

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  
January 2010

# Design and Technology: PROD1 Product Design (3-D Design)

Unit 1 Materials, Components and Application

Wednesday 20 January 2010 9.00 am to 11.00 am

**For this paper you must have:**

- normal writing and drawing instruments
- an Insert Sheet.

### Time allowed

- 2 hours

### Instructions

- Use black ink or black ball-point pen.
- Use pencil and coloured pencils 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. Answers written in margins or on blank pages will not be marked.
- 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 each of Sections A and 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.



J A N 1 0 P R O D 1 0 1

M/Jan10/PROD1

**PROD1**

**SECTION A**

Answer **all** the questions in this section.

1 (a) (i) Name a compliant material used in food packaging.

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.....  
*(1 mark)*

1 (a) (ii) State **one** reason why this compliant material is used in food packaging.

.....  
.....  
*(1 mark)*

1 (b) (i) Name a composite material you are familiar with.

.....  
.....  
*(1 mark)*

1 (b) (ii) Name a specific product made from this material and give **one** reason why this composite material is used.

Product.....  
Reason .....

.....  
.....  
*(2 marks)*

<b>5</b>



2 (a) Match each of the following components to the correct application in the table below.

- Self-tapping screws
- Dowels
- Corner plates
- Pop rivets

You must only use each component once.

<b>Application</b>	Securing square wooden legs to a flat pack dining table	Securing sheet aluminium together	Joining the sides of an MDF box together	Securing a battery compartment on a plastic toy
<b>Component</b>				

(4 marks)

2 (b) Briefly explain **two** benefits of using knock-down fittings.

1.....  
 .....  
 2.....  
 .....

(2 marks)

6
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**Turn over for the next question**

**Turn over ▶**



3 (a) Name **two** hardwoods and **two** softwoods.

<b>Hardwoods</b>		
<b>Softwoods</b>		

(4 marks)

3 (b) Give a suitable use for **one** of the hardwoods you have named in part (a).

.....  
 .....

(1 mark)

5
---

4 Give a use for each of the following smart materials and a reason why it is suitable for that use.

4 (a) Nickel-titanium alloy (Nitonol)

Use .....

Reason for use.....  
 .....

(2 marks)

4 (b) Photochromatic pigment

Use .....

Reason for use.....  
 .....

(2 marks)

4
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**SECTION B**Answer **either** Question 5 **or** Question 6

**5** For **each** of the following materials, describe **two** relevant properties and in each case give a reason why it is useful for the product listed.

Your answer should make reference to:

- product function
- product aesthetics
- product manufacture.

Material	Product
(a) Biodegradable Polymer	Detergent bottles
(b) Flexible Plywood	Laminated furniture
(c) Tungsten Carbide	Cutting tools
(d) Melamine Formaldehyde Laminate (Formica®)	Work surfaces
(e) Metal effects card	Gift boxes

**5** (a) Biodegradable Polymer (Detergent bottles)

Property: .....

Relevance to product: .....

.....

.....

.....

.....

Property: .....

Relevance to product: .....

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(4 marks)

**Turn over ▶**



5 (b) Flexible Plywood (Laminated furniture)

Property: .....

Relevance to product: .....

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.....

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Property: .....

Relevance to product: .....

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*(4 marks)*



**5 (c) Tungsten Carbide (Cutting tools)**

Property: .....

Relevance to product: .....

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Property: .....

Relevance to product: .....

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*(4 marks)*

**Question 5 continues on the next page**

**Turn over ▶**



5 (d) Melamine Formaldehyde Laminate (Work surfaces)

Property: .....

Relevance to product: .....

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Property: .....

Relevance to product: .....

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.....

*(4 marks)*





5 (e) Metal effects card (Gift boxes)

Property: .....

Relevance to product: .....

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Property: .....

Relevance to product: .....

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(4 marks)

20

Turn over for the next question

Turn over ▶



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

**6** Study the photographs of the coffee percolator (**Figures 1 and 2** on the Insert Sheet).  
It is made from die cast aluminium.

**6 (a)** Briefly explain **three** reasons why aluminium is a suitable material for this product.

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*(6 marks)*

**6 (b)** Use notes and diagrams to describe a die casting process.

You may use the space opposite for diagrams.

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*(10 marks)*

**Question 6 continues on the next page**

**Turn over ▶**



6 (c) Explain why die casting is a suitable process for making the percolator.  
You should give **two** reasons in your answer.

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(4 marks)

<b>20</b>







*(9 marks)*

**Question 7 continues on the next page**

**Turn over ▶**



7 (a) (iv) Name a suitable specific metal for Part B of the hairdryer.

.....  
.....

(2 marks)

7 (a) (v) Give **two** reasons why this metal is suitable.

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(4 marks)





7 (b) Explain how the hairdryer has been designed to be safe to use.

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(6 marks)

**Question 7 continues on the next page**

**Turn over ▶**



7 (c) Critically evaluate the ergonomic features of the hairdryer, making suggestions for modifications as necessary.

Use diagrams to support your answer.

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(12 marks)

<b>40</b>

**END OF QUESTIONS**



**There are no questions printed on this page**

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