

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	



General Certificate of Education  
Advanced Subsidiary Examination  
June 2015

# Design and Technology: Product Design (3-D Design)

**PROD1**

## Unit 1 Materials, Components and Application

Tuesday 2 June 2015 9.00 am to 11.00 am

**For this paper you must have:**

- normal writing and drawing instruments.

### Time allowed

- 2 hours

### 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 in Section A.
- Answer **one** question from Section B, **either** Question 5 **or** Question 6.
- Answer the question in Section C.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or 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 80.
- There are 20 marks for Section A, 20 marks for Section B and 40 marks for Section C.

### Advice

- Illustrate your answers with sketches and/or diagrams wherever you feel it is appropriate.
- You are advised to spend approximately 30 minutes on Section A, 30 minutes on Section B and one hour on Section C.



J U N 1 5 P R O D 1 0 1

M/SEM/109717/Jun15/E5

**PROD1**

**Section A**

Answer **all** questions in this section.

**1 (a)** Carbon Fibre Reinforced Polymer (CFRP) and Glass Fibre Reinforced Polymer (GRP) are examples of what type of material? **[1 mark]**

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**1 (b)** Give an application for **one** of the materials named in part (a). **[1 mark]**

Material .....

Application .....

**1 (c)** Give **two** reasons to explain why the material is suitable for the application you have given in part (b). **[2 × 2 marks]**

Reason 1 .....

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Reason 2 .....

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**2** Quality control measures are put in place when manufacturing products.

Suggest **two** quality control measures a manufacturer could carry out.

**[2 × 1 mark]**

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2.....

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**2**

**3** Match the following compliant material to the most appropriate application shown below.

**[4 marks]**

- A** Metal effects card
- B** Styrofoam
- C** Layout paper
- D** Plastazote foam
- E** Fluted polypropylene sheet

**Application**

**Compliant Material**

Construction site safety sign

Sketching with inks and pencils

Gift box outer packaging

Model making

**4**

**Turn over ▶**



**4 (a)** Explain what is meant by the term 'smart material'. **[2 marks]**

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**4 (b) (i)** Name a specific smart material. Give an application for this material. **[2 marks]**

Smart Material .....

Application .....

**4 (b) (ii)** Give **two** reasons to explain why the smart material is suitable for the application you have named in part (b)(i). **[2 × 2 marks]**

Reason 1 .....

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Reason 2 .....

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0 5

**Section B**

Answer **either** Question 5 **or** Question 6.

- 5 The photographs below show a metal luggage rack.



**5 (a) (i)** Name a specific metal suitable for the luggage rack.

**[1 mark]**

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**5 (a) (ii)** Explain in detail why the metal you have named in part (a)(i) is suitable for the luggage rack.

**[6 marks]**

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**5 (a) (iii)** Use notes and diagrams to describe how the frame of the luggage rack has been manufactured and assembled from stock form parts.

**[9 marks]**

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**5 (b)** Describe the health and safety measures the manufacturer could take to ensure the safety of the workforce manufacturing the luggage rack.

**[4 marks]**

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**Do not answer this question if you have answered Question 5.**

- 6 (a)** For each of the following materials, explain in detail why it is suitable for the product. In your answer you may wish to consider manufacture, function and aesthetics.

<b>Material</b>	<b>Product</b>
(i) Melamine Formaldehyde	Kitchen work surface
(ii) Mahogany	Indoor coffee table







**6 (b)** Man-made boards are sometimes used by manufacturers instead of natural woods.

Describe the advantages of using man-made boards compared to natural woods.

**[4 marks]**

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<b>20</b>

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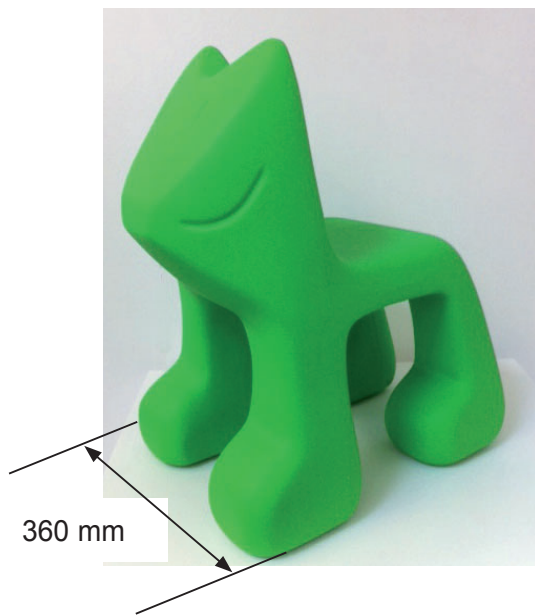
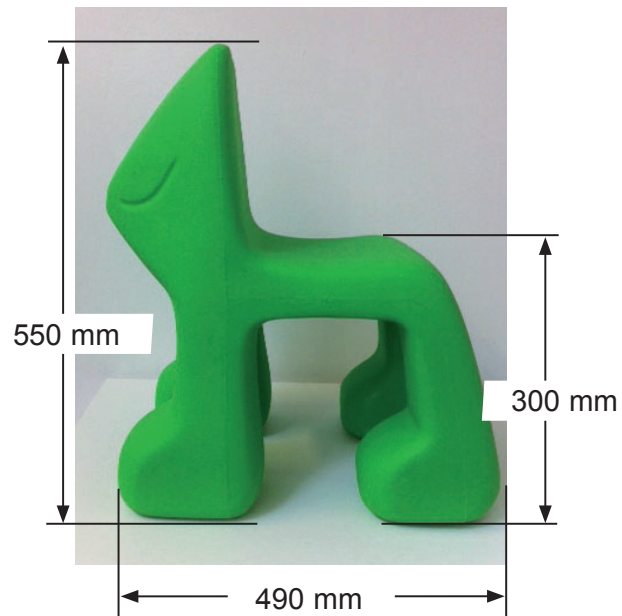
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**Section C**

You must answer this question.

- 7 The photographs below show a child's chair. The chair can be used inside or outside. It is designed for children aged 2 – 6 years old.





**7 (a) (i)** The chair has been made from High Density Polyethylene (HDPE).

Explain in detail why this polymer is suitable.

**[6 marks]**

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**7 (a) (ii)** The manufacturer will have taken steps to ensure the polymer does not degrade if the chair is used outside.

Explain what steps the manufacturer would take to prevent polymer degradation.

**[4 marks]**

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7 (a) (iii) The chair has been rotationally moulded.

Use notes and diagrams to describe this process.

**[9 marks]**

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7 (a) (iv) Complete the following risk assessment for rotational moulding by stating **two** hazards and **two** associated control methods.

[2 × 2 marks]

Hazard	Control Method

7 (b) Use notes and diagrams to critically evaluate the ergonomic and safety aspects of the chair.

[9 marks]

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**7 (c)** Use notes and diagrams to develop the design of the child's chair to include additional play and/or learning features.

**[8 marks]**



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**END OF QUESTIONS**

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