

Surname	Centre Number	Candidate Number
Other Names		0



**GCSE**

4111/01

**DESIGN AND TECHNOLOGY**

**UNIT 1**

**FOCUS AREA: Resistant Materials Technology**

A.M. WEDNESDAY, 15 May 2013

2 hours

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Question 1	
Question 2	
Question 3	
Question 4	
Question 5	
Question 6	
Question 7	
Question 8	
<b>TOTAL MARK</b>	

**ADDITIONAL MATERIALS**

You will need basic drawing equipment, coloured pencils and a calculator for this examination.

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. Where the space is not sufficient for your answer, continue at the back of the book, taking care to number the continuation correctly.

You are reminded of the necessity for good English and orderly presentation in your answers.

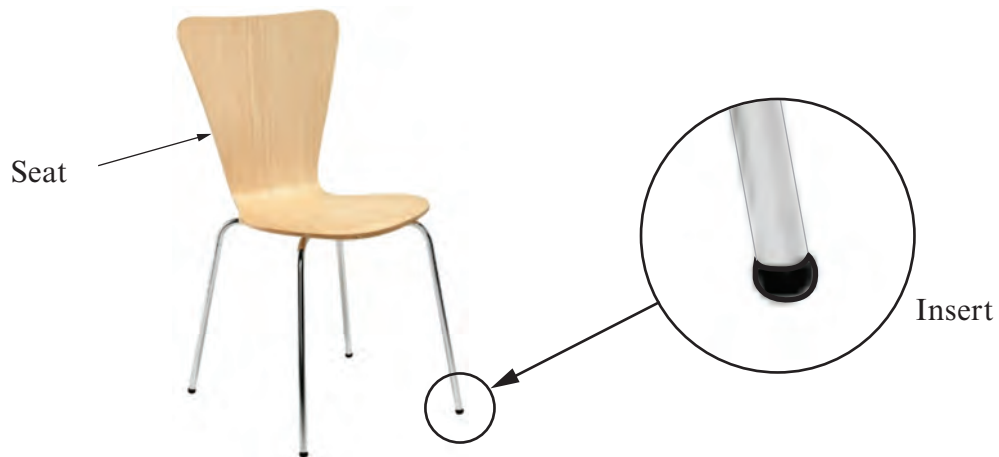
**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets at the end of each question or part-question.

**Section A***Marked out of 60 60 minutes*

1. This question is about Product Analysis. It is worth a total of 15 marks.

Study the image of the office chair shown below and answer the questions that follow. The chair legs are made from stainless steel and the seat is made from birch-faced plywood. A High Density Polyethylene (HDPE) insert is fitted into the base of the legs.



- (a) Complete the table by explaining the choice of material used to make the parts of the chair. [4]

Part	Material	Reasons for choice
Chair legs	Stainless steel	..... ..... ..... .....
Insert at base of legs	HDPE	..... ..... ..... .....

(b) Before designing chairs such as this the designer must consider a range of specification points.

Write a detailed specification point for each of the following design considerations.

(i) Ergonomics: [2]

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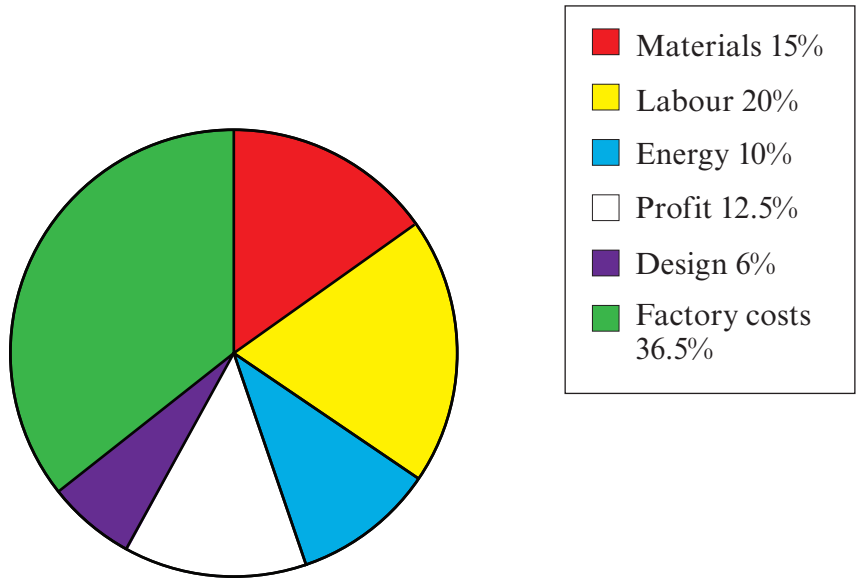
(ii) Sustainability: [2]

.....  
.....

