

Design and Technology  
COMPONENT 1: Papers and Boards

Total Marks
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Monday 19 June 2023 – Morning

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, pair of compasses**

**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.**

## **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.**

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## **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.  
(4 marks)**

**(continued on the next page)**

**Turn over**

**1 continued.**

**A printing company wants to use a new and emerging technology. It operates as a privately-owned business.**

**(b) (i) Explain ONE advantage for the company of operating as a privately-owned business.  
(2 marks)**

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**(continued on the next page)**

**Turn over**

**1(b) continued.**

**The printing company has invested £150,000 of its own money to buy new and emerging technology but wants to raise an additional 30% by crowdfunding.**

- (ii) Calculate how much additional money it will raise by crowdfunding.  
(2 marks)**

**Answer £ \_\_\_\_\_**

**(Total for Question 1 = 8 marks)**

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**Turn over**

**2 Look at Figure 2 for Question 2 in the Diagram Booklet. It shows a concrete candle holder.**

**(a) Name the drawing method that has been used to show the concrete candle holder in Figure 2.  
(1 mark)**

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**(continued on the next page)**

**2 continued.**

**(b) Explain ONE reason for using concrete for the candle holder.  
(2 marks)**

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**(continued on the next page)**



**2 continued.**

**Look at Figure 3 for Question 2(c) in the Diagram Booklet. It shows a standardised size of candle.**

**(c) Explain ONE reason for manufacturing the concrete candle holder to hold a standardised size of candle.  
(2 marks)**

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**(continued on the next page)**

**Turn over**

**2 continued.**

**Look at Figure 4 for Question 2(d) in the Diagram Booklet. It shows a dimensioned drawing of the concrete candle holder.**

**(d) Calculate the volume of concrete required to make the candle holder.**

**Give your answer in  $\text{cm}^3$  to the nearest whole  $\text{cm}^3$ .  
(4 marks)**

**Answer \_\_\_\_\_  $\text{cm}^3$**

**(Total for Question 2 = 9 marks)**

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**Turn over**

**3 Look at Figure 5 for Question 3 in the Diagram Booklet. It shows a vegetable growing frame that is manufactured from a softwood.**

**(a) Name ONE softwood that can be used to manufacture the vegetable growing frame.  
(1 mark)**

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**(continued on the next page)**

**3 continued.**

**(b) Explain ONE reason for manufacturing the vegetable growing frame from a softwood rather than a hardwood.  
(2 marks)**

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**(continued on the next page)**

**3 continued.**

**The original length of timber that is used to make the frame is 300 cm.**

**The combined length of one short side and one long side of the frame is 270 cm.**

**(c) Calculate how much timber is left when a short side and a long side have been cut to size, giving your answer as a fraction of the original length of timber.**

**Ignore the width of any saw cuts.  
(2 marks)**

**Answer \_\_\_\_\_**

**3 continued.**

**Look at Figure 6 for Question 3(d) in the Diagram Booklet. It shows a mild steel fixing that has been used to join the vegetable growing frame together at the corners.**

**(d) Explain ONE disadvantage of using mild steel for the fixing.  
(2 marks)**

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**(continue on the next page)**

**Turn over**

**3 continued.**

**The vegetable growing frame is delivered in a box manufactured from corrugated board.**

**(e) Explain TWO benefits of using corrugated board to manufacture the box.  
(4 marks)**

**Answer space continues on the next page.**

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**3(e) continued.**

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**(Total for Question 3 = 11 marks)**

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**4 Look at Figure 7 for Question 4 in the Diagram Booklet. It shows a polyester laptop bag.**

**(a) Explain ONE working property of polyester that makes it an appropriate choice of material to make the laptop bag.  
(2 marks)**

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**(continued on the next page)**

**4 continued.**

- (b) The material for the laptop bag is 60% new polyester and the rest is recycled polyester.**

**The laptop bag requires 320 grams of polyester in total.**

**Calculate how many grams of recycled polyester are required for the laptop bag.  
(2 marks)**

**Answer \_\_\_\_\_ grams**

**4 continued.**

**The manufacturer carries out a life cycle analysis (LCA) to help reduce the environmental impact of the laptop bag.**

**(c) Explain ONE outcome of an LCA that can help to reduce the environmental impact of the laptop bag.  
(2 marks)**

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**(continued on the next page)**

**Turn over**

**4 continued.**

- (d) Discuss how the features of modern laptops have contributed to remote working.  
(6 marks)**

**Answer space continues on the next 4 pages.**

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**Turn over**

**4(d) continued.**

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**Turn over**

**4(d) continued.**

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**Turn over**

**4(d) continued.**

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**Turn over**

**4(d) continued.**

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**(Total for Question 4 = 12 marks)**

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**TOTAL FOR SECTION A = 40 MARKS**



## **SECTION B**

### **Papers and boards**

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

- 5 Look at Figure 8 for Question 5 in the Diagram Booklet. It shows a design solution for a display stand to hold three boxes of chocolates together with some additional information.**

**(continued on the next page)**

**5 continued.**

**(a) Look at diagram for Question 5(a) in the Diagram Booklet. The display stand holds three boxes of chocolates and needs to be improved to include the following specification points.**

**The display stand must:**

- be able to hold an additional three boxes of chocolates and allow the top face of each individual chocolate box to be seen**
- include a method to show the price of a box of chocolates that allows the price to be changed**
- be portable so that it can be moved to another place without the chocolate boxes falling off.**

