GCE A LEVEL

A602U10-1

S24-A602U10-1

WEDNESDAY, 5 JUNE 2024 – AFTERNOON

DESIGN AND TECHNOLOGY – A level component 1
Product Design

3 hours

A602U101
01

ADDITIONAL MATERIALS

In addition to this paper you will need:
a WJEC pink 16-page answer booklet, a calculator, ruler, pencil and coloured pencils.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Answer **all** questions.

Write your answers in the separate answer booklet provided.

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. A logo for Smith's Electronics of Winchester is shown below.



(a) Explain why the logo for Smith's Electronics of Winchester was refused a trademark. [4]

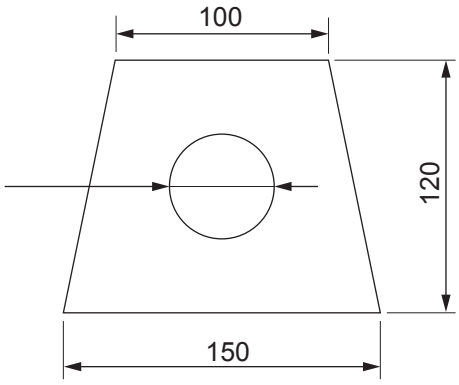
(b) Explain how copyright would protect 'Smith's Electronics of Winchester' from other unauthorised companies using the logo, even if a trademark does not apply. [4]

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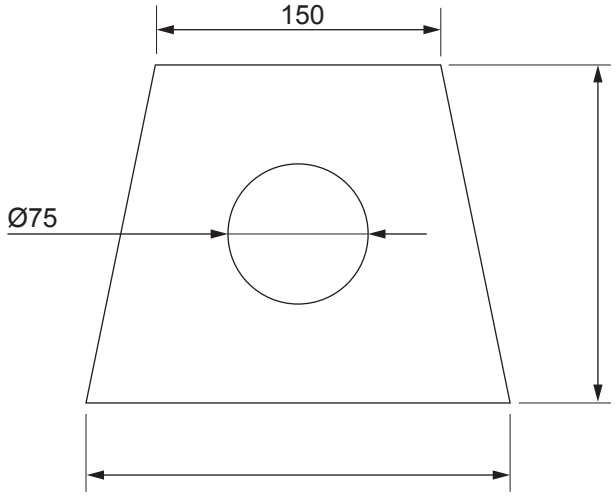
2. A desk lamp designed by a student is shown below. It has a lampshade made from a single copper sheet with a hole cut out of each side. Each of the 4 sides is a trapezium which has been folded from a net (surface development).



(a) Explain how to cut out and fold the copper sheet to create a 3-dimensional form such as the lampshade shown. [4]



Drawing **A –** Original lampshade



Drawing **B –** Scaled-up lampshade

(b) The manufacturer has decided to make the lampshade in two sizes as shown in drawings **A** and **B** above.

(i) Calculate the ratio of lampshade **A:B**.
Show all calculations. [1]

(ii) Calculate the diameter of the circle in lampshade **A**.
Show all calculations. [1]

(iii) Calculate the height of the lampshade shown in drawing **B**.
Show all calculations. [1]

(iv) Calculate the surface area of one side of the lampshade **A**.
Show all calculations. [5]

(c) Discuss the suitability of copper for use as a lampshade. [4]

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3. (a) Describe the mechanical and physical properties of silicone rubber that make it suitable for use as baking moulds. [4]



(b) Explain how the use of Polytetrafluoroethylene (PTFE) has contributed to the design of cookware, such as the frying pan shown. [4]



