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

Tuesday 18 June 2024 | 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.

For the multiple-choice questions, completely fill in the lozenge 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 metals is an alloy?

A Aluminium ⬭

B Brass ⬭

C Iron ⬭

D Tin ⬭

[1 mark]

0 2 Which **one** of the following has to be considered when organising the workplace?

A Fair trade ⬭

B Market pull ⬭

C Technology push ⬭

D Tools and equipment ⬭

[1 mark]

Do not write outside the box

0 3 Which **one** of the following is the definition of a dense material?

A It can be stretched out into a thin length. ⬭

B It has a compact molecular structure. ⬭

C It has the ability to float in water. ⬭

D It is able to conduct an electrical charge. ⬭

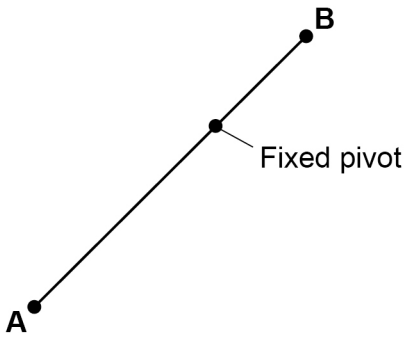
[1 mark]

0 4 **Figure 1** shows a lever to be used as part of a mechanism.

The distance from point A to the fixed pivot is 80 mm.

The distance from point B to the fixed pivot is 20 mm.

Figure 1



If point A of the lever moves 40 mm clockwise, how far does point B move clockwise?

A 10 mm ⬭

B 20 mm ⬭

C 30 mm ⬭

D 40 mm ⬭

[1 mark]

Do not write outside the box

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

A Carbon fibre reinforced plastic (CRP) ⬭

B Graphene ⬭

C High impact polystyrene (HIPS) ⬭

D Wool ⬭

[1 mark]

0 6 A shape has the dimensions:

Length 120 mm

Width 150 mm

Depth 170 mm

What is the volume of the shape in mm^3?

A 30 600 mm^3 ⬭

B 360 000 mm^3 ⬭

C 3 060 000 mm^3 ⬭

D 3 600 000 mm^3 ⬭

[1 mark]

0 7 Which **one** of the following is the definition of a thermoforming polymer?

A A material that becomes brittle when heated to a specific temperature. ⬭

B A material that becomes transparent when heated to a specific temperature. ⬭

C A material that does not soften when heated to a specific temperature. ⬭

D A material that softens when heated to a specific temperature. ⬭

[1 mark]

Do not write outside the box

0 8 What order (class) of lever are the scissors shown in **Figure 2**?

Figure 2

A First order ⬭

B Second order ⬭

C Third order ⬭

[1 mark]

0 9 Which **one** of the following fibres is sourced from a living creature?

A Cotton ⬭

B Elastane ⬭

C Nylon ⬭

D Silk ⬭

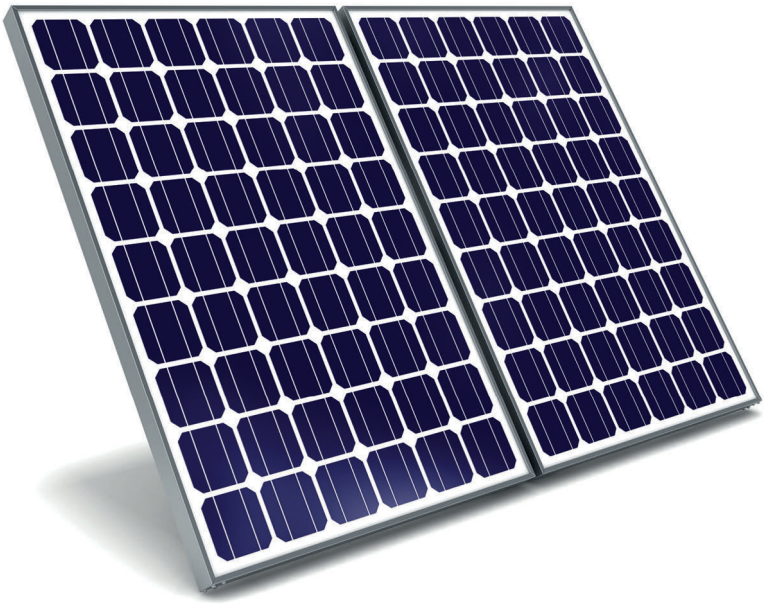
[1 mark]

Turn over for the next question

Do not write outside the box

1 0 Electricity is produced from which form of energy by the device in **Figure 3**?