**(continued on the next page)**

**5(a) continued.**

**Use notes and sketches to show how the display stand 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.**

**Use the outline of the original design solution to show your modifications.  
(6 marks)**

**(continued on the next page)**

**5 continued.**

**(b) Look at Figure 9 for Question 5(b) in the Diagram Booklet. It shows a cardboard puzzle that is used to help develop hand-eye coordination in young children.**

**Explain TWO ways that the cardboard puzzle meets, or fails to meet, the criterion of providing a method to help develop hand-eye coordination in young children.  
(4 marks)**

**Answer space continues on the next 2 pages.**

**5(b) continued.**

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**5(b) continued.**

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**(Total for Question 5 = 10 marks)**

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- 6 Look at Figure 10 for Question 6(a) in the Diagram Booklet. It shows the packaging for an electronic device. The packaging includes an instruction booklet for the device.**

**The packaging is made from folding boxboard.**

- (a) Explain TWO characteristics of folding boxboard that make it an ideal material from which to make the packaging.  
(4 marks)**

**Answer space continues on the next 2 pages.**

**6(a) continued.**

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**6(a) continued.**

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**(continued on the next page)**

**6 continued.**

**(b) Look at Figure 11 for Question 6(b) in the Diagram Booklet. It shows the net for the base section of the packaging marked out on a piece of folding boxboard.**

**Use notes and sketches, in the space below, to show how one base section of packaging would be cut out and assembled using hand tools.**

**You will be marked on how you apply your understanding of design and technology, not your graphical skills.  
(4 marks)**

**Answer space continues on the next page.**

**Turn over**

**6(b) continued.**

**(continued on the next page)**

**Turn over**

**6 continued.**

- (c) Explain ONE way that the manufacturer of the packaging can avoid causing offence to potential buyers of the electronic device in different countries.  
(2 marks)**

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**(continued on the next page)**

**Turn over**

**6 continued.**

**(d) A batch of 1000 nets for the packaging needs to be cut out from flat board.**

**Give TWO different manufacturing methods that could be used to cut out the nets.**

**Explain ONE reason for using each manufacturing method.  
(6 marks)**

**Answer space continues on the next page.**

**6(d) continued.**

**Method 1**

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**Explanation**

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**6(d) continued.**

**Method 2**

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**Explanation**

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**(Total for Question 6 = 16 marks)**

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**7 Look at Figure 12 for Question 7 in the Diagram Booklet. It shows a cardboard toy that is manufactured in a batch of 100 and a fastener that is used in the assembly of the toy.**

**(a) Name the specific type of fastener shown in Figure 12.  
(1 mark)**

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**(continued on the next page)**



**7 continued.**

**Look at Figure 13 for Question 7 in the Diagram Booklet. It shows the rear wheel of the toy which has been made from 6 mm thick corrugated board using computer-aided manufacturing (CAM).**

- (b) Explain TWO advantages of using CAM to manufacture the rear wheels of the toy.  
(4 marks)**

**Answer space continues on the next 2 pages.**

**7(b) continued.**

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**7(b) continued.**

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**(continued on the next page)**

**7 continued.**

**(c) Look at Figure 14 for Question 7(c) in the Diagram Booklet. It shows a dimensioned drawing of a template for the front section of the toy.**

**The template will be used to mark out the front section of the toy and will be made from 5mm thick material.**

**Produce an isometric drawing of the template on the grid provided in the Diagram Booklet.**

**(5 marks)**

**(continued on the next page)**

**7 continued.**

- (d) Explain TWO disadvantages of using a template to mark out the front section of the toy.  
(6 marks)**

**Answer space continues on the next page.**

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**7(d) continued.**

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**(Total for Question 7 = 16 marks)**

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- 8 Look at Figure 15 for Question 8 in the Diagram Booklet. It shows some takeaway food boxes manufactured from foil-lined board.**

**Manufacturing takeaway food boxes from foil-lined board is cost effective.**

- (a) Explain ONE OTHER benefit of manufacturing the takeaway food boxes from foil-lined board.  
(2 marks)**

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**(continued on the next page)**

**Turn over**

**8 continued.**

- (b) Explain ONE cost factor that will have been considered when selecting foil-lined board as the material from which to manufacture the takeaway food boxes.  
(3 marks)**

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**(continued on the next page)**

**Turn over**



**8 continued.**

- (c) Explain TWO quality control checks that would be carried out on the takeaway food boxes before they are allowed to leave the factory.  
(4 marks)**

**Answer space continues on the next page.**

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**Turn over**

**8(c) continued.**

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**8 continued.**

**(d) The takeaway food boxes are manufactured in China and sold around the world.**

**Figure 16 shows some additional information about the takeaway food boxes.**

**FIGURE 16**

<b>Source of foil-lined board</b>	<b>Japan</b>
<b>Country of manufacture</b>	<b>China</b>
<b>Potential market</b>	<b>Restaurants, takeaway restaurants and supermarkets</b>
<b>Scale of production</b>	<b>Continuous</b>

**(continued on the next page)**

**Turn over**

**8(d) continued.**

**Analyse the information in Figure 16.**

**Evaluate the takeaway food boxes with reference to social factors including:**

- use for different social groups**
  - trends / fashion**
  - popularity.**
- (9 marks)**

**Answer space continues on the next 4 pages.**

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**Turn over**

8(d) continued.

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Turn over

**8(d) continued.**

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**Turn over**

8(d) continued.

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Turn over

**8(d) continued.**

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**(Total for Question 8 = 18 marks)**

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**TOTAL FOR SECTION B = 60 MARKS**  
**TOTAL FOR PAPER = 100 MARKS**  
**END OF PAPER**