

FOR OFFICIAL USE



National
Qualifications
SPECIMEN ONLY

Mark

S861/75/01

Practical Metalworking

Date — Not applicable

Duration — 1 hour



* S 8 6 1 7 5 0 1 *

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Number of seat

Date of birth

Day

Month

Year

Scottish candidate number

Total marks — 60

Attempt ALL questions.

Write your answers clearly in the spaces provided in this booklet. Additional space for answers is provided at the end of this booklet. If you use this space you must clearly identify the question number you are attempting.

Use **blue** or **black** ink.

Before leaving the examination room you must give this booklet to the Invigilator; if you do not, you may lose all the marks for this paper.

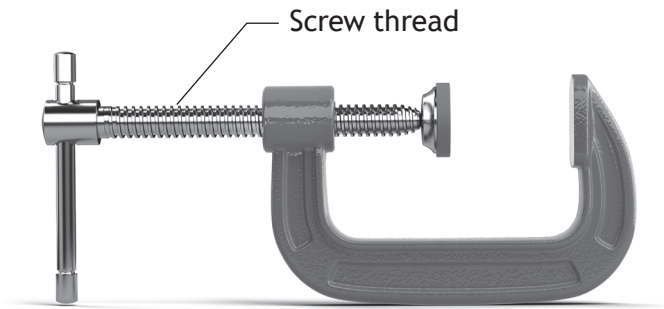


* S 8 6 1 7 5 0 1 0 1 *

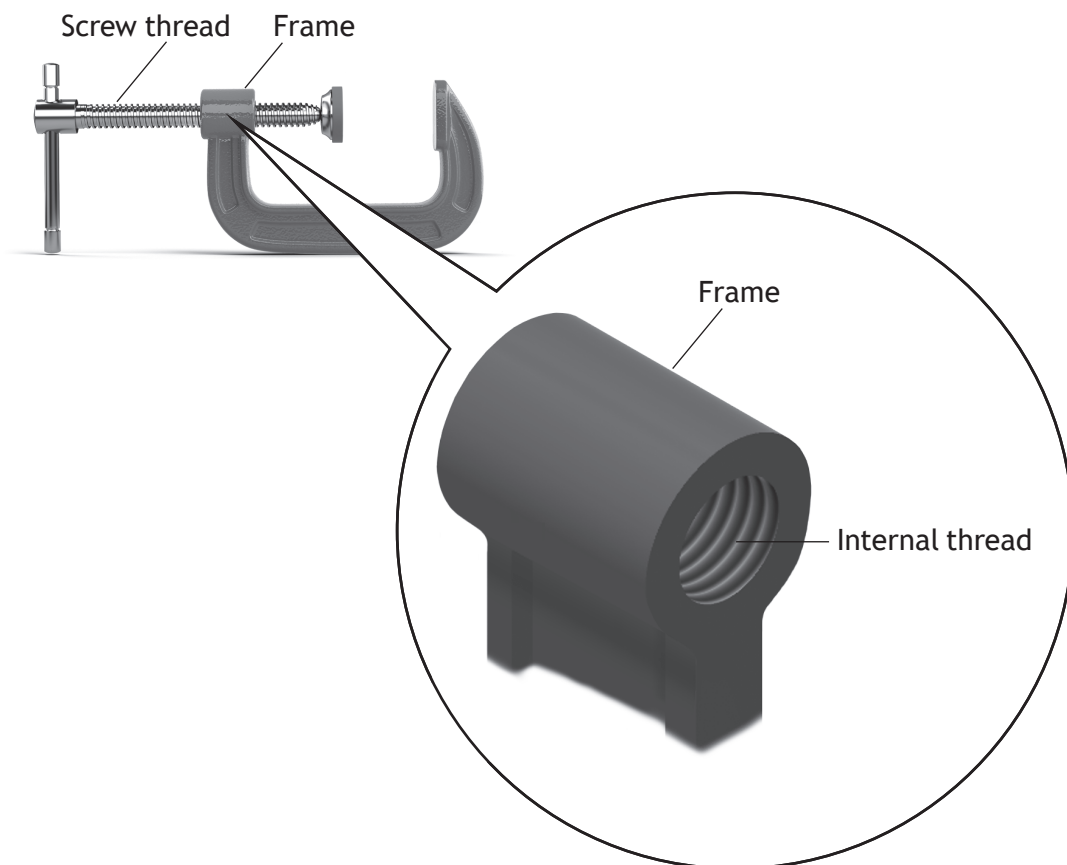


Total marks — 60
Attempt ALL questions

1. A G-cramp is used for cramping material securely to a surface. The drawing below shows how the G-cramp is to be made.



