



GCSE

4141/01

DESIGN AND TECHNOLOGY

UNIT 1

FOCUS AREA: Product Design

A.M. TUESDAY, 19 May 2015

2 hours plus your additional time allowance

Surname _____

Other Names _____

Centre Number _____

Candidate Number 0 _____

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	

ADDITIONAL MATERIALS

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

INSTRUCTIONS TO CANDIDATES

Use black ink, black ball-point pen or your usual method.

Write your name, centre number and candidate number in the spaces provided on the front cover.

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.



PRODUCT INFORMATION:

- **Clear panes of heating glass to toast bread.**
- **Variable heat settings.**
- **Stainless steel base unit.**
- **Easy to use dial.**

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 opposite showing a concept model of a transparent toaster.

- (a) **UNDERLINE the most suitable scale of production for the concept model of a transparent toaster. [1]**

ONE-OFF PRODUCTION

BATCH PRODUCTION

1(b) Before starting to design the transparent toaster a specification was written.

Describe what you think were the most important specification points for EACH of the following aspects.

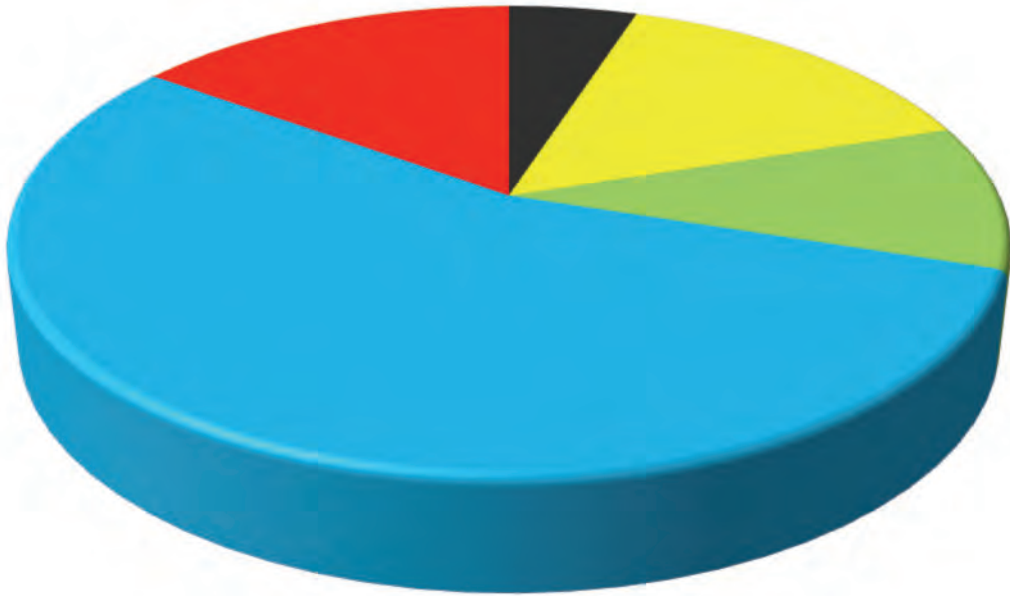
(i) Materials [2]

(ii) Aesthetics [2]

1(b) (iii) Safety [2]

1(c) (i) Explain how using a transparent material improves the function of the transparent toaster. [2]

(ii) Discuss ONE difficulty that may be encountered when trialling the transparent toaster. [2]



