SPECIMEN MATERIAL

Please write clearly, in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
DESIGN AND TECHNOLOGY

Date of Exam Morning Time allowed: 2 hours

Materials
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 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 on blank pages.
- Do all rough work in this book. Cross through any work that 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.

SECTION A - Core Technical Principles

Questions **1-10** are multiple choice questions. For multiple choice questions you should shade in **one** lozenge. If you make a mistake, cross through the incorrect answer and shade the correct response.

1 A designer has created a security system for use in a home. The system is intended to alert the home owner to an intruder. What is the input in this system?

A Alarm sound ⬭

B Automatic message sent to mobile phone ⬭

C Flashing light ⬭

D Motion sensor ⬭

[1 mark]

2 **Figure 1** shows a stool.

This source has been removed due to third-party copyright restrictions.

When a person sits on this stool, what is the main force on the stool leg?

A Compression ⬭

B Shear ⬭

C Tension ⬭

D Torsion ⬭

[1 mark]

3 Which of the following metals should not be used outdoors without a protective coating of a different material?

A Aluminium alloy ⬭

B Copper ⬭

C Low carbon steel ⬭

D Zinc ⬭

[1 mark]

4 Which **one** of the following is a production method based on providing stock as it is needed?

A Computer Aided Manufacture ⬭

B Flexible Manufacturing ⬭

C Integrated Manufacture ⬭

D Just in Time Manufacturing ⬭

[1 mark]

5 Which **one** of the following statements is true?

A Balsa is a natural material used in model making ⬭

B Medium Density Fibreboard is a man-made material commonly used for outdoor furniture ⬭

C Silk is a man-made material used in the textiles industry ⬭

D Urea formaldehyde is a natural material used to manufacture electrical sockets ⬭

[1 mark]

6 What is the definition of a smart material?

A A material that can hold data ⬭

B A material that can withstand excessive force ⬭

C A material that reacts to changes in the environment ⬭

D A material that shrinks when heated ⬭

[1 mark]

7 Designers often create products that they know will have a limited life span. What is this called?

A Design for disassembly ⬭

B Design for maintenance ⬭

C Planning for manufacture ⬭

D Planned obsolescence ⬭

[1 mark]

8 Which of the following is a thermosetting polymer?

A Acrylic (PMMA) ⬭

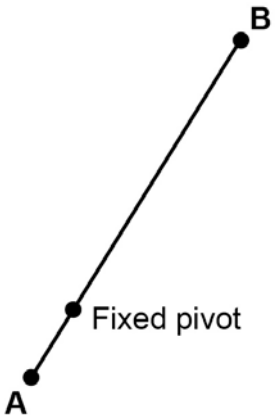
B High Density Polythene (HDPE) ⬭

C Polyester resin (PR) ⬭

D Polypropylene (PP) ⬭

[1 mark]

9 The diagram below shows the movement of a lever which is part of a toy.
The distance from point **A** to the pivot is 10mm.
The distance from point **B** to the pivot is 40mm.
If point **A** moves 10mm to the right, how far would point **B** move to the left?



A 10mm ⬭

B 20mm ⬭

C 40mm ⬭

D 50mm ⬭

[1 mark]

10 Which **one** of the following is a softwood?

A Beech ⬭

B Mahogany ⬭

C Oak ⬭

D Spruce ⬭

[1 mark]

11 State **two** properties of natural fibres that make them suitable for clothing.

[2 marks]

Property 1 _____

_____

Property 2 _____

_____

12 State **two** reasons why corrugated cardboard is used as packaging for cooked pizzas.

[2 marks]

1. _____

_____

_____

2. _____

_____

_____

13 . 1 In 2010 the use of renewable energy in the UK accounted for 6.5% of total energy usage. By 2015 this figure had increased to 25%.

Give **two** reasons for the increase in the use of renewable energy sources.

[2 marks]

1.

2.

13 . 2 Explain why some people are opposed to the use of renewable energy sources.

[2 marks]

13.3 The amount of renewable energy generated in 2015 was 83.3 Terawatt hours (TWh).

The ratio of solar power to other forms of renewable energy was 1:10.

What amount of energy was attributed to solar power?

Give your answer to 1 decimal point.

[2 marks]

SECTION B - Specialist Technical Principles

The following are examples of different stock forms.

Stock forms				
Acrylic rod	Corrugated cardboard sheet	Aluminium sheet	Wool yarn	Medium Density Fibreboard (MDF)

14 Choose **one** of the stock forms in the table on **page 10.**
Name **one** of the primary sources it is made from.
In the box below, use notes **and/or** sketches to explain the process of changing it from primary source to stock form.