(c) The seat of the chair has been made by the process of laminating. Explain the advantages of using this process to manufacture the seat of the chair. [3]

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.....  
.....  
.....

(d) The pie chart below shows a breakdown of the costs that add up to the final selling price of the chair.



(i) The fixed costs for the manufacturer are the Profit, Design and Factory costs. What percentage (%) of the final selling price are the fixed costs?

..... %

[1]

(ii) The chart shows that the material costs of the chair are 15% of the final selling price. If the material costs are £8.40, calculate the final selling price. [3]

Show all your workings.

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.....

2. This question is about the general issues of Design and Technology. It is worth a total of 10 marks.

(a) This question refers to the six Rs of sustainability. Complete the table below by explaining the meaning of the following 2 Rs. [4]

Refuse	<p>.....</p> <p>.....</p> <p>.....</p>
Rethink	<p>.....</p> <p>.....</p> <p>.....</p>

(b) COSHH assessments are an important aspect of Health and Safety in the workplace. State what the initials COSHH stand for. [2]

Control Of S..... H..... to Health

(c) Study the list of energy sources below and underline the **two** non-renewable energy sources. [2]

Wind Oil Solar Gas Geothermal

(d) Outline the reasons why non-renewable energy sources are often considered to be harmful to the environment. [2]

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4. This question is about the Design Process and how it is used. It is worth a total of 25 marks.

(a) Study the key terms below and use lines to connect them with the correct definition. [3]

<b>Key terms</b>	<b>Definition</b>
Brief	A list of features essential to the design.
Development	A short statement of the design problem.
Specification	Improving on the best design idea.

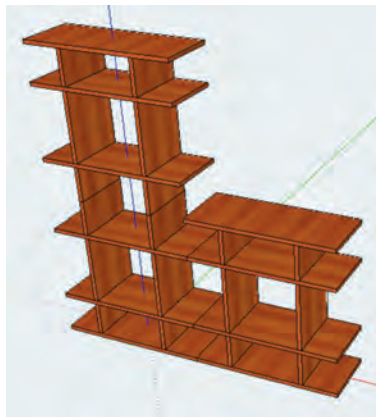
(b) State **two** activities that could be undertaken to gather information when researching a Design and Technology project. [2]

Activity 1: .....

Activity 2: .....

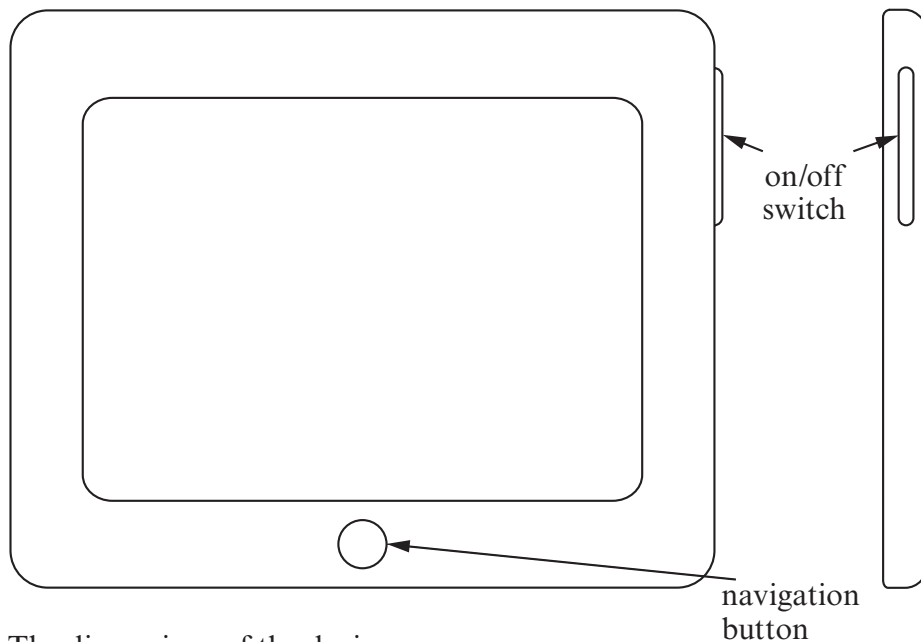
(c) The image below shows a CAD model of a storage unit.

