Surname	Centre Number	Candidate Number
First name(s)		2

GCE AS

B602U10-1

S24-B602U10-1

MONDAY, 13 MAY 2024 – AFTERNOON

DESIGN AND TECHNOLOGY – AS component 1
Product Design

2 hours 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**10**	
2.	**11**	
3.	**14**	
4.	**8**	
5.	**10**	
6.	**6**	
7.	**11**	
8.	**9**	
9.	**9**	
10.	**12**	
Total	**100**	

B602U101
01

ADDITIONAL MATERIALS

You will need a ruler and a calculator.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

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. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) 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.

JUN24B602U10101

© WJEC CBAC Ltd.

Examiner only

Answer **all** questions.

1. The images below are of a copper-coated saucepan.





(a) Describe **two** properties of copper that make it an appropriate material for coating the saucepan.

Property 1: [2]

.....

.....

.....

Property 2: [2]

.....

.....

.....

© WJEC CBAC Ltd.

Examiner only

(b) Explain **two** different functional qualities to be considered when designing the copper-coated saucepan.

Functional quality 1: [2]

.....

.....

.....

Functional quality 2: [2]

.....

.....

.....

(c) Explain **one** reason why PTFE is suitable for coating the inside of the saucepan. [2]

.....

.....

.....

© WJEC CBAC Ltd.

Examiner only

2. The square section of drainpipe pictured below is made from UPVC.



(a) Explain **two** properties of UPVC that make it a suitable material for the drainpipe. [4]

.....

.....

.....

.....

.....

.....

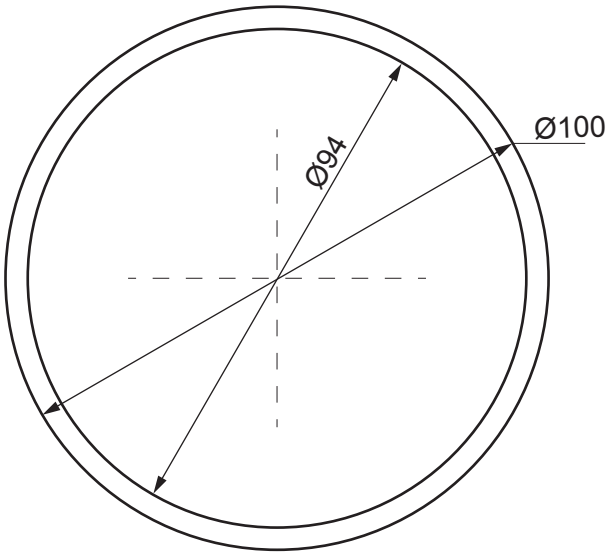
© WJEC CBAC Ltd.

Examiner only

(b) (i) Below is a cross-section of a UPVC drainpipe.

Calculate the volume of UPVC required for a **one** metre length of drainpipe in millimetres rounded to a whole number. [4]

Show all workings.



Not to Scale – all dimensions in mm

.....

.....

.....

.....

.....

.....

(ii) UPVC costs 1 pence per gram. Calculate the UPVC material cost of **one** metre of drainpipe. [3]

Note: 1 mm^3 = 1 gram

Show all workings.

.....

.....

.....

.....

.....

B602U101
05

© WJEC CBAC Ltd.

Examiner only

3. Study the images below of a kitchen chair.





(a) Using notes and diagrams, describe how injection moulding has been used to produce the seat of the kitchen chair. [5]

.....

.....

.....

.....

.....

.....

.....

© WJEC CBAC Ltd.

Examiner only

(b) Explain how the properties of polypropylene make it a suitable material for the seat of the kitchen chair. [4]

(c) Discuss how ergonomics and anthropometrics play an important part in the design of the kitchen chair. [5]

© WJEC CBAC Ltd.

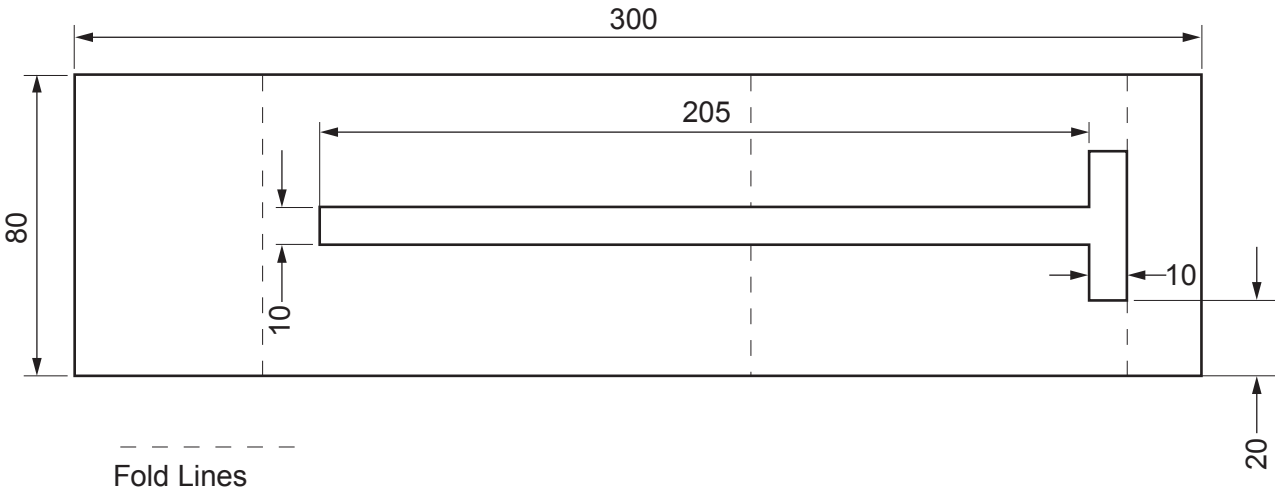
Turn over.