Figure 3



A Biomass ⬭

B Tidal ⬭

C Solar ⬭

D Wind ⬭

[1 mark]

Do not write outside the box

1 1 Give **two** properties of natural timbers.

[2 marks]

Property 1 _____

_____

Property 2 _____

_____

1 2 Outline **two** reasons why foil lined cardboard is used in the packaging of the takeaway food container shown in **Figure 4**.

[4 marks]

Figure 4

Reason 1 _____

_____

_____

_____

Reason 2 _____

_____

_____

_____

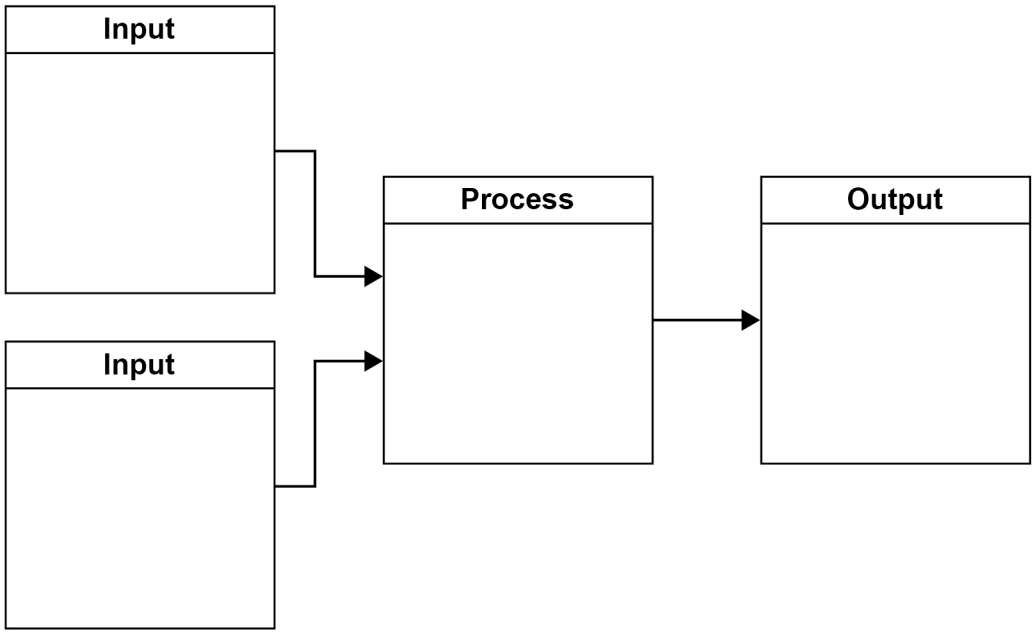
Do not write outside the box

1 3 **Figure 5** shows a system block diagram for a laptop computer.

Complete the diagram by adding **one** component that could be used in **each** box.

[4 marks]

Figure 5



20

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Section B – Specialist technical principles

Answer **all** questions in this section.

1 4 A homeowner is building a garden patio with an area 28 m^2

The patio uses paving stones measuring 0.6 m × 0.6 m.

[4 marks]

Calculate how many paving stones are needed in total.

Show your working and give your answer to the nearest whole paving stone.

Number of paving stones needed = _____

Do not write outside the box

1 5 **Table 1** shows a range of specific materials.

Table 1

Aluminium	**Cartridge paper**	**High impact Polystyrene (HIPS)**	**Oak**	**Silk**

Choose **one** material from the table above.

