AQA

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
DESIGN AND TECHNOLOGY

Unit 1 Written Paper

Friday 24 May 2019 Afternoon 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 pencils 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
- 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.

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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]

0 2 Identify the source of renewable energy.

A Coal ⬭

B Hydro-electrical ⬭

C Natural gas ⬭

D Oil ⬭

[1 mark]

Do not write outside the box

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]

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]

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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]

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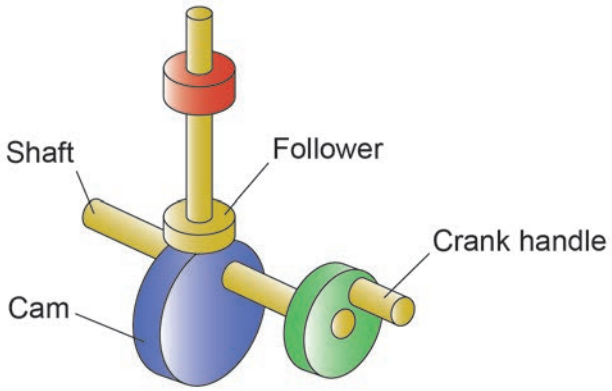
0 8 What change in motion takes place in the mechanism in **Figure 1** when the crank handle is turned?

Figure 1



A Linear to reciprocating ⬭

B Oscillating to rotary ⬭

C Reciprocating to linear ⬭

D Rotary to reciprocating ⬭

[1 mark]

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]

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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 mm^2 ⬭

B 62 370 mm^2 ⬭

C 62 407 mm^2 ⬭

D 62 485 mm^2 ⬭

[1 mark]

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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** 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.

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		

[2 marks]

1 2 Explain how Kevlar fibres are processed and arranged to give this material its unique properties.

[2 marks]

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1 3 Give **two** properties of manufactured boards.

[2 marks]

Property 1 _____

Property 2 _____

1 4 Explain **two** ways how just in time (JIT) production can help manufacturers improve efficiency.

[4 marks]

1 _____

2 _____

20

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Section B – Specialist technical principles

Answer **all** questions in the spaces provided.

1 5 Study the high chair in **Figure 2**.

Figure 2

Identify the force acting upon each of the following **three** parts of the high chair when in use.

[3 marks]

Legs _____

Seat _____

Straps _____

Do not write outside the box

1 6 Choose **one** of the addition processes in the table below.

Lamination	Printing	Sewing	Soldering	Welding

My chosen process is _____

In the box below, use notes **and** sketches to describe your chosen process.

Identify the equipment used in your chosen process.

[6 marks]

Do not write outside the box

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 _____

Turn over for the next question

Do not write outside the box

1 8 . 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]

1 9 Choose **one** of the material categories in the table 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]

Do not write outside the box

1 9 . 2 Name **one** process used to convert your chosen material category into a workable form.

[1 mark]

1 9 . 3 Using notes and/or sketches describe the process you have named above.

[4 marks]

Turn over for the next question

Do not write outside the box

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]

30

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Turn over for Section C

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ANSWER IN THE SPACES PROVIDED

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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.

2 1 . 1 Analyse and evaluate the playground equipment in terms of suitability for the user.

[4 marks]

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2 1 . 2 Analyse and evaluate the playground equipment in terms of inclusion of safety features.

[4 marks]

2 1 . 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]

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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 +/–0.5%

Calculate the maximum and minimum length of each step to two decimal places.

[2 marks]

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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 for the next question

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2 3 Designers often collaborate.

Discuss the importance of collaboration in creating effective design solutions.

Give examples to support your answer.

[6 marks]

Do not write outside the box

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 for the next question

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2 5 . 1 Explain why surface finishes are applied to materials and fabrics for aesthetic reasons.

Give examples in your answer.

[3 marks]

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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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 _____

Question 26 continues on the next page

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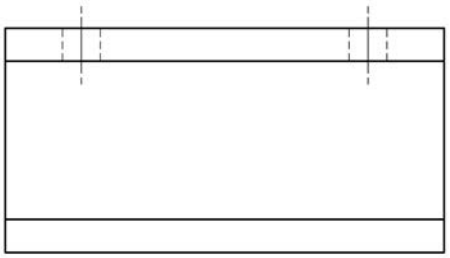
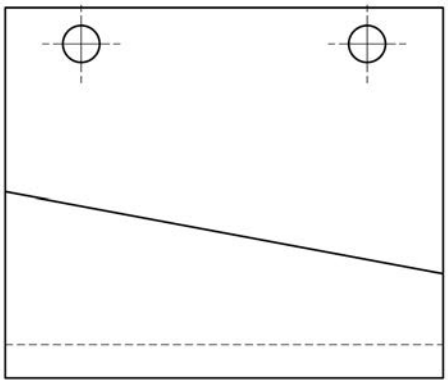
2 6 . 2 Below is a drawing of a storage rack for letters.