 **Design 5%**

 **Materials 15%**

 **Energy 10%**

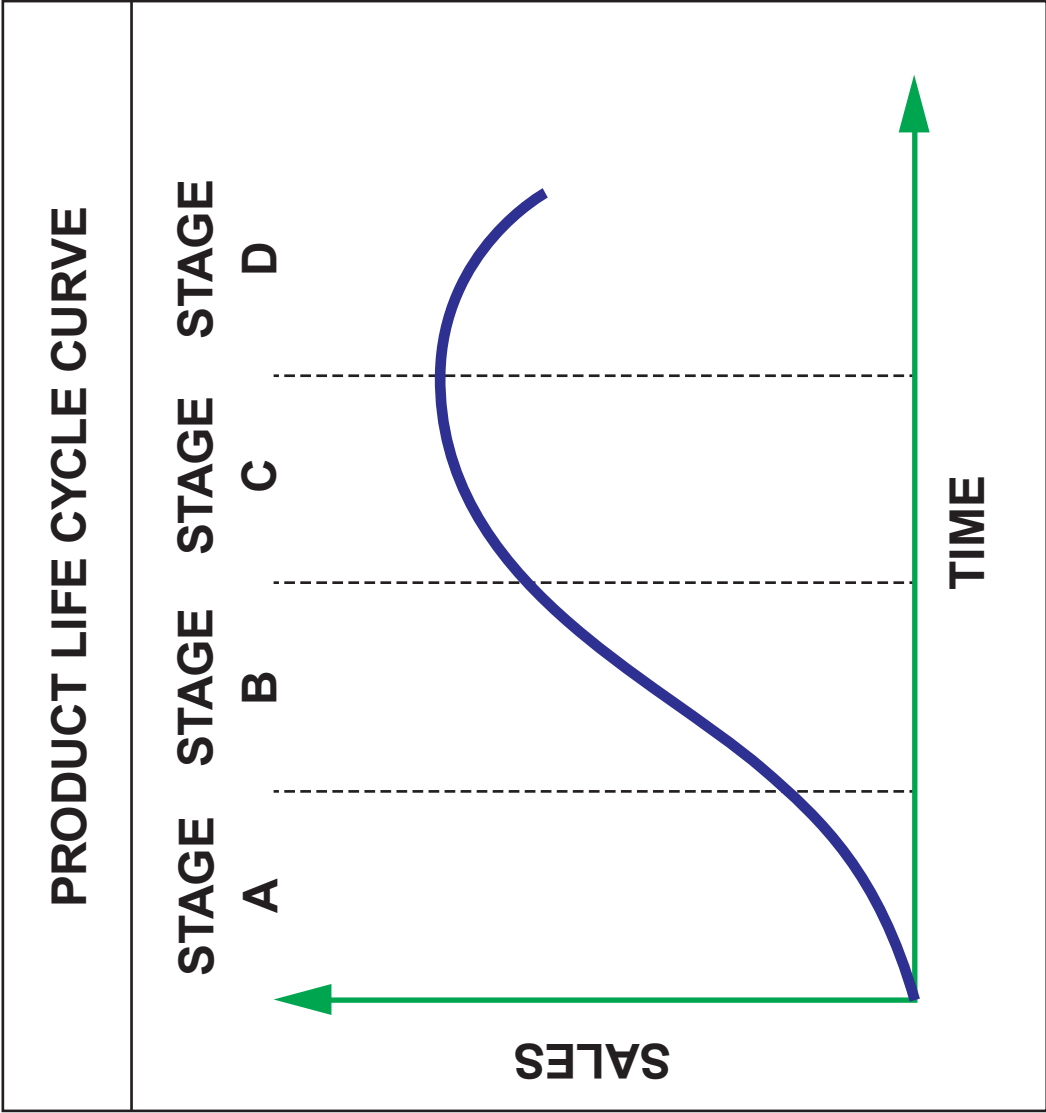
 **Manufacturing 55%**

 **Profit 15%**

1(d) The pie chart opposite shows a breakdown of the costs that will determine the final selling price of the transparent toaster.

(i) State which area contributes the largest amount to the cost. [1]

(ii) The chart shows that 15% profit will be made for each toaster sold. If the profit made for each transparent toaster is £18, calculate the total selling price. [3]
(SHOW ALL YOUR WORKINGS.)



STAGE	NAME
STAGE A	INTRODUCTION
STAGE B	_____
STAGE C	_____
STAGE D	_____

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

(a) The Product Life Cycle Curve opposite shows the sales of a product at each stage throughout its life cycle.

(i) Complete the table by selecting the correct name for EACH stage of the graph from the list provided below. [3]

MATURITY

DECLINE

GROWTH

DESIGN

2(a) (ii) Describe what happens during the INTRODUCTION stage of a product. [3]

2(b) Discuss how the environmental impact of a product can be reduced by conducting a life cycle analysis exercise during the design of the product. [4]

3. This question is about the Designers that you have studied. It is worth a total of 10 marks.

During your course you have studied the work of Jonathan Ive and Philippe Starck.

- (a) Complete the table below by stating the name of a product that EACH designer is famous for designing.

(i)	Jonathan Ive is famous for designing the _____ [1]
(ii)	Philippe Starck is famous for designing the _____ [1]

DESIGN PROCESS

Problem

Research and Analysis

Initial Design Ideas

Development of Chosen Design

Final Design Idea

Evaluation

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

(a) Complete the design process opposite by adding the stages from the list below in the correct order.

[3]

Brief and Specification

Manufacturing

CAD

Planning the Making

(b) (i) Describe a method of developing the style and form of a product. [2]

4(b) (ii) Explain how the design specification helps when evaluating the product at the end of the design process. [2]



4(c) Many people are now using tablet computers.

You have been asked to design a portable stand for a tablet computer that can be used in a variety of situations to hold the tablet securely when in use.

**The dimensions of the tablet computer are:
Height = 240 mm, Width = 185 mm, Depth = 9 mm.**

Specification

THE DESIGN MUST:

- **be modern, sleek and minimal to match the design of the tablet;**
- **be free standing and portable;**
- **show how the tablet will be securely attached to the stand;**
- **have a way to adjust the angle at which the tablet is held.**

4(c) MARKS WILL BE AWARDED FOR:

- (i) designing a modern, sleek and minimal stand; [4]**
- (ii) showing how the stand is free standing and portable; [2]**
- (iii) showing how the tablet will be attached and how the angle can be adjusted; [4]**
- (iv) specifying a suitable material and manufacturing process for the stand; [2]**
- (v) showing TWO overall dimensions for the stand; [2]**
- (vi) quality of communication. [4]**

Draw your design in the box below.