[5 marks]

Name of stock form _____

Name of primary source _____

15 Describe **two** ways that materials **and/or** products are strengthened **or** reinforced.

Give examples in your answer.

[2 x 2 marks]

1.

2.

16 . 1 Choose **one** product or component in **Figure 2** and describe **two** features that make it suitable for mass production.

[2 x 2 marks]

This source has been removed due to third-party copyright restrictions. Steel car door	This source has been removed due to third-party copyright restrictions. Polymer toy musical instrument	This source has been removed due to third-party copyright restrictions. Newspaper	This source has been removed due to third-party copyright restrictions. Cotton T - Shirt	This source has been removed due to third-party copyright restrictions. Printed Circuit Board	This source has been removed due to third-party copyright restrictions. Flat pack furniture

Figure 2

Name of product/component _____

Feature 1 _____

_____

_____

_____

_____

_____

Feature 2 _____

_____

_____

_____

_____

_____

16 . 2 Name **one** industrial process used in the manufacture of the product or component you have chosen for question **16.1**.

In the box below, use notes **and/or** sketches to explain this process in detail.

Name of industrial process:

[5 marks]

17 Circle **one** of the following and give **two** reasons why its characteristics or physical properties are suitable for its intended use.

- **Polypropylene** – for a school stacking chair
- **Foam core board** – for a display board
- **Brass** – for a trumpet
- **Pine** – for a bedroom wardrobe
- **Silk** – for use in a men's tie
- **Printed Circuit Board (PCB)** – for use in a hand held game

[2 marks]

1 _____

_____

_____

2 _____

_____

_____

18 Designers sometimes choose materials according to their impact on society and the environment.

Examples include the use of fair trade cotton, recycled components and biodegradable packaging.

Evaluate how the use of such materials might be seen as the ethical choice.

[10 marks]

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SECTION C - Designing and Making Principles

The product below is a GPS Sports Watch worn by adult runners to monitor activity and aid training.

This source has been removed due to third-party copyright restrictions.

Specification

- Lightweight
- Waterproof (face and strap)
- Rechargeable battery
- Battery lasts up to 3 weeks (10 hours in GPS mode)
- Watch features include; time, date, calendar, alarm, touchscreen and GPS for recording sporting data.

Evaluate the watch in terms of its:

19 . 1 suitability for the user

[4 marks]

19 . 2 aesthetic quality

[4 marks]

19 . 3 ergonomics

[4 marks]

20 . 1 Explain what is meant by the term ‘anthropometrics’ and why it is important for designers to consider.

[4 marks]

20	.	2

Name **two** anthropometric measures that might be used in the design of a watch. Explain why each is appropriate.

[2 x 2 marks]

1.

2.

21 . 1 You have been asked to redesign the watch shown on **page 19** to make it suitable for a child aged between 9 and 11 years old.

The data in the table below shows the preferred colour scheme according to 240 children aged between 9 and 11 years old.

Complete the table by calculating the missing percentage of children who like different colours.

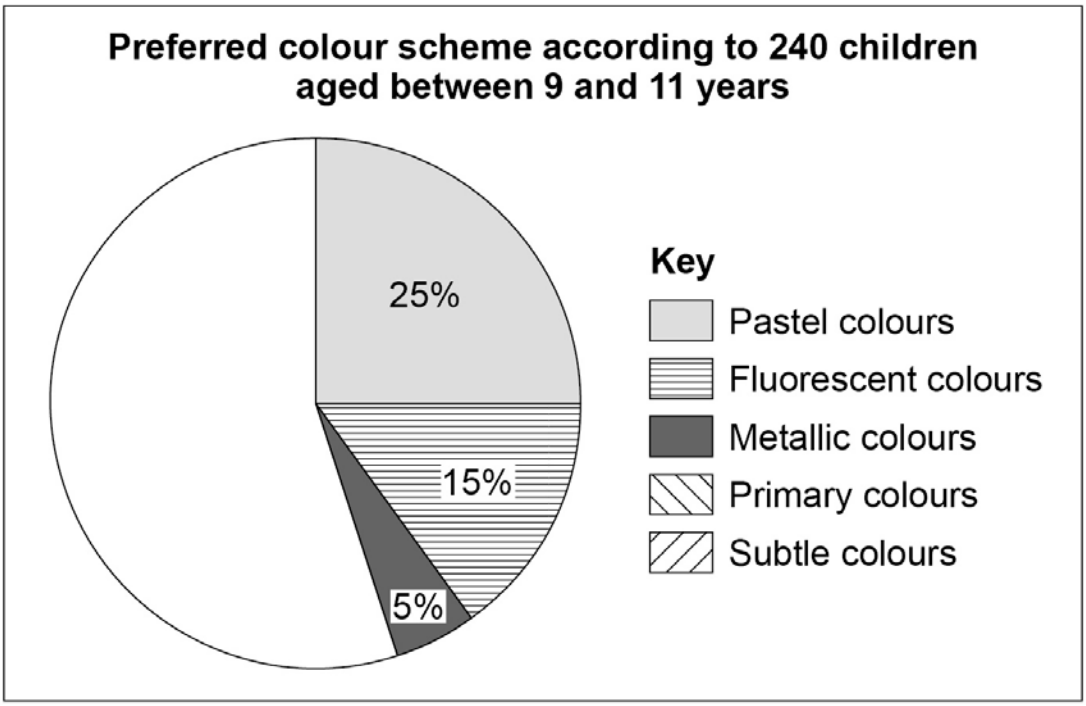
[1 mark]

