



GCE A LEVEL



A602U10-1

MONDAY, 2 JUNE 2025 – MORNING

DESIGN AND TECHNOLOGY – A level component 1

Product Design

3 hours plus your additional time allowance

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, black ball-point pen or your usual method.

Answer ALL questions.

Write your answers in the separate answer booklet provided, following the instructions on the front of the answer booklet.

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.

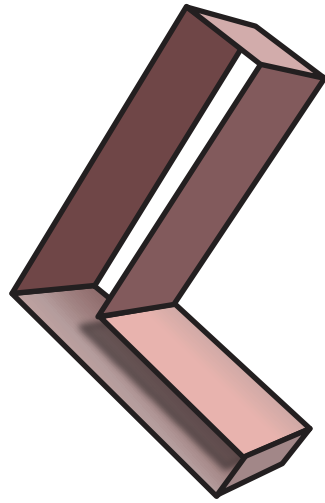
You may use a calculator in this examination.

Answer ALL questions.

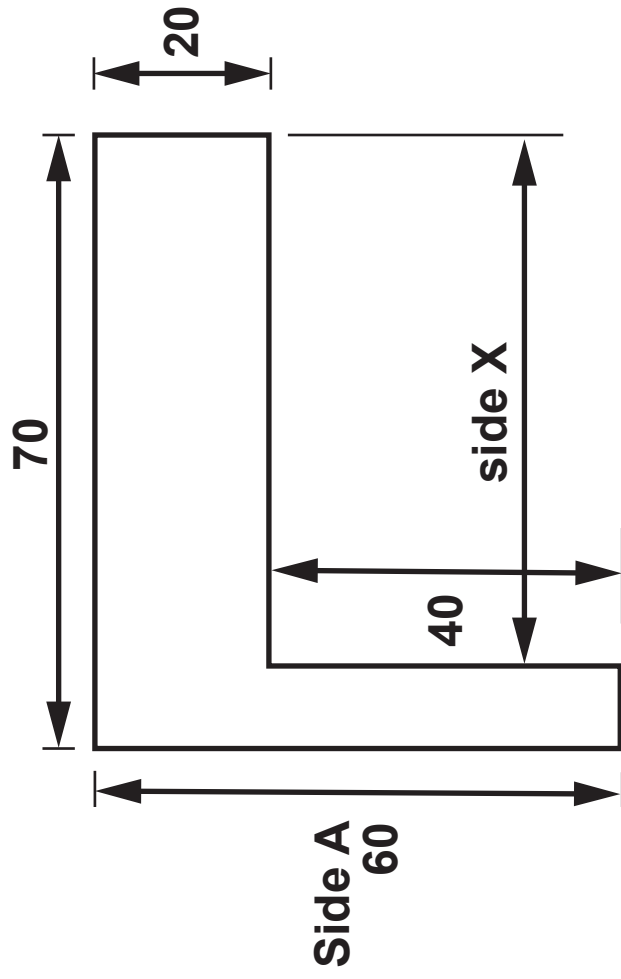
- 1. Shown below is an ergonomic computer mouse.**



- (a) Explain how the design of the computer mouse has been considered, to make it more comfortable for the user. [6 marks]**
- (b) Explain how improvement in material technology has had an impact on the environmental footprint of the computer mouse shown. [4 marks]**



Component in isometric view



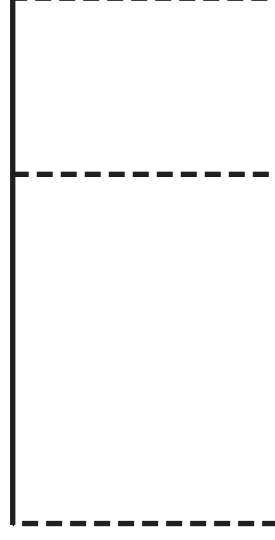
Plan view

10

30



Front elevation



Side view

Third angle orthographic view
All dimensions in mm

2. A 3D-printed component for a model cityscape is shown opposite.

(a) (i) Calculate the length of the missing side X.

[1 mark]

Show all calculations.

(ii) It takes 7 seconds to print one layer of side A (60 mm). Calculate the speed of the print in mm/s.

[2 marks]

Show all calculations.

(iii) The layer height is set to 0.2 mm. Calculate how many layers are in the component shown.

[2 marks]

Show all calculations.

(iv) Calculate how long it would take to print the whole component assuming there is only one 'wall'; there is no base and 0% infill. [4 marks]

Show all calculations.

