Surname	Centre Number	Candidate Number
Other Names		0

GCSE – NEW

3603U10-1

S19-3603U10-1-R1

FRIDAY, 24 MAY 2019 – AFTERNOON

DESIGN AND TECHNOLOGY
UNIT 1
PRODUCT DESIGN

2 hours

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**10**	
2.	**10**	
3.	**15**	
4.	**20**	
5.	**20**	
6.	**25**	
Total	**100**	

3603U101
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ADDITIONAL MATERIALS

In addition to this examination paper, you will need a calculator.

INSTRUCTIONS TO CANDIDATES

Answer **all** questions.

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

Write your answers in the spaces provided in this booklet. If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Use black ink or black ball-point pen.

Do not use pencil or gel pen.

Do not use correction fluid.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part question. You are advised to divide your time accordingly.

The total number of marks available is 100.

You are reminded of the need for good English and orderly, clear presentation in your answers. The quality of your written communication, including appropriate use of punctuation and grammar, will be assessed in your answer to question 4*(a)*.

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Answer **all** *Questions.*

1. Study the images shown below. One is of a new smart watch with activity tracker. It has been designed to replace a traditional watch like the one in the other image.

New smart watch with activity tracker

Traditional watch

(a) Explain **one** aesthetic change used in the new smart watch with activity tracker that will improve the product for the target market. [2]

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(b) When consumers purchase the new smart watch with activity tracker, they are likely to dispose of the traditional watch. Explain **two** ways consumers could do this sustainably. 2 × [2]

1. .....

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2. .....

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(c) During the development of the new smart watch with activity tracker, designers used CAD to produce iterations of ideas. Describe in detail the benefits of using CAD to develop the new smart watch with activity tracker. [4]

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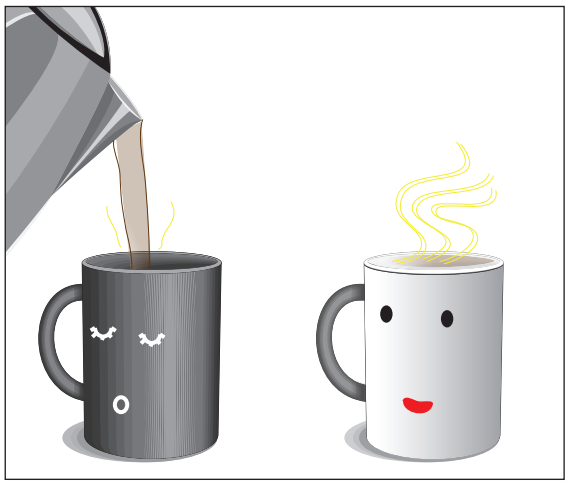
2. The image below shows a new coffee mug. The outside of the mug displays two different faces depending on its contents.



(a) State the name of a suitable smart material that could be used in the new coffee mug and describe how this material functions appropriately. [2]

Name of smart material: .....

Function: .....

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(b) Explain **two** advantages of using this material to the user. [4]

Advantage 1: .....

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Advantage 2: .....

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(c) A set of new mugs has been designed with a glass container held in a separate coloured holder. When designing the new mug, the designer produced a number of 3D printed models using rapid prototyping as shown below.

(i) State the name of **one** suitable 3D printing material to make the coloured holders. [1]

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(ii) Explain the advantages to the designer of using 3D printing when rapid prototyping the new mug. [3]

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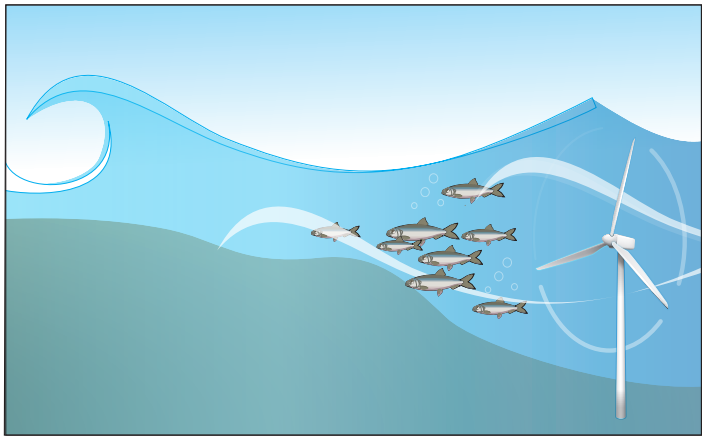
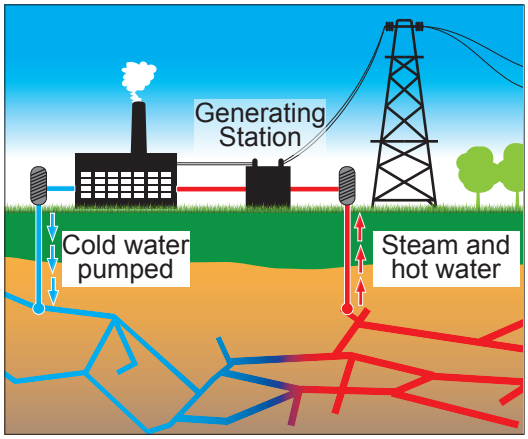
3. Study the images of renewable energy sources shown below.



