



**GCSE – NEW**

**3603U10-1**

**FRIDAY, 24 MAY 2019 – AFTERNOON**

**DESIGN AND TECHNOLOGY**

**UNIT 1**

**PRODUCT DESIGN**

**2 hour plus your additional time allowance**

**Surname** \_\_\_\_\_

**Other Names** \_\_\_\_\_

**Centre Number** \_\_\_\_\_

**Candidate Number** 0 \_\_\_\_\_

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

## **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 on the front cover.**

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

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

**4**

**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).**

**Answer ALL Questions.**

- 1. Study the images shown opposite. 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**

**1(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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**1(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]**

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**2. The image opposite 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:**

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**Function:** \_\_\_\_\_

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

**Advantage 1:** \_\_\_\_\_

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**Advantage 2:** \_\_\_\_\_

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**2(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 opposite.**

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

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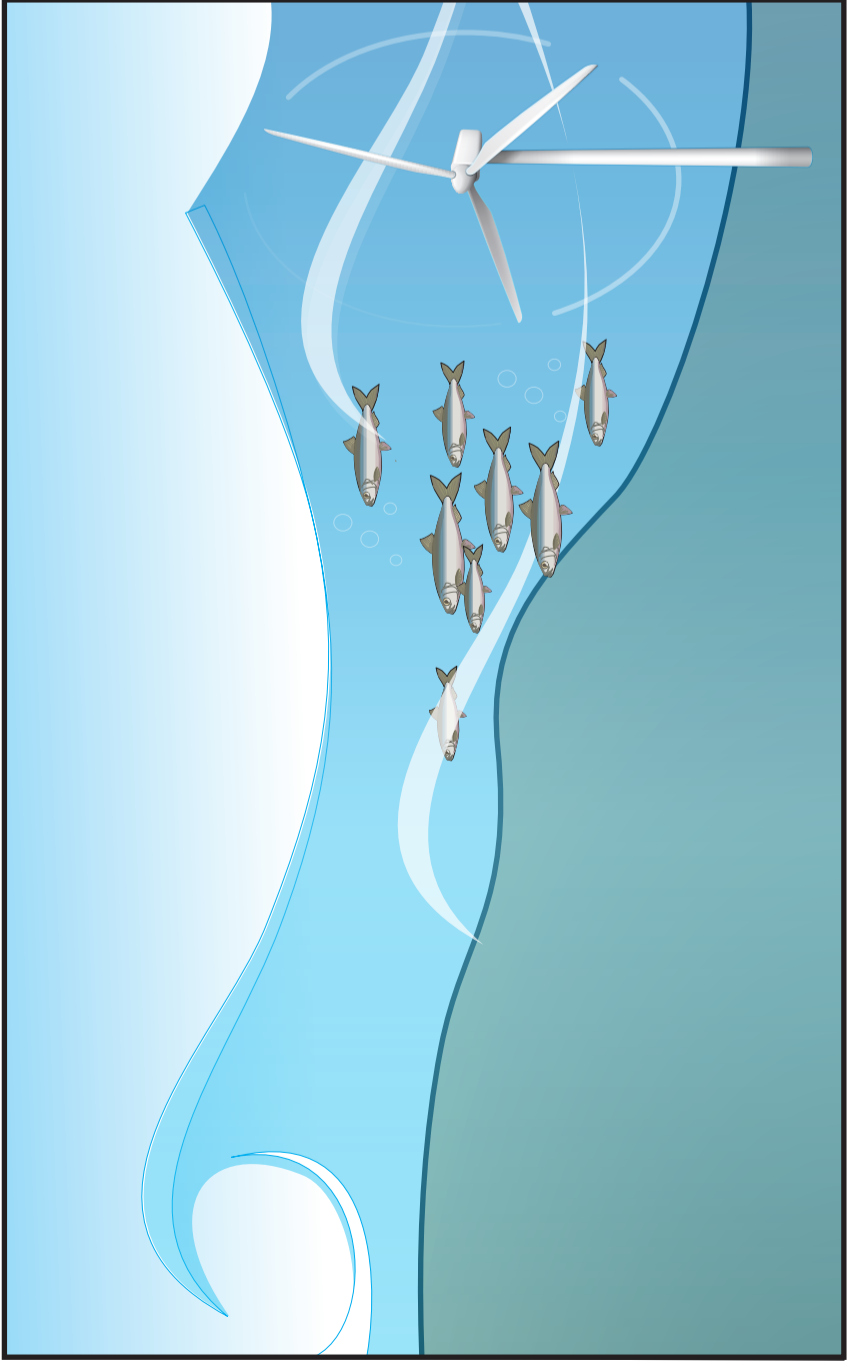
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**(ii) Explain the advantages to the designer of using 3D printing when rapid prototyping the new mug. [3]**

