

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	
TOTAL	



General Certificate of Secondary Education
June 2015

Design and Technology: Resistant Materials Technology

45601

Unit 1 Written Paper

Monday 8 June 2015 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.
- Section A relates to the context given 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 6.



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

Section A

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

In this section you will:

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

Design Brief

- A manufacturer of interior lighting has asked you to produce a range of designs for a task light. The light should illuminate the work area on a home office desk or student desk.
- You should produce **five** design ideas for a task light for use on a home office desk or student desk.
- For **three** of your design ideas the light **must** be adjustable.

Below is a view of a typical home office desk or student desk.



Question 1 is about the Design Specification.

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

1 Give **three** design requirements of a task light for use on a home office desk or student desk.

Explain each of your answers.

An example has been completed for you.

Requirement: the device should be stable.

Explanation: because the light might be knocked over and become damaged.

[3 marks]

1 (a) Requirement 1

Explanation 1

.....

.....

[3 marks]

1 (b) Requirement 2

Explanation 2

.....

.....

[3 marks]

1 (c) Requirement 3

Explanation 3

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.....

9

Turn over ▶



Question 2 is about creative design.

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

- 2 (a)** Use the information in the Design Brief on page 2, and your answers in Question 1, to help you sketch **two** different design ideas for a task light.

The task lights do **not** need to be adjustable.

Marks will be awarded for creativity.

[2 × 3 marks]



2 (b) Use the information in the Design Brief on page 2, and your answers in Question 1, to help you to sketch **three** different design ideas for an adjustable task light.

Each of your task lights should use a different method of adjustment.

Marks will be awarded for creativity.

[3 × 3 marks]

15

Turn over ▶



Question 3 is about developing the design.

You are advised to spend about 12 minutes on this question.

3 Choose your best idea from Question 2 (b).

On pages 6 and 7, show how you would develop your design using notes and sketches.

Marks will be awarded for:

- details of a specific material and a suitable finish (explain your choices) **[2 marks]**
- constructional details **[3 marks]**
- design features and sizes **[3 marks]**
- details of your chosen method of adjustment. **[3 marks]**





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Turn over for Question 4

Turn over ▶



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



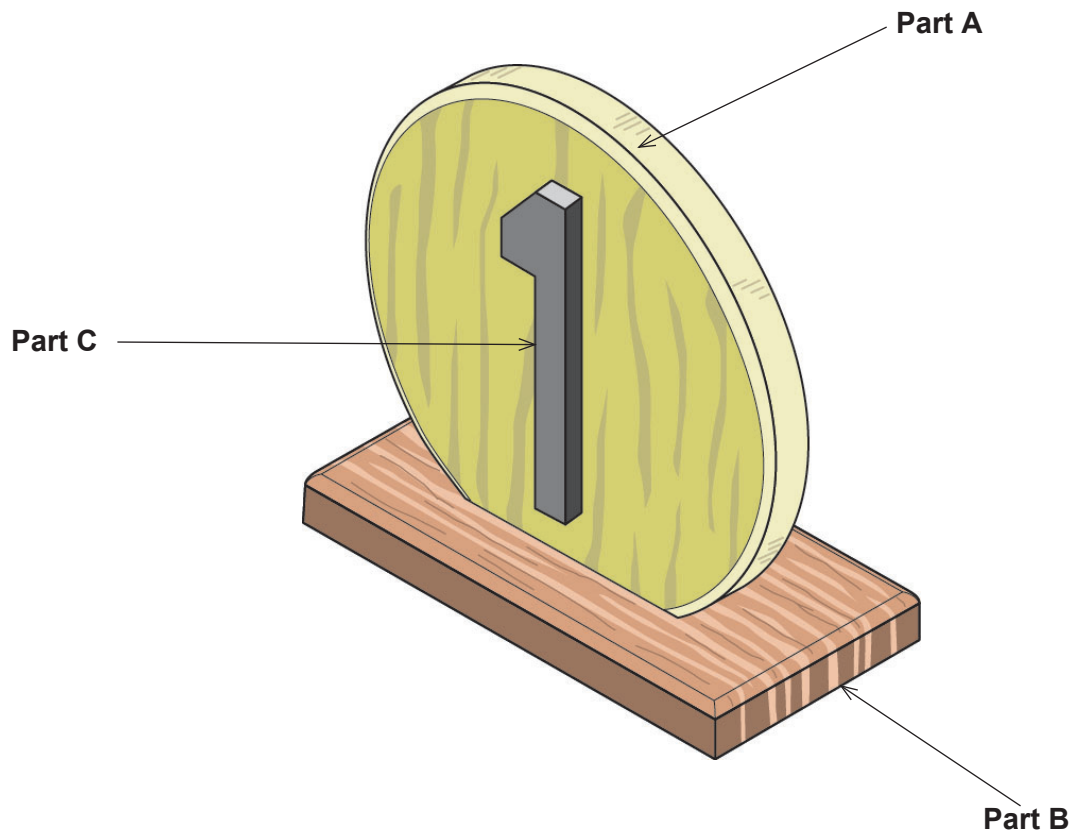
Section B

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

Question 4 is about making.