The frame of the G-cramp requires an internal thread to be cut as shown below.



1. (continued)

- (a) (i) Name the tool used to cut the internal thread in the frame. 1

- (ii) Complete the procedure for cutting the internal thread in the frame. 3

1 Drill pilot hole in frame.

2 _____

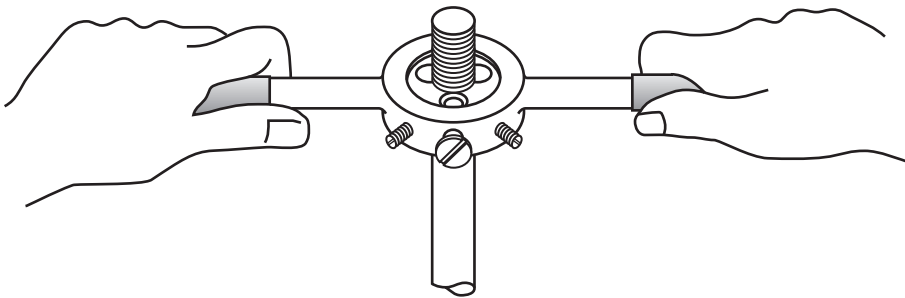
3 _____

4 Turn clockwise to begin cutting the thread.

5 _____

6 Repeat steps 4 and 5 until thread is fully cut.

- (b) The tool shown below was used to cut the screw thread.



- (i) Name this tool. 1

- (ii) Explain why the external thread on the screw must be cut after the internal thread in the frame is cut. 2

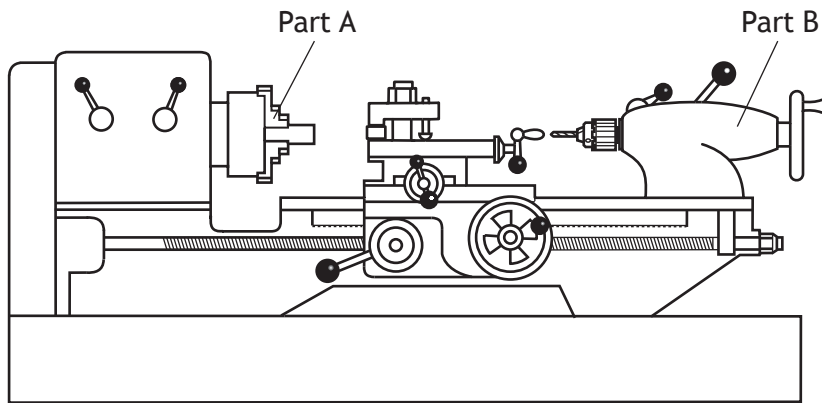


1. (continued)

MARKS

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The centre lathe shown below was used in the manufacture of parts of the G-cramp.



(c) Name Parts A and B.

2

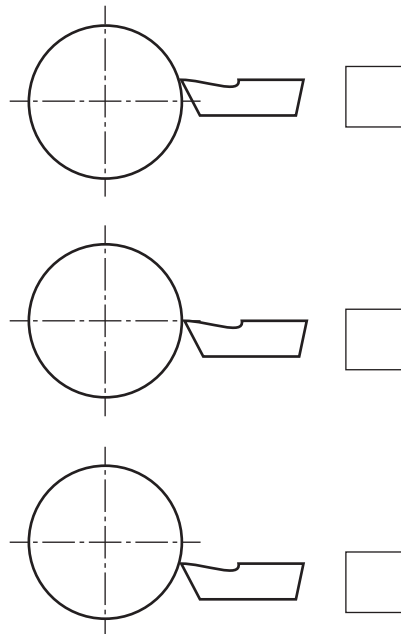
Part A _____

Part B _____

Setting the correct tool height is an essential part of the preparation process when using the centre lathe.