My chosen material is _____

1 5 . 1 Name **one** property of your chosen material.

[1 mark]

_____

_____

1 5 . 2 Give **one** product that uses your chosen material.

[1 mark]

_____

1 5 . 3 Describe why your chosen material is used in the product given in **Question 15.2**.

[2 marks]

_____

_____

_____

_____

Do not write outside the box

1 6 All materials are available in stock forms.

1 6 . 1 Name **one** specific material stock form.

[1 mark]

_____

1 6 . 2 Outline the benefits of using stock forms for designers and manufacturers.

[4 marks]

_____

_____

_____

_____

_____

_____

_____

_____

Turn over for the next question

Do not write outside the box

1 7 A manufacturer needs to purchase 1000 electric motors at a cost of £6.95 per 10 motors.

The manufacturer is then offered a discount of 15%.

What is the total price the manufacturer will have to pay for the 1000 motors?

Give your answer to the nearest pence.

Show your working.

[3 marks]

£ _____

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1 8 Choose **one** of the surface treatments or finishes from **Table 2**.

Table 2

Dip coating	**Painting**	**Printing**	**Lubrication**	**Vinyl decals**

Using notes and/or sketches, describe how your chosen surface treatment or applied finish is produced.

My chosen surface treatment or finish is:

[6 marks]

Turn over for the next question

Do not write outside the box

1 9 Analyse and evaluate the ecological issues that have to be considered in the sourcing and extraction of raw materials to make products.

Give examples to support your answer.

[8 marks]

30

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Turn over for the next question

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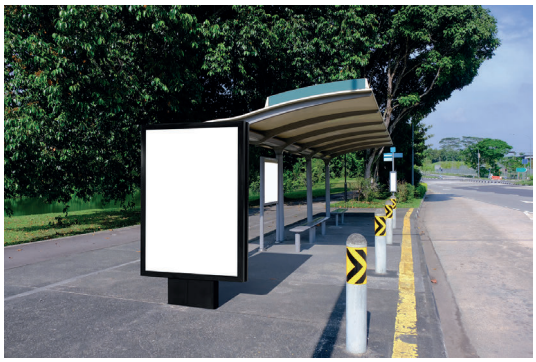
Section C – Designing and making principles

Answer **all** questions in this section.

2 0 Study the different bus stops shown in **Figure 6**.

Figure 6



A

B

C

D

2 0 . 1 Analyse and evaluate the bus stops in terms of user needs and wants.

[4 marks]

Do not write outside the box

2 0 . 2 Analyse and evaluate the bus stops in terms of innovative features that could be added to improve user experience.

[4 marks]

2 0 . 3 Analyse and evaluate how the designer of a bus stop may have considered anthropometrics and ergonomics.

[4 marks]