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

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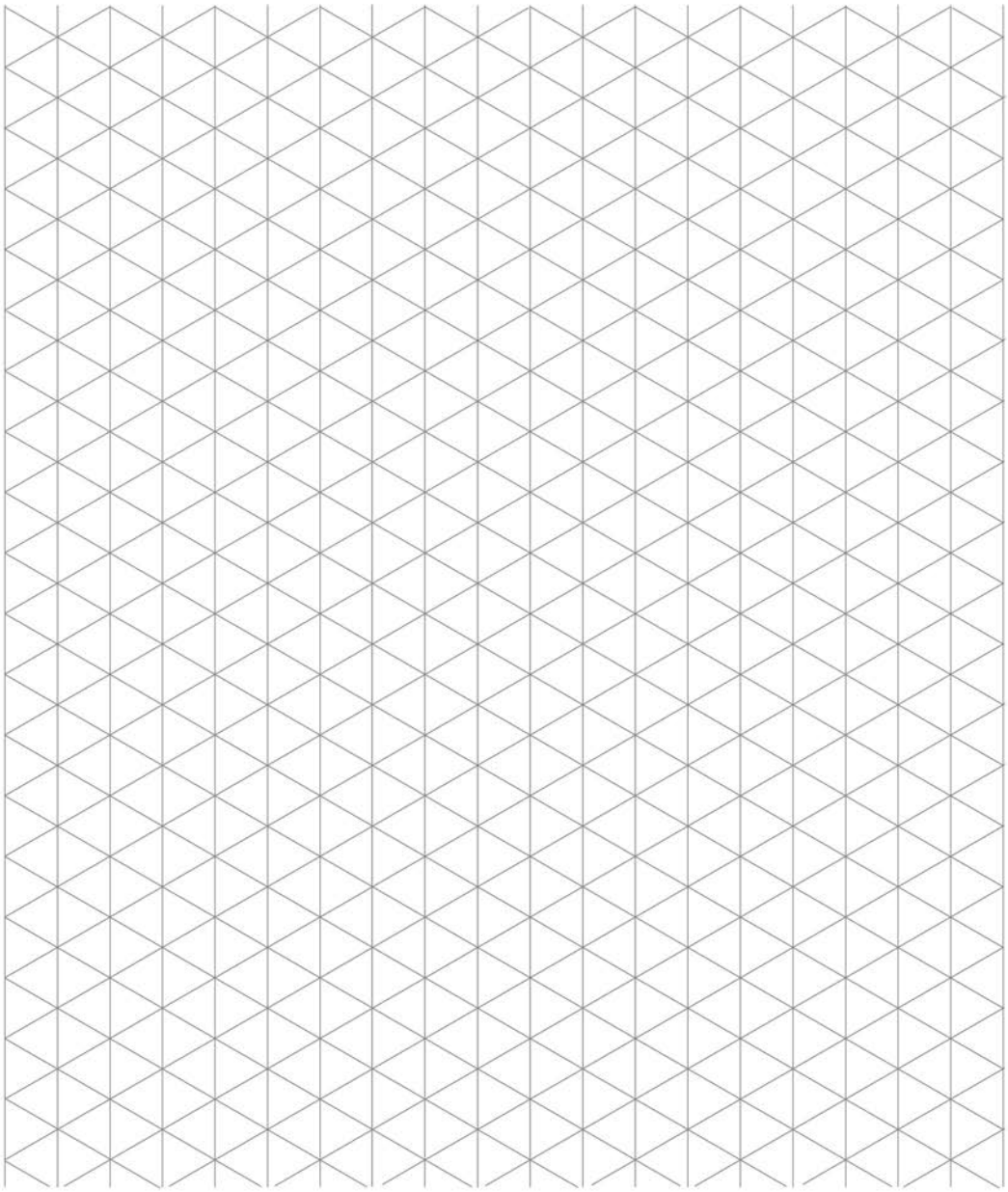

Isometric drawing

Turn over for the next question

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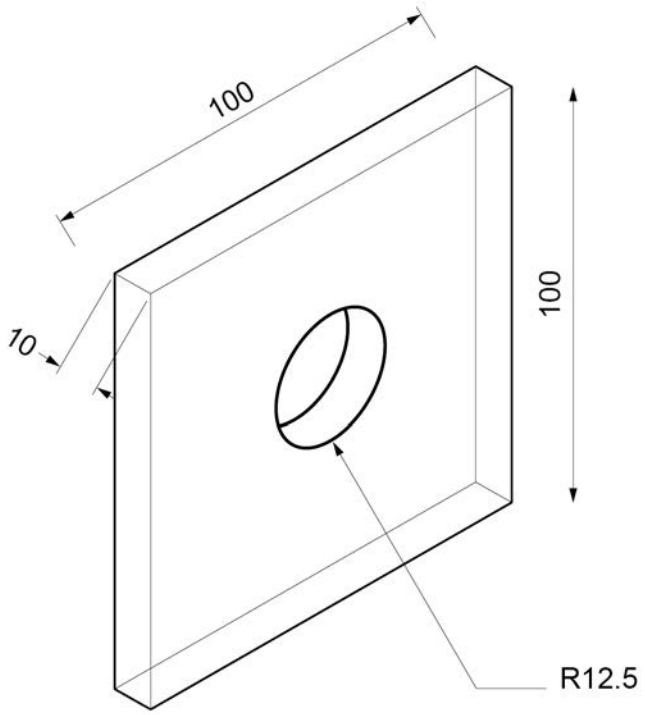
2 7 The component in **Figure 5** is to be made by pouring a liquid material into a mould.

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]

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2 8 Explain why modelling is an important tool used by designers to develop prototypes.

Give specific examples in your answer.

[4 marks]

50

END OF QUESTIONS

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ANSWER IN THE SPACES PROVIDED

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