

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	
9	
10	
TOTAL	



General Certificate of Secondary Education  
June 2013

# Design and Technology: 45601 Resistant Materials Technology

Unit 1 Written Paper

Friday 7 June 2013 1.30 pm to 3.30 pm

**For this paper you must have:**

- a black pen, a pencil, a ruler, an eraser, a pencil sharpener and coloured pencils.

**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 **all** questions.
- 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 you do not want to be marked.

**Information**

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 120.
- The questions in Section A relate to the context referred to in the Preliminary Material that was previously issued.
- You are reminded of the need for good English and clear presentation in your answers. Quality of Written Communication will be assessed in Question 7 (b).



J U N 1 3 4 5 6 0 1 0 1

M/Jun13/45601

**45601**

## Section A

Answer **all** questions in the spaces provided.

In this section you will be asked to:

- produce a Design Specification
- produce a range of ideas
- develop **one** of your ideas
- evaluate your chosen idea.

### Design Situation

Restaurant and café owners often provide a number of items on each table.

The illustrations below show the sort of things that they often provide.



### Design Brief

The owner of a chain of 'Art Deco' inspired cafés has asked you to design a device for holding and carrying some or all of these items.

The device must display the menu and table number.

**All** your designs must clearly illustrate your understanding of the 'Art Deco' style.



Question 1 is about the Design Specification.

You are advised to spend about 5 minutes on this question.

**1** Give **three** design requirements of the device.

Explain each of your answers.

An example has been completed for you.

*Requirement: The device should protect the items being stored.*

*Explanation: This will prevent the items from being damaged.*

**1 (a)** Requirement 1 .....

.....

Explanation .....

.....

(2 marks)

**1 (b)** Requirement 2 .....

.....

Explanation .....

.....

(2 marks)

**1 (c)** Requirement 3 .....

.....

Explanation .....

.....

(2 marks)

6
---

Turn over ▶



Question 2 is about creative design.

You are advised to spend about 15 minutes on this question.

**2** Study the information given in the **Design Brief** (page 2) and your **Design Specification** (page 3).

Use this information to help you sketch **five** different ideas for a device.  
**All** your designs must be in the 'Art Deco' style.

Marks will be awarded for creativity.

(5 x 3 marks)

<b>15</b>



Question 3 is about developing the design.

You are advised to spend about 10 minutes on this question.

**3** Choose your best idea from Question 2.

Use notes and sketches to show how you would develop your design.  
Justify your choices of materials and finishes.

Marks will be awarded for details relating to:

- materials and finishes
- constructional details
- design features and sizes.

*(3 marks)*

*(3 marks)*

*(3 marks)*

**Turn over for the next question**

9

**Turn over ▶**



Question 4 is about evaluation.

You are advised to spend about 5 minutes on this question.

**4** Evaluate your developed design (Question 3) against your design requirements (Question 1).

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.....

.....

.....

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.....

.....

*(3 marks)*

<b>3</b>



**Section B**

Answer **all** questions in the spaces provided.

Question 5 is about materials.

You are advised to spend about 10 minutes on this question.

**5 (a)** Complete the following table by matching each plastic (polymer) with its correct category.

The first one has been done for you.

Plastic (polymer)	Category	
	Thermoplastic	Thermosetting plastic
Acrylic (PMMA)	✓	
Urea formaldehyde (UF)		
Polyvinyl chloride (PVC)		
Polypropylene (PP)		
Polyethylene terephthalate (PET)		
Melamine formaldehyde (MF)		

(5 marks)

**Question 5 continues on the next page**

**Turn over ▶**

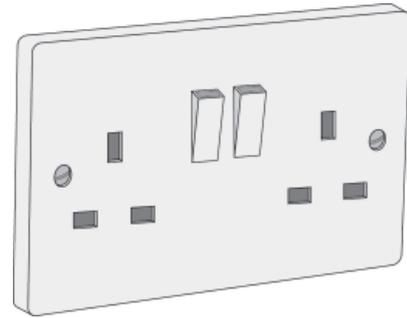


5 (b)

Margarine tub



Electrical socket



5 (b) (i) Name the **category** of plastic that has been used to manufacture the **margarine tub**.

.....  
(1 mark)

5 (b) (ii) Explain why this **category** of plastic has been chosen.

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

5 (c) (i) Name the **category** of plastic that has been used to manufacture the **electrical socket**.

.....  
(1 mark)

5 (c) (ii) Explain why this **category** of plastic has been chosen.