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

- 4** Study the Year 11 inter-house football trophy shown below.



Part A and **Part B** will be made from wood.

Part C will be made from cast metal.

Question 4 continues on the next page

Turn over ▶



Use notes and sketches to show how you would make **one** Year 11 inter-house football trophy in a school workshop.

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

Stage 1: How to make Part A and Part B

[4 marks]

Stage 2: How to join Part A to Part B

[4 marks]



Stage 3: How to produce the mould and cast **Part C**

[6 marks]

Blank area for writing the answer to Stage 3.

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Turn over ▶





Question 5 is about fastenings and adhesives.

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

5 (a) Complete the table shown below.

The first row has been done for you.

Fastening	Full Name	Function
	Washer	A washer spreads the pressure and protects the surface of the material.
<p style="text-align: right;">[1 mark]</p>	Bolt	<p style="text-align: right;">[2 marks]</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>
	<p style="text-align: right;">[2 marks]</p> <p>.....</p>	<p style="text-align: right;">[2 marks]</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>



5 (b) Give a use for **each** of the following adhesives.

Give **two** advantages and **one** disadvantage of using each adhesive.

5 (b) (i) Polyvinyl acetate (PVA)

[1 mark]

Use

[1 mark]

Advantage 1

[1 mark]

Advantage 2

[1 mark]

Disadvantage.....

Question 5 continues on the next page

Turn over ▶



5 (b) (ii) Cyanoacrylate (Super Glue)

[1 mark]

Use

.....

[1 mark]

Advantage 1

.....

[1 mark]

Advantage 2

.....

[1 mark]

Disadvantage.....

.....



5 (c) Use notes and sketches to show how you would glue **two** materials together using epoxy resin.

[5 marks]

20

Turn over ▶



Question 6 is about product analysis.

You are advised to spend about 8 minutes on this question.

6 Study the **two** tools shown.

Cordless drill/driver



Screwdriver



Explain the advantages and disadvantages of using a cordless drill/driver rather than a screwdriver.

Quality of Written Communication will be assessed in this question.

[8 marks]

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8

Turn over for the next question

Turn over ▶



Question 7 is about smart, nano and composite materials.

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

7 (a) (i) Explain what is meant by the term ‘smart material’.

[2 marks]

.....

.....

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7 (a) (ii) Complete the table.

Product	Material
<p style="text-align: right;">[1 mark]</p> <p>.....</p>	<p>Shape memory alloys (SMA) ‘Nitinol’</p>
<p>A baby’s feeding spoon that changes colour if the food is too hot</p>	<p style="text-align: right;">[1 mark]</p> <p>.....</p>
<p style="text-align: right;">[1 mark]</p> <p>.....</p>	<p>Motion control gel ‘Smart grease’</p>

7 (b) (i) Explain what is meant by the term ‘nanomaterial’.

[2 marks]

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7 (b) (ii) Give an example of the use of a 'nanomaterial' and explain its advantages.

[3 marks]

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7 (c) Name a composite material used for the body of a Formula 1 racing car.

Explain why this material has been used.

[2 marks]

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12

Turn over for the next question

Turn over ▶



Question 8 is about health and safety.

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

8 (a) Complete the table by:

- stating the meaning of each sign
- naming an activity where you would need to follow the advice of this sign
- identifying the hazard.

Sign	Meaning	Activity	Hazard
	Safety glasses must be worn	[1 mark]	[1 mark]
	[1 mark]	When handling hot metal or carrying sharp objects	[1 mark]
	[1 mark]	[1 mark]	You could damage your hearing
	[1 mark]	[1 mark]	[1 mark]



Question 9 is about finishes.

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

9 (a) Study the pine table shown below.



9 (a) (i) Name a suitable finish for the pine table.

[1 mark]

.....

9 (a) (ii) Give **two** reasons for choosing the finish you have named in part (a) (i).

[2 marks]

Reason 1

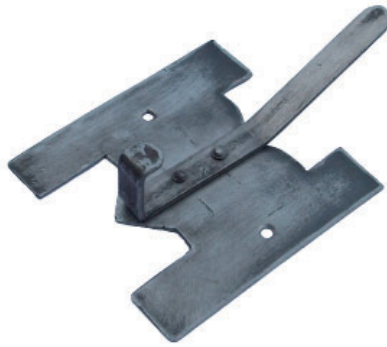
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Reason 2

.....



9 (b) Study the mild steel coat hook show below.



9 (b) (i) Name a suitable finish for the mild steel coat hook.

[1 mark]

.....

9 (b) (ii) Explain why the mild steel coat hook needs a finish.

[4 marks]

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Question 9 continues on the next page

Turn over ▶



9 (b) (iii) Use notes and sketches to describe how you would apply the finish you have named in part **(b) (i)**.

[6 marks]

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END OF QUESTIONS

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