



# Cambridge International AS & A Level

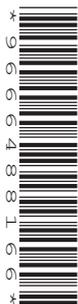
DESIGN & TECHNOLOGY

9705/12

Paper 1

October/November 2021

3 hours



You must answer on the answer booklet/paper.

You will need: Answer booklet/A4 paper                      Coloured pencils  
A3 drawing paper (2 sheets)                      Extra sheets of A3 drawing paper if needed  
A range of design drawing equipment

## INSTRUCTIONS

- Answer **three** questions in total:
  - Section A: answer **one** question on the answer booklet/A4 paper provided.
  - Section B: answer **one** question on the answer booklet/A4 paper provided.
  - Section C: answer **one** question on A3 drawing paper. Use both sides of the paper.
- You may request additional sheets of A3 drawing paper, but only if you have used up both sides of each of the 2 sheets provided.
- If you have been given an answer booklet, follow the instructions on the front cover of the answer booklet.
- Use a black or dark blue pen.
- Write your name, centre number and candidate number on all the work you hand in.
- Do **not** use an erasable pen or correction fluid.
- You may use an HB pencil, or coloured pencils as appropriate, for any diagrams, graphs or rough working.
- At the end of the examination, fasten all your work together. Do **not** use staples, paper clips or glue.

## INFORMATION

- The total mark for this paper is 120.
- The number of marks for each question or part question is shown in brackets [ ].
- All dimensions are in millimetres.

This document has **12** pages. Any blank pages are indicated.

## Section A

Answer **one** question from this section on the Answer Booklet/A4 paper provided.

- 1 Fig. 1.1 gives details of a set of mats which are to be made in a school workshop.

