

GCSE
DESIGN & TECHNOLOGY:
INDUSTRIAL TECHNOLOGY
PAPER 3 (Foundation Tier)
WEDNESDAY 13 JUNE 2007

F **1959/3**

Afternoon

Time: 1 hour

Candidates answer on the question paper.
No additional materials are required.



Candidate
Name

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- **WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.**

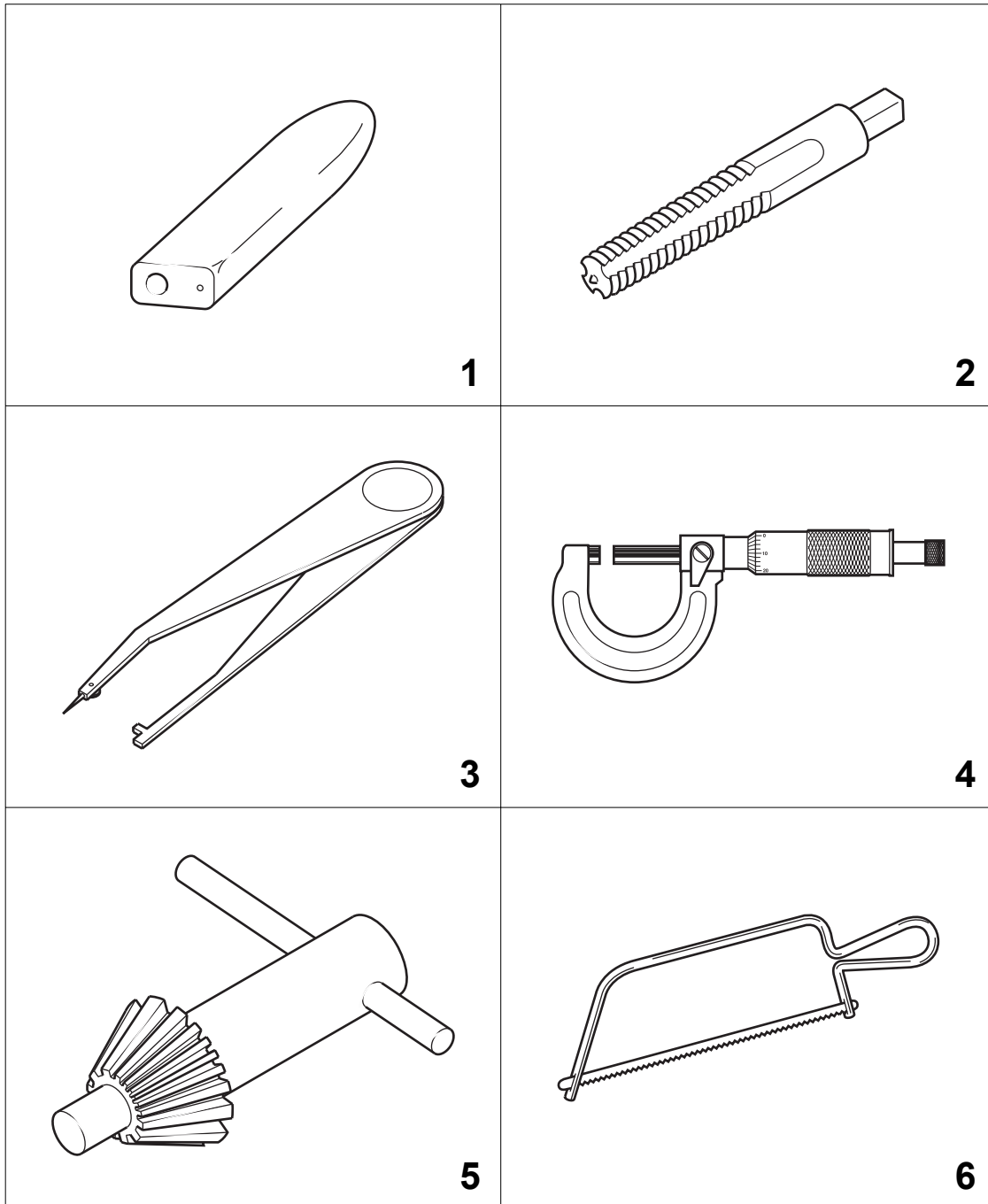
INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- All dimensions are in millimetres.
- Assume any mechanical system to be 100% efficient.

For Examiner's Use	
1	
2	
3	
4	
5	
Total	

This document consists of **12** printed pages.

- 1 The table below shows a collection of basic hand tools used in the workshop. Each of the tools has been designed to carry out a particular task.



