

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	
8	
TOTAL	



General Certificate of Education
Advanced Subsidiary Examination
January 2013

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

PROD1

Unit 1 Materials, Components and Application

Thursday 10 January 2013 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 6 **or** Question 7.
- Answer Question 8 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.



J A N 1 3 P R O D 1 0 1

Section A

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

1 (a) Explain what is meant by the term *computer numerical control*.

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(2 marks)

1 (b) Give an application for computer numerical control and give **one** reason why it is used.

Application

Reason.....

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(2 marks)

4



2 Plywood is a man-made board.

Name a product it is used in and give **two** reasons why it is suitable for the product you have named.

Product.....

Reason 1

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Reason 2

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(3 marks)

3

3 Match the following pieces of workshop equipment to the correct applications shown below.

- A** Centre lathe
- B** Milling machine
- C** Brazing hearth with gas-air torch
- D** Bandsaw

You should use each letter once only.

Application

Equipment

Cutting sheet acrylic into 100mm squares

Reducing the diameter of an aluminium bar

Cutting a 10mm slot into a 50 x 50mm mild steel block

Annealing a piece of copper sheet

(4 marks)

Turn over ▶

4



4

Figure 1



Figure 2



4 (a) Figures 1 and 2 are health and safety signs. Name a specific process or situation where you will see each of these signs in use.

Figure 1

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Figure 2.....

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(2 × 1 mark)

4 (b) Explain fully why there is a need to take the precaution shown in each sign.

Figure 1

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Figure 2.....

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(2 × 2 marks)

6



5 Explain why ultra violet hardening adhesive is considered a safer alternative to cyanoacrylate (superglue) for use in a school workshop.

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(3 marks)

3

Turn over for the next question

Turn over ▶



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ANSWER IN THE SPACES PROVIDED**



Section B

Answer **either** Question 6 **or** Question 7.

6 **Figure 3** on the Insert Sheet shows a concrete bench for use in an outdoor area.

Answer the following questions.

6 (a) Explain in detail why concrete is a suitable material for the bench.

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(6 marks)

Question 6 continues on the next page

Turn over ▶



6 (b) Use notes and diagrams to describe the most appropriate method for batch producing a concrete bench like this.

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[Empty box for writing]

(8 marks)

Question 6 continues on the next page

Turn over ▶



6 (c) The seat section of the bench can crack. Use notes and diagrams to explain how the bench could be modified to prevent this.

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(6 marks)

Turn over for the next question

20

Turn over ▶



Do not answer this question if you have answered Question 6.

- 7 (a)** For each of the following materials, give **four** reasons why it is suitable for the product.
In your answer you may wish to consider manufacture, function and aesthetics.

Material	Product
(i) Nickel plated steel sheet	Pencil case
(ii) High impact polystyrene	Disposable razor



7 (b) Cellulose acetate is sometimes used in food packaging. Explain why it might be used in such an application.

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(4 marks)

20

Turn over for the next question

Turn over ▶



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8 (a) (iii) Part B has been made from acrylic sheet. Give **two** reasons why this is suitable.

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(2 × 2 marks)

8 (b) (i) Use notes and diagrams to describe how all parts of the collection box have been fabricated as a one-off product.

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(9 marks)

Question 8 continues on the next page

Turn over ▶



8 (b) (ii) Explain why fabrication is a suitable type of manufacture for the collection box.

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(4 marks)

8 (c) The timber based parts of the collection box have been finished by painting. Name specific paints that could have been used and describe the finishing process in detail.

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(4 marks)



Question 8 continues on the next page

Turn over ▶



8 (d) Use notes and diagrams to develop the design of the collection box. In your answer, you should consider the following specification:

- Be suitable for production in small batches (e.g. 3 to 5 per production run)
- Be made from material that will be weatherproof
- Include an interactive or fun element to encourage donations.



(12 marks)

END OF QUESTIONS

40



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