A Batteries can be safely thrown away with household rubbish. ⬭

B Rechargeable batteries can only be used ten times. ⬭

C Toys that use batteries do not have any safety features. ⬭

D Zinc carbon batteries leak and corrode. ⬭

[1 mark]

0 4 Which **one** of the following is a thermoforming polymer?

A Epoxy resin (ER) ⬭

B High density polythene (HDPE) ⬭

C Melamine formaldehyde (MF) ⬭

D Polyester resin (PR) ⬭

[1 mark]

0 5 Which **one** of the following is a **working** property of a material?

A Absorbency ⬭

B Density ⬭

C Fusibility ⬭

D Malleability ⬭

[1 mark]

0 6 When manufacturers focus on the reduction of waste during production, it is called

A batch manufacture. ⬭

B flexible manufacture. ⬭

C lean manufacture. ⬭

D mass manufacture. ⬭

[1 mark]

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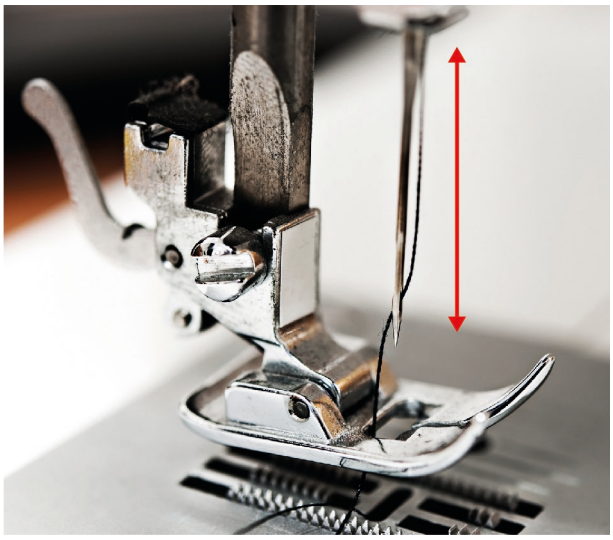
0 7 What type of motion best describes the action of the sewing machine needle in **Figure 1** when in operation?

Figure 1



A Linear ⬭

B Oscillating ⬭

C Reciprocating ⬭

D Rotary ⬭

[1 mark]

0 8 Which **one** of the following is a feature of design in society?

A Focus on machines ⬭

B Focus on materials ⬭

C Focus on people ⬭

D Focus on resources ⬭

[1 mark]

Do not write outside the box

0 9 Name the renewable energy source in **Figure 2**.

Figure 2

A Solar ⬭

B Tidal ⬭

C Wave ⬭

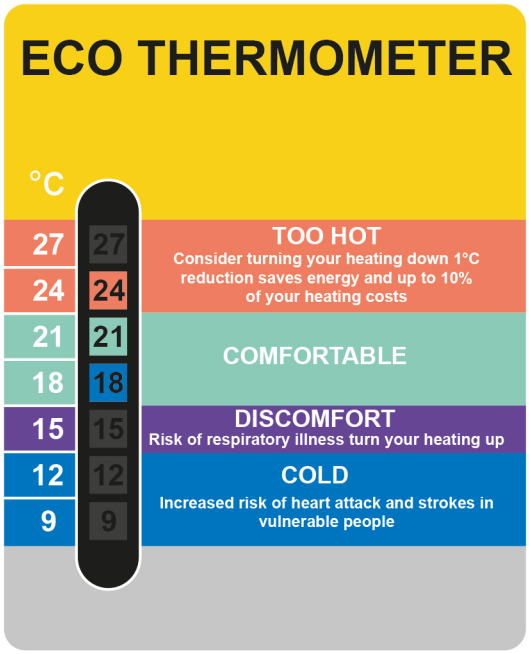
D Wind ⬭

[1 mark]

Turn over for the next question

Do not write outside the box

1 0 Identify the colour-changing smart material used in the thermometer below.