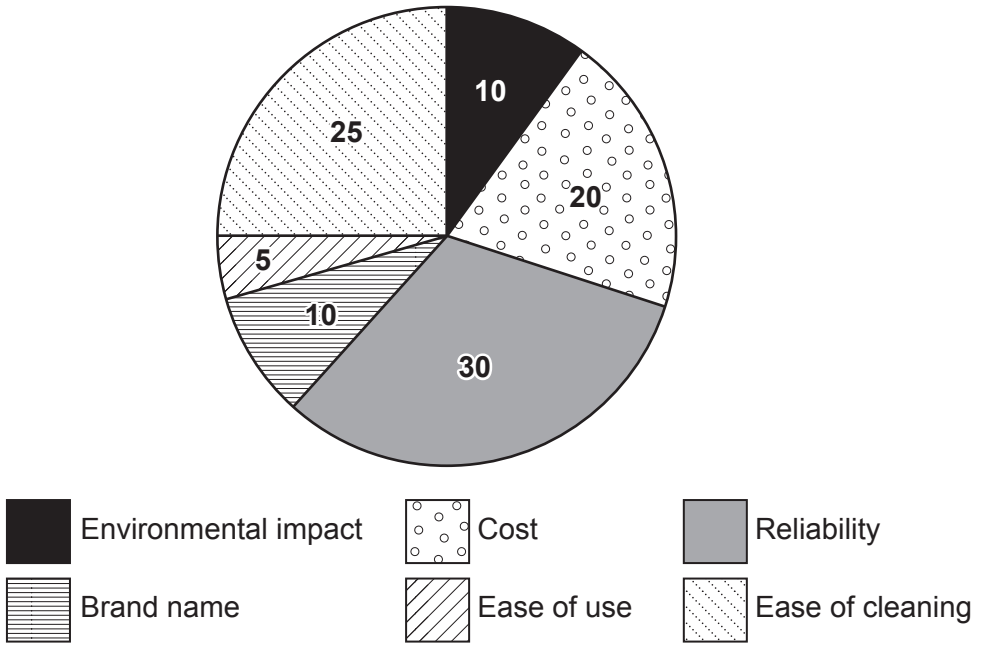
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4. Market research is an important part of the design process when developing innovative products.

(a) Discuss the role a focus group plays in the development of new products. [4]

(b) The pie chart shows the results of a survey of 180 people when asked the question 'what is the most motivating factor in your decision to purchase a new electric toothbrush?'

Purchasing factors as a percentage of responses



Calculate how many more people chose reliability over ease of use.
Show all workings. [3]

(c) Calculate the number of people who would have to change their option from Reliability to Brand name to make the categories equal.
Show all workings. [4]

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5. Laminated timber products, such as those shown below, are often used in contemporary furniture design.





(a) Using notes and sketches, explain how you would construct a laminated timber product such as those shown. [5]

(b) Explain the advantages of laminating timber to make contemporary furniture. [5]

6. A new 3D printer is to be sold in the marketplace, discuss strategies that could be used to determine the retail price. [5]

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7. Computer Aided Design (CAD) and physical modelling are used extensively throughout the design process to help develop products such as the electric shaver shown below.



(a) Evaluate how CAD can be used to help determine material choices at the design phase before physical prototypes are made. [6]

(b) Analyse the benefits physical models have on the design process for a new product such as an electric shaver. [6]

8. Explain how high build quality can influence the sale of products such as electric DIY tools. [9]





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Turn over.

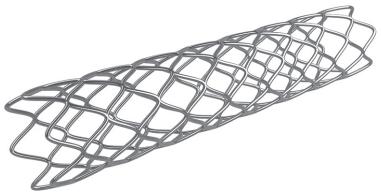
9. Shape Memory Alloys (SMA) are increasingly being used in the development of new products such as those shown below.



SMA glasses



SMA dental braces



SMA stent

Discuss the advantages and disadvantages of the use of SMAs in the development of new products. [9]

10. There is a growing demand for designers to acknowledge environmental, moral and ethical responsibilities when designing new and innovative products.

Evaluate the impact of environmental, moral and ethical considerations on the development of new, innovative products. [12]

END OF PAPER

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