Complete the table below by adding the tool numbers, the correct names and the processes they would be used for. The first one has been done for you.

TOOL No.	CORRECT NAME OF TOOL	PROCESS
1	Rivet set and snap	Forming the head of a round head rivet
5		
		Cutting through 3mm diameter steel wire
	Tap	
3		
		Accurately measuring the thickness or diameter of a piece of metal

[10]

[Total: 10]

- 2 Fig. 1a shows a part of a simple linkage.
The part is made from the 3mm thick mild steel blank shown in Fig. 1b.

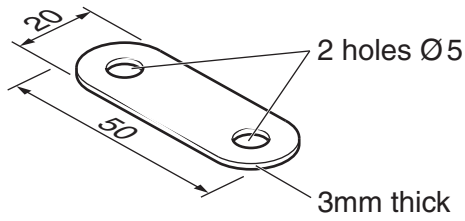


Fig. 1a

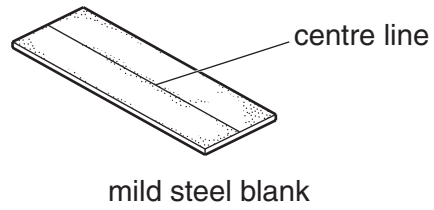


Fig. 1b

- (a) Complete the table below by giving the stages needed to make the part shown in Fig. 1a.

	STAGE
1	Apply engineer's blue to blank
2	Mark centre line on blank
3	
4	
5	
6	
7	
8	

[6]

(b) The part shown in Fig. 1a is to be made in large numbers and a jig will be used when drilling the holes.

Give **two** advantages of using a drilling jig when making a batch of parts.

Advantage 1 _____
_____ [1]

Advantage 2 _____
_____ [1]

(c) Drilling machines can be dangerous if they are not used properly.

Give **two** safety precautions you must take when using a drilling machine.

Safety Precaution 1 _____
_____ [1]

Safety Precaution 2 _____
_____ [1]

[Total: 10]

3 Fig. 2 shows a simple hanger used to hold a garden spade. The hanger is made from mild steel.

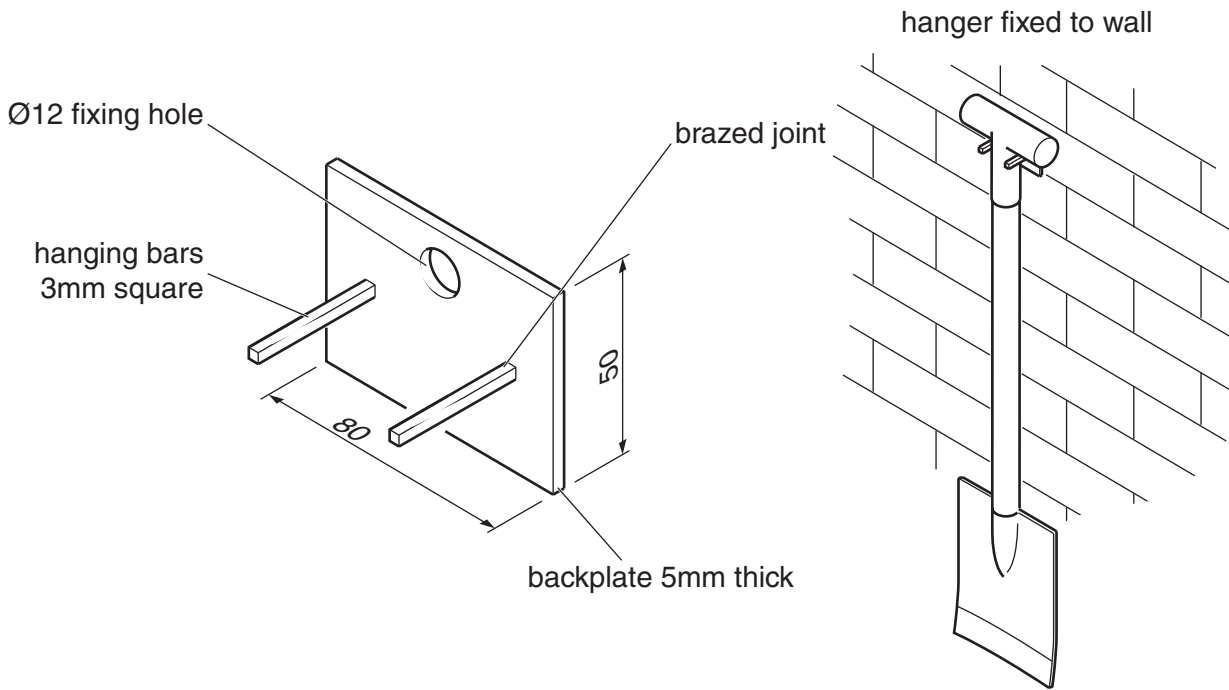


Fig. 2

(a) The hanger has a number of design faults.