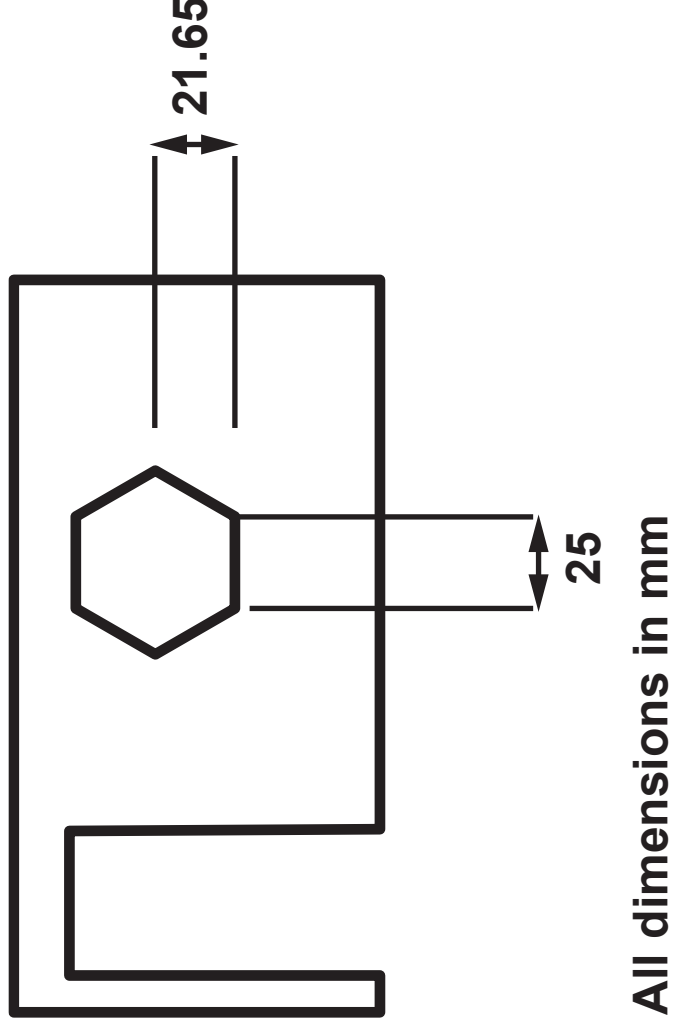
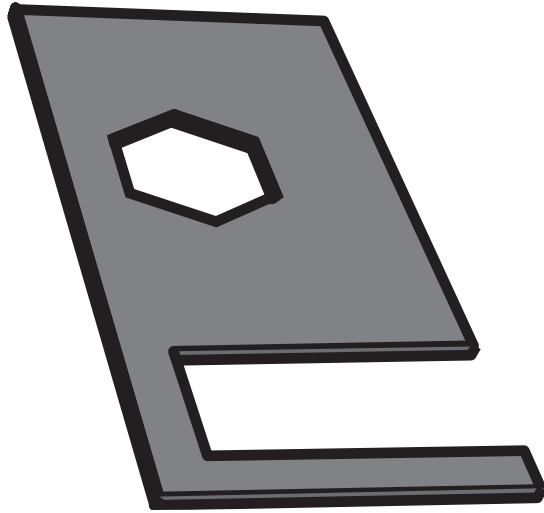
(b) Identify the common faults associated with 3D printers and explain how these can have an impact on collaborative design projects. [4 marks]

(Turn over)

- 3. Shown below is a piece of one-off furniture made from a range of different materials.**



- (a) Explain the quality control measures required to ensure accuracy and consistency when manufacturing the table shown as a one-off product. [4 marks]**
- (b) Explain how Quality Assurance measures can be used by the manufacturer to ensure the table is delivered to the customer with the intended performance, design and reliability. [4 marks]**



- 4. The CAD drawing shown opposite is a side elevation of an architectural model.**
- (a) Calculate the area of the regular hexagon aperture for the window. [4 marks]**
Show all calculations.
- (b) The quality control check put in place to make sure the window material fits into the aperture is ± 0.25 mm on the area of the hexagon. Calculate the maximum and minimum size the window can be if it is to pass the quality control check. [2 marks]**
Show all calculations.
- (c) The architectural model itself is to be made from laser ply. Suggest a suitable material for the window section and discuss the material characteristics that make it suitable for this application. [4 marks]**

- 5. The image below shows furniture that has been manufactured from an MDF board.**



- (a) Explain why MDF is used by some manufacturers to produce flat-pack furniture such as the shelving unit shown. [5 marks]**
- (b) Outline the environmental factors that must be considered when using MDF for any form of product manufacture. [6 marks]**

6. With reference to specific design features, describe and explain how consumer groups can influence the design of a product, such as the electric bicycle shown. [6 marks]



7. The phone case shown below has been manufactured using carbon fibre reinforced plastic (CFRP).



- (a) Evaluate the suitability of carbon fibre reinforced plastic (CFRP) for use in the phone case shown. [6 marks]
- (b) Analyse the method of laying-up carbon fibre in terms of the cost of manufacture over traditional plastic phone cases. [6 marks]

8. Analyse the effectiveness of the five-stage risk assessment to reduce the risk of harm to the consumer when operating the children's buggy shown below, or a similar product. [9 marks]



9. Explain the benefits of copyright protection to a designer when generating new work. [9 marks]
10. Products such as Mercedes-Benz vehicles are manufactured using a Just-In-Time (JIT) methodology. Explain how JIT affects the unit cost of the final product to the consumer. [12 marks]

END OF PAPER