(d) (i) Identify the correct tool height by ticking (✓) one box below.

1



(ii) Describe what could happen if the cutting tool was not set at the correct height.

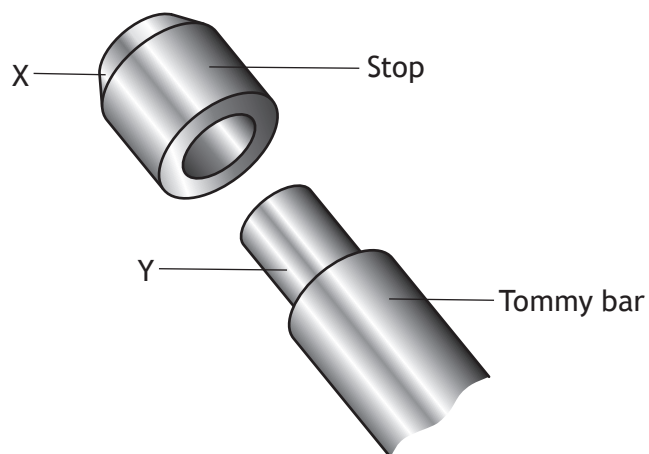
1



1. (continued)

MARKS
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MARGIN

The stop and tommy bar of the G-cramp are shown below.



The machining processes from the end of the stop and tommy bar are shown at X and Y above.

(e) Name the machining processes carried out at X and Y.

2

X _____

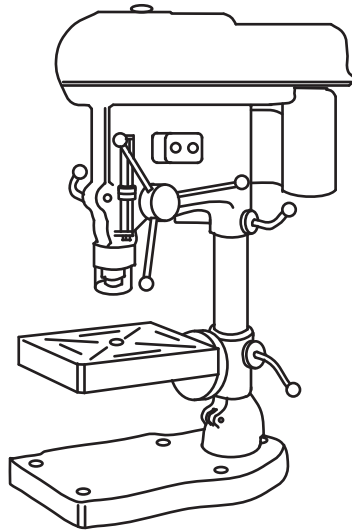
Y _____

[Turn over



1. (continued)

The machine below was used to drill a blind hole in the moveable jaw of the G-cramp.



(f) (i) Name this machine. 1

(ii) Explain what is meant by the term blind hole. 1

(iii) Describe two circumstances when it would be appropriate to reduce the speed of the machine. 2

1 _____

2 _____

(iv) Describe how the machine would be set to ensure that the hole is drilled to the correct depth. 1



1. (f) (continued)

- (v) Describe three safety checks that should be carried out on the machine before switching it on.

3

1 _____

2 _____

3 _____

Part of the moveable jaw of the G-cramp is made from high carbon steel.

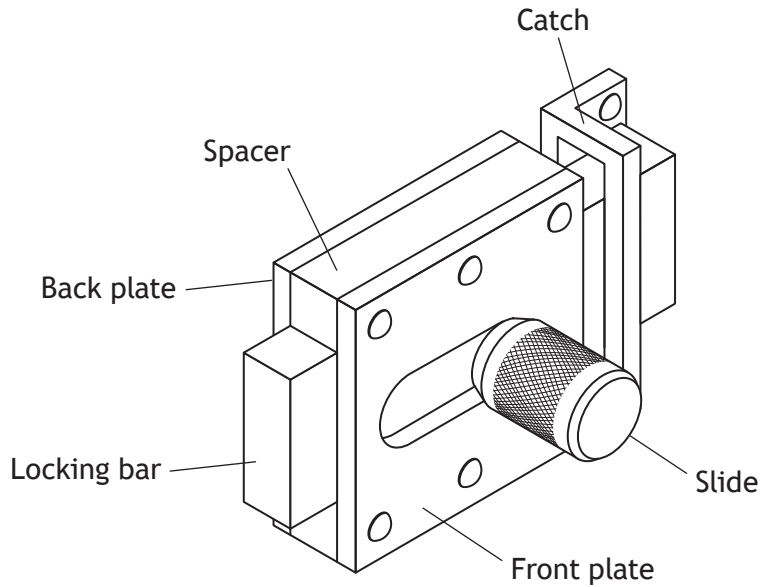
- (g) State one property of high carbon steel.