Energy Source **A**



Energy Source **B**

(a) (i) State the names of renewable Energy Sources **A** and **B**.

Energy Source **A**: ..... Energy Source **B**: ..... [2]

(ii) Describe how Energy Source **B** is intended to generate renewable energy. [2]

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(iii) Explain **two** disadvantages of using Energy Source **A** to generate renewable energy. [2]

Disadvantage 1: .....

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Disadvantage 2: .....

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(iv) Explain why modern manufacturing and production systems now use renewable energy sources where possible. [2]

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(b) Many products, like the refrigerator shown below, are supplied with energy labels.

(i) Describe why manufacturers must now supply energy labels with many products. [2]

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(ii) Explain in detail the benefits of energy labels to the consumer when purchasing products. [5]

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4. The images below show a new range of kitchen products designed to encourage young children to prepare food at family meal times.

(a) Analyse how the designer would gather information on the target market to use during the generation of ideas for the kitchen products. [4]

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(b) The kitchen products are injection moulded using high density polythene, and finished with a rubberised handle. Evaluate how this impacts on the environmental footprint of the product. [6]

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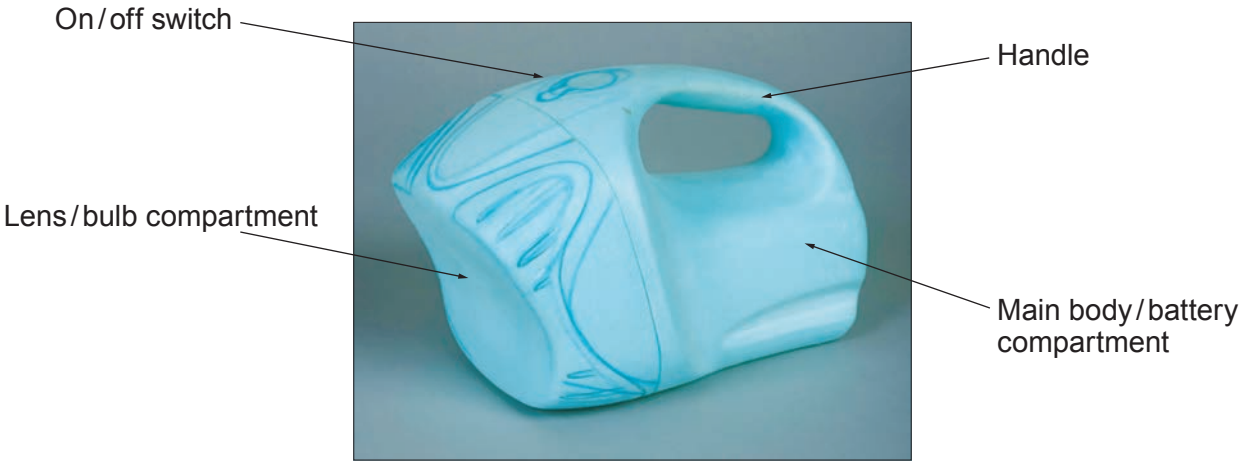
(c) A student has designed and made a concept model of a new handheld torch in blue modelling foam.