Do not write outside the box

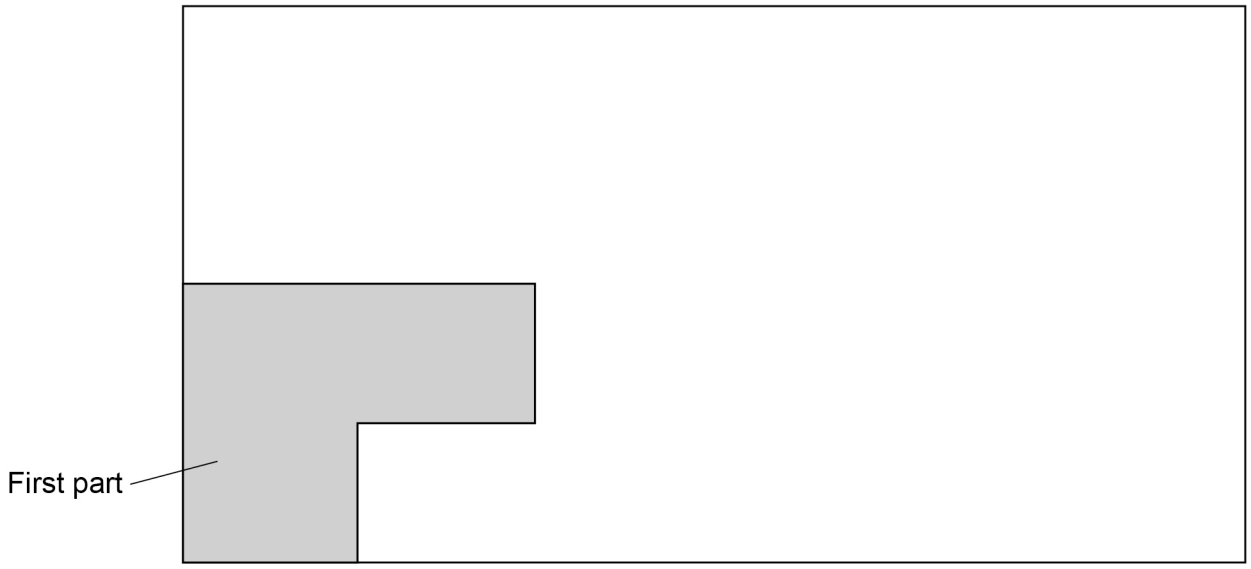
2 1 . 1 Explain the term 'nesting/tessellating' when cutting materials.

[2 marks]

2 1 . 2 A series of identical parts are to be cut out from a sheet material using a laser cutter to ensure that no waste is created by the cuts.

The position of the first part is shown in **Figure 7**.

Figure 7



Draw on **Figure 7** to show where all the other parts need to be placed to use the material efficiently.

[2 marks]

Do not write outside the box

2 2 Give **five** safety precautions a user needs to consider when using tools and equipment that use heat.

[5 marks]

Safety precaution 1 _____

_____

Safety precaution 2 _____

_____

Safety precaution 3 _____

_____

Safety precaution 4 _____

_____

Safety precaution 5 _____

_____

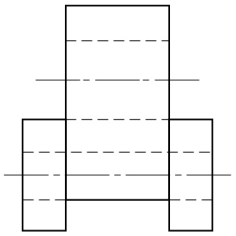
Turn over for the next question

Do not write outside the box

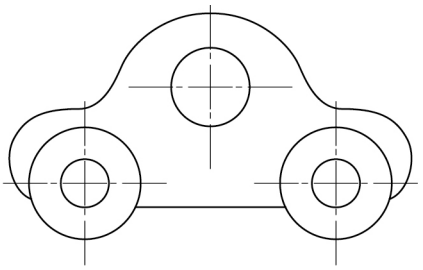
2 3 Below is a drawing of a toy car.

Complete a third angle orthographic projection by adding a **plan view** in the box provided.

Plan view



Front view



Side view

[6 marks]

Do not write outside the box

2 4 . 1 Two pieces of fabric are to be joined together by stitching.

The length of the join is 960 mm.

A sewing machine will stitch at a rate of 1050 stitches per minute and each stitch will be 3 mm long.

Calculate how many **seconds** it will take to join the two pieces of material.

Give your answer to the nearest whole second.

Show your working.

[4 marks]

_____ seconds

2 4 . 2 Calculate how many **minutes** it will take to complete 30 joins.

Show your working.

[2 marks]

_____ minutes

Turn over for the next question

Do not write outside the box

2 5 Explain what is meant by avoiding design fixation.

Give examples to support your answer.

[4 marks]

2 6 . 1 Explain what is meant by the term ‘tolerance’ when measuring a component.

[2 marks]

Do not write outside the box

2 6 . 2 Describe how tolerances are used as part of Quality Control.

Give examples in your answer.

[4 marks]

2 7 Describe how researching the work of other designers and companies can help with design work.

[4 marks]

Turn over for the next question

2 8 Explain the purpose of using a focus group when developing a product.

[3 marks]

50

END OF QUESTIONS

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ANSWER IN THE SPACES PROVIDED

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

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