A large, empty rectangular box with a thin black border, intended for drawing a design. The box occupies most of the lower half of the page.

DESCRIPTION	PRODUCTION SCALE
A single item is made specifically to order.	<hr/>
500 identical special edition items are produced.	<hr/>
A large number of identical items are produced using automation.	<hr/>

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) Using the words provided, complete the table opposite by placing the correct production scale next to each description. [3]**

BATCH PRODUCTION

MASS PRODUCTION

ONE-OFF PRODUCTION




RAPID PROTOTYPING

5(b) In industry a production line can be fully automated. Describe TWO benefits for the manufacturer when using this type of production line. 2 × [2]

Benefit 1: _____

Benefit 2: _____

5(c) Describe why quality assurance is important when mass producing products. [3]

MATERIAL	PRODUCT	PROPERTIES
<p>STAINLESS STEEL</p>	 <p>KITCHEN UTENSILS</p>	<p>1. _____ _____</p> <p>2. _____ _____</p>
<p>ABS</p>	 <p>GAMES CONSOLE CONTROLLER</p>	<p>1. _____ _____</p> <p>2. _____ _____</p>
<p>CARBON-FIBRE REINFORCED POLYMER</p>	 <p>SNOW BOARDING HELMET</p>	<p>1. _____ _____</p> <p>2. _____ _____</p>

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

(a) Designers need to consider the properties of EACH material if their product is to be successful.

Complete the table opposite by stating TWO properties for EACH of the materials named. [6]

(b) Describe what a composite material is. [3]




6(c) Explain why photochromic pigment has been used in the manufacture of the lenses for the cycling sunglasses pictured below. [2]



6(d) Standard components are often bought in to be used in the manufacture of a product. Describe TWO advantages to the manufacturer of using standard components. 2 × [2]

Advantage 1: _____

Advantage 2: _____

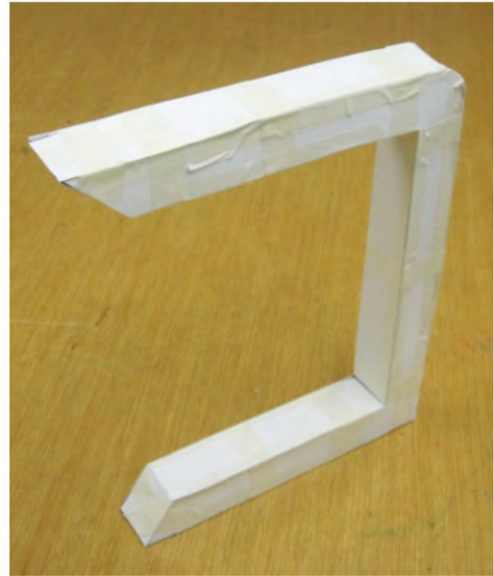
TOOL/EQUIPMENT	NAME	USE
	<hr/> <hr/> <p style="text-align: right;">[1]</p>	<p>Use 1:</p> <hr/> <hr/> <p>Use 2:</p> <hr/> <hr/> <p style="text-align: right;">[2]</p>
	<hr/> <hr/> <p style="text-align: right;">[1]</p>	<p>Use 1:</p> <hr/> <hr/> <p>Use 2:</p> <hr/> <hr/> <p style="text-align: right;">[2]</p>
	<p style="text-align: center;">VERNIER CALIPER</p>	<p>Use 1:</p> <hr/> <hr/> <p>Use 2:</p> <hr/> <hr/> <p style="text-align: right;">[2]</p>

7. This question is about Tools, Equipment and Making. It is worth a total of 20 marks.
- (a) Complete the table opposite by inserting the correct name for each piece of equipment and describing its use.
- (b) Complete the table below by filling in the missing stages of the vacuum forming process. [4]

STAGE NO.	VACUUM FORMING PROCESS
1	Make a mould/former from a heat proof material.
2	
3	
4	Heat the plastic until it becomes malleable.
5	
6	
7	Remove the mould from the formed plastic shape.

7(c) Discuss ONE safety precaution to be considered when using the vacuum former. [2]

- 7(d) The images below show a cardboard prototype model of a desk lamp. Use labelled sketches to describe in detail the main stages for making the model. [6]



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

(a) (i) State what the letters ICT stand for. [2]

Information C _____ T _____

(ii) Explain how a spreadsheet program can be used to analyse research. [2]

8(a) (iii) State TWO reasons for using the internet to carry out research. [2]

Reason 1:

Reason 2:

8(b) The kettle pictured below uses a system to perform its function.



(i) Name ONE input device used in the kettle system. [1]

(ii) Name ONE output device used in the kettle system. [1]

8(b) (iii) Feedback is an important feature when controlling systems. Explain how feedback would be used in the kettle system. [2]

(c) Explain ONE benefit of using CAM to manufacture a prototype. [2]

8(d) Discuss the advantages of using CAM for high volume production. [3]

END OF PAPER