State **one** reason why CAD modelling is often carried out during the development stage of a project. [2]



Reason: .....  
.....  
.....

- (d) You have been asked to design a stand to securely hold a tablet computer. The stand will be used by pupils seated at desks in a school IT department.



The dimensions of the device are:

height = 200mm, width = 300mm, thickness = 10mm

### Specification

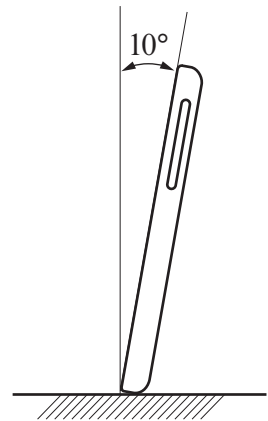
The stand must:

- sit on the desk, be free-standing and compact;
- hold the tablet computer securely at an angle of  $10^\circ$  from the vertical;
- allow access to the navigation button and on/off switch;
- not block the user's view of the screen.

Draw **one** design for the stand. Use notes to explain your ideas.

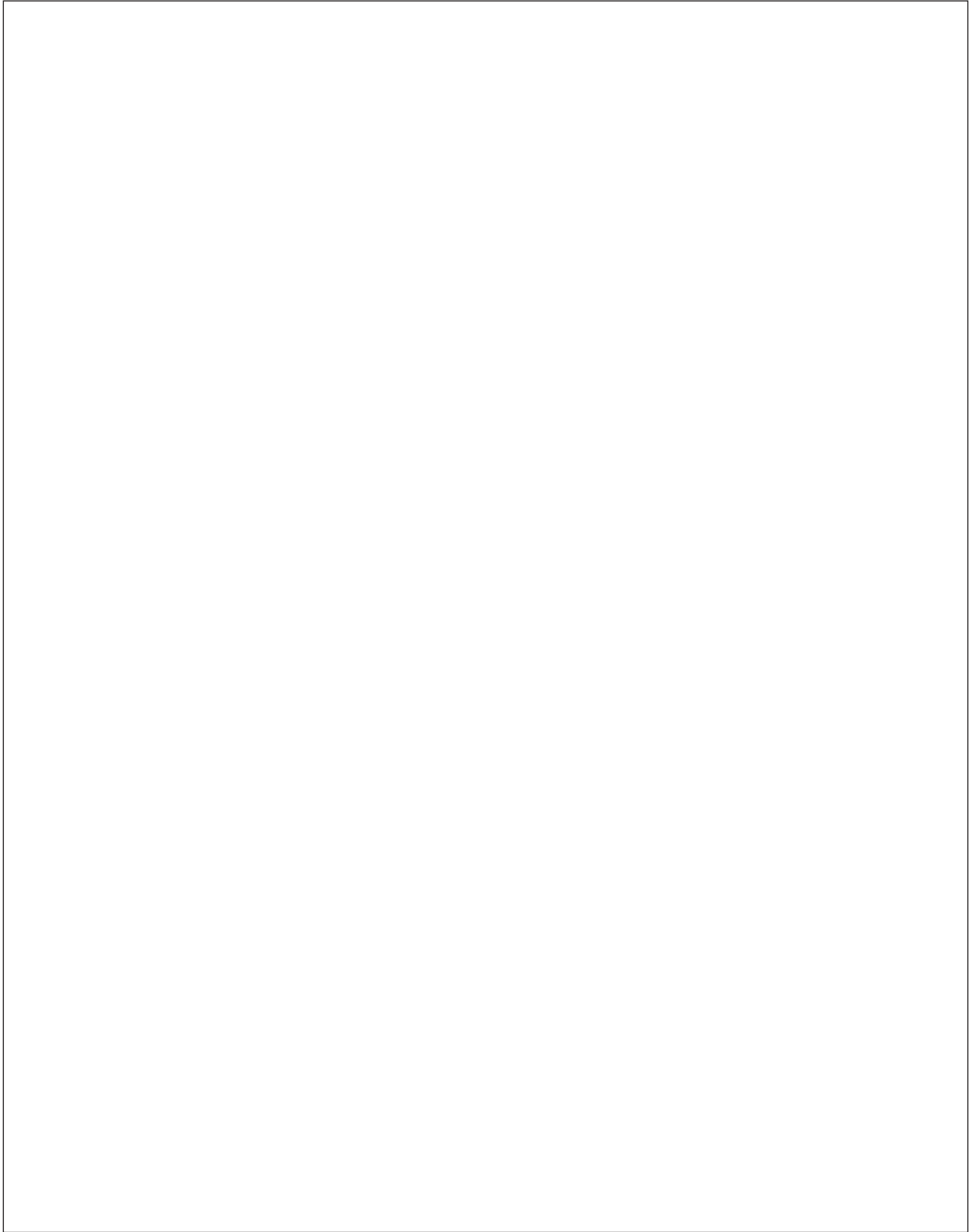
Marks will be awarded for:

