

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

4111/01

DESIGN & TECHNOLOGY

UNIT 1

FOCUS AREA: Resistant Material Technology

P.M. FRIDAY, 23 May 2014

2 hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
Section A	1.	15
	2.	10
	3.	10
	4.	25
Section B	5.	10
	6.	15
	7.	20
	8.	15
Total		120

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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 micro-scooter shown here and answer the questions that follow.

The micro-scooter sells for £60. The frame is made from Aluminium and the tyres from Nylon.

- (a) (i) State **two** reasons why Aluminium is a suitable material for the frame of the scooter. [4]

Reason 1:

Reason 2:

- (ii) State **two** reasons why Nylon is a suitable material for the tyres of the scooter.

Reason 1:

Reason 2:

- (b) The manufacturer has received an order for 2500 identical scooters. **Underline** the most suitable scale of production that could be used by the company to fulfil this order. [1]

MASS PRODUCTION

BATCH PRODUCTION

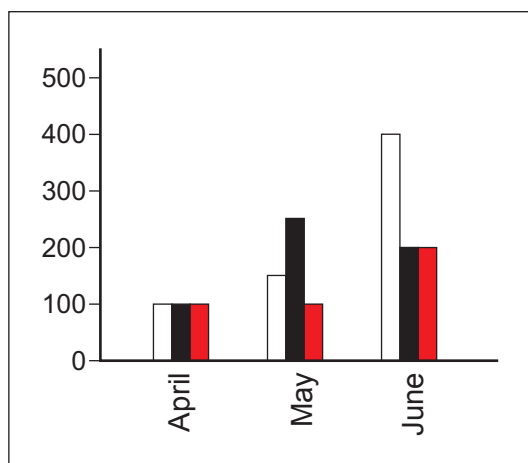
ONE-OFF PRODUCTION

- (c) It is important for designers of products such as the scooter to fully consider a range of specification points.
Write a detailed specification point for **each** of the following design considerations related to the scooter.

(i) Safety: [2]

(ii) Size: [2]

- (d) The scooter is available in a range of colours (Black, Red and White).
The graph below shows the sales of the scooters over a period of three months. The number of sales in each colour of scooter can also be calculated from the graph.



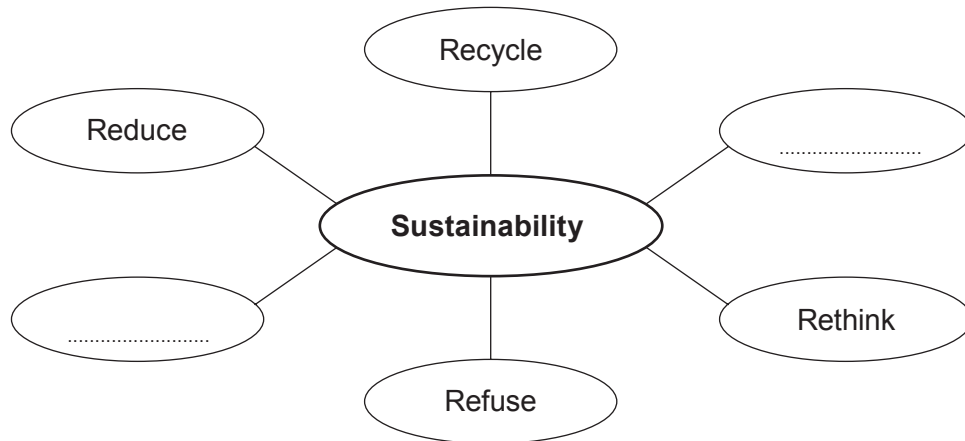
(i) In which month were the highest number of **black** scooters sold? [1]

(ii) Of the total number of scooters that were sold over the three months, calculate the percentage that were red. [2]
(Show all your workings.)