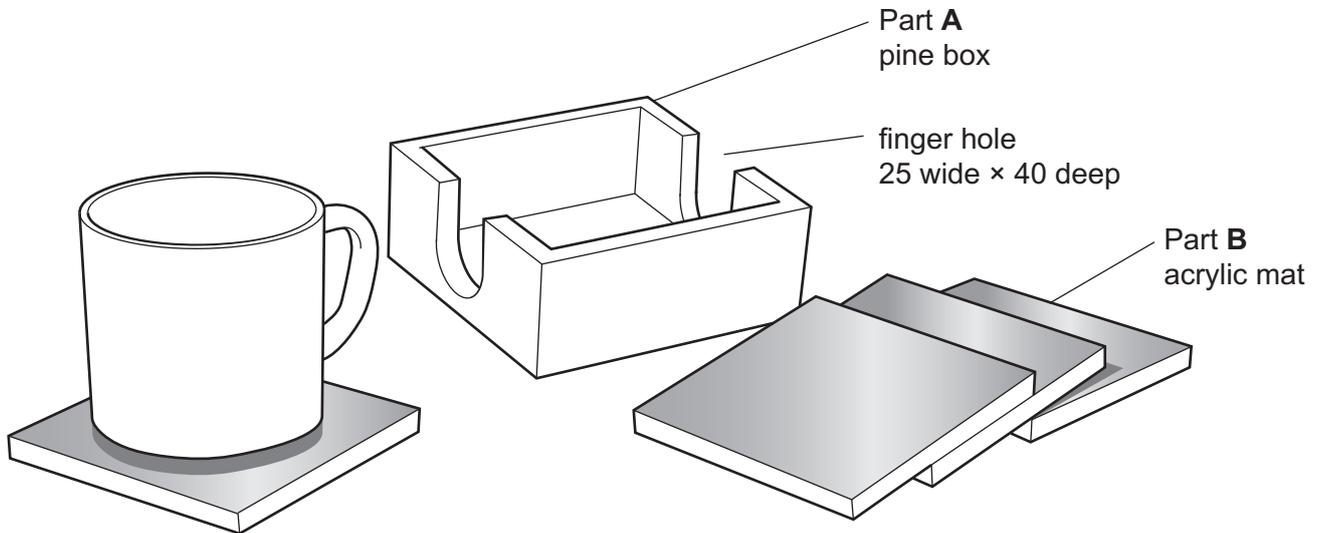


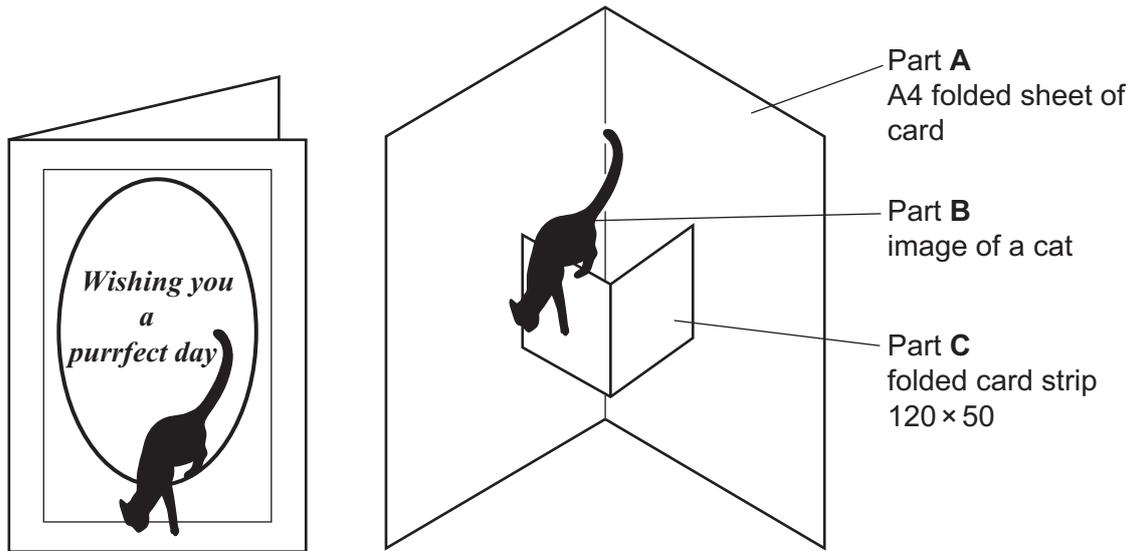
Fig. 1.1

- (a) State **two** properties of acrylic that make it a suitable material for the mat. [2]
- (b) Use notes and sketches to describe how to mark out and cut:
- (i) a joint, other than a butt joint, that could be used on a corner of Part **A** [6]
  - (ii) the finger hole in Part **A**. [6]

You must give details about the tools, equipment and processes involved and the safety precautions that have to be undertaken at each stage.

- (c) Use notes and sketches to show a method of adding the words 'Coffee time' to Part **B**, the acrylic mat. [6]

2 Fig. 2.1 gives details of a pop up card which is to be made in a school workshop.



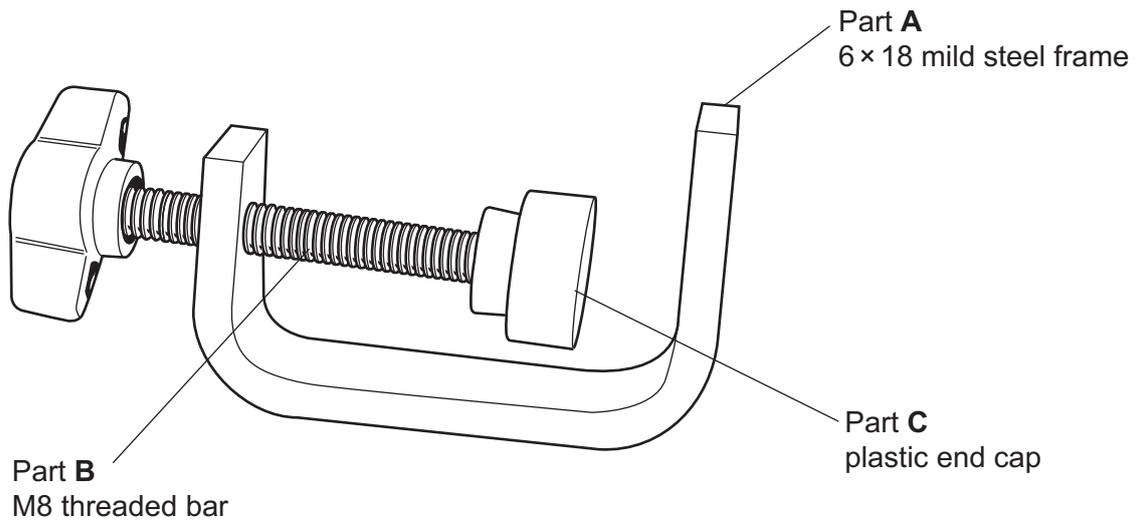
**Fig. 2.1**

- (a) Use a sketch and notes to show the size of the envelope required for the pop up card. [2]
- (b) Use notes and sketches to describe:
- (i) how Part **B** could be made in quantity [6]
  - (ii) how Part **C** could be marked out, cut out and joined to Part **A**. [6]

You must give details about the tools, equipment and processes involved and the safety precautions that have to be undertaken at each stage.

