AQA

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

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.

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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 technical textile?

A Brass ⬭

B Graphene ⬭

C Kevlar ⬭

D Polyester ⬭

[1 mark]

0 2 Which term can mean the latest trends in clothing or decoration?

A Belief ⬭

B Culture ⬭

C Faith ⬭

D Fashion ⬭

[1 mark]

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0 3 Which **one** of the following has a positive impact on the environment?

A Global warming ⬭

B Inefficient working ⬭

C Pollution ⬭

D Reducing waste ⬭

[1 mark]

0 4 Aluminium is used in the manufacture of cooking pots because it has which property?

A Absorbency ⬭

B Density ⬭

C Electrical conductivity ⬭

D Thermal conductivity ⬭

[1 mark]

0 5 Name the type of motion represented by the symbol below.

Figure 1

A Linear ⬭

B Oscillating ⬭

C Reciprocating ⬭

D Rotary ⬭

[1 mark]

Do not write outside the box

0 6 Which **one** statement about absorption is true?

A Kevlar softens when it absorbs water ⬭

B MDF expands when it absorbs water ⬭

C Nylon disintegrates when it absorbs water ⬭

D Polypropylene changes colour when it absorbs water ⬭

[1 mark]

0 7 In business, a method of raising brand awareness by using websites and social media is called

A a co-operative. ⬭

B innovation. ⬭

C virtual marketing. ⬭

D virtual retailing. ⬭

[1 mark]

0 8 A designer has been asked to create load-bearing furniture from card or board. Identify the most suitable material for this project.

A Corrugated card ⬭

B Foil lined board ⬭

C Ink jet card ⬭

D Solid white board ⬭

[1 mark]

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0 9 A smart material is one which

A conducts electricity. ⬭

B protects against fire. ⬭

C reacts to a stimulus. ⬭

D waterproofs fabric. ⬭

[1 mark]

1 0 Which **one** of the following is a manufactured board?

A Ash ⬭

B Balsa ⬭

C Plywood ⬭

D Spruce ⬭

[1 mark]

1 1 Give **two** reasons why blended and mixed fibres are used in clothing.

[2 marks]

1 _____

_____

2 _____

_____

Turn over for the next question

Do not write outside the box

1 2 Explain the disadvantages of extracting fossil fuels as a source of energy.

[3 marks]

1 3 Toy trains like the one in **Figure 2** are to be painted.

Figure 2

Paint is purchased in tins that can each cover 4 square metres. **Table 1** shows the amount of paint in **each** colour required to paint **one** train.

Table 1

Colour	**Paint needed m^2**
Blue	0.20
Green	0.45
Red	0.30
Yellow	0.25

Do not write outside the box

1 3 . 1 A batch of 50 trains are to be painted. Calculate the **total** number of tins of **green** paint that need to be purchased.

[2 marks]

Answer _____

1 3 . 2 What percentage of **green** paint will go to waste?

Calculate your answer to **two** decimal places.

[3 marks]

Answer _____ %

20

Turn over for Section B

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Section B – Specialist technical principles

Answer **all** questions in this section.

1 4 **Table 2** shows a range of products.

Table 2

		
Mail packaging	**Baseball bat**	**Screwdriver blade**
		
Baby's drinking cup	**Gym wear**	**Electronic device with display**

Choose **one** product from **Table 2**.

My chosen product is _____

Do not write outside the box

1 4 . 1 Name the specific main material/component of your chosen product.

[1 mark]

1 4 . 2 Name **one** property of the material of your chosen product.

[1 mark]

1 4 . 3 Describe why the property is needed for the product to function properly.

[2 marks]

1 5 Describe **two** ways materials can be stiffened.

You may use examples in your answer.

