Surname	Centre Number	Candidate Number
Other Names		2

GCE AS – NEW

B602U10-1

S18-B602U10-1

DESIGN AND TECHNOLOGY – AS component 1
Product design

MONDAY, 14 MAY 2018 – AFTERNOON

2 hours 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**8**	
2.	**14**	
3.	**8**	
4.	**13**	
5.	**10**	
6.	**5**	
7.	**12**	
8.	**9**	
9.	**9**	
10.	**12**	
Total	**100**	

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ADDITIONAL MATERIALS

You will need a ruler and a calculator.

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.

INFORMATION FOR CANDIDATES

When and where appropriate, answers should be amplified and illustrated with sketches and/or diagrams.

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 number of marks available is 100.

You are reminded of the need for good English and orderly, clear presentation in your answers.

You may use a calculator in this examination.

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Answer **all** *questions.*

1. Final detail designing is essential for the manufacture of successful products.

(a) The image below is of a modern flat-pack drawer unit made from high-density chipboard with a veneer surface.



Describe **two** properties of high-density chipboard that make it appropriate for the drawer unit.

Property 1: [2]

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Property 2: [2]

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(b) Knock-down fittings, such as the examples shown below are commonly used in the construction of flat-pack furniture.



Explain **one** advantage of using knock-down fittings in the flat-pack drawer unit for the consumer. [2]

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(c) Explain **one** feature of effective detail designing. [2]

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2. Qualitative and quantitative testing is critical to the eventual success of the final product.



With reference to the design and production of the car shown above.

(a) Explain **one** qualitative test that the designer will carry out during the development of the car. [2]

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(b) Explain **one** quantitative test that the manufacturer will carry out during the development of the car. [2]

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(c) Explain **two** reasons why manufacturers use their unique logo on products.

Reason 1: [2]

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Reason 2: [2]

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(d) The images below show a simple plant pot manufactured in polypropylene.





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(i) One plant pot costs £1.52 to manufacture. The manufacturer sells the product to the retailer for £9.99 per pot.

Over a period of one month, the manufacturer makes a profit of £1160.39.

Calculate the number of plant pots that have been supplied to the retailer during this month. [2]

Show all calculations.

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(ii) Every time the manufacturer produces 500 or more plant pots the £1.52 per unit manufacturing cost reduces by 1.5%.

Calculate the gross profit for an order of 8350 plant pots. [4]

Show all calculations.

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3. The image below is of a modern plug socket with USB connection made from urea formaldehyde.



(a) The plug socket has been made by the process of injection moulding. Use notes and diagrams to describe this process. [4]

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(b) Explain **two** properties that make urea formaldehyde a suitable material for the modern plug socket.

Property 1: [2]

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Property 2: [2]

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4. The external light product shown below features an acrylic dome with a rim.



(a) Explain why acrylic is a suitable material for this product. [2]