- (c) Use notes and sketches to show how Computer Aided Design (CAD) could be used to produce the design on the front of the card. [6]

3 Fig. 3.1 gives details of a metal cramp which is to be made in a school workshop.



**Fig. 3.1**

(a) State **two** types of motion used in the cramp. [2]

(b) Use notes and sketches to describe:

(i) how to make Part A [6]

(ii) how to cut the thread on Part B. [6]

You must give details about the tools, equipment and processes involved and the safety precautions that have to be undertaken at each stage.

(c) Use notes and sketches to show a method of making a batch of 500 of Part C, the plastic end cap. [6]

## Section B

Answer **one** question from this section on the Answer Booklet/A4 paper provided.

- 4 Fig. 4.1 gives details of a child's high chair made from plywood.

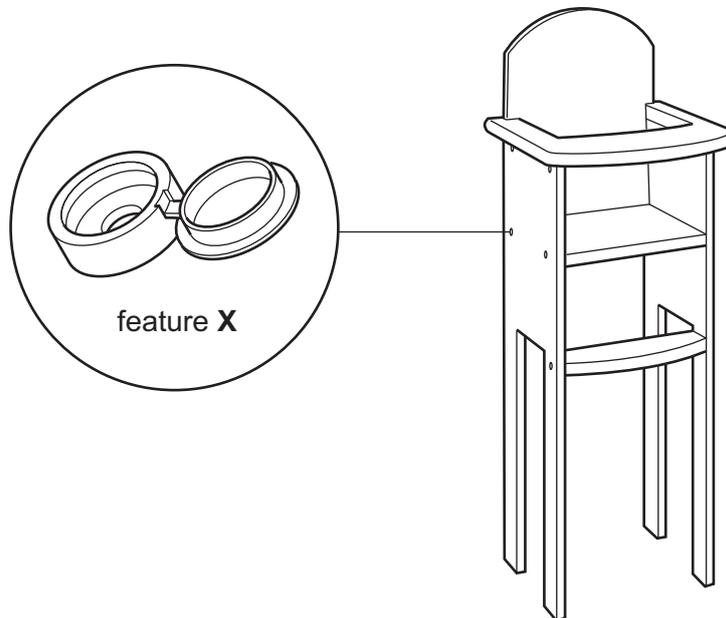


Fig. 4.1

- (a) Explain the function of the design feature shown at **X**. [2]
- (b) Identify and describe **two** problems with the child's high chair. [4]
- (c) Using notes and sketches, explain how the child's high chair would need to be changed to overcome the **two** problems you have identified in **part (b)**. [6]
- (d) Discuss why some furniture, such as a child's high chair, is designed to be mass produced. Your answer should:
- (i) analyse the given situation and identify **three** relevant issues raised by the question [3]
  - (ii) explain why you consider these issues to be relevant [3]
  - (iii) contain specific examples/evidence to support your conclusions. [2]