Give **three** design faults in the garden spade hanger shown in Fig. 2 and describe how the design could be improved.

Fault 1 _____ [1]

Improvement 1 _____ [1]

Fault 2 _____ [1]

Improvement 2 _____ [1]

Fault 3 _____ [1]

Improvement 3 _____ [1]

- (b) It has been decided to make a batch of garden spade hangers.
A sawing jig is needed to help produce the backplates from a length of 50×5 mild steel strip.

Design a sawing jig to produce a batch of backplates for the garden spade hangers. The jig needs to meet the following specification points:

- the mild steel strip needs to be held firmly whilst it is being cut;
- the backplates must all be cut to the same length;
- the ends of the backplates must be cut square to the edges; and
- the jig should be able to be held in a bench vice.

[4]

[Total: 10]

4 CAD/CAM is widely used by designers and manufacturers.

A toy manufacturer wants to produce the educational toy shown in Fig. 3.

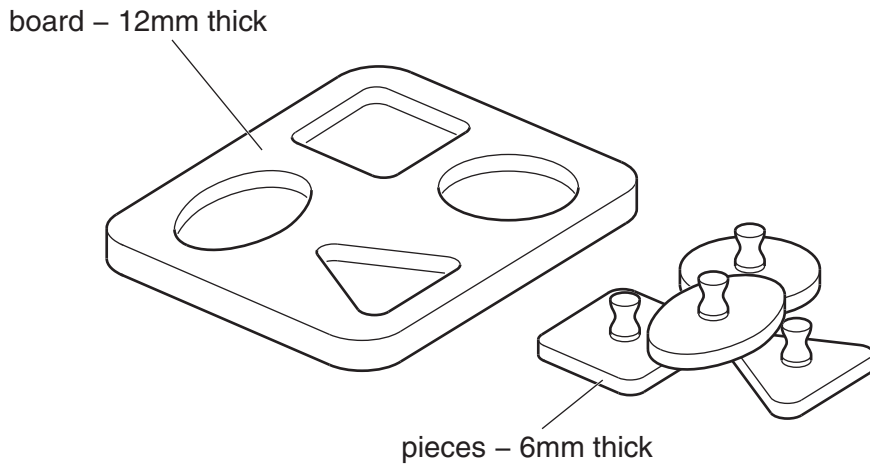


Fig. 3

(a) Give **two** benefits of using CAD when designing the educational toy shown in Fig. 3.

Benefit 1 _____
_____ [1]

Benefit 2 _____
_____ [1]

(b) The company wants to introduce CAM into its manufacturing process.
State **two** possible effects on the workforce.

Effect 1 _____
_____ [1]

Effect 2 _____
_____ [1]

(c) (i) Name a type of CNC machine that would be suitable for making a prototype of the toy shown in Fig. 3.

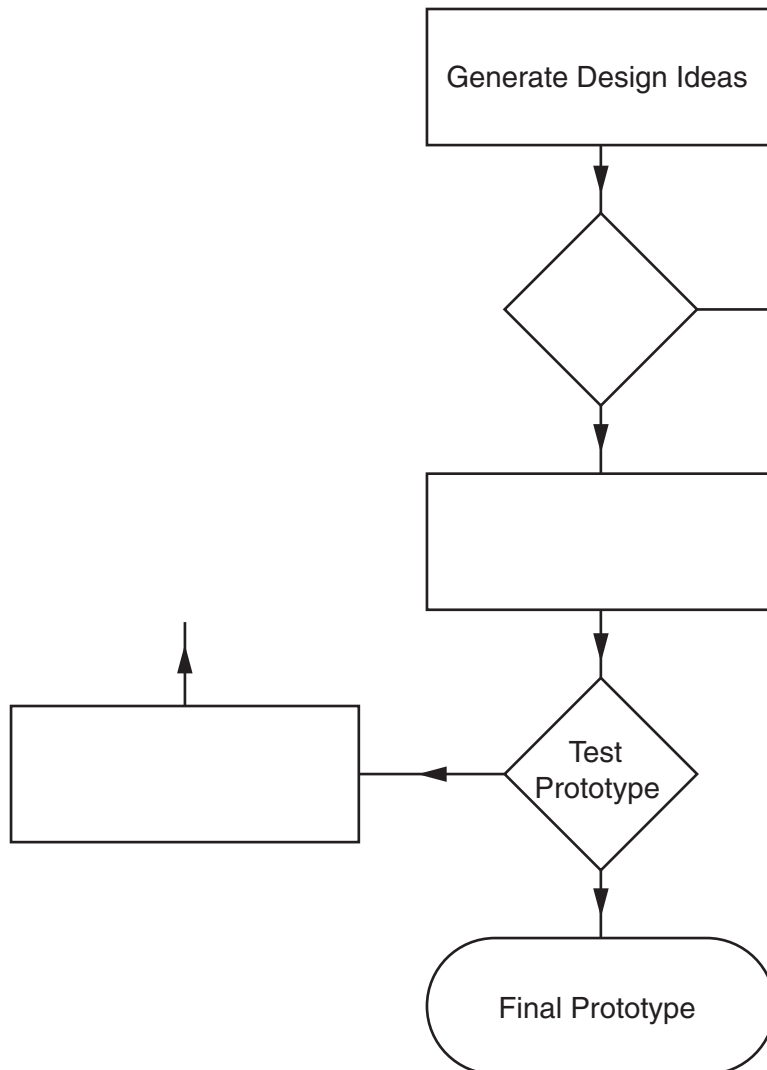
_____ [1]

