



Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2024

Centre Number

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Candidate Number

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Technology and Design

Assessment Unit AS 1

assessing

Design and Materials

MV24

[STE11]

MONDAY 13 MAY, AFTERNOON

Time

1 hour, plus your additional time allowance.

Instructions to Candidates

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write on blank pages.

Questions which require drawing or sketching should be completed using an H.B. pencil.

All other questions must be completed in black ink only.

Do not write in pencil.
Answer **all seven** questions.

Information for Candidates

The total mark for this paper is 40.
Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **6**.

Design and Materials

Answer **all** questions

1 Mechanical and physical properties are an important consideration when selecting a material for a component or product.

(a) Briefly explain what is meant by the mechanical properties of elasticity and plasticity: [1 mark for each]

Elasticity _____

Plasticity _____

(b) Explain the difference between the physical properties of electrical conductivity and thermal conductivity. [2 marks]

2 PVC and acrylic are used in a wide range of products.

(a) Give **two** different reasons other than cost and availability, why PVC is used for pipes and guttering. [2 marks]

1. _____

2. _____

(b) Give **two** different reasons other than cost and availability, why acrylic is used for the lens cover on car lights.

[2 marks]

1. _____

2. _____

3 Oak and plywood may be used to manufacture indoor seating.

(a) Briefly outline **one** main property of oak which would make it suitable to be used for indoor seating. [1 mark]

(b) Briefly outline **two** advantages of plywood which make it suitable for indoor seating. [2 marks]

1. _____

2. _____

(c) Stains or oils may be used as a finish on seating. Briefly explain the main purpose of using a stain as a finish on indoor seating and the main purpose of using an oil as a finish on outdoor seating.

[1 mark for each]

Using a stain _____

Using an oil _____

4 Alloy rims for cars may be manufactured using the process of pressure die casting.

(a) Give **one** specific reason why pressure die casting is the most suitable process for manufacturing car rims. [1 mark]

(b) With the aid of an annotated sketch, describe the pressure die casting process. [4 marks]

5 Thermochromic materials, photochromic materials and phosphorescent pigments are modern materials.

(a) Distinguish between a thermochromic material and a photochromic material.
[2 marks]

(b) Briefly outline the main characteristic of phosphorescent pigments and give **one** application for their use.
[1 mark for each]

Application _____

Blank Page

(Questions continue overleaf)

6 Solid modelling and rapid prototyping are widely used in the design and manufacture of many products. For each of the following:

- Explain what is meant by the term solid modelling and with reference to a suitable product of your choice, explain **one** way solid modelling may be used in the design and manufacture of your chosen product.
- Explain what is meant by the term rapid prototyping and with reference to a suitable product of your choice, explain **one** way rapid prototyping may be used in the design and manufacture of your chosen product.