Colour Scheme	**Number of children**	**Percentage of total**
Pastel colours	60	25%
Primary colours	102	
Fluorescent colours	36	15%
Subtle colours	30	
Metallic colours	12	5%
Total	240	

21 . 2 Using the information from the table in question **21.1** complete the pie chart below showing the **percentages** of children who like different colours.

You must show your calculations.

[2 marks]



21 . 3 Explain how this data would influence the way product could be redesigned.

[3 marks]

22 . 1 Study the image and specification of the watch on **page 19.**

You have been asked to redesign the watch for a child aged between **9** and **11** years old. In order to make the watch more appealing to children it should allow for activities other than running.

Give **four** changes or additions to the original design specification and explain how each would make the watch suitable for the new target market.

You should **not** refer to the colour of the watch in your answer.

[8 marks]

1 _____

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22.2 Explain why having a design specification is important to designers and how this helps to ensure a successful outcome.

[3 marks]

23 . 1 Name a suitable material **or** system that designers might use to create a model of a design.

[1 mark]

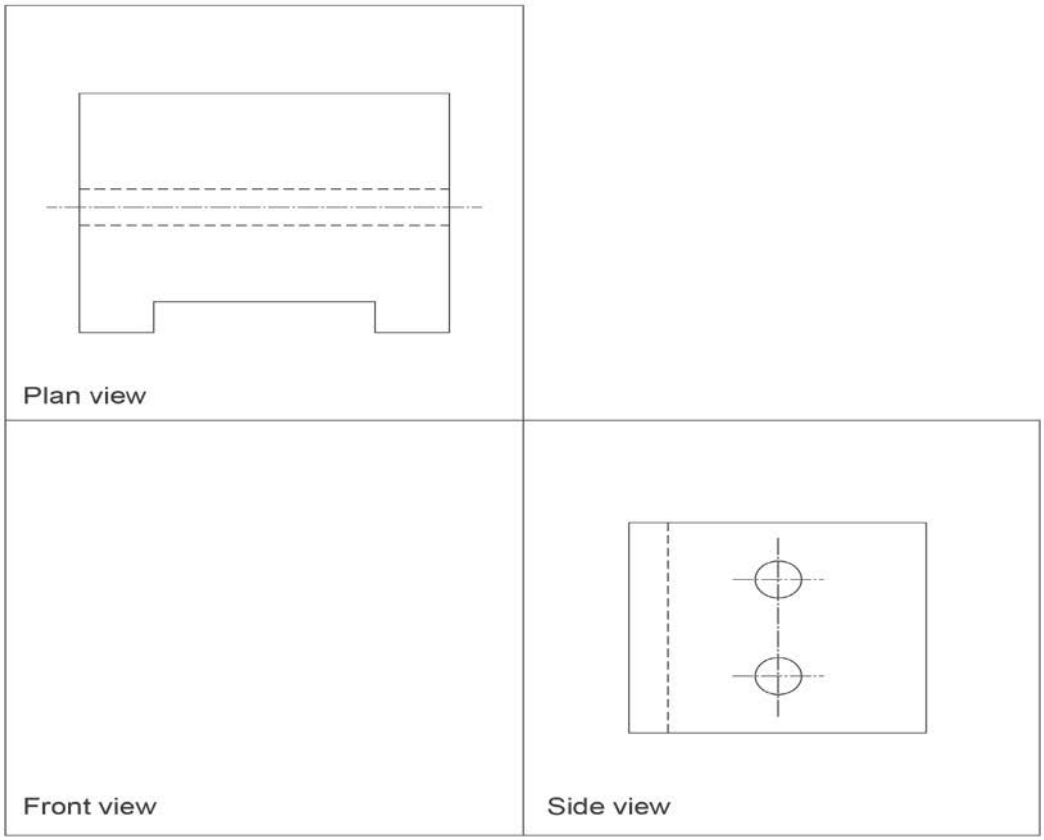
23 . 2 Explain why designers create models of their designs before final manufacture.

