

DESIGN AND TECHNOLOGY

6043/12

Paper 1 Technology

October/November 2018

2 hours 30 minutes

Additional Materials: Answer Booklet/Paper
 Plain paper
 Sketching equipment



READ THESE INSTRUCTIONS FIRST

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.
Write your Centre number, candidate number and name on the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.
DO NOT WRITE IN ANY BARCODES.

Part A

Answer **all** questions.

Part B

Answer **four** questions.

Answer **two** questions from Section 1 and **two** questions from Section 2.

You are advised to spend no longer than 45 minutes on Part A.
Use sketches where appropriate to help answer any question. You may use coloured pencils.
All dimensions are in millimetres.
The number of marks is given in brackets [] at the end of each question or part question.

At the end of the examination, fasten all your work securely together.

This document consists of **11** printed pages and **1** blank page.

Part A

Attempt **all** questions.

- 1 Fig. 1 shows a cross-section drawing of **three** different holes drilled into two separate pieces of wood. State the **three** types of drilled hole **A**, **B** and **C**.

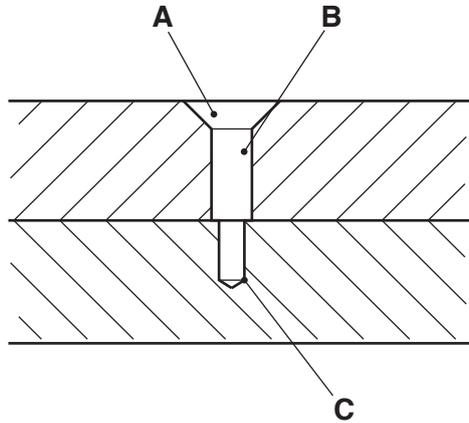


Fig. 1

[3]

- 2 State why a $\text{Ø}5$ hole is drilled before an M6 tap is used. [1]
- 3 Explain what is meant by the following workshop terms:
- (a) case hardening [1]
- (b) tempering [1]
- 4 Explain briefly:
- (a) what a thermochromic material is [1]
- (b) why a thermochromic material would be used in the manufacture of a baby's bowl and spoon. [1]
- 5 State **two** pieces of anthropometric data you would need when designing the handle shown in Fig. 2.

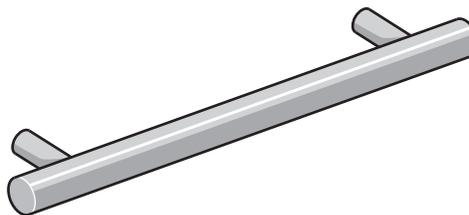
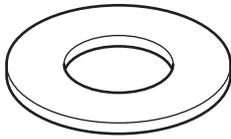


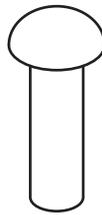
Fig. 2

[2]

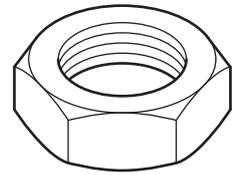
- 6 State **three** safety precautions you would take when drilling sheet metal on a pillar drill and give reasons for each. [6]
- 7 (a) State a suitable specific wood that a mallet could be manufactured from and give a reason for your choice. [2]
- (b) State a suitable specific plastic that a food container could be manufactured from and give a reason for your choice. [2]
- 8 Sketch a try-square and state its purpose. [2]
- 9 Fig. 3 shows **three** components used when joining materials. Name each one.



A



B



C

Fig. 3

[3]

- 10 State what is meant by the term *datum line* and explain the benefits of using datum lines when marking out. [3]

Part B

Attempt **four questions**, **two** from Section 1 and **two** from Section 2.

All questions carry equal marks.

Section 1 – Tools and Materials

11 **Three** different holding tools are shown in Fig. 4.