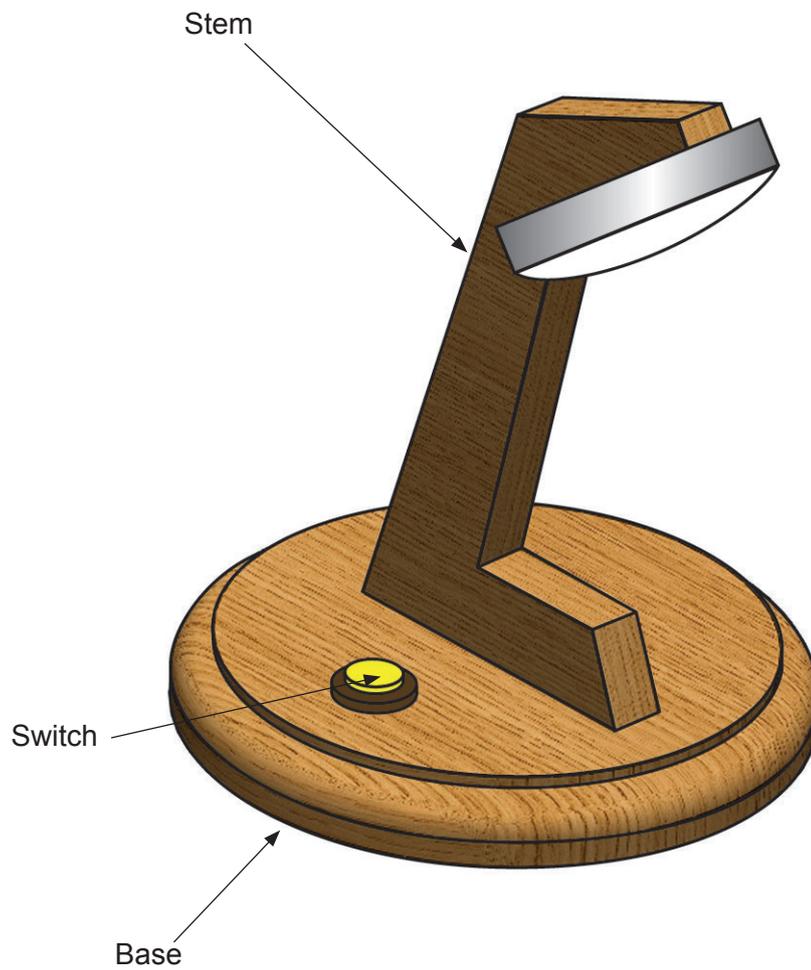
.....  
.....  
.....  
.....  
(2 marks)



Question 6 is about making.

You are advised to spend about 20 minutes on this question.

**6** Study the wooden lamp shown below.



**Question 6 continues on the next page**

**Turn over ▶**



Use notes and sketches to show clearly how you would make a batch of **ten** lamps in a school workshop.

At each stage, name **all** the tools, equipment or software you would use.

Stage 1: Marking out **or** CAD (Computer-Aided Design)

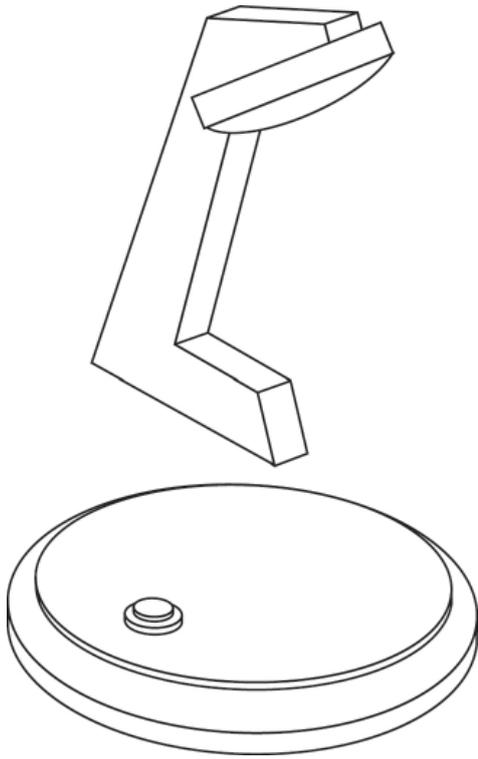
(4 marks)

Stage 2: Cutting and shaping **or** CAM (Computer-Aided Manufacture)

(4 marks)

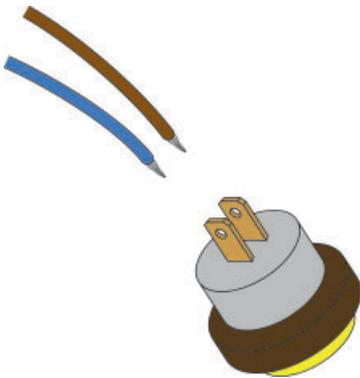


Stage 3: Show how the base could be joined to the stem



(4 marks)

Stage 4: Show how the wires could be secured to the back of the switch



(4 marks)

16

Turn over ▶



Question 7 is about materials.

You are advised to spend about 15 minutes on this question.

7 (a) Study the products shown below.

Name **one** suitable, **specific** material which has been used to make each outdoor chair.

Give **one** reason for **each** choice.

Give the original source of the material.

**Wooden chair**



Material ..... (1 mark)

Reason .....  
.....  
..... (1 mark)

Original source of the material  
..... (1 mark)

**Metal chair**



Material ..... (1 mark)

Reason .....  
.....  
..... (1 mark)

Original source of the material  
..... (1 mark)



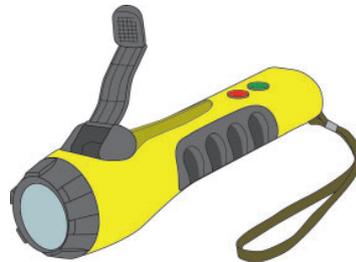


Question 8 is about product analysis.