- |   |     |
|---|-----|
| (i) including details needed to satisfy the specification;                  | [3] |
| (ii) clear details showing the design and construction of a suitable stand; | [6] |
| (iii) labelling suitable materials, components and processes;               | [3] |
| (iv) stating <b>two</b> important dimensions;                               | [2] |
| (v) quality of communication.   | [4] |





Draw your design in the box below.



**Section B**

*Marked out of 60 60 minutes*

5. This question is about Commercial Manufacturing Processes. It is worth a total of 10 marks.

(a) Complete the table by selecting the correct production process from the list below. [3]

Blow Moulding      Pressing      Injection Moulding      Forging      Veneering

<p>Polypropylene tray</p> 	<p>The <b>polypropylene tray</b> on this wheelbarrow was produced using</p> <p>.....</p>
	<p>This <b>aluminium baking tin</b> was produced using</p> <p>.....</p>
	<p>The <b>steel head</b> on this hammer was produced using</p> <p>.....</p>

(b) Batch production is the most widely employed commercial production method. Describe what you understand by the term batch production. [3]

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.....

.....

(c) The photograph shows a wheelie bin which has been made by the process of rotational moulding.



Describe **one** advantage and **one** disadvantage of making the product by this method.

Advantage: [2]

.....

.....

Disadvantage: [2]

.....

.....

6. This question is about Materials and Components. It is worth a total of 15 marks.

(a) Plastics are classified as thermoplastics or thermosetting plastics.  
Complete the table by inserting each material in the correct column.

[4]




HIPS      Melamine Formaldehyde      Nylon      Polypropylene

Thermoplastic	Thermosetting plastic
.....	.....
.....	.....
.....	.....
.....	.....

(b) Designers need to consider the best material properties if their products are to be successful.

Complete the table by stating **two** specific properties for **each** of the materials named that make them suitable for the product.

[6]

Material	Product	Specific properties
Teak	 Garden Bench	1. .... 2. ....
ABS	 Bicycle Helmet	1. .... 2. ....
Duralumin	 Bicycle Gear	1. .... 2. ....

(c) State the correct name of the **two** catches shown below.

[2]



(i) ..... catch

(ii) ..... catch

(d) Glass-Reinforced Plastic (GRP) is a widely used composite material.

(i) State **one** product that could be manufactured using GRP.

[1]

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(ii) Complete the following sentence that describes the structure of Glass-Reinforced Plastic (GRP):