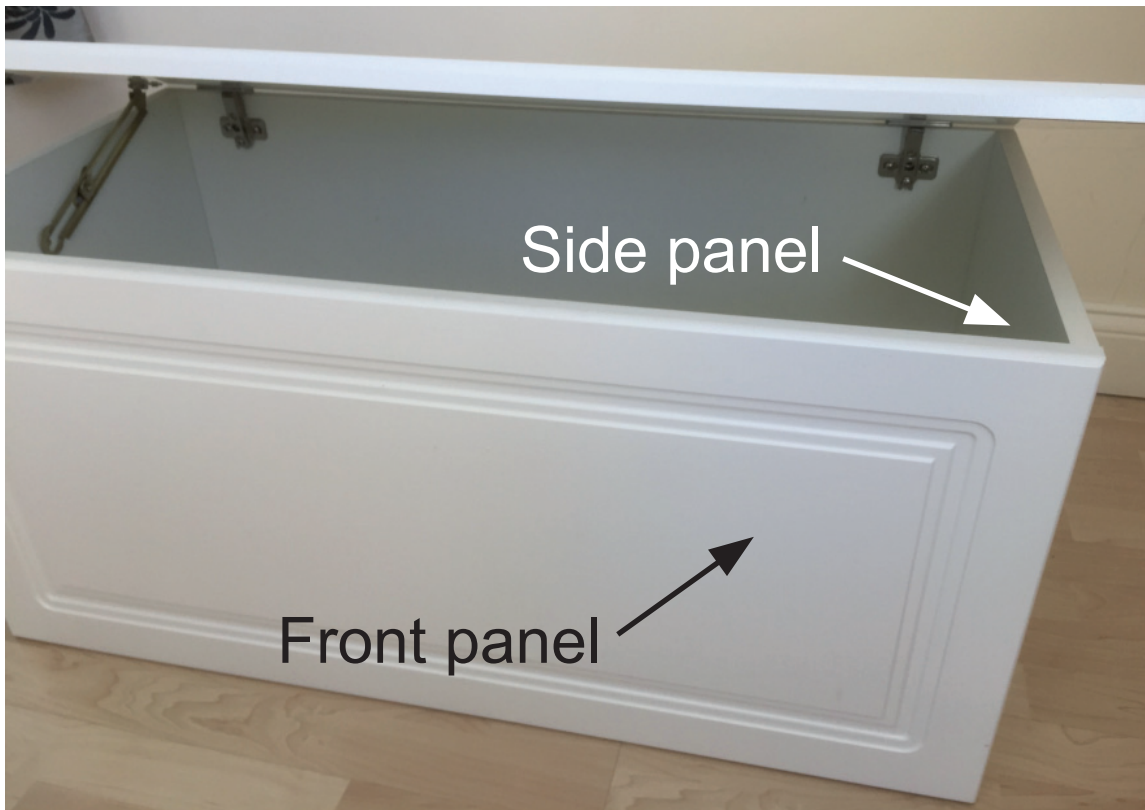
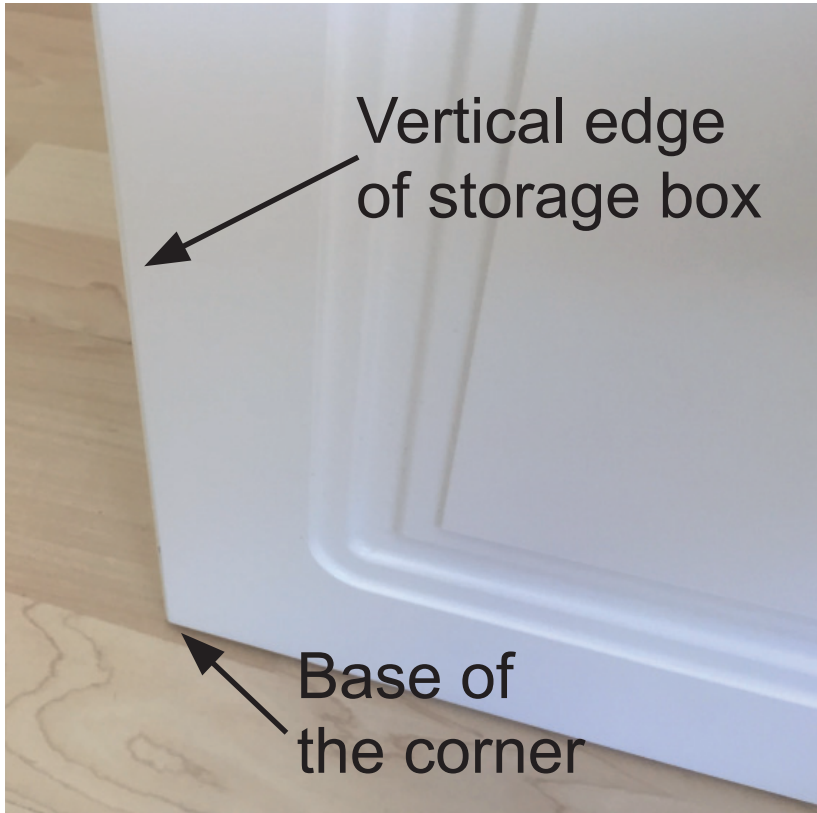
Quality of written communication will be assessed in this question. [8 marks]

Solid modelling:

7 **Fig. 1** below and opposite shows a basic low-cost storage box. It has been suggested that the vertical edges of the storage box need protection from being damaged and that the user needs to be able to adjust the height of the corners so that the storage box remains level.

Fig. 1





With reference to **Fig. 1** and using the blank A4 pro forma answer pages (**answer numbers 7(a)** and **7(b)**) complete the following using annotated freehand sketches:

- (a)** An appropriate design which is attached to the front and side panel of the storage box to provide protection to the vertical edge and is also attached to the base of the corner to allow the user to adjust the height of the corner of the storage box to ensure it sits level on the floor (for the purpose of your design you may ignore how the base, side and front panels are joined together). [6 marks]
- (b)** An appropriate redesign to the top of the front and side panels of the storage box to reduce the chance of the user getting their fingers trapped between the panels and the lid when closing. [4 marks]

Pro forma answer page (answer number 7(a))

Pro forma answer page (answer number 7(b))

**This is the end of the
question paper**

SOURCES

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Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
Total Marks	

Examiner Number

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