

Surname	Centre Number	Candidate Number
Other Names		0

**GCSE**

4141/01



S17-4141-01

DESIGN AND TECHNOLOGY**UNIT 1****FOCUS AREA: Product Design**

TUESDAY, 23 MAY 2017 – MORNING

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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010001**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 booklet, 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 information below about a computer keyboard.



Product Information:

- Modern curved shape and colour.
- Cost: £39.99.
- Injection moulded ABS casing and buttons.
- Built in wrist support.

(a) Explain how the following specification points have been met for this product.

(i) The computer keyboard must be made from a material that withstands excessive wear and tear. [2]

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(ii) The computer keyboard must be competitively priced. [2]

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(iii) The computer keyboard must be aesthetically pleasing. [2]

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- (b) The computer keyboard has been designed with specific ergonomic features. Name **two** ergonomic features and describe how they improve the product for the user.

Ergonomic Feature 1: [1]

Improvement: [2]

Ergonomic Feature 2: [1]

Improvement: [2]

- (c) The table below shows anthropometric measurements from a group of female product design students.

Student	Hand Length (mm)	Hand Breadth (mm)
A	175	75
B	190	80
C	160	70
D	185	80
E	180	70

- (i) State which student has the longest hand length [1]
- (ii) Calculate the average hand breadth for the group of students. [2]
(Show all your workings).

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

(a) Complete the table below by inserting the correct R for each of the descriptions. [4]
(Two examples have been done for you).

<i>Description</i>	<i>R</i>
Make use of old components in new products.	
Reconsider the best way to make a product more sustainable.	Rethink
Try to fix a product instead of throwing it away.	
Reprocess a material to make a new product.	Recycle
Minimise the amount of energy and material you use.	
Don't buy a product unless there is a real need.	

(b) The ruler pictured has been made from recycled plastic cups.



Describe why this is beneficial for the environment. [3]

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(c) Explain in detail what the term 'sustainable design' means. [3]

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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) Draw a line to match the design stage to the correct related activity. 3 x [1]

<i>Design Stage</i>
Research
Evaluation
Final design

<i>Related Activity</i>
Detailed presentation drawing
Target market analysis
Review of final product

(b) (i) Explain what is meant by the term 'design brief'. [2]

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(ii) Describe the importance of making a prototype when developing a new idea. [2]

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- (c) Using the images on the mood board below as inspiration, design a new concept toaster that will be used in a modern household kitchen.



Use notes and sketches to present your idea for the toaster in the space provided on the next page.

Specification

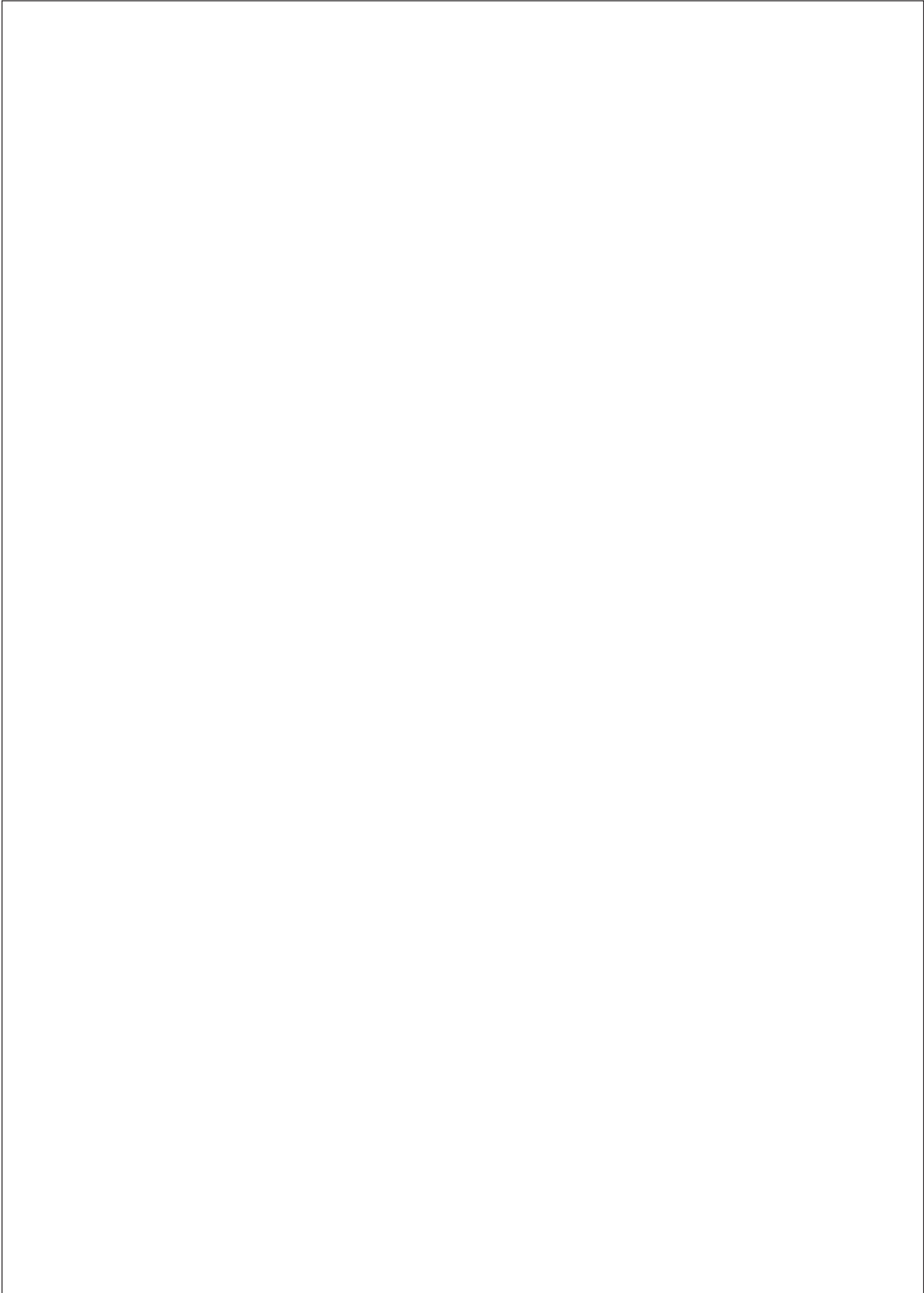
The design must:

- be inspired by the images, styles and colours presented in the mood board;
- have an innovative way of inserting bread into and removing it from the toaster;
- have an innovative way of removing crumbs from the toaster;
- be suitable for a modern household kitchen.

Marks will be awarded for:

- | | |
|---|-----|
| (i) a design that is suitable for a modern household kitchen; | [1] |
| (ii) reflecting the styles and colours of the mood board; | [4] |
| (iii) an innovative way of inserting and removing the bread; | [3] |
| (iv) an innovative way of removing the crumbs; | [3] |
| (v) suitable sizes, materials and manufacturing processes; | [3] |
| (vi) quality of communication. | [4] |

Draw fully labelled details for the toaster in the box below.



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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) Study the image of the product below and **underline** the correct manufacturing process used to make it. [1]



Vacuum Forming

Injection Moulding

(b) Complete the table by adding a description for **each** of the commercial scales of production listed.

Scale of Production	Description
Batch Production	<p>.....</p> <p>.....</p> <p>.....</p> <p>..... [2]</p>
One-off Production	<p>.....</p> <p>.....</p> <p>.....</p> <p>..... [2]</p>

(c) Describe the term 'quality assurance'.

[2]

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(d) Explain the advantages to the manufacturer of mass producing products.

[3]

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

(a) Complete the table by inserting **each** material listed below under the correct classification of plastic. [3]

Melamine Formaldehyde Acrylic Polypropylene

<i>Thermoplastic</i>	<i>Thermosetting Plastic</i>
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(b) Glass Reinforced Polymer (GRP) is a composite material that is used in many products.

(i) Name **one** product that is made using GRP. [1]

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(ii) Complete the following sentence that describes the structure of GRP. [2]

Glass Reinforced Polymer (GRP) is made up of
 embedded in a Resin.

(c) Describe what is meant by the term 'material properties'. [2]

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(d) The table below shows two products and the name of the material they are made from. State a property for **each** material and give a reason why it has been used.

<i>Product</i>	<i>Explanation of named property</i>
 <p>Thermometer Strip</p>	<p>Material: Thermo-chromic Film</p> <p>Property: [1]</p> <p>Reason: [1].</p>
 <p>Drinks Can</p>	<p>Material: Aluminium</p> <p>Property: [1]</p> <p>Reason: [1].</p>

(e) Describe how advancements in battery technology has influenced the design of many modern day products and give an example. [3]

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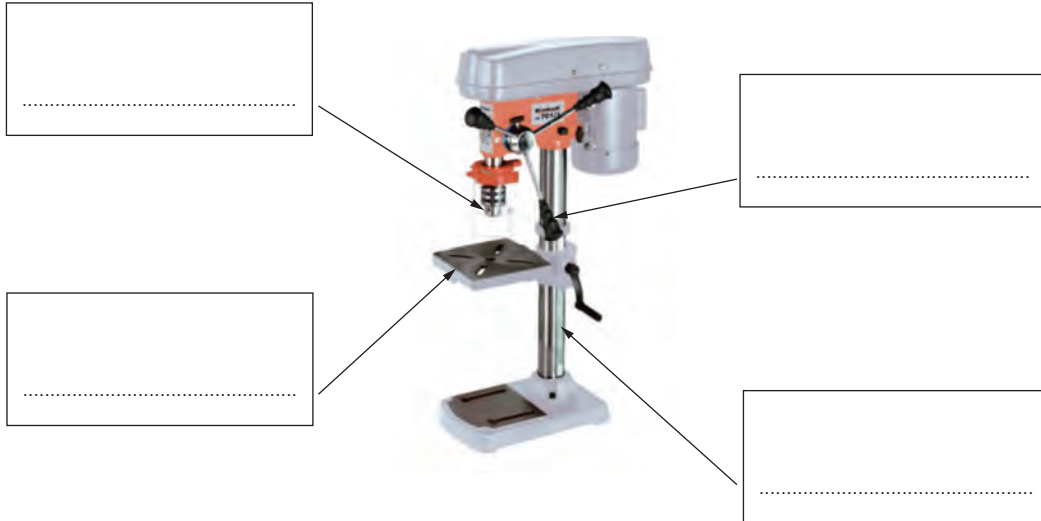
7. This question is about Tools, Equipment and Making. It is worth a total of 20 marks.