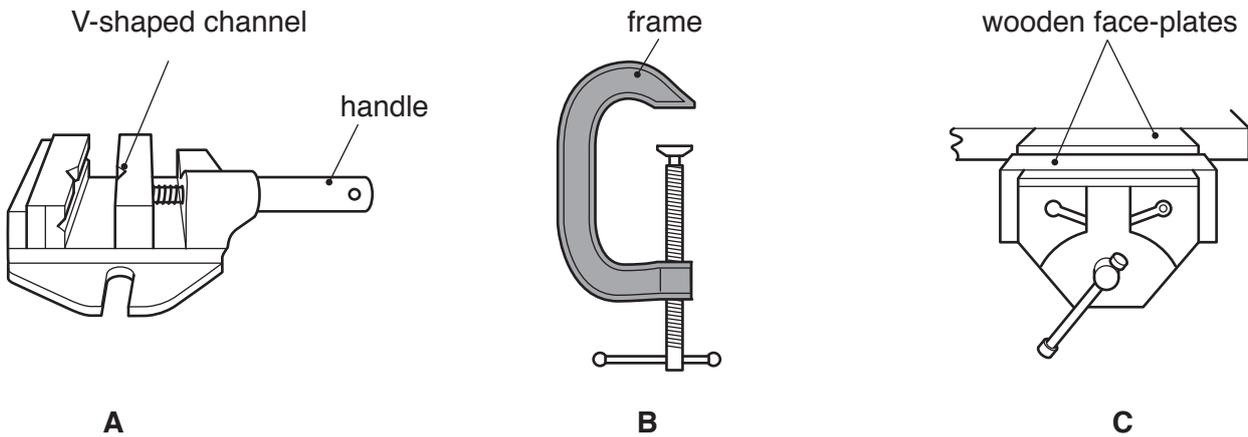


Fig. 4

- (a) Name the holding tools shown in Fig. 4 and state a specific use for each. [6]
- (b) Explain the reasons for:
- (i) the V-shaped channels in **A** [2]
 - (ii) the shape of the frame in **B** [2]
 - (iii) the wooden face-plates on **C**. [2]
- (c) Explain:
- (i) how you could prevent work from being damaged when using **B** [2]
 - (ii) what the hole in the handle of tool **A** is used for. [2]
- (d) Sketch a metalworking vice. [2]

- 12 Wood is a popular material to use when manufacturing because of its range of properties and its sustainability.

Material	Use	Properties
Chipboard		
Mahogany		
Plywood		
Pine		

- (a) Copy and complete the chart above, giving a use for each material and state **two** properties that make it suitable for that use. [12]
- (b) Explain why timber is considered a sustainable material. [1]
- (c) State what is meant by the term *timber conversion*. [1]
- (d) Fig. 5 shows the cross-section of a tree once it has been cut down.

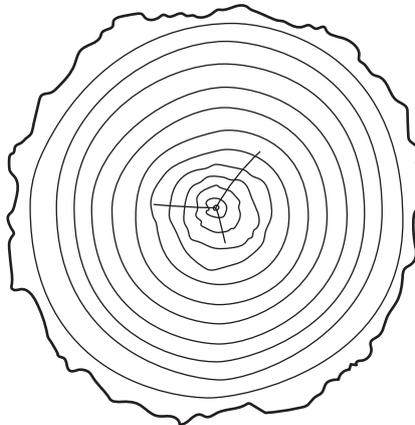


Fig. 5

Use sketches to show what the following methods of conversion look like:

- (i) plain sawing [1]
- (ii) quarter sawing. [1]
- (e) State which type of sawing given in part (d)(i) and part (d)(ii) is cheaper and explain why. [2]