[2 x 2 marks]

1

2

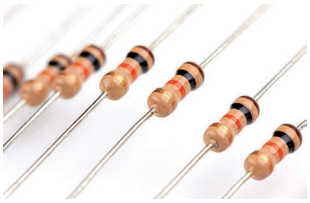
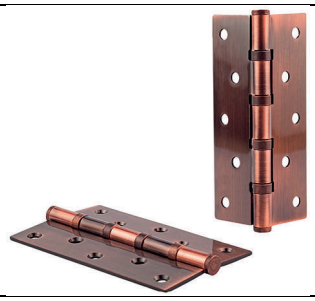
Turn over for the next question

1 6 . 1 **Table 3** shows a variety of standard components.

Choose a component and complete **one** row in **Table 3**.

[3 marks]

Table 3

Component	Component name	Component function
		
		
		
		
		

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1 6 . 2 Explain the benefits of using standard components when manufacturing products.

[2 marks]

Turn over for the next question

Do not write outside the box

1 7 **Table 4** shows examples of manufacturing processes.

Table 4

Offset lithography	Turning	Casting	Injection moulding	Weaving	Flow soldering

Choose **one** of the manufacturing processes from **Table 4**.

Use notes and/or sketches to describe how your chosen process is used to make products.

[6 marks]

My chosen manufacturing process is _____

Do not write outside the box

1 8 Choose **one** of the methods/techniques shown in **Table 5**.

Table 5

Dimensional accuracy	Process time	Registration accuracy

My chosen method/technique is _____

Describe how your chosen method/technique is used to ensure quality control.

[3 marks]

_____

_____

_____

_____

_____

_____

Turn over for the next question

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1 9 Before a consumer makes a product purchase they should consider the six Rs shown in **Table 6**.

Table 6

Reduce	Refuse	Re-use	Repair	Recycle	Rethink

Analyse and evaluate how the six Rs may help a consumer make an informed decision whether to purchase or not.

[8 marks]

30

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Turn over for Section C

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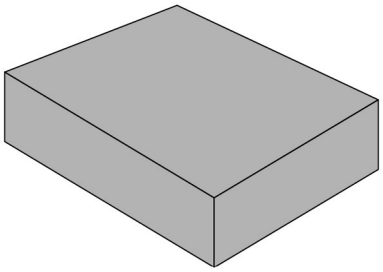
Section C – Designing and making principles

Answer **all** questions in this section.

2 0 **Figure 3** shows the base for a basketball stand.

Figure 3



2 0 . 1 **Table 7** gives the details of the internal volume of the base.

Table 7

Internal dimensions of the base	Length	Width	Depth
	600 mm	450 mm	200 mm

Calculate the internal volume of the base in **cm^3**

[2 marks]

Answer _____ cm^3

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2 0 . 2 To stop the basketball stand from falling over, the hollow base is filled with dry sand. The sand has a density of 1.6 g per cm^3

Calculate the mass of sand needed to fill the base.

Give your answer to the nearest whole kg.

[3 marks]

Answer _____ kg

Turn over for the next question

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2 1 Vacuum cleaners have changed considerably over time.

Study the images in **Figure 4**.

Figure 4

Suction bag vacuum cleaner

Cyclonic vacuum cleaner

Hand held vacuum cleaner

Robot vacuum cleaner

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2 1 . 1 Analyse and evaluate how aesthetics are considered in the design of the modern vacuum cleaners shown in **Figure 4**.

[4 marks]

2 1 . 2 Analyse and evaluate how the modern vacuum cleaners in **Figure 4** meet the needs and wants of users.

[4 marks]

Question 21 continues on the next page

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2 1 . 3 Analyse and evaluate how iterative design may have been used to improve the vacuum cleaners in **Figure 4**.