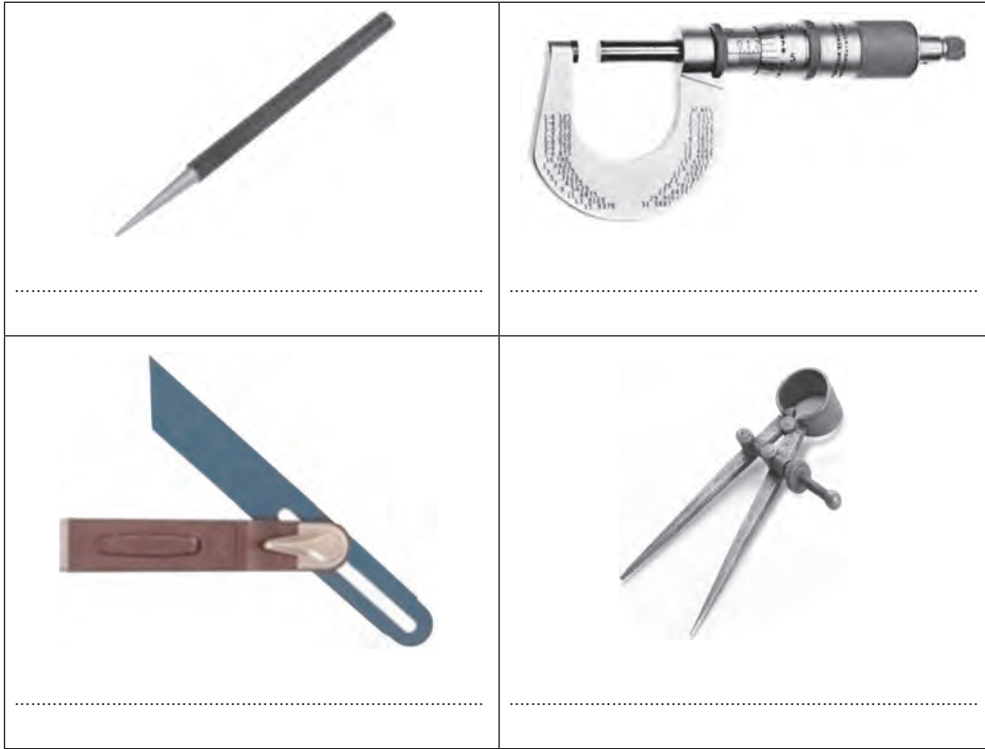
Glass-Reinforced Plastic (GRP) is made up of Glass .....  
embedded in a ..... resin.

[2]

7. This question is about Tools, Equipment and Making. It is worth a total of 20 marks.

(a) State the correct name of **each** of the tools shown below.

[4]



(b) State **two** safety precautions that need to be followed when using a woodworking lathe.

[2]



Precaution 1: .....

.....

Precaution 2: .....

.....

(c) State the meaning of the **two** warning signs shown below.

[2]



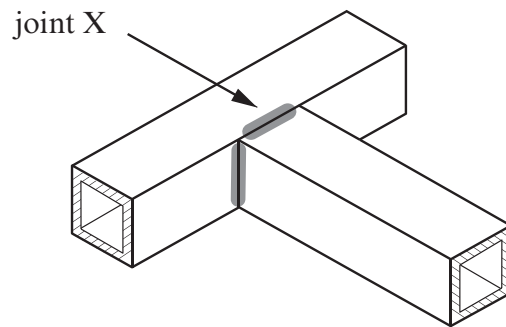
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(d) The two pieces of square section steel tube shown in the diagram below are to be permanently joined at joint X.

(i) Name a suitable heat process to permanently join the two pieces. [1]

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(ii) Using notes and sketches, describe how you would use the heat process to permanently join these two pieces. [5]



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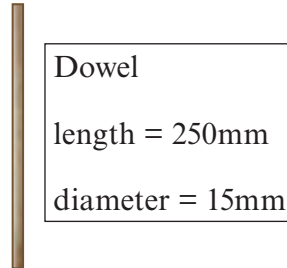
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- (e) As part of the manufacture of this wooden plate rack, 30 pieces of 15mm diameter dowel need to be cut to an identical length of 250mm.



Sketch a design for a suitable jig that could be used in a school workshop to assist in the manual cutting out of the dowel using a tenon saw. Show how the jig is securely held in use. Use notes to explain your design. [6]



8. This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

(a) Joints can be permanent or temporary. Complete the table by inserting the metal joining methods in the correct column. [4]

Pop riveting                      Self tapping screws                      Brazing                      Epoxy resin

Permanent	Temporary
.....	.....
.....	.....
.....	.....
.....	.....

(b)



The handles of these pliers have been plastic dip coated.

Explain **one** reason why this finishing process has been applied.

[2]

.....

.....

.....

(c) The diagram below shows a design for a drinks coaster. The design is to be manufactured on a laser cutter using 4mm plywood.



Describe the main operations involved in setting up, engraving and cutting out the coaster on a laser cutter. [4]

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(d) Other than speed of manufacture, explain **one** benefit of using CAM to the manufacturer. [2]

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(e) A manufacturer is considering purchasing a rapid prototyping machine.  
Discuss the advantages and disadvantages to the manufacturer of investing in a rapid  
prototyping machine. [3]

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**END OF PAPER**

