

Design and Technology
COMPONENT 1: Papers and Boards

Total Marks

Time: 1 hour 45 minutes

In the boxes below, write your name, centre number and candidate number.

Surname					
Other names					
Centre Number					
Candidate Number					

YOU MUST HAVE

**Calculator, ruler, writing and drawing equipment,
protractor, compass**

YOU WILL BE GIVEN

Diagram Booklet

INSTRUCTIONS

Answer ALL questions.

Answer the questions in the spaces provided in this Question Paper or in the separate Diagram Booklet – there may be more space than you need.

Calculators may be used.

Any diagrams may NOT be accurately drawn, unless otherwise indicated.

You must show all your working out with your answer clearly identified at the end of your solution.

INFORMATION

The total mark for this paper is 100.

The marks for EACH question are shown in brackets – use this as a guide as to how much time to spend on each question.

There may be spare copies of some diagrams.

Turn over

ADVICE

Read each question carefully before you start to answer it.

Try to answer every question.

Check your answers if you have time at the end.

SECTION A

Core

Answer ALL questions. Write your answers in the spaces provided.

- 1 (a) The materials that products are made from are chosen because of their properties.**

Look at FIGURE 1 for Question 1(a) in the Diagram Booklet. It shows a table of products.

For each of the products shown, give a property of the material it is made from that makes the material suitable for the product.

The first one has been done for you.

(continued on the next page)

1 continued.

**(b) Explain ONE disadvantage of using urea formaldehyde for the 3-pin plug.
(2 marks)**

The pins of the 3-pin plug are made from brass.

**Brass is an alloy of copper and zinc in the ratio of 13:7
(13 parts copper to 7 parts zinc).**

(continued on the next page)

1 continued.

- (c) Calculate how much copper is required to make 50 kg of brass.
(2 marks)**

Answer _____ kg

(Total for Question 1 = 8 marks)

Turn over

2 Look at FIGURE 2 for Question 2 in the Diagram Booklet. It shows a wall mounted book holder manufactured from mahogany.

(a) Name ONE other appropriate hardwood that could be used to make the wall mounted book holder.
(1 mark)

(b) Explain ONE working property of mahogany that makes it an appropriate choice of material for the wall mounted book holder.
(2 marks)

(continued on the next page)

2 continued.

Each wall mounted book holder is made as a one-off.

(c) Explain ONE advantage for the manufacturer of making each wall mounted book holder as a one-off.

(2 marks)

(continued on the next page)

2 continued.

Look at FIGURE 3 for Question 2(d) in the Diagram Booklet. It shows the sizes of two pieces of mahogany used to make the wall mounted book holder.

The mahogany has a cross sectional area of 5 cm^2

- (d) Calculate the cost of the mahogany required to make one wall mounted book holder if the mahogany costs $\text{£}1,200\text{ m}^3$.
(4 marks)**

Cost £ _____

(Total for Question 2 = 9 marks)

Turn over

3 Look at FIGURE 4 for Question 3 in the Diagram Booklet. It shows an electrically powered hand drill and the circuit symbol for an electrical component.

(a) Name the type of electrical component from the circuit symbol shown in Figure 4.
(1 mark)

The electrically powered hand drill is being redesigned. The manufacturer is considering using a bevel gear inside.

(b) Explain ONE reason for using a bevel gear inside the electrically powered hand drill.
(2 marks)

3 continued.

- (c) The electrically powered hand drill also has a compound gear train inside.**

Look at FIGURE 5 for Question 3(c) in the Diagram Booklet. It shows a schematic diagram of the compound gear train.

**Calculate the revolutions per minute (RPM) of the driven gear if the driver gear rotates at 400 RPM.
(2 marks)**

Driven gear _____ RPM

3 continued.

- (d) Explain ONE benefit of using a battery for the electrically powered hand drill.
(2 marks)**

(continued on the next page)

3 continued.

The manufacturer of the electrically powered hand drill is considering using carbon fibre for the main body.

**(e) Explain TWO benefits of using carbon fibre for the main body of the electrically powered hand drill.
(4 marks)**

1 _____

2 _____

(continued on the next page)

3 continued.

(Total for Question 3 = 11 marks)

4 A not-for-profit organisation has developed some agro-textiles that can be used by farmers.

**(a) Explain TWO ways that agro-textiles can be used by farmers.
(4 marks)**

1 _____

2 _____

4 continued.

- (b) A farmer requires 420 m^2 of agro-textile to cover their field.**

The agro-textile is available in rolls 50 m long measuring 1.2 m wide.

Calculate the number of rolls of agro-textile the farmer needs to cover their field.

(2 marks)

Number of rolls _____

(continued on the next page)

Turn over

4 continued.

- (c) Discuss how fair trade products have been used to support farmers and societies in developing countries.
(6 marks)**

(continued on the next page)

4 continued.

[illegible]

(continued on the next page)

Turn over

4 continued.

[illegible]

(continued on the next page)

Turn over

4 continued.

[illegible]

(Total for Question 4 = 12 marks)

TOTAL FOR SECTION A = 40 MARKS

Turn over

SECTION B

Papers and Boards

Answer ALL questions. Write your answers in the spaces provided.

- 5 Look at FIGURE 6 for Question 5(a) in the Diagram Booklet. It shows a design solution for a display sign that is used by an outdoor ice cream seller together with some additional information.**

- (a) The display sign holds advertising discs that show what flavour of ice cream is on sale and needs to be improved to include the following specification points.**

The display sign must:

- hold the disc securely and allow the disc to be easily changed when a different flavour of ice cream is being sold**
- include a cover that protects the backing board and support and prevents the disc from being affected by wind and rain**
- be able to be hung up on a hook near to the ice cream and easily moved to another hook when ice cream is being sold at a different location.**

(continued on the next page)

Turn over

5 continued.