13 Fig. 6 shows an aluminium cupboard handle.

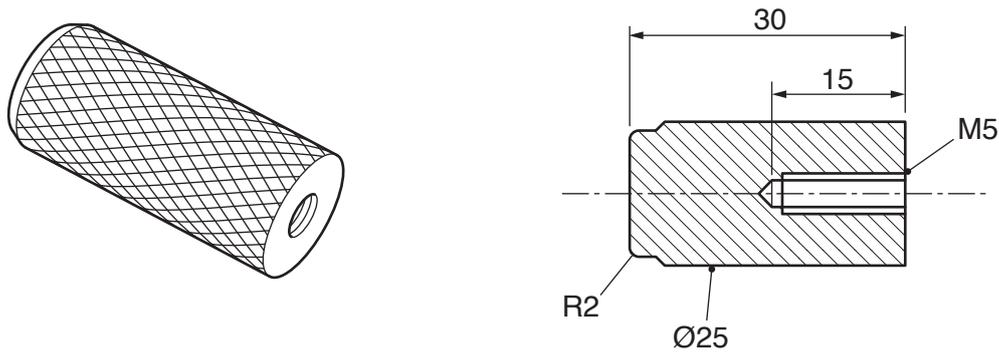


Fig. 6

- (a) Explain why aluminium would be a suitable material to use for the cupboard handle. Give **two** reasons. [2]
- (b) State the surface finish that has been given to the handle and explain why this surface finish is suitable. [2]
- (c) Name **two** tools used to produce an M5 thread in the handle. [2]
- (d) Fig. 7 shows a machine used in the workshop to make the handle.

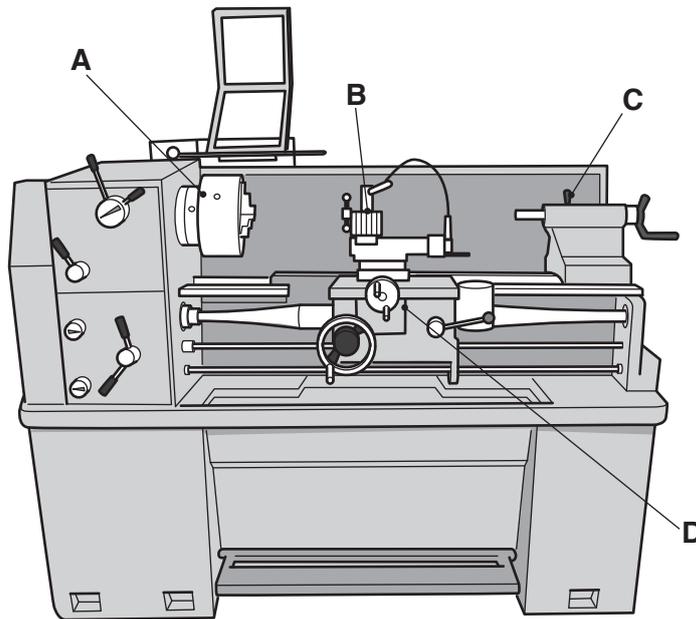


Fig. 7

- (i) Name the machine in Fig. 7 and state **three** manufacturing processes the machine can be used for. [4]
- (ii) State the parts of the machine indicated by **A, B, C** and **D**. [4]
- (iii) State **two** possible safety hazards when using the machine shown in Fig. 7 and give **two** suitable safety precautions that should be taken. [4]

