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General Certificate of Education Advanced Subsidiary Examination January 2012

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

PROD1

Unit 1 Materials, Components and Application

Tuesday 17 January 2012 9.00 am to 11.00 am

#### For this paper you must have:

- · normal writing and drawing instruments
- a colour Insert Sheet (enclosed).

#### 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 six questions.
- Answer all questions in Section A.
- Answer one question from Section B, either Question 5 or Question 6.
- Answer Question 7 in Section C.
- You must answer the questions in the spaces provided. Do not write outside the box around each page.
- Do all rough work in this book. Cross through any work that you do not want to be marked.

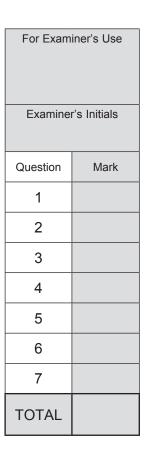
#### Information

- 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.
- You will be marked on your ability to:
  - use good English
  - organise information clearly
  - use specialist vocabulary where appropriate.

#### Advice

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





## Section A

	Answer all of the questions in this section.
1 (a)	Define what is meant by the term thermoset polymer.
	(2 marks)
1 (b)	Urea Formaldehyde is a thermoset polymer.
	Name a product in which it is used and explain why this material is suitable for the product you have named.
	(3 marks)



2	Flexible Medium Density Fibreboard is a modern material.	
	Name a product in which it is used and explain why this material is suitable for the product you have named.	
	(3 marks)	
		3
3	Match each of the components listed below with the correct joining method for the applications given.	_ 3_
	<ul> <li>A Cam-lock fitting</li> <li>B Panel Pin</li> <li>C Self-tapping screw</li> <li>D Polymer corner blocks</li> </ul>	
	In each case, put the correct letter in the box on the right. You should use each component once only.	
	Joining Method Component	
	Fitting a hard board sheet to the back of flat-pack bookcase	
	Securing the top and bottom pieces to the side panels of a flat-pack bookcase	
	Fitting a decorative trim to the base of a flat-pack bookcase	
	Fitting a polymer handle to a drawer front	
	(4 marks)	
		4



4	(a)	What is meant by the symbol shown below?
		(1 mark)
4	(b)	Name a specific substance that would be labelled with the above symbol and that might be used in a workshop.
		(1 mark)
4	(c)	Explain in detail the safety precautions that should be taken with substances labelled with this symbol.
		(6 marks)



### **Section B**

## Answer either Question 5 or Question 6.

5	Study the photographs of the aluminium garden chair ( <b>Figures 1</b> and <b>2</b> ) on the Insert Sheet and answer the following questions.
5 (a)	Explain in detail why aluminium is a suitable material for a garden chair.
	(6 marks)

Question 5 continues on the next page





The garden chair has been made by forming and fabrication processes. Use notes and diagrams to describe the most appropriate methods of batch producing chairs like the one shown in <b>Figures 1</b> and <b>2</b> .



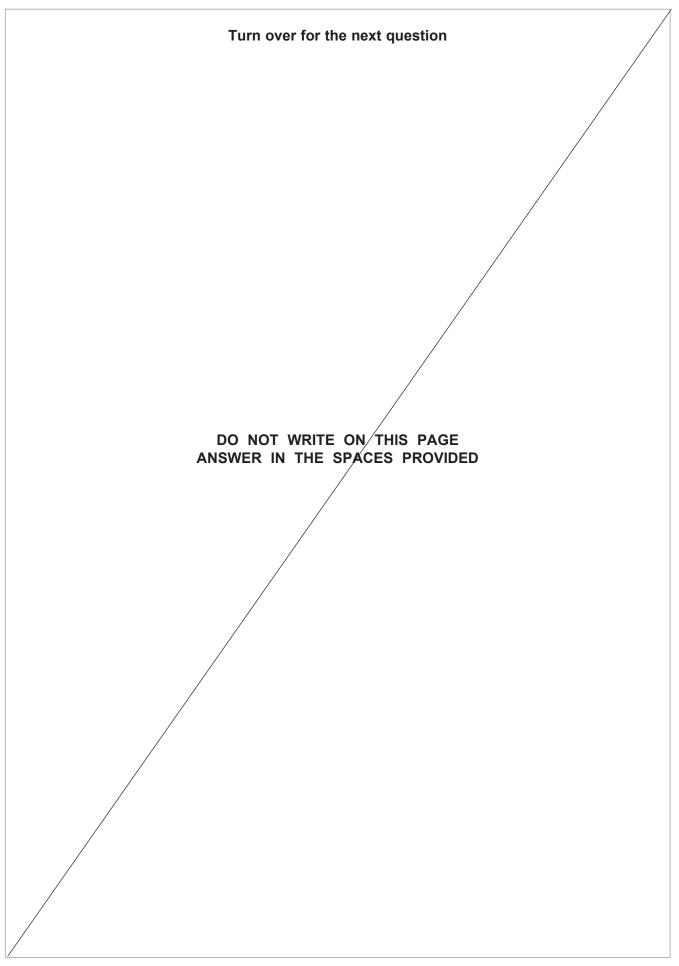
(10 marks) Question 5 continues on the next page



5 (c)	Describe in detail an appropriate method of finishing the chair. In your answer, you should refer to a specific finish and explain why it is suitable.
	(4 marks)

Turn over for the next question







# 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 listed.

Your answer should make reference to:

- product function
- product aesthetics
- product manufacture.

Material	Product
(i) Polyethylene Terephthalate (PET)	Mineral water bottle
(ii) Veneered Medium Density Fibreboard	Dining Table
(iii) Recycled unbleached card	Liner for mobile phone packaging



6 (a) (i)	Polyethylene Terephthalate (mineral water bottle)
	(6 marks)
	Question 6 continues on the next page



6 (a) (ii)	Veneered Medium Density Fibreboard (dining table)
	(6 marks)
	(o mame)



	(6 marks)  Question 6 continues on the next page
6 (a) (iii)	Recycled unbleached card (liner for mobile phone packaging)



Recycled unbleached card is one material suitable for the liner of mobile p packaging. Name an alternative material that could be used and give <b>one</b> this material would be suitable.	none reason why
	(2 marks)
	(Z IIIaiks)
	Recycled unbleached card is one material suitable for the liner of mobile pl packaging. Name an alternative material that could be used and give one this material would be suitable.



# **Section C**

	You <b>must</b> answer this question.
7	<b>Figure 3</b> on the Insert Sheet shows a child's chair designed for use in play areas. It is suitable for children aged 2 – 5 years.  Answer the following questions.
7 (a) (i)	The chair is made from polypropylene. Explain in detail why this polymer is suitable for the chair.
	(6 marks)
	Question 7 continues on the next page



7 (a) (ii)	The chair has been rotationally moulded. Use notes and diagrams to describe this process.



(10 marks) Question 7 continues on the next page Turn over ▶



7 (b) (i)	Use notes and diagrams to critically evaluate the anthropometric, ergonomic and safety aspects of the chair. You should refer to the data table on the Insert Sheet.



(9 marks)

Question 7 continues on the next page



7 (b) (ii)	Use notes and diagrams to develop the design of the child's chair. In your answer, you should consider the following specification:
	<ul> <li>provide a means of storing toys or other items</li> <li>include additional play or learning features.</li> </ul>



(10 marks) Question 7 continues on the next page Turn over ▶



7 (b) (iii)	Given the developments that you have suggested in part (ii), briefly describe what changes would need to be made in the manufacturing process of the chair.
	(5 marks)

# **END OF QUESTIONS**