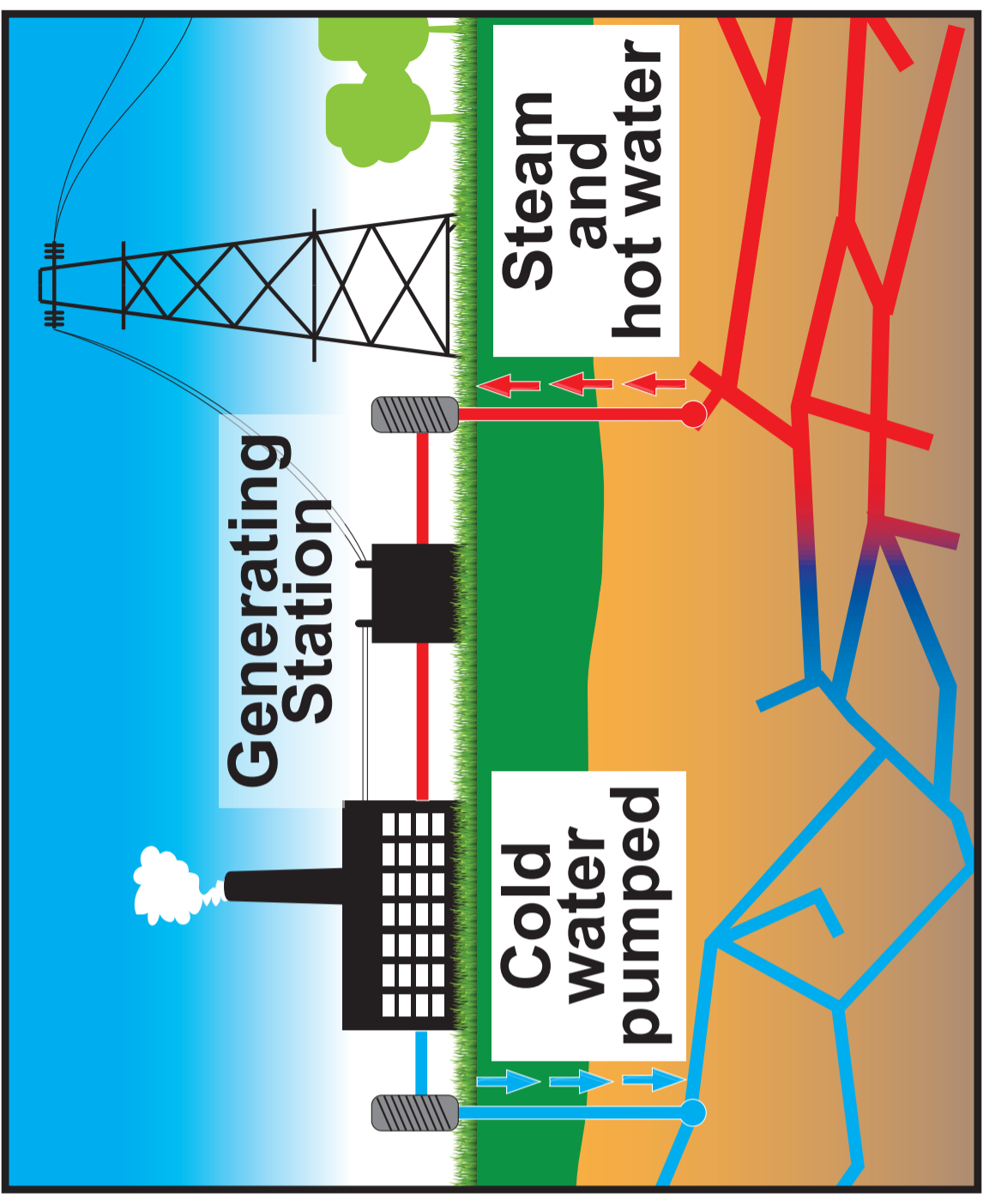
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**Energy Source A**