(i) Evaluate the advantages to the student of using blue modelling foam to make the concept model in a school workshop. [4]

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(ii) Analyse the benefits that modelling will have for the eventual success of the new handheld torch. [6]

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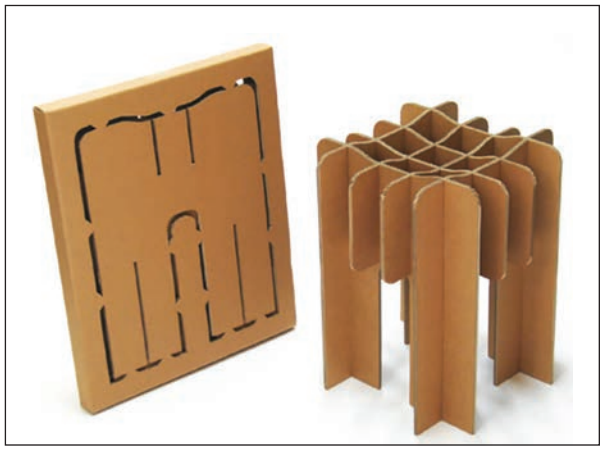
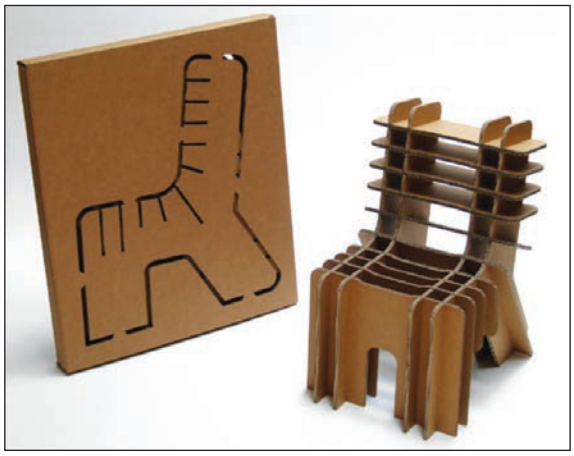
5. An eco-furniture company has launched a range of flat-packed stools and chairs made from corrugated cardboard.





(a) (i) Give **one** reason for the stools and chairs being delivered to the customer as a flat-pack. [2]

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(ii) Describe how the properties of high quality corrugated cardboard make it suitable for the flat-packed stools and chairs. [2]

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(iii) The stools and chairs do not require any glue or fixtures during assembly. Explain **two** advantages this will bring for the consumer. 2 × [2]

Advantage 1: .....

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Advantage 2: .....

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The eco-furniture company also sells lighting products as shown below.

(iv) Explain how the designer has used corrugated cardboard in an innovative way. [2]

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(b) A range of concept bicycle racks has been designed to offer schools and offices security for owners to leave bicycles.

(i) The bicycle rack is made from mild steel. Explain why this material is suitable for the bicycle rack. [2]

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(ii) The mild steel has been powder coated. Describe the main function of this finish. [2]

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(iii) Explain how providing a range of bicycle racks might appeal to the consumer and the impact this may have on the manufacturer. [6]

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6. A portable tennis game has been launched aimed at 3 to 5 year olds. The game can be played by one or two players and on any surface.

Tennis game with rotating spinner	Clips to hang bats	Contents stored in ABS base	ABS base used as carry case

Product Features:

- Height adjustable PVC tubes for upright stand.
- ABS spinner with nylon cord allows tennis ball to rotate around upright stand.
- All products pack away into the large ABS base and carry case.
- Clips to hang bats onto when not in use.
- Recommended Retail Price (RRP) £25.99.

(a) (i) Describe the properties of PVC that make it a suitable material for the tubes used to create the upright stand. [2]

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(ii) The tennis game needs to be easily assembled and disassembled. Explain how this has been achieved. [2]

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(iii) Explain **two** advantages of using injection moulding to make the ABS base and carry case. 2 × [2]

Advantage 1: .....

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Advantage 2: .....

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(iv) Explain how the physical properties of nylon make it suitable for the cord attached to the tennis ball. [3]

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(v) Different parts of the product are manufactured in different countries and shipped to a central location for assembly.

Describe the winners and losers created by manufacturing in this way. [4]

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(vi) Explain why, initially, the manufacturer of the tennis game would produce a limited number of products using batch production. [3]

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(b) Rather than extrude 300 mm red PVC tubes for the upright stand, the manufacturer decided to purchase 3.1 m lengths of standard 30 mm diameter tubing from an external source.

Explain how this will benefit the manufacturer when producing the tennis game. [3]

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(c) The manufacturer uses a semi-automated production line when making the parts for the tennis game.

(i) Describe the benefits to the manufacturer of using a semi-automated production line. [2]

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(ii) Explain why the manufacturer uses manual workers as part of the production process. [2]

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END OF PAPER

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