- (e) The scooter has been designed in Europe and manufactured in China. Explain the reasons why the manufacturer has chosen to manufacture the scooter in China. [3]

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

(a) Complete the chart below by adding the **two** missing Rs of sustainability. [2]



(b) State the specific material referred to by **each** of the recycling symbols shown below. [2]



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(c) Five step Risk Assessments are undertaken in working environments in order to consider the risks of carrying out a making process.

Complete the five step Risk Assessment below.

[2]

1. Identify the hazards.
2.
3. Evaluate the potential risk.
4. Record the findings.
5.

- (d) Complete the following definition of a LCA.

[2]

*"A Life C..... A..... is a method used to measure
and evaluate the impact of a product on the environment".*

- (e) Explain the purpose of the British Standards Institution (BSI).



[2]

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- During your course you have studied the work of Ross Lovegrove and Philippe Starck.

- [2]

	
Name:	Name:

- [8]

Marks will be awarded for the content of the answer and the quality of written communication.

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

(a) The designing process includes the stages listed below.

Making the product	Developing	Specification
Researching	Evaluating	

(i) State which of the stages would be done first. [1]

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(ii) State which of the stages would be done last. [1]

.....

(b) A plan for making always includes a step by step list of making activities. State **two** other important considerations that could also be included in a plan for making. [2]

Consideration 1:

Consideration 2:

(c) Explain how a detailed design specification can assist when undertaking a Design and Technology project. [3]

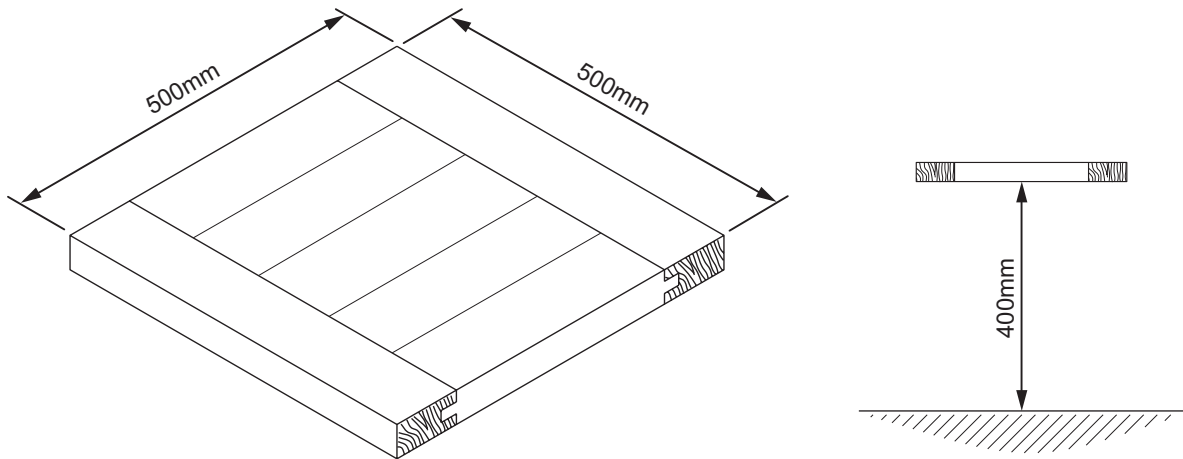
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(d) The diagram below shows a wooden table top.



You are required to design a folding leg mechanism that will support the table top at a height of 400 mm from the floor.

The table must fold flat for storage when not in use.

Specification

The folding leg mechanism must:

- allow the table to fold flat for efficient storage;
- be safe and simple to fold;
- hold the table top securely at a height of 400 mm when in use;
- be fixed to the table top.

Draw **one** design for the folding leg mechanism. Use notes to explain your idea.

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 folding leg mechanism; | [6] |
| (iii) labelling suitable materials, components and processes; | [3] |
| (iv) stating two relevant 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) Place **each** of the processes shown below under the material they apply to. [4]

Line Bending Steam Bending Blow Moulding Die Casting

Wood	Metal	Plastic

- (b) The photograph shows a cupboard manufactured from chipboard covered in a thin layer of natural wood.