**Energy Source B**

**3. Study the images of renewable energy sources shown opposite.**

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

**Energy Source A: \_\_\_\_\_**

**Energy Source B: \_\_\_\_\_ [2]**

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

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**3(a) (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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**3(a) (iv) Explain why modern manufacturing and production systems now use renewable energy sources where possible. [2]**

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 **ENERG** Y IJA  
енергия · ενεργεια IE IA

I II

**A+++**

**A+++**

A++

A+

A


B


C


D

ENERGIA · енергия · ενεργεια  
ENERGIJA · ENERGY · ENERGIE  
ENERGI

**280**  
kWh/annum

  
**155 L**

  
\* \* \*  
**54 L**

  
**38 dB**

**3(b) Many products, like the refrigerator shown opposite, 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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**On / off switch**

**Lens / bulb  
compartment**



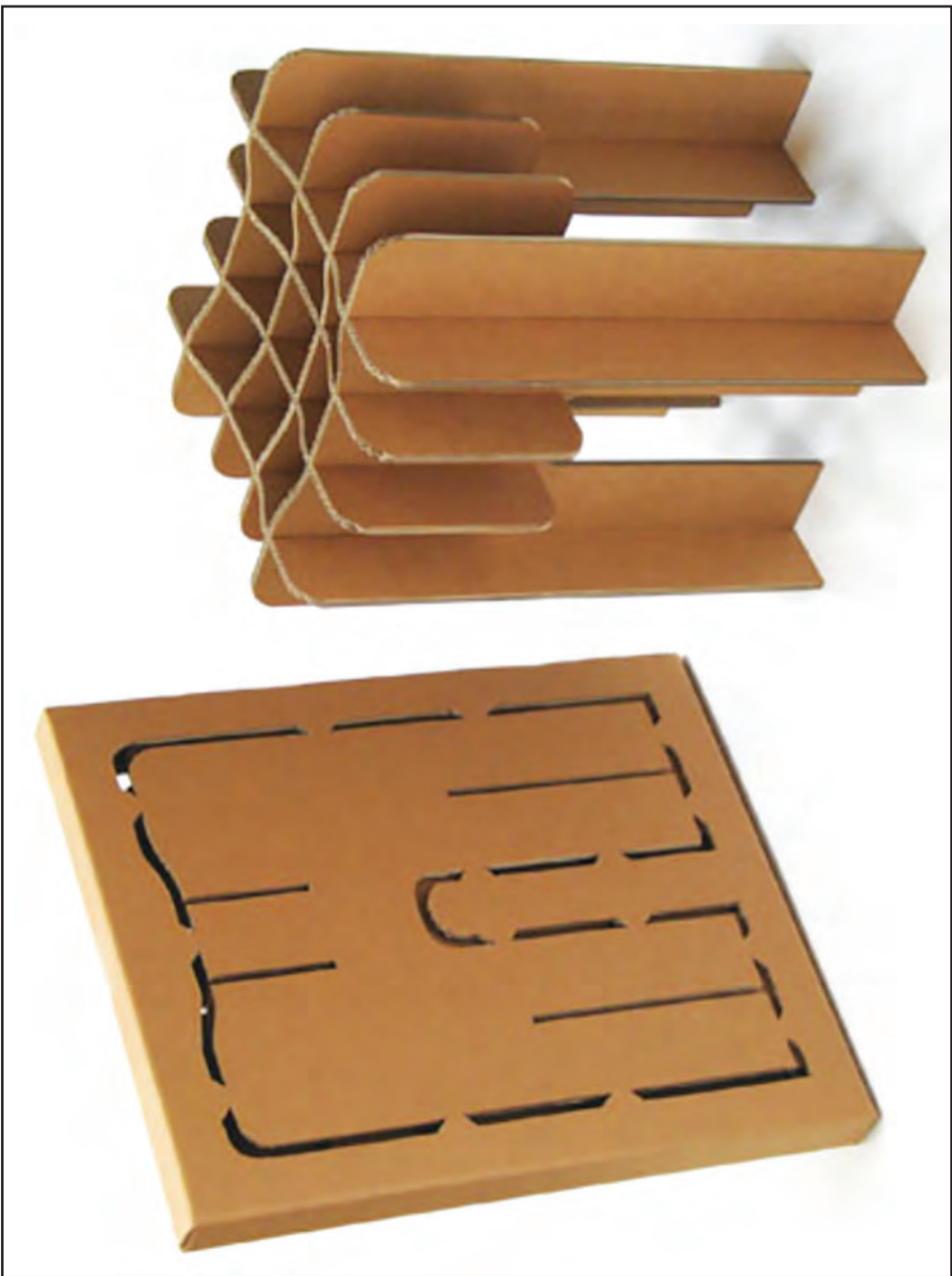
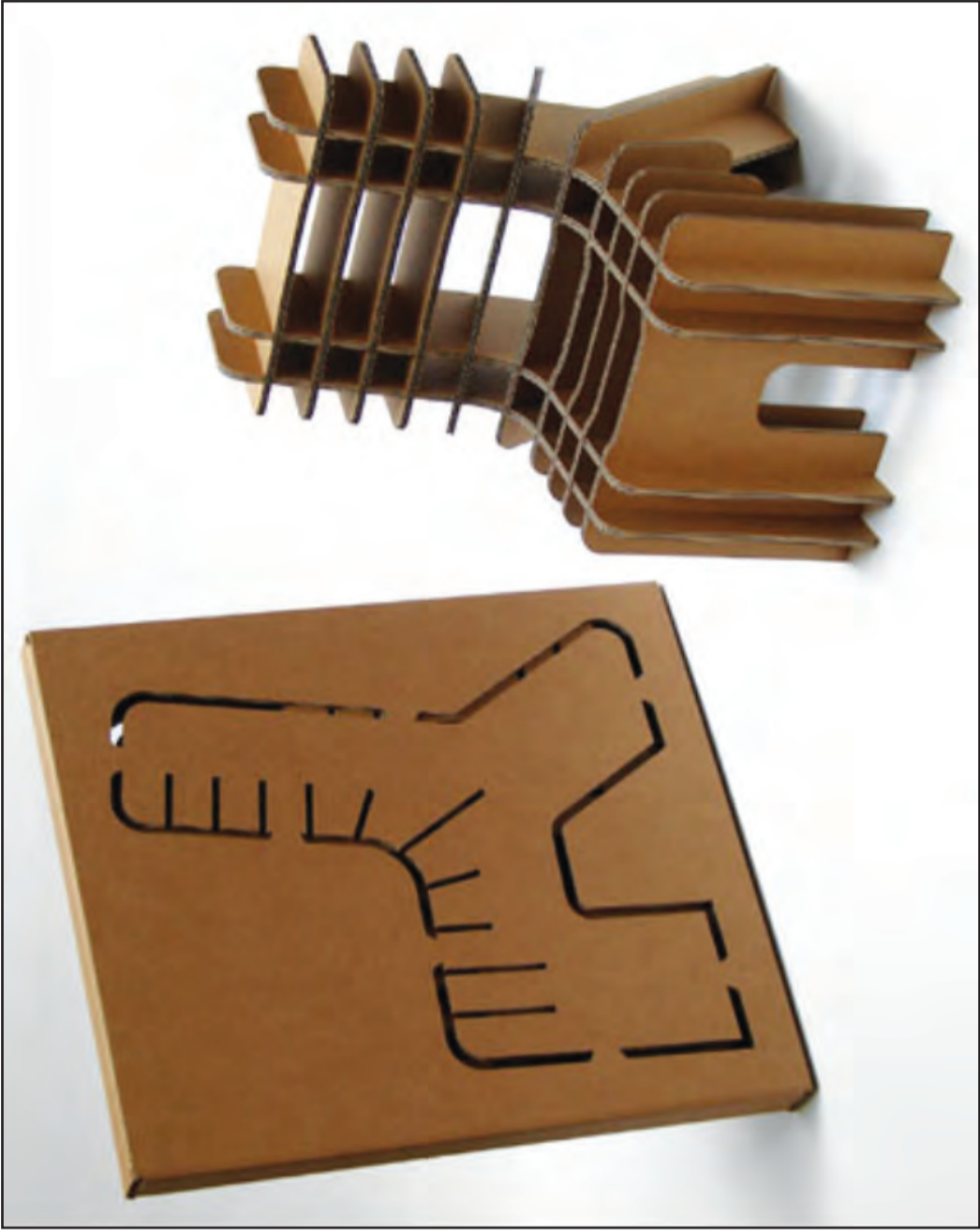
**Handle**