1

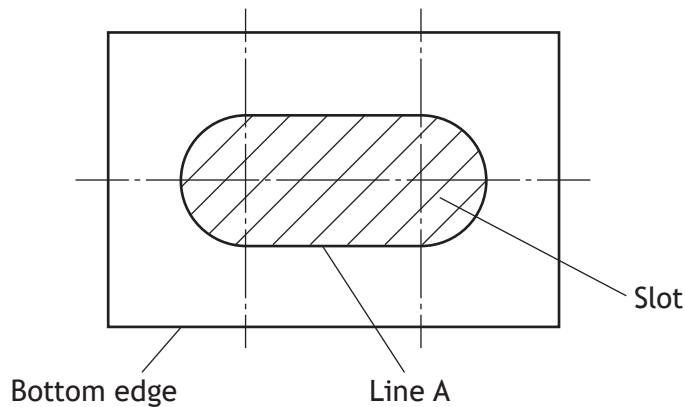
[Turn over



2. A door latch for a changing cubicle at the local sports centre is shown in the diagram below.



The front plate requires a slot to be cut. The marking out of the slot is shown in the diagram below.



Line A has to be parallel to the bottom edge of the front plate.

- (a) Name the marking tool which should be used to mark Line A.

1



2. (continued)

Waste material is produced as a result of cutting the slot. The waste material is placed in the appropriate recycling bin.

- (b) (i) Explain why it is important to recycle metal. Give two reasons.

2

Reason 1 _____

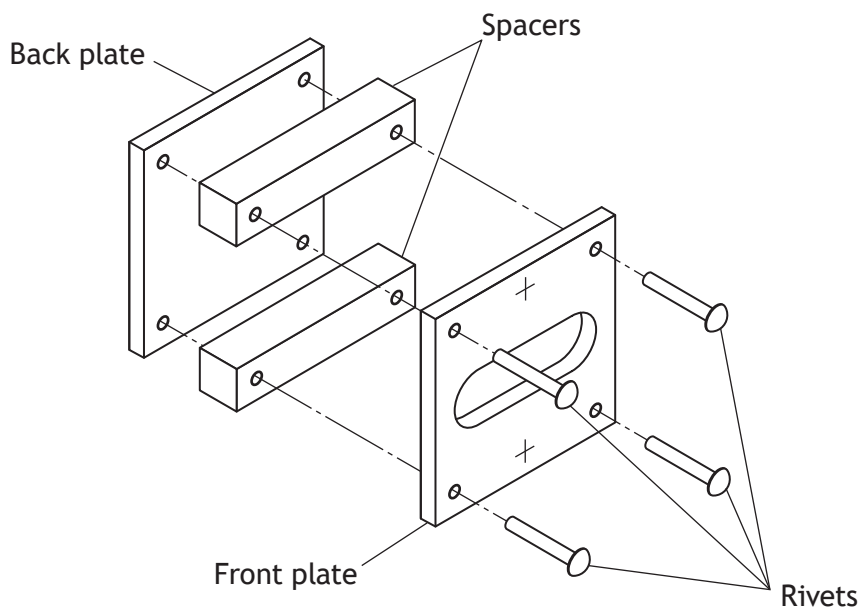
Reason 2 _____

Aluminium and mild steel are two metals that can be recycled.

- (ii) State the property of mild steel that would allow it to be separated from aluminium during the recycling process.

1

The diagram below shows an exploded view of part of the door latch.



Four rivet holes are to be drilled on the front and back plates.