Examiner only

4. Study the details of the acrylic mobile phone stand shown below.







Phone stand Design A

Not to Scale – all dimensions in mm

(a) Calculate the surface area of the **Phone stand Design A**. [3]

Show all workings.

.....

.....

.....

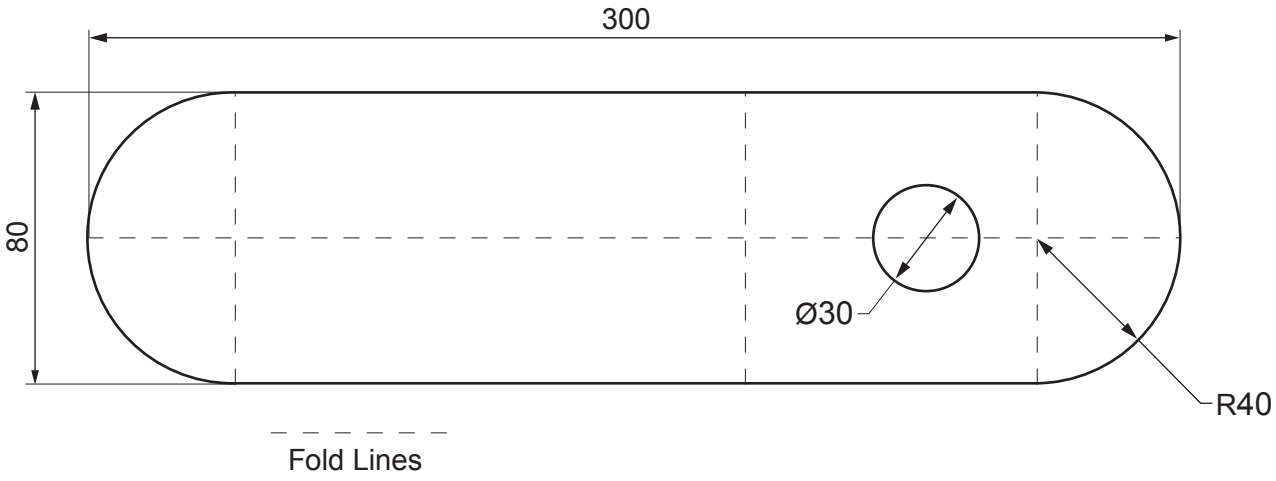
.....

.....

© WJEC CBAC Ltd.

Examiner only

(b) Below is an alternative phone stand design the manufacturer wants to make.



Phone stand Design B

Not to Scale – all dimensions in mm

Calculate whether **Phone stand Design A** or **Phone stand Design B** contains the least amount of acrylic. [5]

Show all workings.

B602U101
09

© WJEC CBAC Ltd.

Examiner only

5. The image below shows a dental brace made from a shape-memory alloy.



(a) Describe **two** reasons why a shape-memory alloy has been used over more traditional materials for the dental brace. [4]

.....

.....

.....

.....

.....

.....

© WJEC CBAC Ltd.

Examiner only

(b) Describe **two** advantages of using Polymorph to model ideas as part of the iterative design process.

Advantage 1: [2]

.....

.....

.....

Advantage 2: [2]

.....

.....

.....

(c) Explain how thermochromic materials can be used in products to ensure safety for the user. [2]

.....

.....

.....

© WJEC CBAC Ltd.

Examiner only

6. The product below is certified by the British Standards Institute (BSI) and the Conformité Européene (CE).



Explain the advantages to the consumer of purchasing products with relevant safety marks. [6]

© WJEC CBAC Ltd.

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

© WJEC CBAC Ltd.

Examiner only

7. Examine the two hot drinks travel mugs pictured below.



- Stainless steel body
- Silicon rubber grip
- Polypropylene lid



- Bamboo fibre body
- Silicon rubber grip
- Silicon lid

(a) Analyse the physical properties of the materials that make them suitable for these products. [5]

.....

.....

.....

.....

.....

.....

.....

.....

© WJEC CBAC Ltd.

Examiner only

(b) Evaluate how the material choices for the **two** travel mugs impact on their carbon footprint. [6]

.....

.....

.....

.....

.....

.....

.....

.....

.....

© WJEC CBAC Ltd.

Examiner only

8. The watches below are designed to track the fitness and activity of the user.



Analyse how market-pull and technology-push forces have influenced the development of such watches. [9]

© WJEC CBAC Ltd.

Examiner only

9. Evaluate the range of factors a designer would have to consider to ensure the wireless headphones shown below are fit for purpose. [9]

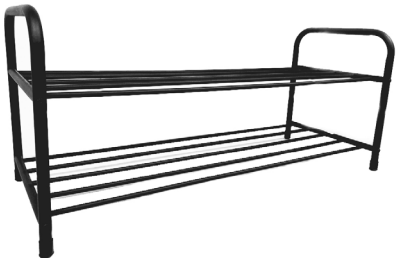


© WJEC CBAC Ltd.

Examiner only

10. The modern storage racks shown below are manufactured using standardised components, parts and materials.







Discuss the advantages and disadvantages of using standardised components, parts and materials to the manufacturer in the modern storage racks. [12]

© WJEC CBAC Ltd.

Examiner only

.....

.....

.....

.....

.....

.....

.....

END OF PAPER

© WJEC CBAC Ltd.

Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

Examiner only

© WJEC CBAC Ltd.