5 Fig. 5.1 gives details of a paintbrush set.

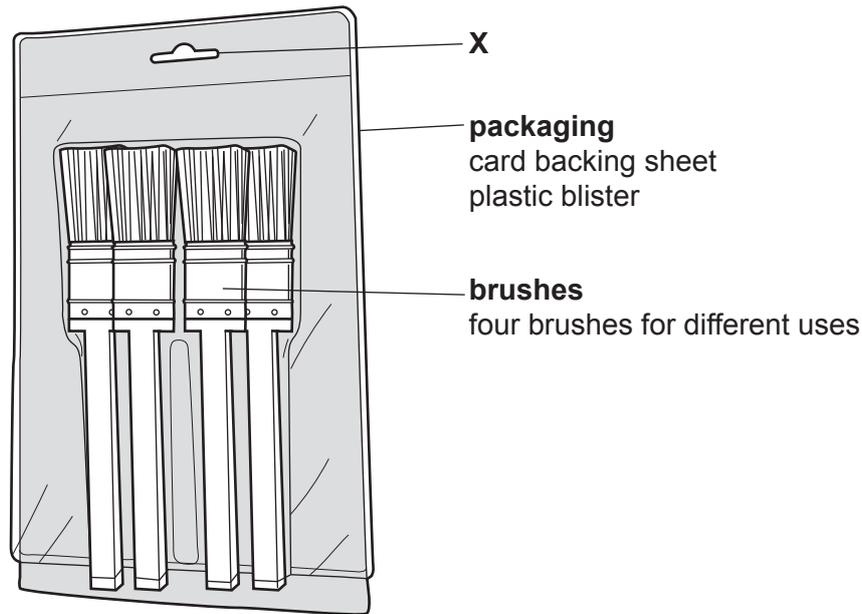
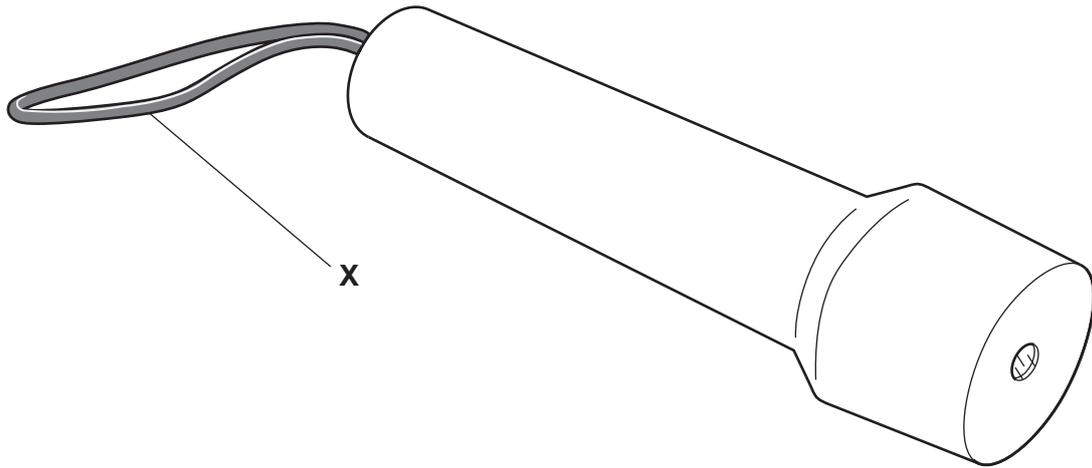


Fig. 5.1

- (a) Explain the function of the design feature shown at **X**. [2]
- (b) Identify and describe **two** problems with the paintbrush set. [4]
- (c) Using notes and sketches, explain how the paintbrush set would need to be changed to overcome the **two** problems you have identified in **part (b)**. [6]
- (d) Discuss why packaging, such as used for the paintbrush set, focuses on function rather than aesthetics. Your answer should:
- (i) analyse the given situation and identify **three** relevant issues raised by the question [3]
  - (ii) explain why you consider these issues to be relevant [3]
  - (iii) contain specific examples/evidence to support your conclusions. [2]

6 Fig. 6.1 gives details of a battery operated torch.



**Fig. 6.1**

- (a) Explain the function of the design feature shown at **X**. [2]
- (b) Identify and describe **two** problems with the battery operated torch. [4]
- (c) Using notes and sketches, explain how the battery operated torch would need to be changed to overcome the **two** problems you have identified in **part (b)**. [6]
- (d) Discuss why some electric powered products use energy sources other than batteries. Your answer should:
- (i) analyse the given situation and identify **three** relevant issues raised by the question [3]
  - (ii) explain why you consider these issues to be relevant [3]
  - (iii) contain specific examples/evidence to support your conclusions. [2]

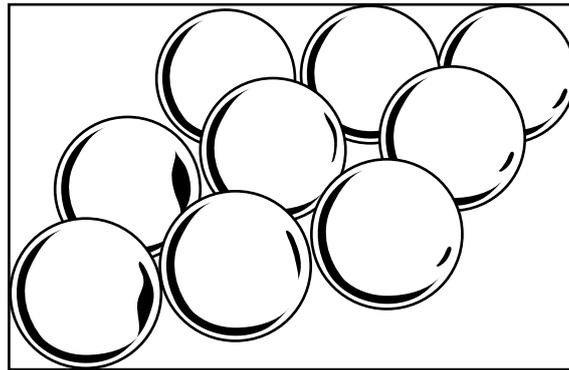
**Section C**

Answer **one** question from this section on the plain A3 paper provided.