Underline the correct name of this process from the list shown below: [1]

VENEERING EXTRUDING
PRESSING



- (c) State **two** advantages of using this process in the manufacture of the cupboard. [2]

Advantage 1:

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Advantage 2:

.....

- (d) Just in Time (JIT) is an important system used in modern manufacturing. Discuss the advantages of Just in Time (JIT) to the manufacturer. [3]

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

- (a) Metal alloys are a mixture of two or more metals. Correctly match the following alloys to the metals from which they are made. [4]

Stainless steel

Brass

Duralumin

Bronze

Metals

Alloy

Copper (65%) + Zinc (35%)

=

Steel (72%) + Chrome and Nickel (18%)

=

Aluminium (95%) + Copper (4%) + Magnesium (1%)




=

Copper (90%) + Tin (10%)

=

- (b) Complete the table by **underlining** the correct words from **each** list.
(The first product has been completed as an example.)

[4]

Product	Material	Classification
 Metalworking vice	Aluminium <u>Cast iron</u> Pewter	<u>Ferrous metal</u> Non ferrous metal
 Electrical socket	Urea formaldehyde Polystyrene Acrylic	Thermosetting plastic Thermoplastic
 Mallet	Chipboard Beech Balsa	Hardwood Softwood Manufactured board

- (c) State the correct name of the **two** Knock Down Fittings (KDFs) shown below. [2]



(i)



(ii)

- (iii) Describe **one** advantage to the consumer of buying products that are assembled using Knock Down Fittings (KDFs). [2]

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- (d) (i) State the correct name of **one** smart material that you have studied. [1]

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- (ii) Describe how the properties of the smart material named above can be used in a specific product. [2]

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

- (a) State the correct name of **two** items of personal protective gear that can be worn in order to work safely in a school workshop. [2]

Item 1:

Item 2:

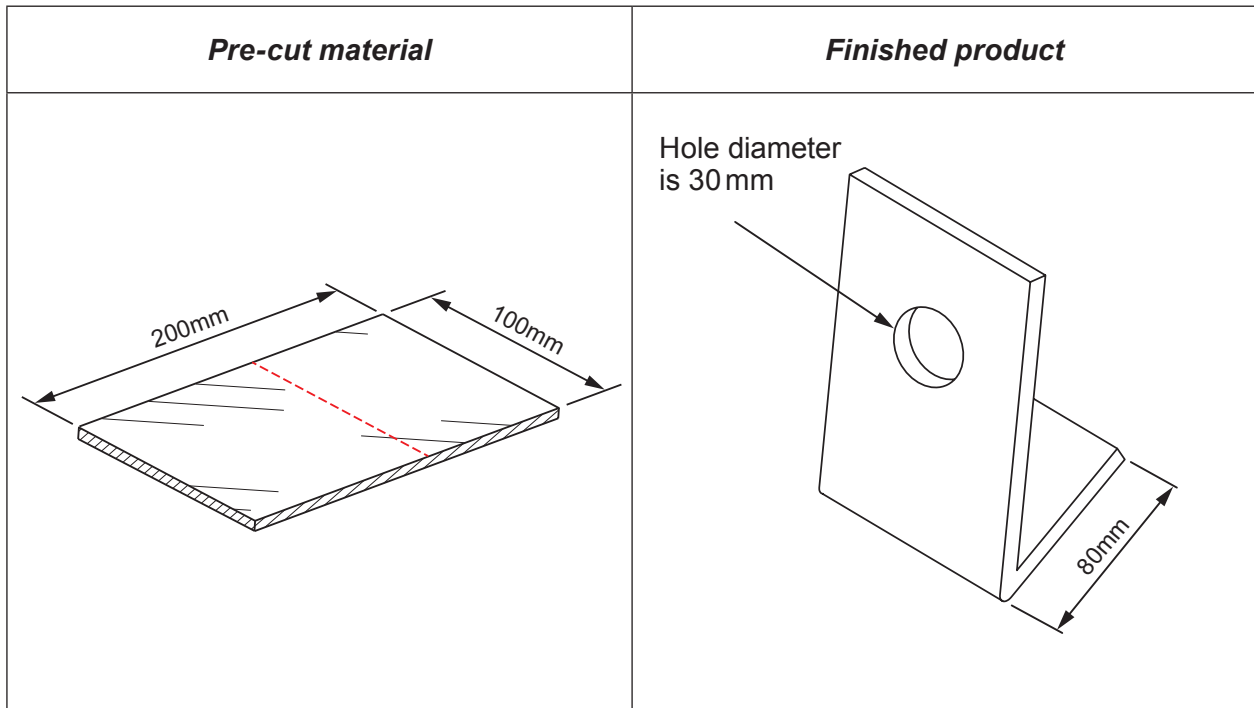
- (b) State the correct name of **each** of the drilling tools shown below. [4]