The front plate was marked out and drilled before being used as a template for the back plate.

[Turn over



* S 8 6 1 7 5 0 1 0 9 *

2. (continued)

MARKS

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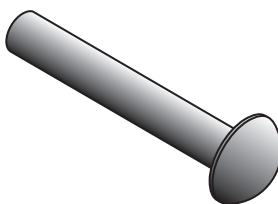
(c) Describe two advantages of using a template rather than marking out individual holes.

2

1 _____

2 _____

The type of rivet used to join the plates and spacers is shown below.



(d) Name this type of rivet.

1



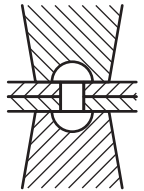
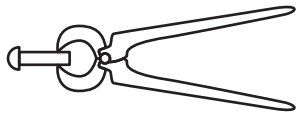



2. (continued)

MARKS DO NOT WRITE IN THIS MARGIN

The sequence of operations for riveting is shown below in the **correct** order. However, the diagrams that accompany the sequence of operations are shown in the **incorrect** order.

(e) Write the correct number of the sequence of operations in the box next to the diagram. The first one is done for you. 4

Sequence of operations	Diagrams	
<div style="border: 1px solid black; display: inline-block; padding: 2px 5px;">1</div> cut rivet to correct length		<div style="border: 1px solid black; width: 40px; height: 30px; margin: 0 auto;"></div>
<div style="border: 1px solid black; display: inline-block; padding: 2px 5px;">2</div> bring pieces of metal together with rivet set		<div style="border: 1px solid black; width: 40px; height: 30px; margin: 0 auto;"></div>
<div style="border: 1px solid black; display: inline-block; padding: 2px 5px;">3</div> swell the rivet with the flat face of the hammer		<div style="border: 1px solid black; width: 40px; height: 30px; margin: 0 auto;"></div>
<div style="border: 1px solid black; display: inline-block; padding: 2px 5px;">4</div> form rivet head with ball pein hammer		<div style="border: 1px solid black; display: inline-block; padding: 2px 5px;">1</div>
<div style="border: 1px solid black; display: inline-block; padding: 2px 5px;">5</div> finish forming head with snap		<div style="border: 1px solid black; width: 40px; height: 30px; margin: 0 auto;"></div>

It was decided that the rivet joint formed on the back plate to the spacer would be a countersink.

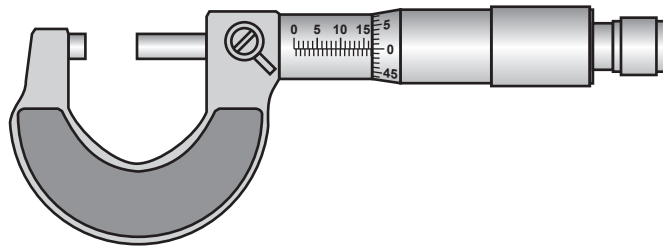
(f) Explain one advantage of countersinking the rivet instead of forming a dome. 1



2. (continued)

MARKS DO NOT WRITE IN THIS MARGIN

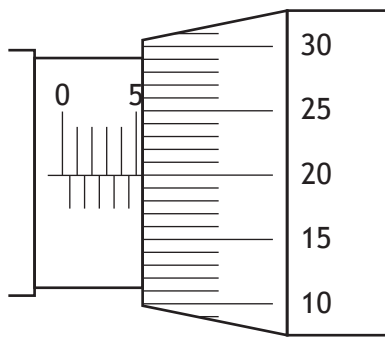
The tool shown below was used during the manufacture of the door latch.



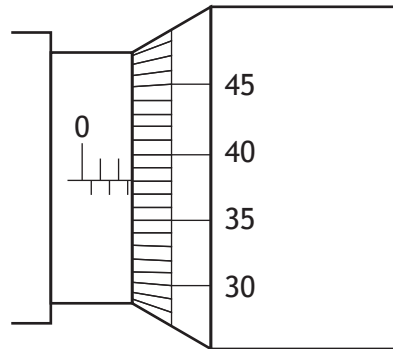
(g) (i) Name this tool.