14 Fig. 8 shows a prototype design for a decorative bowl to hold fruit.

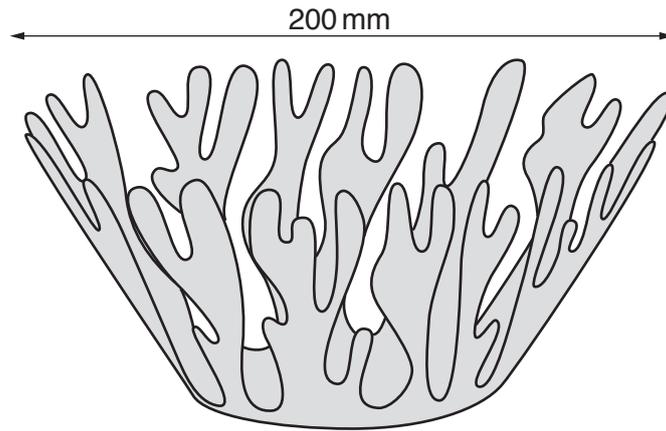


Fig. 8

- (a) State **two** factors that must be taken into consideration when choosing a material to manufacture the bowl. [2]
- (b) The bowl could be made from a range of materials, including acrylic, aluminium or sheet steel. State:
- (i) a hand tool that could be used to cut the shape out from 1.5 mm thick sheet aluminium [1]
 - (ii) a workshop machine that could be used to cut the shape out from 3 mm thick acrylic sheet [1]
 - (iii) **two** suitable finishes that could be applied to the 1 mm thick sheet steel. [2]
- (c) Name **three** pieces of equipment you would use to prepare the sheet steel surface before applying either of the finishes given in part (b)(iii). [3]
- (d) If the bowl was made from acrylic sheet, describe how you would achieve a high-quality finish on the cut edges. [2]
- (e) For either acrylic or aluminium sheet, use sketches and notes to show how the flat shape could be formed into the bowl shape shown in Fig. 8, after it has been cut out. [7]

Section 2 – Processes

15 Details of a shower tray are shown in Fig. 9.

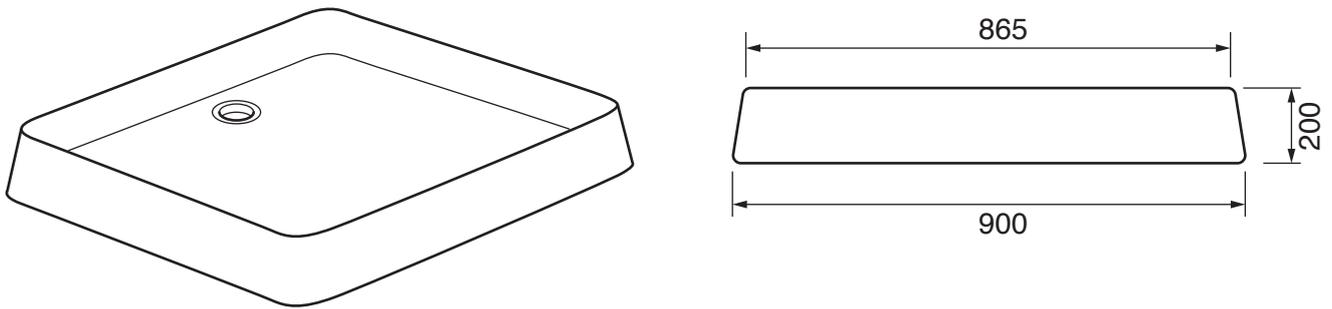
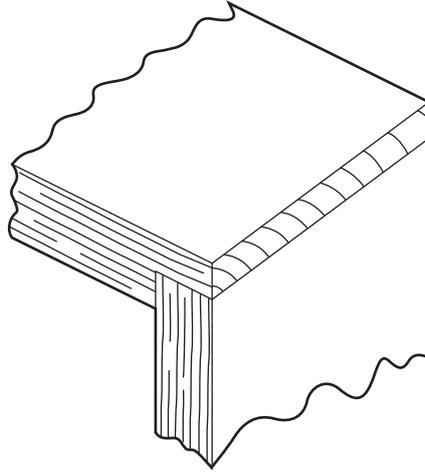


Fig. 9

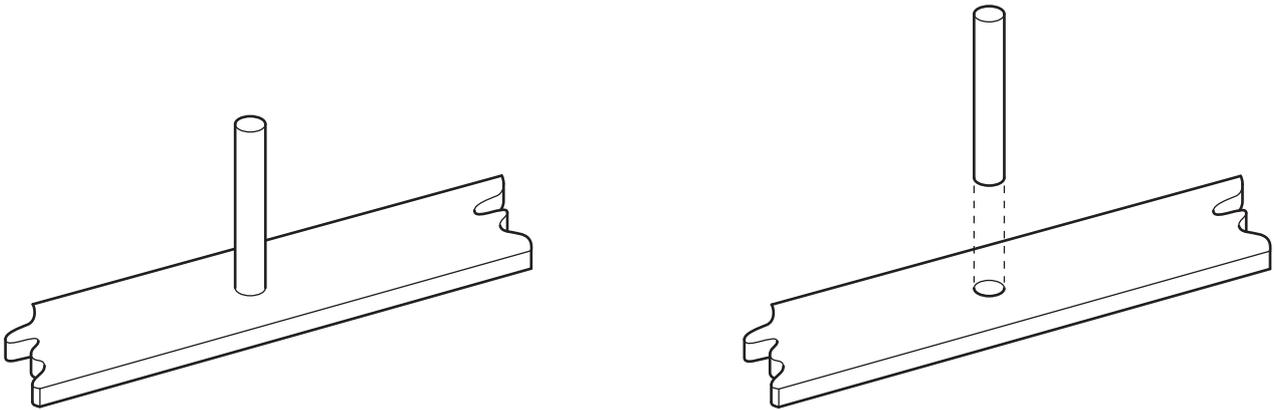
- (a) Name a suitable plastic that the shower tray could be made from. [1]
- (b) Explain the importance of a draft angle when making the tray. [2]
- (c) Using sketches and notes, explain how the tray would be made. [11]
- (d) Using sketches and notes show **two** improvements that could be made to the design of the shower tray. [4]