 <p>.....</p>	 <p>.....</p>
 <p>.....</p>	 <p>.....</p>

- (c) State the hazard highlighted by **each** of the symbols shown below. [2]



- (d) The product shown in the diagram below has been made from a single piece of 3 mm acrylic. The material has been pre-cut on a bandsaw to the size shown.



- (i) State the correct name of the equipment required to heat the acrylic ready for bending along the red dotted line. [1]

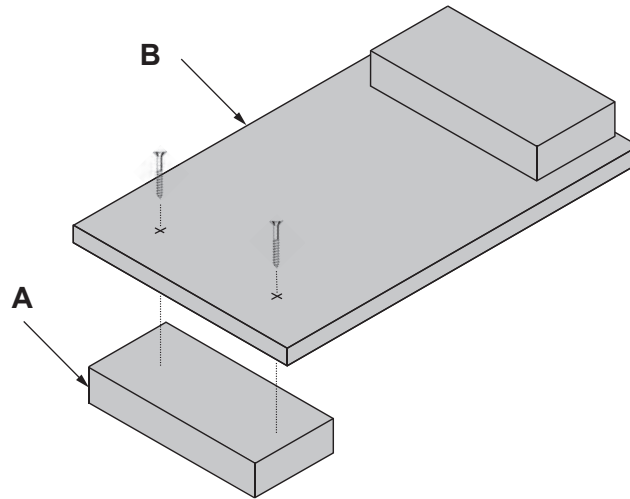
Name:

- (ii) Outline a step-by-step plan for forming and finishing the product using common workshop tools and equipment. [5]

Step	Steps for Making
1	
2	
3	
4	
5	

- (e) The diagram shows a partially completed bench hook made from MDF.

To complete the bench hook, part **A** needs to be permanently joined to part **B** by using adhesive and two 30 mm wood screws.



- (i) Name a suitable adhesive.

[1]

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- (ii) Using notes and sketches, describe how you would accurately and securely join the parts using adhesive and two 30 mm wood screws. [5]

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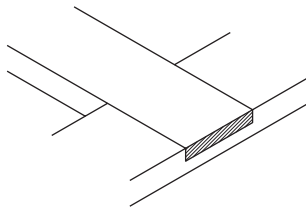
Turn over for Question 8

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

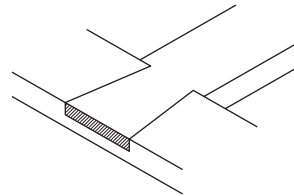
- (a) Place **one tick (✓)** for **each** finish to indicate if it is suitable for use on wood or metal or both. [3]

<i>Finish</i>	<i>Wood</i>	<i>Metal</i>	<i>Both</i>
Teak oil			
Plastic coating			
Paint and Primer			

- (b) Correctly name the following wood joints. [2]



Name:



Name:

- (c) The design of the mould is crucial to the process of vacuum forming. Discuss the features that are required for a high quality vacuum forming mould. [3]

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- (d) Explain how the use of CAD (Computer Aided Design) can be beneficial when working on a resistant materials project. [3]

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- (e) The item shown below has been cast in pewter.



Discuss the important factors that would ensure a successful pewter casting.

[4]

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END OF PAPER