**Main  
body / battery  
compartment**









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

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

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**5(a) (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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**5(a) (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 opposite.**

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

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

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

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

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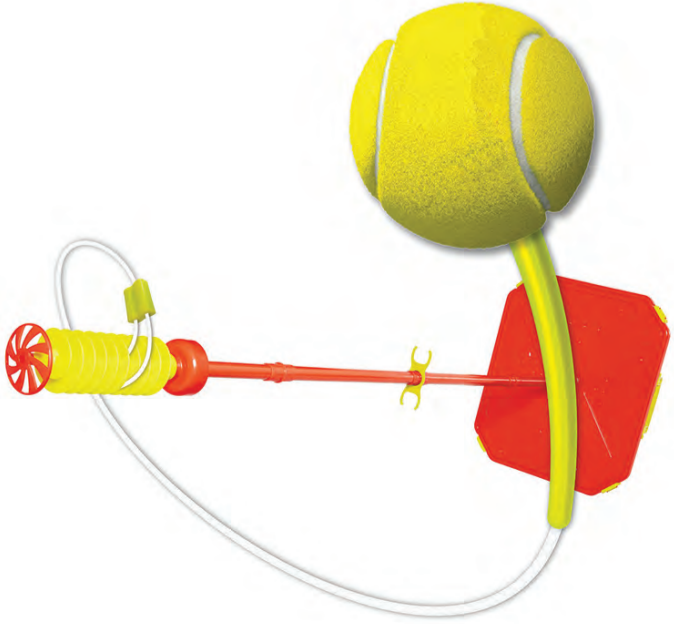



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				<p><b>Tennis game with rotating spinner</b></p>	<p><b>Clips to hang bats</b></p>	<p><b>Contents stored in ABS base</b></p>	<p><b>ABS base used as carry case</b></p>
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- 6. A portable tennis game, shown opposite, has been launched aimed at 3 to 5 year olds. The game can be played by one or two players and on any surface.**

**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.**

**6(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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**6(a) (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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**6(a) (iv) Explain how the physical properties of nylon make it suitable for the cord attached to the tennis ball. [3]**

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**6(a) (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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**6(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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**6(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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**6(b) (ii) Explain why the manufacturer uses manual workers as part of the production process. [2]**

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**END OF PAPER**