[4 marks]

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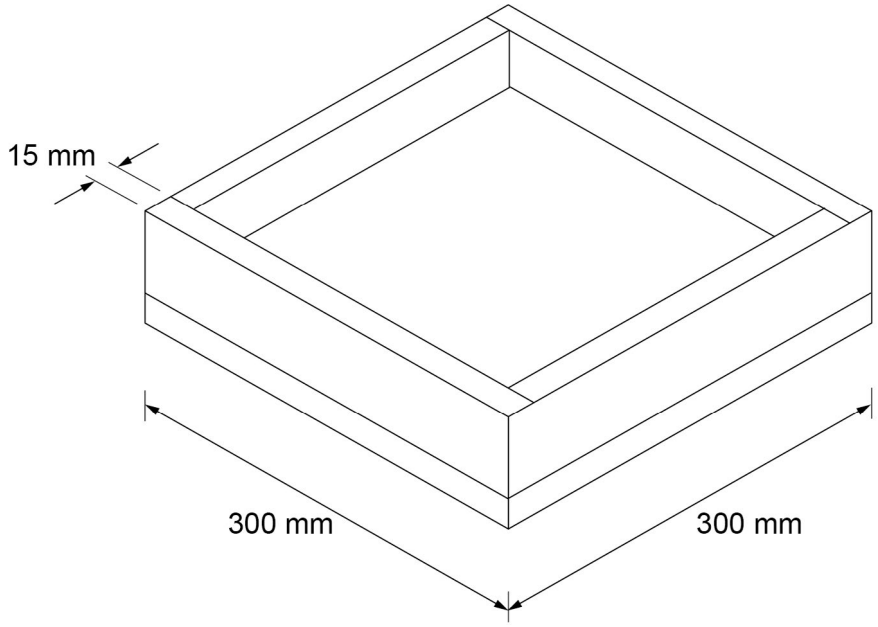
2 2 . 1 Study the diagram of the box in **Figure 5**.

Figure 5



The overall base dimensions are 300 mm × 300 mm.

The thickness of the material used for the sides of the box is 15 mm.

Use the dimensions provided to calculate the **internal** base area of the box.

Give your answer with units.

Show your working.

[4 marks]

Answer _____

Turn over ►

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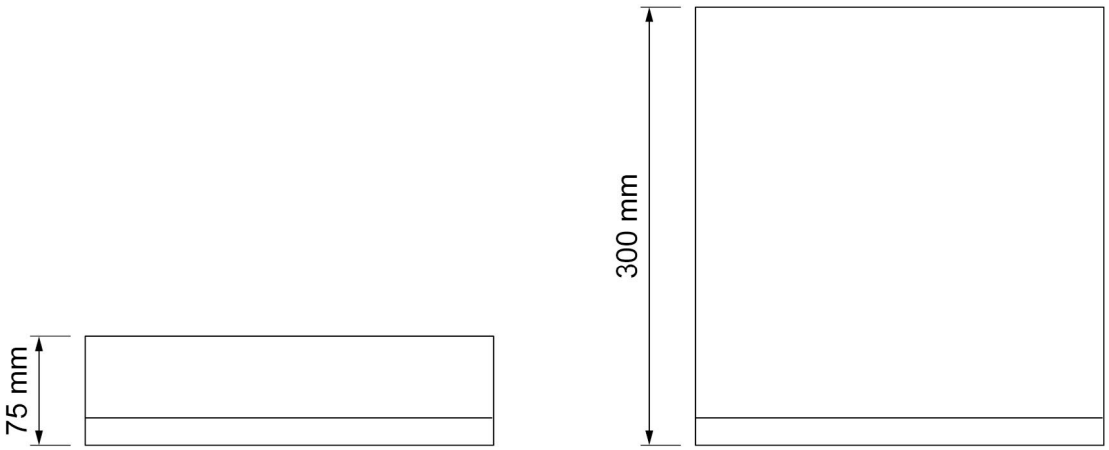
2 2 . 2 The box shown in **Figure 5** is to be enlarged/increased in capacity.

Study the front elevations of the original box front and the enlarged box front shown in **Figure 6**.

Figure 6



Existing box front as shown in **Figure 5**

New larger box front

Give the ratio of the height of the new box compared to the height of the existing box.

Show your working.

Give your answer in its simplest form.

[2 marks]

Ratio is _____

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2 3 The image below represents the Fairtrade organisation.

2 3 . 1 Name **one** product associated with Fairtrade.