(a) Complete the table by stating the correct name and the correct use for **each** piece of equipment shown below. 6 x [1]

<i>Equipment</i>	<i>Name</i>	<i>Used For</i>
	 	 <hr/> <hr/> <hr/>
	 	 <hr/> <hr/> <hr/>
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(b) Using the words from the list below, label the diagram to show the correct name for **each** part of the pedestal drill. [4]

Table Chuck Lever Handles On/Off Switch Pedestal



(c) Describe **two** safety precautions to be considered when using the pedestal drill. [2]

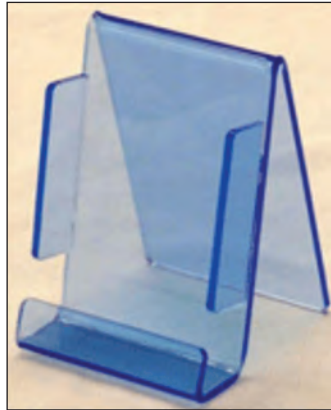
Precaution 1:

Precaution 2:

(d) Describe a possible safety hazard when drilling a hole in a piece of acrylic. [2]

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(e) The image below shows an acrylic mobile phone stand that has been manufactured in a school workshop. Use notes and sketches to describe in detail the main stages for manufacturing the mobile phone stand. [6]



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

(a) State the full meaning of CAD. [1]

Computer A D.....

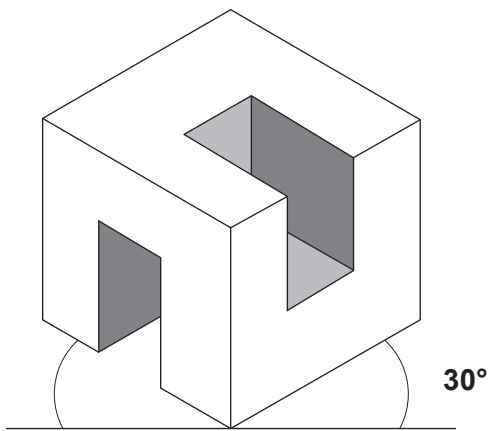
(b) Complete the table below by stating the name of the CAM machine used to produce **each** of the products pictured. [3]

<i>Vehicle Signage</i>	<i>Engraved Acrylic</i>	<i>Prototype Shoe</i>
		

(c) Systems are often used in modern products. Place a **tick** (✓) in the correct box to indicate the correct term for each of the statements. [3]

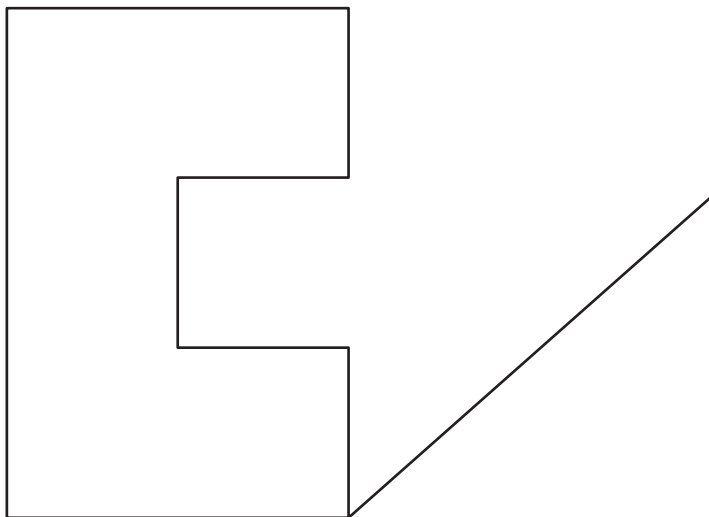
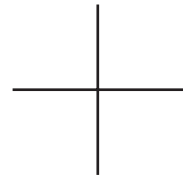
<i>Statement</i>	<i>Input</i>	<i>Process</i>	<i>Output</i>
The sound produced by a speaker.			
Pressing the button on a computer mouse.			
A chain turning the gears on a bicycle.			

(d) State the name of the recognised drawing method used to create the image below.



Name: [1]

(e) Complete the drawing below and make it 3D by using the one point perspective method. Use the cross provided as the vanishing point and add colour rendering to your finished drawing. [7]



END OF PAPER