A Liquid crystal display ⬭

B Nanomaterial ⬭

C Photochromic pigment ⬭

D Thermochromic pigment ⬭

[1 mark]

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1 1 . 1 Name **one** manufactured board.

[1 mark]

1 1 . 2 Explain **one** advantage of using manufactured boards.

[2 marks]

1 2 Explain the term 'planned obsolescence'.

Give an example of a product designed for 'planned obsolescence' in your answer.

[3 marks]

Turn over for the next question

Do not write outside the box

1 3 Give **two** advantages of 'crowd funding'.

[2 marks]

Advantage 1 _____

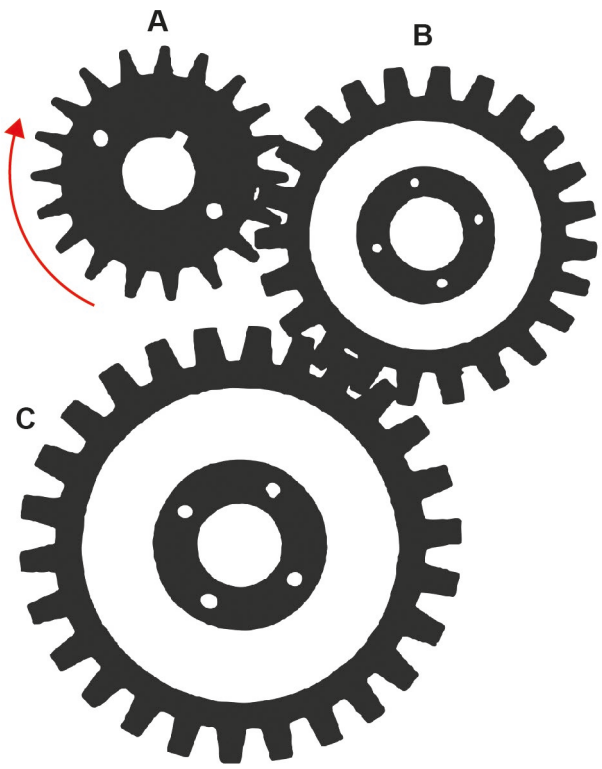
_____

Advantage 2 _____

_____

1 4 Describe the direction and speed of movement of **part C** in the gear train shown below when gear A turns clockwise.

[2 marks]



_____

_____

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_____

_____

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20

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Section B – Specialist technical principles

Answer **all** questions in this section.

1 5 A clothing manufacturer is producing 1500 coats for retail. Each coat will need four buttons and one extra for a spare. Each button costs 14 pence.

What is the total cost of the buttons required to complete the order?

Show your working.

Give your answer in £s.

[3 marks]

Answer £ _____

1 6 Give **two** aesthetic considerations when selecting materials and/or components to make prototypes.

[4 marks]

Consideration 1 _____

Consideration 2 _____

Do not write outside the box

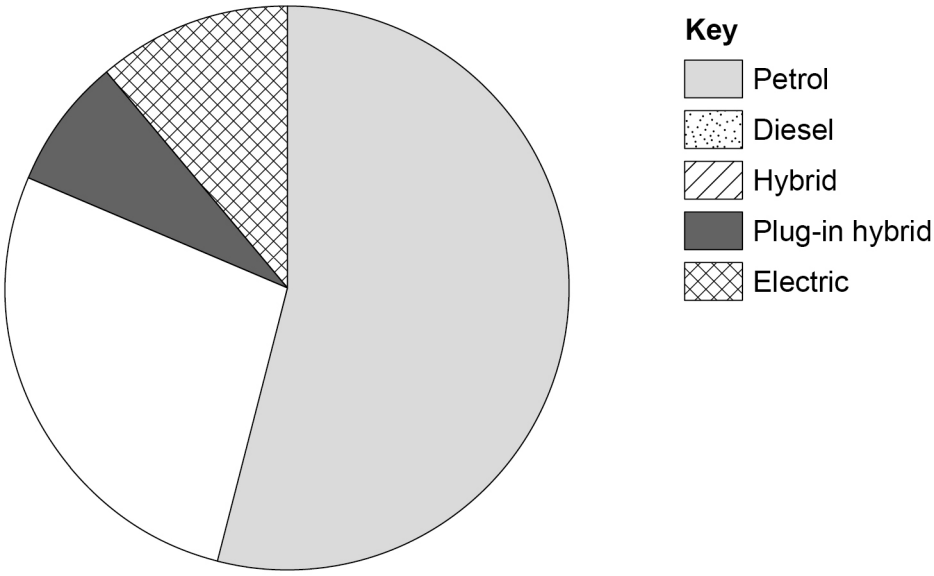
1 7 The data in the table below shows the approximate percentage of vehicles sold in the UK in 2021 by the type of fuel/power they use.