16 Different processes are shown in Fig. 10.

A mark out and cut the rebate joint;



B drill, prepare and braze the mild steel flat and round bar;



C drill and bend the acrylic frame and glue the acrylic rod to the acrylic frame.

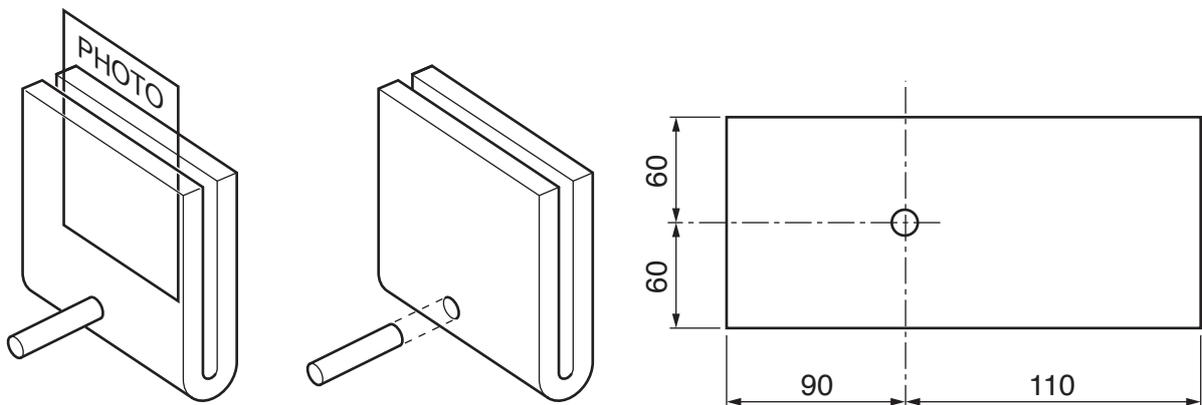


Fig. 10

Choose **two** processes from **A**, **B** or **C**. Use sketches and notes to describe how the processes are carried out. [18]