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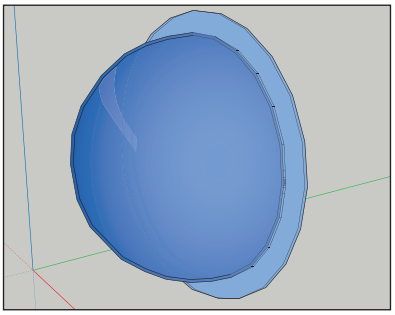
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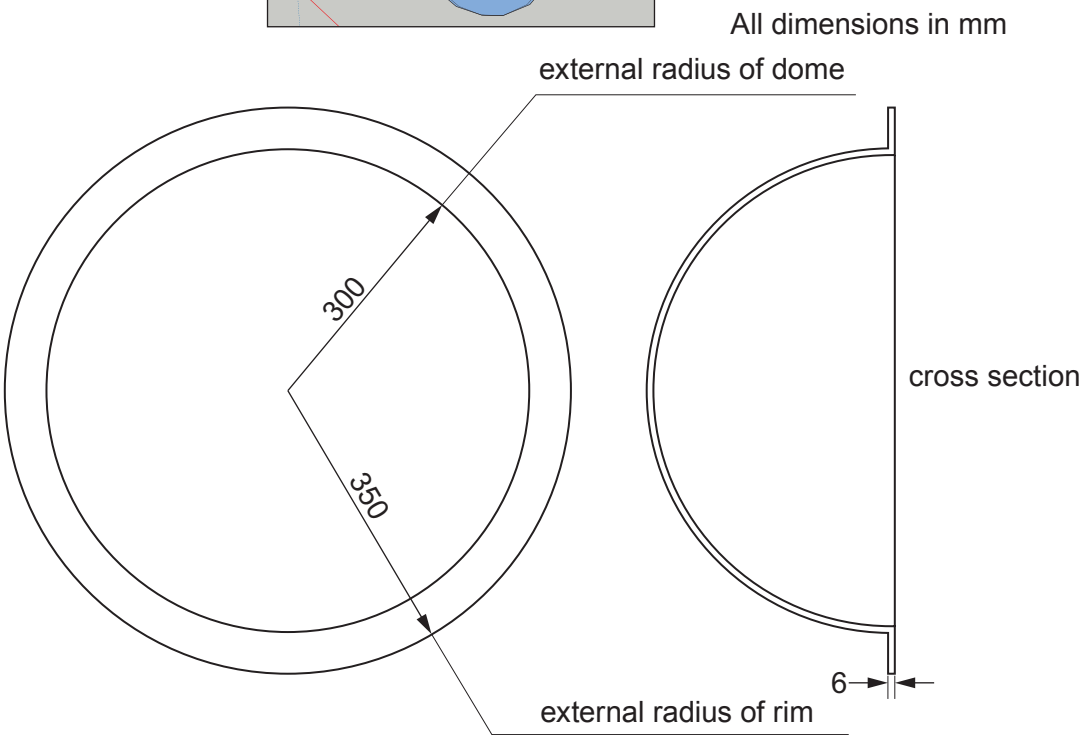
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(b) The diagrams show a 2D working drawing (all dimensions in mm) and a 3D CAD drawing of the product. (Both Not to Scale)





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The formula for calculating the surface area of a hemisphere is $A = 2\pi r^2$.

(i) Using the formula, calculate the surface area of the **dome** and **the rim** in m^2 to 3 decimal places. *Show all calculations*. [5]

(ii) The formula $V = \frac{4}{3} \times \pi \times r^3$ is used to calculate the volume of a sphere.

Calculate the volume of material used to make the acrylic dome without the rim in mm^3. [4]
(Rounded to a whole number.)

Show all calculations.

(c) Describe why vacuum forming could be used to manufacture the acrylic dome. [2]

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5. *(a)* Explain the meaning of the term 'Just in Time' manufacturing (JIT). [2]

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(b) The design of the packaging has a significant impact on the success of a product.

(i) Describe **two** reasons why a company would conduct consumer market research when developing packaging for a new mobile phone.

Reason 1: [2]

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Reason 2: [2]

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(ii) Smart materials such as thermochromic inks are widely used in the packaging of food and drink products such as the drinks cans below.



Describe **two** advantages of using thermochromic inks in product packaging to the consumer.

Advantage 1: [2]

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Advantage 2: [2]

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6. The CE mark is often found on packaging such as the LED Bulb shown below.





Explain how the CE mark protects the consumer when purchasing a LED bulb. [5]

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7. Manufacturers often use standardised parts when manufacturing and assembling products such as the bike shown below.



(a) Analyse the advantages and disadvantages of using standardised parts in the design and production of a mountain bike to the manufacturer. [6]

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(b) Evaluate how the use of stock forms of hardwoods, softwoods and manufactured boards affect the manufacturer and the consumer. [6]



Typical wooden product made from stock forms



Stock forms available from supplier

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8. Quality control and quality assurance are critical to ensure the successful manufacture and sale of a new product.



Analyse the role that quality control and quality assurance play in the success of a new product, such as the vacuum cleaner shown. [9]

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9. Many companies now utilise the benefits of global production when manufacturing products where different parts, components or materials are sourced internationally.

Evaluate the economic and environmental effects of global production. [9]

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10. Modern sports equipment such as hockey sticks, tennis rackets, cycles and golf clubs are made using composite materials such as fibreglass, Kevlar and Carbon Fibre Weave.







Describe the advantages and disadvantages of using composite materials in the design of modern sports equipment. [12]

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END OF PAPER

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