[3 marks]

24 Below is a drawing of part of a point of sale display.

Complete the third angle orthographic projection by adding a **front view** and **isometric drawing** of the shape in the boxes provided.

[5 marks]



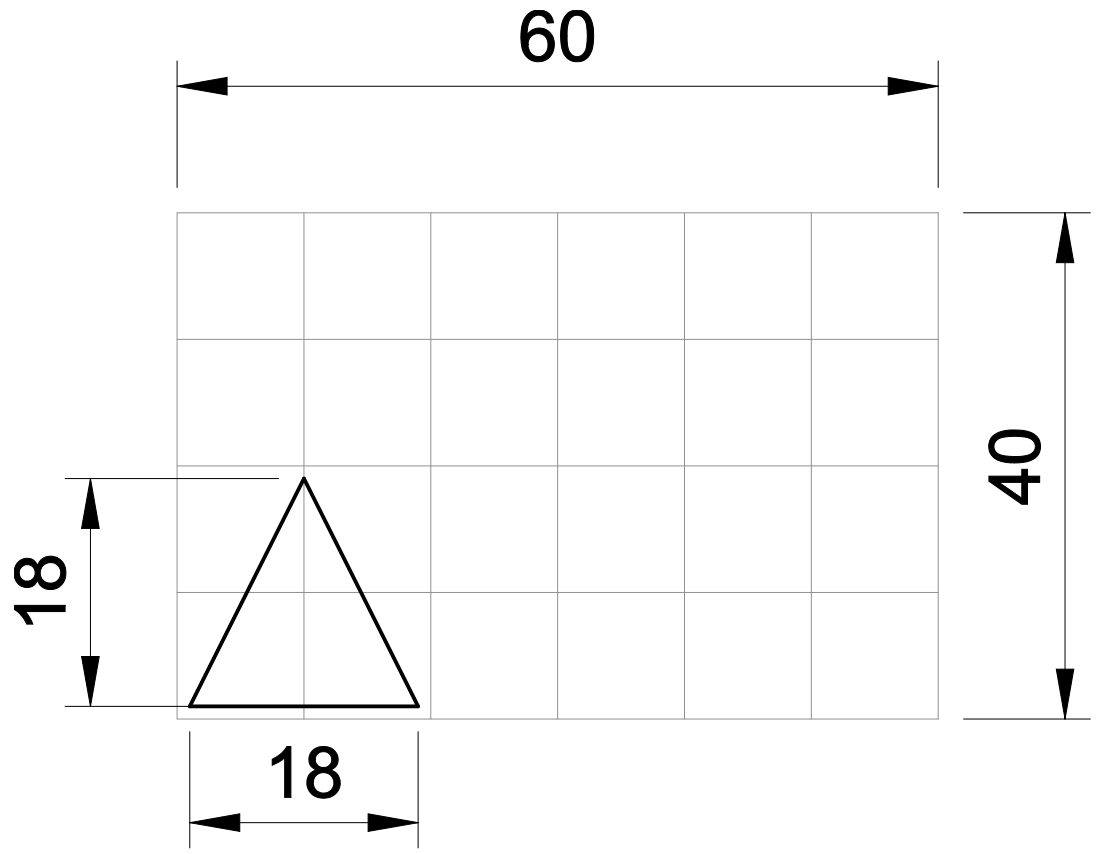
Isometric drawing

25 . 1 When packaging is cut out *'nesting'* is used to ensure that minimal material is wasted.

A piece of material measures 60mm by 40mm. A triangle pattern measures 18mm (height) by 18mm (base).

The first triangle has been placed on the material. Repeat the triangle pattern to ensure that as many as possible fit on the material.

[1 mark]



25 . 2 Calculate the amount of material wasted when producing the shapes you have drawn in **Question 25.1**.

Assume no material is wasted when cutting.

[3 marks]

END OF QUESTIONS