Percentage of vehicles sold in 2021 by fuel/power type	
Petrol	54%
Diesel	10%
Hybrid	17.5%
Plug-in hybrid	7.5%
Electric	11%

Use the information in the table above to complete the pie chart.

Show your working.

[4 marks]



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1 8 Choose **one** commercial process from the table below.

Paper and board die cutting	Wood turning	Metal casting	Polymer extrusion	Textile weaving	Electronic pick and place assembly

My chosen process is _____

1 8 . 1 Name a **specific** main material used with this process.

[1 mark]

_____

1 8 . 2 Name a stock form of the material used in your chosen process.

[1 mark]

_____

1 8 . 3 Give **two** reasons that make your chosen process suitable for commercial manufacture.

[4 marks]

Reason 1 _____

Reason 2 _____

Do not write outside the box

1 9 Five tools are shown below.

1 9 . 1 Name **one** of the tools shown.

[1 mark]

_____

1 9 . 2 Explain what the tool you have named in Question **19.1** is used for.

[2 marks]

_____

_____

_____

_____

Do not write outside the box

1 9 . 3 Give **two** safety points that need to be considered when using the tool you have named in Question **19.1**.

[2 marks]

Safety point 1 _____

_____

Safety point 2 _____

_____

Turn over for the next question

Do not write outside the box

2 0 Different products are made in different volumes using the production methods in the table below.

Prototype/one-off	Batch	Mass	Continuous

Discuss the advantages and disadvantages of manufacturing in quantity compared to producing a one-off item.

You should refer to the production methods in the table and give examples in your answer.

[8 marks]

30

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Section C – Designing and making principles

Answer **all** questions in this section.

2 1 Describe how prototypes help designers to ensure a product is fit for its intended purpose.

Give examples in your answer.

[6 marks]

Turn over for the next question

Do not write outside the box

2 2 The **two** bags below are used by children to carry belongings and equipment.

Rucksack

Specification:
- lightweight
- waterproof
- high visibility
- adjustable straps
- carrying handle
- compartments.

Drawstring bag

Specification:
- lightweight
- compact design
- large single storage space
- simple construction
- waterproof.

Analyse and evaluate both products in terms of:

2 2 . 1 The suitability for the user.

[6 marks]

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2 2 . 2 Ergonomics and anthropometrics.

[6 marks]

Turn over for the next question

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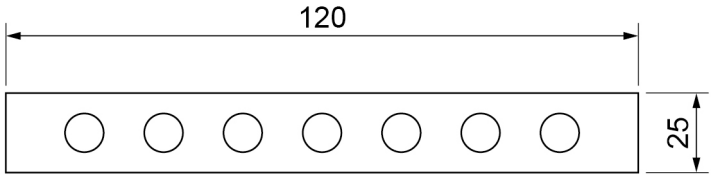
2 3 The component below is to be manufactured with seven circular holes.

Each hole is:

- 7 mm in diameter
- equally spaced from each other **and** from each end of the component
- equally spaced from the top and bottom of the component.