1

Two readings from the tool are shown below.



Reading A



Reading B

(ii) State the correct readings shown above.

2

Reading A _____

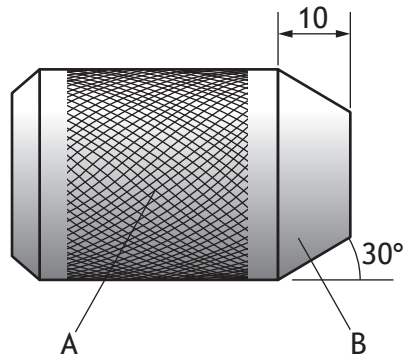
Reading B _____



2. (continued)

MARKS
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The slide on the door latch is shown below.



- (h) (i) Name the turning process shown at A. 1

- (ii) State an adjustment to the centre lathe that may be necessary before carrying out the process shown at A. 1

- (iii) Name the turning process shown at B. 1

The slide on the door latch is made from aluminium.

- (i) State two properties of aluminium that make it suitable for the slide. 2

1 _____

2 _____

[Turn over



2. (continued)

- (j) Describe two health and safety issues in this picture of a metalworking bench, other than it being untidy.

2



Issue 1 _____

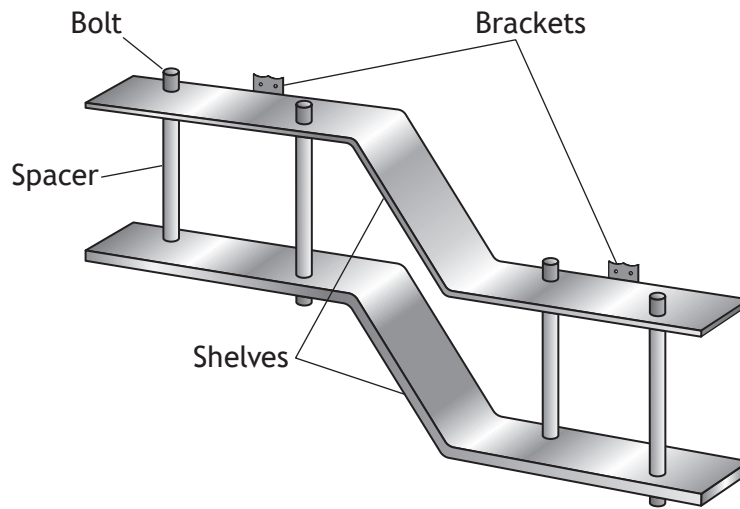
Issue 2 _____

[Turn over



* S 8 6 1 7 5 0 1 1 4 *

3. The diagram below shows a metal shelving unit.



The spacers are made from $\text{Ø}12\text{mm}$ round bar. The ends are drilled to accommodate the bolt. The tool shown below was used in this process.



(a) (i) Name this tool.

1

The shelves are made from sheet metal drilled using a pillar/pedestal drill.

(ii) Name the device that would be used to secure/hold the shelves for drilling.

1

(iii) Explain one reason why the shelves are shaped and drilled before bending.

1

[Turn over



3. (continued)

The shelves are manufactured from mild steel.

The mild steel becomes work hardened when shaped. It is annealed to make it soft and workable.

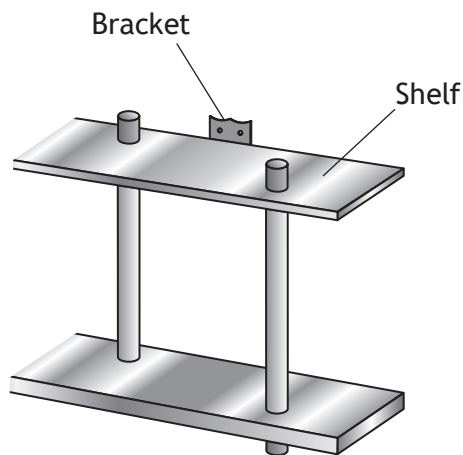
(b) (i) Explain the term, work hardened.