[1 mark]

2 3 . 2 Explain the need for fair trade and give **one** example of people who benefit from it.

[4 marks]

Turn over for the next question

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2 4 Focus groups and market research are used by designers to gather information before designing products.

Use **one** example for **each** technique and describe how they would be used to help design products.

[2 x 3 marks]

Focus groups

Market research

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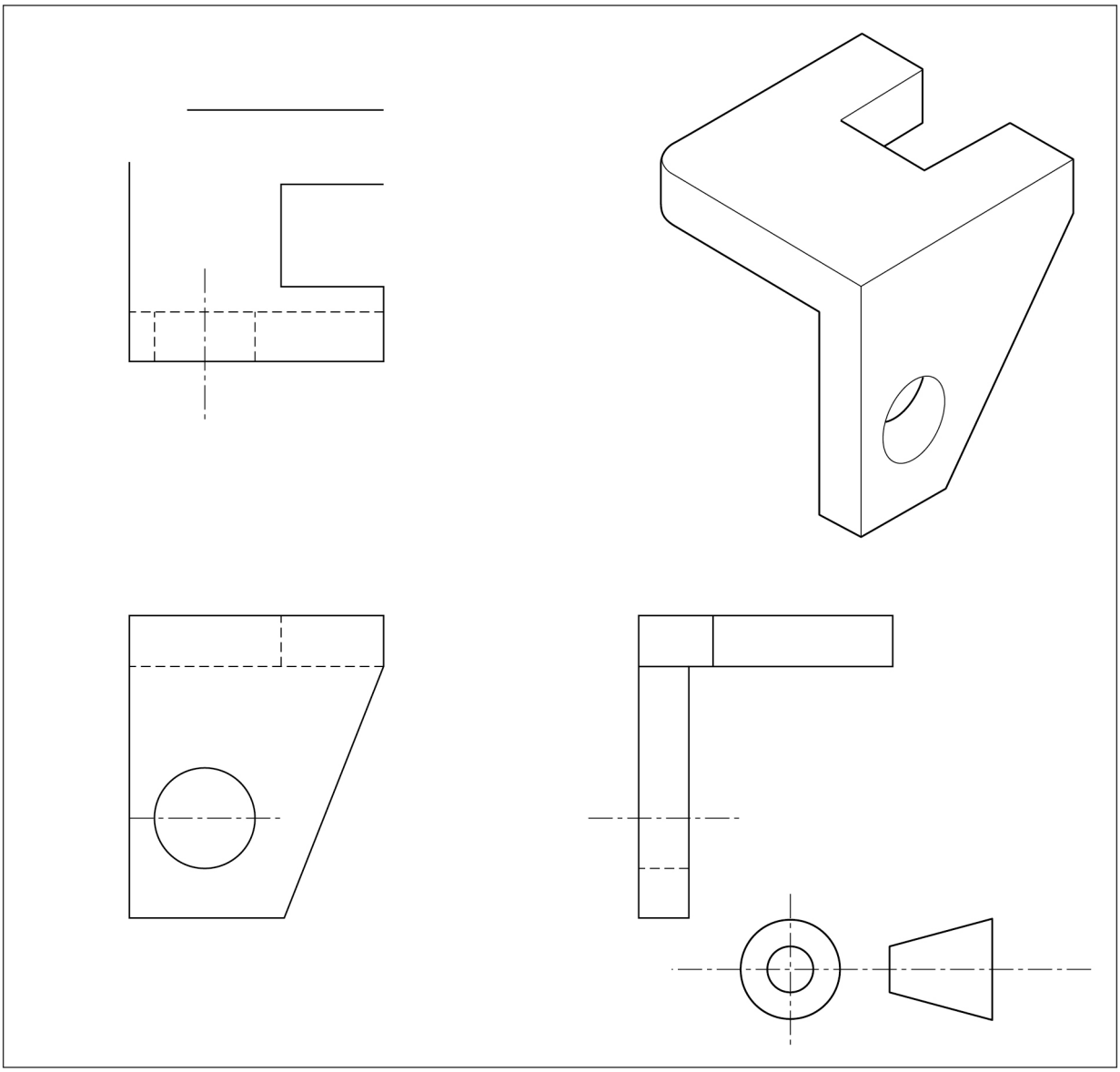
2 5 Below is a part-completed third angle orthographic projection drawing of a component.