All dimensions in mm
Not to scale

2 3 . 1 What distance will the centre line need to be from either long side?

[1 mark]

Answer _____ mm

2 3 . 2 What is the required distance from the centre of one hole to the centre of the next hole to ensure the holes are equally spaced?

Show your working.

[2 marks]

Answer _____ mm

Do not write outside the box

2 3 . 3 Work out the shortest distance between the circumferences of any two holes.

Show your working.

[2 marks]

Answer _____ mm

2 3 . 4 The holes are to be drilled 7 mm with a tolerance of ±0.5 mm. State the maximum and minimum acceptable diameters of the holes.

[1 mark]

_____ Max mm

_____ Min mm

Turn over for the next question

Do not write outside the box

2 4 Explain why designers look at the work of others before creating new designs.

[3 marks]

2 5 Explain how a user-centred design approach can ensure that products are fit for purpose.

Give examples in your answer.

[6 marks]

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Turn over for the next question

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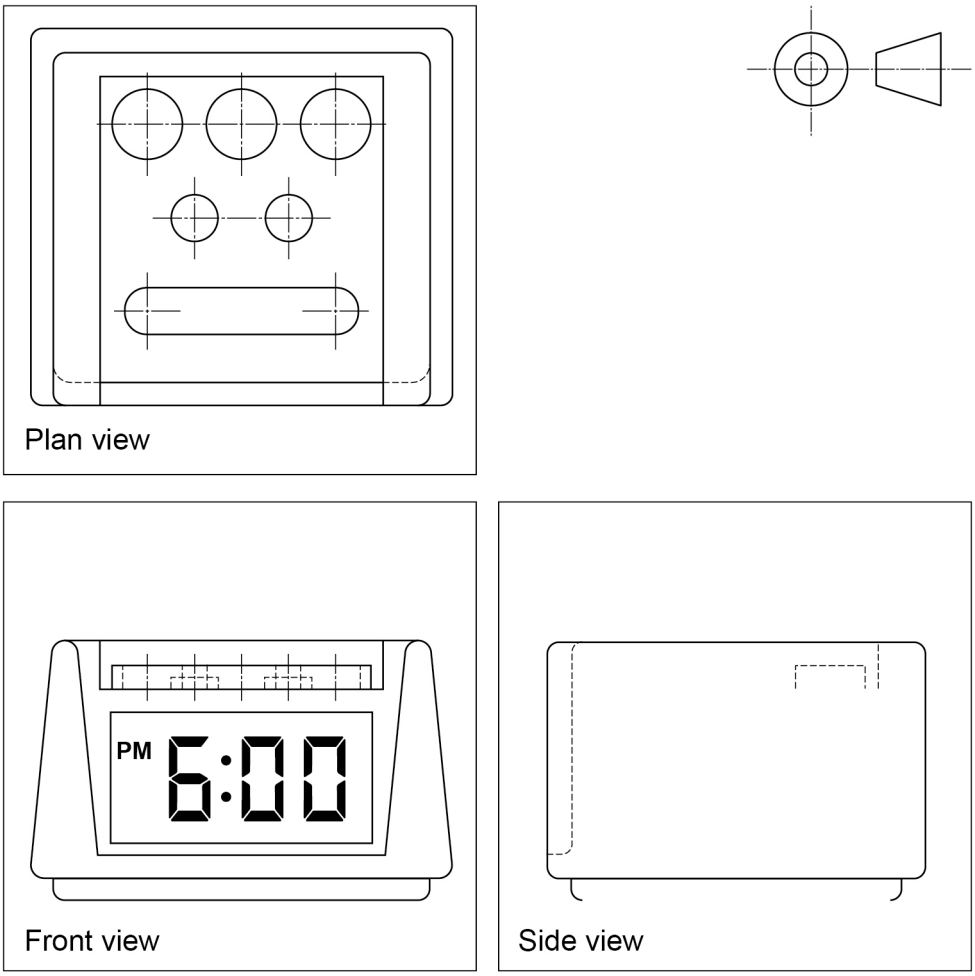
2 6 **Figure 3**, shown below, is a drawing of a radio alarm clock.