In the Diagram Booklet, use notes and sketches, on the outline, to show how the display sign could be modified to include these three specification points.

You will be marked on how you apply your understanding of design and technology, not your graphical skills.

(6 marks)

(continued on the next page)

5 continued.

- (b) Look at FIGURE 7 for Question 5(b) in the Diagram Booklet. It shows a money box made from a polymer in the shape of a tea cup. The tea cup has a design on the front that has been applied using sublimation printing.**

Explain TWO ways that the money box meets, or fails to meet, the criteria of providing a method to encourage young children to save money.

(4 marks)

1 _____

(continued on the next page)

5 continued.

2 _____

(Total for Question 5 = 10 marks)

- 6 Look at FIGURE 8 for Question 6(a) in the Diagram Booklet. It shows a wedding guest book.**

The guest book has front and back covers that have been made from 2 mm thick folding boxboard.

Bonded paper has been used for pages of the guest book.

The pages of the wedding guest book are manufactured from standard sized sheets of bonded paper.

- (a) Explain TWO advantages for the manufacturer of using standard sized sheets of bonded paper for the pages.
(4 marks)**

1 _____

6 continued.

2 _____

(continued on the next page)

6 continued.

- (b) Look at FIGURE 9 for Question 6(b) in the Diagram Booklet. It shows a window that is cut through the front cover of the wedding guest book.**

In the space below, and on page 28, use notes and sketches to show how the window in the front cover would be accurately cut out using hand tools.

You will be marked on how you apply your understanding of design and technology, not your graphical skills.

(4 marks)

(continued on the next page)

Turn over

6 continued.

(continued on the next page)

Turn over

6 continued.

- (c) The lettering on the front cover of the wedding guest book has been produced with hot foil blocking.**

**Explain ONE reason why hot foil blocking has been used for the lettering.
(2 marks)**

(continued on the next page)

6 continued.

- (d) Give TWO different methods that could be used to join the completed front cover, pages and back cover of the wedding guest book together.**

**For each method, explain ONE advantage of using the method to join the front cover, pages and back cover of the wedding guest book together.
(6 marks)**

Method 1

Explanation

(continued on the next page)

Turn over

6 continued.

Method 2

Explanation

(Total for Question 6 = 16 marks)

7 Look at FIGURE 10 for Question 7 in the Diagram Booklet. It shows a mobile phone stand made from 4 mm thick solid whiteboard.

- (a) State the type of force the back rest is subjected to when the mobile phone is resting on it.
(1 mark)**

(continued on the next page)

7 continued.

- (b) Explain TWO working properties of solid whiteboard that make it a suitable material for the mobile phone stand.
(4 marks)**

1 _____

2 _____

7 continued.

Look at FIGURE 11 for Question 7(c) in the Diagram Booklet. It shows a dimensioned drawing of the mobile phone stand back rest before it is folded.

The back rest is manufactured from a single piece of solid whiteboard.

(continued on the next page)

7 continued.

- (c) Calculate the volume of waste material produced when making the back rest.**

Give your answer to the nearest whole cm^3 .

**Use $\pi = 3.142$
(5 marks)**

(continued on the next page)

Turn over

7 continued.

(continued on the next page)

Turn over

7 continued.

Answer _____ **cm³**

(continued on the next page)

7 continued.

The support part of the mobile phone stand could be fabricated from separate pieces of solid whiteboard rather than from a single piece.

- (d) Explain TWO reasons for fabricating the support part of the mobile phone stand from separate pieces of solid whiteboard rather than manufacturing it from a single piece.
(6 marks)**

1 _____

7 continued.

2 _____

(Total for Question 7 = 16 marks)

- 8 Look at FIGURE 12 for Question 8 in the Diagram Booklet. It shows a plant carrier manufactured from corrugated board.**

The plants are placed in compartments that are 100 mm × 100 mm.

- (a) Explain ONE benefit of manufacturing the plant carrier from corrugated board.
(2 marks)**

(continued on the next page)

8 continued.

The plant carriers are subjected to quality control checks during manufacture.

- (b) Explain ONE advantage of carrying out a quality control check on the plant carriers during manufacture.
(3 marks)**

(continued on the next page)

8 continued.

- (c) Explain TWO reasons why printing would be used to manufacture the labels for the plant carriers.
(4 marks)**

1 _____

2 _____

(continued on the next page)

Turn over

8 continued.

- (d) The plant carrier is manufactured from corrugated board and has labels that are printed on copier paper that are then applied to its surfaces.**

Look at FIGURE 13 for Question 8(d) in the Diagram Booklet. It shows some additional information about the plant carrier.

Analyse the information in Figure 13.

Evaluate the plant carrier with reference to social and availability factors including:

- use for different social groups**
- use of stock materials**
- use of specialist materials.**

(9 marks)

(continued on the next page)

8 continued.

[illegible]

(continued on the next page)

Turn over

8 continued.

[illegible]

(continued on the next page)

Turn over

8 continued.

[illegible]

(continued on the next page)

Turn over

8 continued.

(Total for Question 8 = 18 marks)

TOTAL FOR SECTION B = 60 MARKS

TOTAL FOR PAPER = 100 MARKS

END OF PAPER