17 Fig. 11 shows a child's building brick.

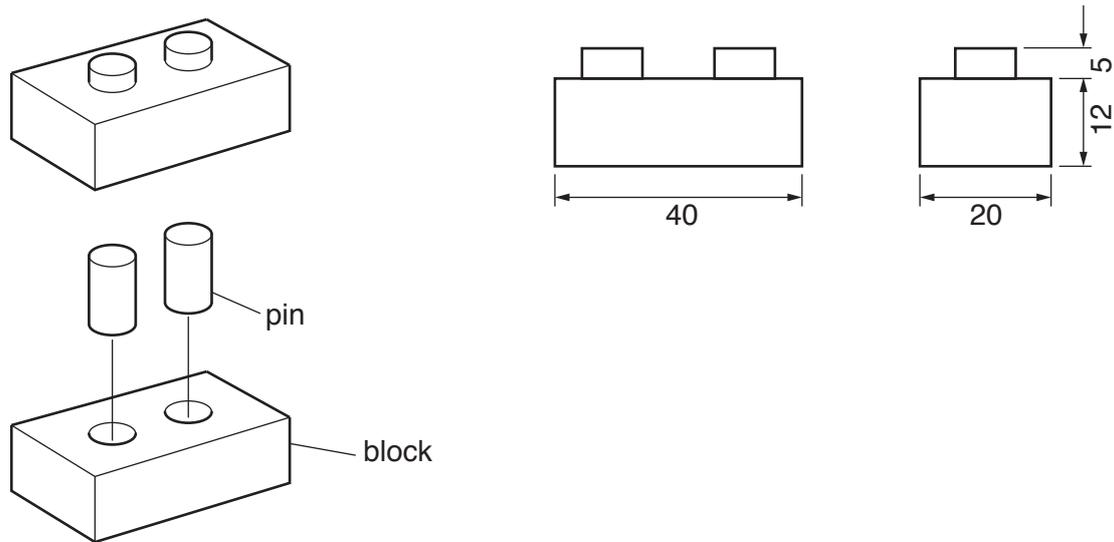


Fig. 11

- (a) Choose a suitable wood the brick could be made from. [1]
- (b) For the material you have chosen use sketches and notes to describe:
- (i) how 30 blocks of identical length could be cut from a strip of wood 1300 mm × 20 mm × 12 mm [5]
- (ii) a method to ensure the holes for the pins are drilled safely and accurately in each block. [5]
- (c) State an alternative specific material the building brick could be made from if 10 000 were required. [1]
- (d) Using sketches and notes, explain a process that could be used to manufacture 10 000 bricks using the material stated in part (c). [6]

18 A child's artist easel is shown in Fig. 12.

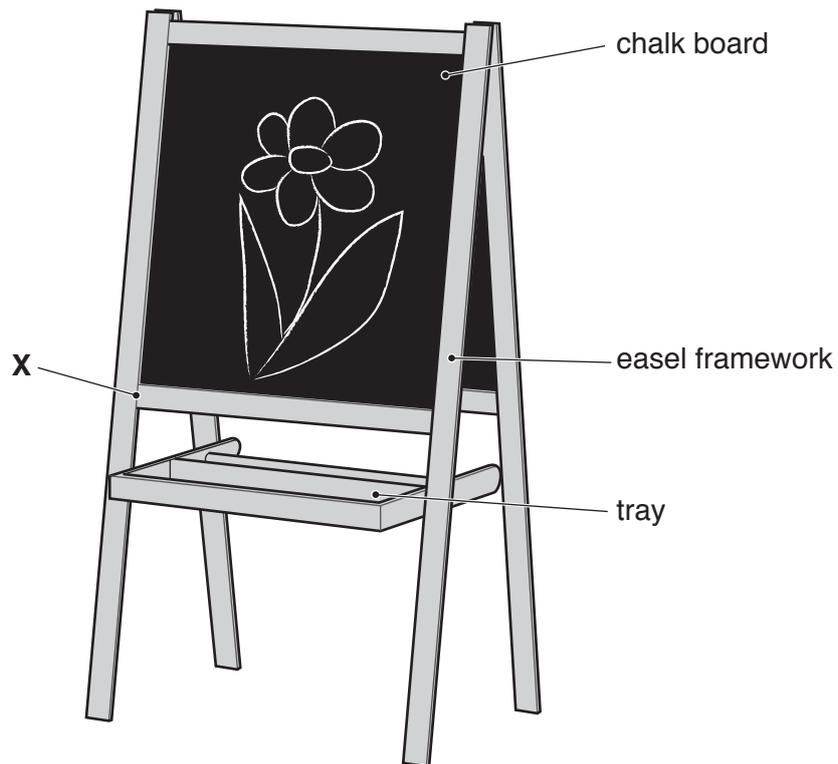


Fig. 12

The frame is made from softwood, the chalk board and tray base are made from MDF with a suitable laminate finish.

(a) Select **two** of the following and for each, use sketches and notes to describe a suitable method to:

- A join the easel framework together at X
- B insert the chalk board into the easel framework
- C attach the tray to the easel framework.

[12]

(b) Use sketches and notes to show how the easel could be modified to allow height adjustment.

[6]

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