(ii) State what the letters CNC stand for.

C _____ N _____ C _____ [1]

(d) Flow charts are often used for planning.

Complete the flow chart below to show the stages needed when using CAD/CAM to design and make a prototype of a new product.



[4]

[Total: 10]

- 5 Fig. 4 shows a slimline electric heater. The heater has been designed to be free-standing or wall mounted.

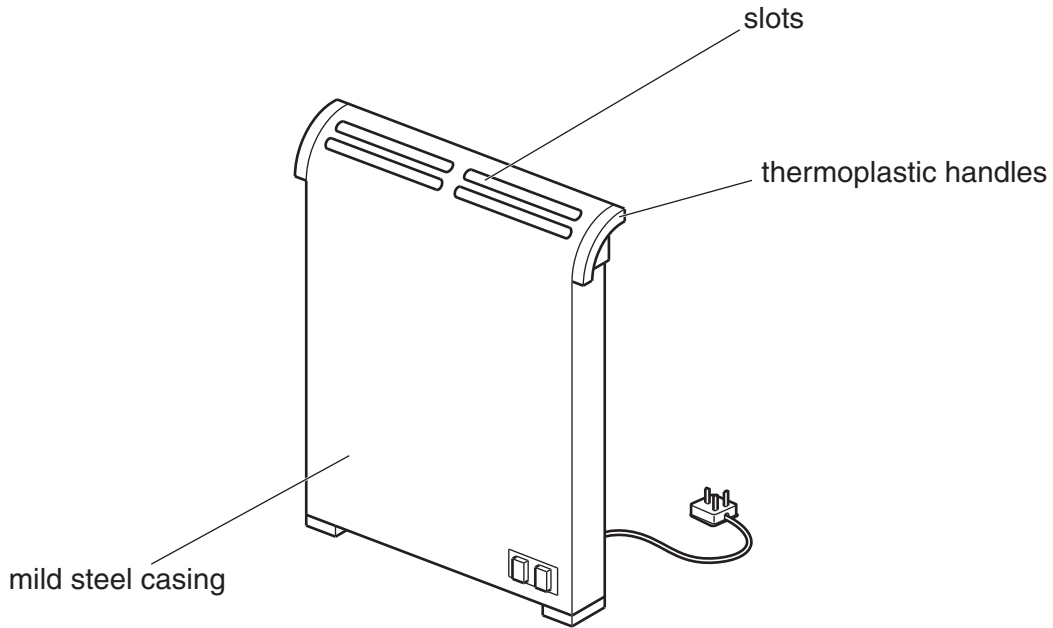


Fig. 4

(a) Name **one** industrial process that could be used to produce batches of the mild steel casing.
 _____ [1]

(b) The thermoplastic handles are produced by injection moulding.

(i) Name a thermoplastic that would be suitable to use for making the handles.
 _____ [1]

(ii) Give **two** reasons why injection moulding is a suitable process for the manufacture of these handles.

Reason 1 _____
 _____ [1]

Reason 2 _____
 _____ [1]

(c) The heater shown in Fig. 4 is found to be unstable when free-standing.

Use sketches and notes to show **one** possible design modification that would make it more stable.

[2]

(d) A fitting is needed to enable the heater to be wall mounted.

Design a suitable fitting that:

- supports the heater securely;
- allows easy removal; and
- spaces the heater from the wall.

[4]

[Total: 10]

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