1

(ii) Describe the process of annealing mild steel.

2

An enlarged view of the bracket and shelf is shown below. The bracket is also made from mild steel.



(c) Describe a suitable method of joining the brackets to the shelves, other than using an adhesive or glue.

1

3. (continued)

The spacer is made from brass, which is a metal alloy.

(d) Describe what is meant by the term alloy.

1

(e) State a property of brass that makes it a suitable material for the spacer.

1

(f) (i) State one possible finish that could be applied to the shelving unit.

1

(ii) State two reasons for applying a finish to the shelving unit.

2

Reason 1 _____

Reason 2 _____

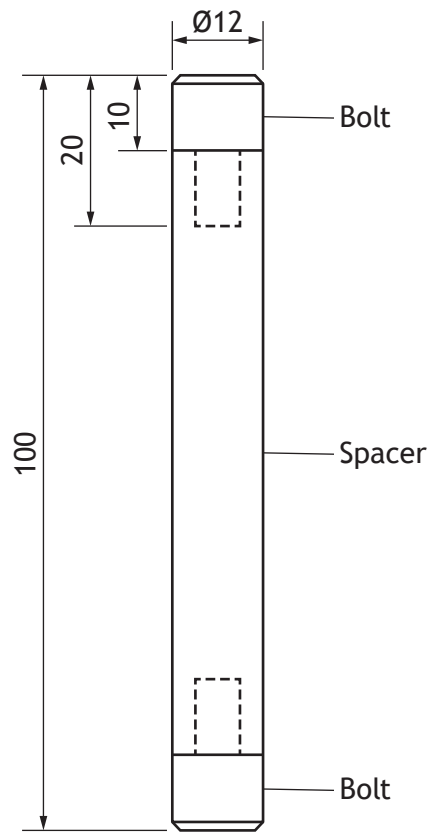
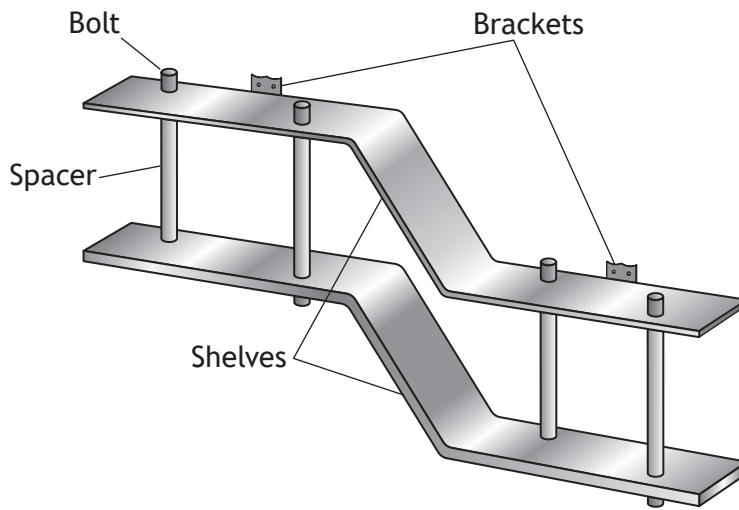
[Turn over for next question



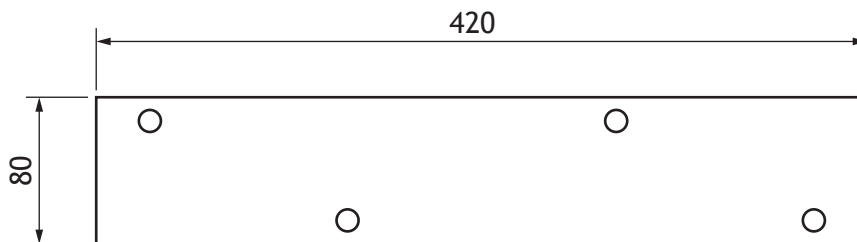
3. (continued)

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Drawings of the shelving unit are shown below.



Spacer Assembly



Shelf



* S 8 6 1 7 5 0 1 1 8 *

3. (continued)

MARKS

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- (g) Using the information from the drawings on *page 18*, complete the cutting list below.