You are provided with two sheets of plain A3 paper. You should use **both** sides of the paper. **Each** of the four parts **(a) – (d)** of the question you choose to answer should take up one side of paper.

When you are asked to **develop** a design you must show, using notes and sketches, the development and evaluation of a **range** of ideas into a single design solution. The design proposal should be annotated to give details about materials, joining methods and important sizes.

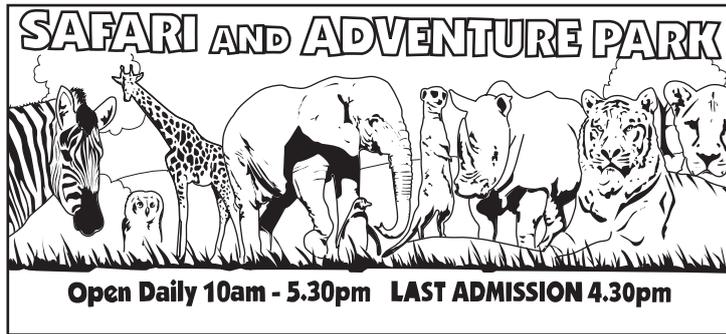
7 Fig. 7.1 shows nine Ø10 ball bearings.



**Fig. 7.1**

- (a)** Use notes and sketches to **develop** a design for a game that uses **three** ball bearings. [20]
- (b)** Use notes and sketches to **develop** a design for a carrying case for the game designed in **part (a)**. [20]
- (c)** Use notes and sketches to **develop** a design a method of storing the **six** spare ball bearings that attaches to the carrying case designed in **part (b)**. [20]
- (d)** Produce a pictorial (3D) rendered drawing of the complete ball bearing game which shows all of the features that you have designed in **parts (a) – (c)**. [20]

8 Fig. 8.1 shows a poster for a safari park and the parts of a painting set.



poster



paint pot  
 Ø70 at top  
 70 high  
 Ø60 at bottom

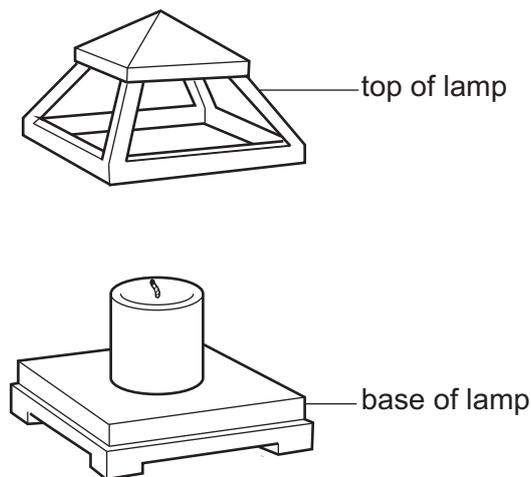


paintbrush  
 Ø12  
 120 long

Fig. 8.1

- (a) Use notes and sketches to **develop** a design for a child's painting book based upon the animal shapes in the poster. The painting book must be A4 size and consist of six pages. [20]
- (b) Use notes and sketches to **develop** a design for a holder for six pots of paint and a paintbrush. [20]
- (c) Use notes and sketches to **develop** a design for an easy to carry environmentally friendly package for the painting book designed in **part (a)** and holder designed in **part (b)**. [20]
- (d) Produce a pictorial (3D) rendered drawing of the complete painting set which shows all of the features that you have designed in **parts (a) – (c)**. [20]

- 9 Fig. 9.1 shows an incomplete design for a ceiling mounted candle lamp which is made from painted mild steel sheet.



**Fig. 9.1**

- (a) Use notes and sketches to **develop** a design for a method of joining the top and base of the candle lamp. [20]
- (b) Use notes and sketches to **develop** a design for a mechanism that allows the candle lamp to be hung from a ceiling and the height to be adjusted. [20]
- (c) Use notes and sketches to **develop** a design for an ergonomic handle to be attached to the base of the candle lamp to assist in the height adjustment. [20]
- (d) Produce a pictorial (3D) rendered drawing of the ceiling mounted candle lamp which shows all of the features that you have designed in **parts (a) – (c)**. [20]



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