You are advised to spend about 15 minutes on this question.

8 Study the wind up torch shown below.

Wind up torch



8 (a) Give **four** ergonomic features of the wind up torch.

Explain each of your answers.

8 (a) (i) Feature 1 .....  
Explanation .....  
.....  
(2 marks)

8 (a) (ii) Feature 2 .....  
Explanation .....  
.....  
(2 marks)

8 (a) (iii) Feature 3 .....  
Explanation .....  
.....  
(2 marks)

8 (a) (iv) Feature 4 .....  
Explanation .....  
.....  
(2 marks)



**8 (b)** Using the wind up torch as an example, explain the importance of anthropometric data.

.....

.....

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.....

.....

.....

.....

*(4 marks)*

**Question 8 continues on the next page**

**Turn over ▶**



8 (c) Study the two products shown below.

Wind up torch



Gas light



8 (c) (i) Give a specific use for the wind up torch.

.....  
(1 mark)

Give **two** reasons why it is suitable for this use.

Reason 1 .....

Reason 2 .....

(2 marks)

8 (c) (ii) Give a specific use for the gas light.

.....  
(1 mark)

Give **two** reasons why it is suitable for this use.

Reason 1 .....

Reason 2 .....

(2 marks)



Question 9 is about scales of production.

You should spend about 10 minutes on this question.

**9 (a)** Explain the term '**one off production**' and give examples of products to illustrate your answer.

.....

.....

.....

.....

.....

.....

(4 marks)

**9 (b)** Explain the term '**batch production**' and give examples of products to illustrate your answer.

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.....

.....

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.....

.....

(4 marks)

**9 (c)** Explain the term '**continuous production**' and give examples of products to illustrate your answer.

.....

.....

.....

.....

.....

.....

(4 marks)

12

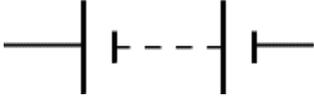
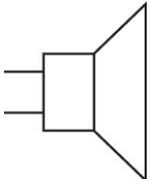
Turn over ▶



Question 10 is about electrical systems.

You are advised to spend about 15 minutes on this question.

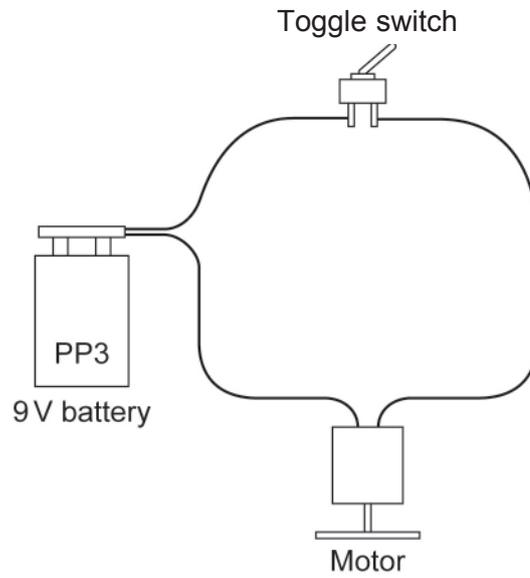
10 (a) (i) Complete the table shown below. The first one has been done for you.

Component	Schematic symbol	Function
Battery		<p><i>It provides power to the circuit</i></p>
Switch		<p>.....</p> <p>.....</p> <p>.....</p> <p style="text-align: right;"><i>(1 mark)</i></p>
Lamp		<p>.....</p> <p>.....</p> <p>.....</p> <p style="text-align: right;"><i>(1 mark)</i></p>
Motor		<p>.....</p> <p>.....</p> <p>.....</p> <p style="text-align: right;"><i>(1 mark)</i></p>
<p>.....</p> <p style="text-align: right;"><i>(1 mark)</i></p>		<p><i>It converts electrical energy into sound</i></p>



**10 (a) (ii)** Draw a schematic drawing of the electrical circuit shown below.

Label all the components.



(4 marks)

**Question 10 continues on the next page**

**Turn over ▶**



**10 (b) (i)** Give **two** reasons why copper wire is used to connect electrical components.

Reason 1 ..... (1 mark)

Reason 2 ..... (1 mark)

**10 (b) (ii)** Name the material that is used to cover the copper wire. Explain why this material has been used.

Material ..... (1 mark)

Explanation ..... (1 mark)

**10 (c)** The process of soldering can be a dangerous activity.

Complete the table shown below.

Health and safety issue	Hazard	Precaution
The tip of the soldering iron gets hot.	.....	.....
	.....	.....
	(1 mark)	(1 mark)
Soldering gives off fumes.	.....	.....
	.....	.....
	(1 mark)	(1 mark)

**END OF QUESTIONS**

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Question 7(a): Wooden chair, Thinkstock®

Question 7 (a): Metal chair, Riverfield Office Interiors®

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