Figure 3



2 6 . 1 Name the drawing technique in **Figure 3** used to show details of the radio alarm clock.

[1 mark]

_____

_____

2 6 . 2 Complete the drawing in **Figure 3** by adding the correct detail to the side view.

[4 marks]

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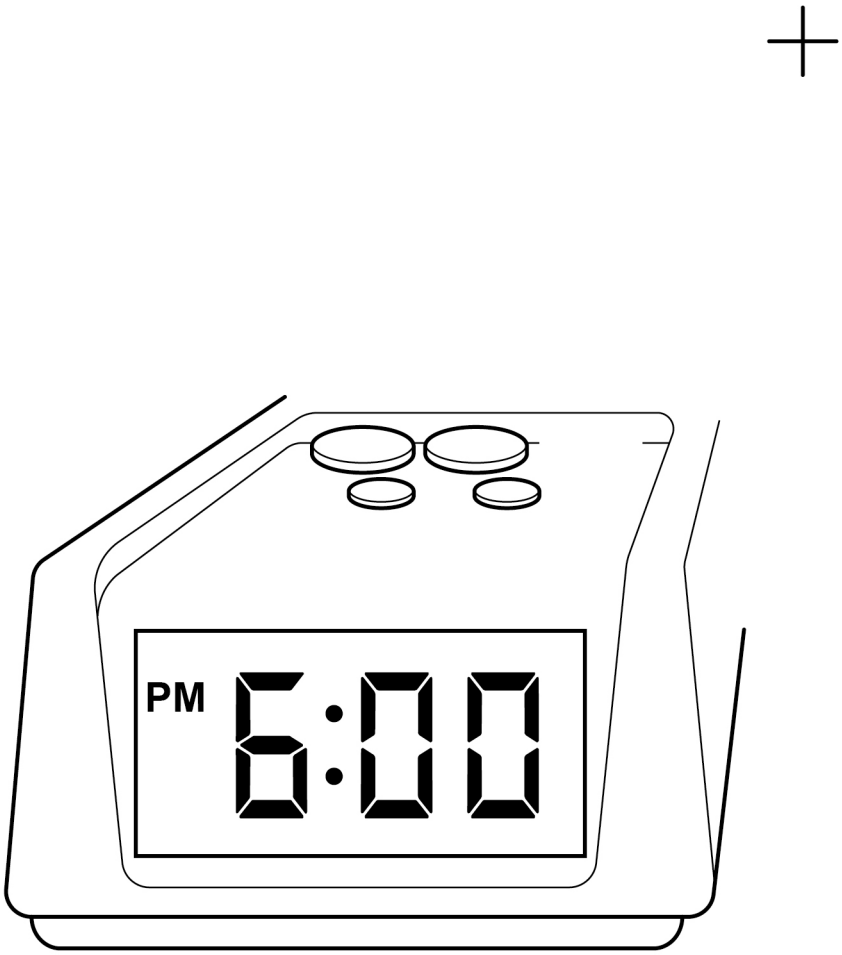
2 6 . 3 **Figure 4** shows a partially completed one-point perspective drawing of the radio alarm clock.

Complete the drawing using the given vanishing point marked by a cross.

[4 marks]

Figure 4



Turn over for the next question

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2 7 Explain **two** advantages of using audio and/or visual recordings when developing design ideas.

[4 marks]

Advantage 1 _____

_____

_____

_____

Advantage 2 _____

_____

_____

_____

2 8 Explain how **each** of the following issues may be considered before designing and manufacturing new products.

[4 marks]

Fair trade _____

_____

_____

_____

Global warming _____

_____

_____

_____

50

END OF QUESTIONS

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ANSWER IN THE SPACES PROVIDED

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