Complete the **three** orthographic views.

A complete isometric of the part has been given to help you.

[5 marks]



Turn over for the next question

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2 6 Use notes and/or sketches to describe how a material of your choice would need to be prepared/processed for a surface treatment or finish.

Name any equipment you would use and describe how it is set up.

[6 marks]

Do not write outside the box

2 7 . 1 Name the written technique used to communicate design ideas as shown in **Figure 7**.

[1 mark]

Figure 7

This is what the product will look like when the sliding covers are in use. This is the design I have chosen as it gives the maximum amount of protection to the devices inside but it also doesn't take up any more room when opened or closed meaning the area the device takes up when in use is no more than when it's not being used.

This is a CAD model of what the USB power bank will look like. The gap will be just large enough for the user's hand to easily reach in and replace the cables as well as feeding them through the cut-outs in the side panel so devices can easily be charged with their standard cables (something manufacturers recommend to improve the lifespan of the devices, as well as reducing the risk of fire from worse quality cables).

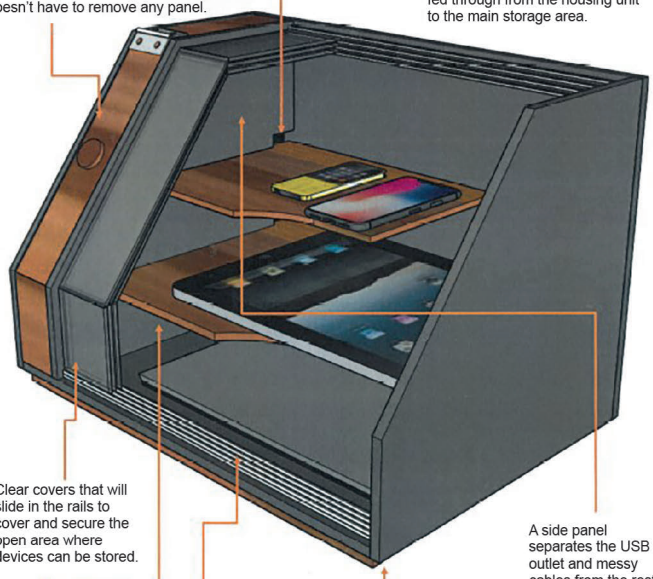
Aesthetics – 8
Additional features – 9
Storage – 10
Size – 7
Ergonomics – 7

These are the ratings of my client review when I asked him to score each category (10 being the best I could have hoped for).

Client review: this is definitely an improvement on the previous design I was shown. This would take up a lot less space and is the more compact design I was hoping for when I gave you the suggestions. I like the sliding cover and shows a lot more thought has been put in compared with the previous lift-up cover.

The top panel is hinged so that the user can simply access the charging ports without any specialist species of equipment and also doesn't have to remove any panel.

Charging slots cut into the side panel so charging leads can be fed through from the housing unit to the main storage area.



Clear covers that will slide in the rails to cover and secure the open area where devices can be stored.

Large lower shelf to store larger hand-held devices like tablets and two in one PCs.

Smooth acrylic rails, so that the cover panels can slide easily and precisely. These can be cut on the laser cutter to get the precise measurements needed.

Raised base using simple square legs so that the product has a stable base with minimum contact points with the surface it rests on.

A side panel separates the USB outlet and messy cables from the rest of the project. This means that the minimalist and modern look is kept (something messy cables and charging leads would ruin).

Technique _____

2 7 . 2 Explain the advantages for a designer in the use of the technique shown in **Figure 7** to communicate design ideas.

[4 marks]

_____

_____

_____

_____

_____

_____

_____

_____

50

END OF QUESTIONS

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