4

Part	Quantity	Length	Width	Thickness	Material
Shelf	2	420		2	Mild steel
Spacer	4		Ø12	N/A	Brass
Bolt			Ø12	N/A	Brass
Bracket	2	25	25	1	Mild steel

All sizes in millimetres

[END OF SPECIMEN QUESTION PAPER]



* S 8 6 1 7 5 0 1 1 9 *

MARKS

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ADDITIONAL SPACE FOR ANSWERS AND ROUGH WORK



* S 8 6 1 7 5 0 1 2 0 *

MARKS

DO NOT
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THIS
MARGIN

ADDITIONAL SPACE FOR ANSWERS AND ROUGH WORK



* S 8 6 1 7 5 0 1 2 1 *



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Practical Metalworking

Marking Instructions

These marking instructions have been provided to show how SQA would mark this specimen question paper.

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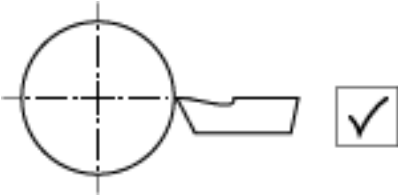
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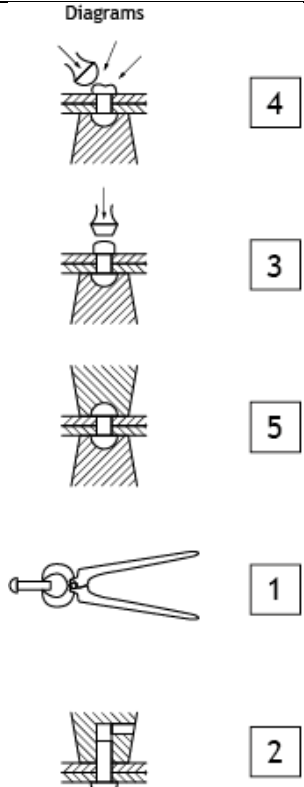
General marking principles for National 5 Practical Metalworking

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this paper. These principles must be read in conjunction with the detailed marking instructions, which identify the key features required in candidate responses.

- (a) Marks for each candidate response must always be assigned in line with these general marking principles and the detailed marking instructions for this assessment.
- (b) Marking should always be positive. This means that, for each candidate response, marks are accumulated for the demonstration of relevant skills, knowledge and understanding: they are not deducted from a maximum on the basis of errors or omissions.

Marking instructions for each question

Question			Expected answer(s)	Max mark	Additional guidance
1.	(a)	(i)	Tap	1	Accept any reference to 'tap'
		(ii)	2 Cramp the taper tap in the tap wrench. 3 Apply a suitable lubricant (eg cutting compound). 5 Turn anti-clockwise to break thread cuttings.	3	
	(b)	(i)	Any one of the following: <ul style="list-style-type: none"> Die Split die Die stock 	1	
		(ii)	Because the die can be adjusted for the external thread (1 mark) but the tap can't be adjusted for the internal thread (1 mark).	2	
	(c)		Part A Chuck Part B Tailstock	2	
	(d)	(i)		1	
	(d)	(ii)	Any one of the following: <ul style="list-style-type: none"> the tool would not cut the metal the cutting tool could catch/break the finish would be poor machine vibration would be evident/heard 	1	
	(e)		X Chamfering Y Parallel turning	2	
	(f)	(i)	Pillar/pedestal drill	1	
		(ii)	A hole that does not go all the way through a piece of material.	1	
		(iii)	When drilling a harder material. When drilling a larger hole.	2	
		(iv)	Any one of the following: <ul style="list-style-type: none"> set depth stop mark drill/drill spindle with pencil/pen/chalk/masking tape check with Vernier callipers 	1	
		(v)	Any three of the following: <ul style="list-style-type: none"> position of safety button chuck key removed speed checked chuck guard down work is held securely 	3	

Question		Expected answer(s)	Max mark	Additional guidance
1.	(g)	Any one of the following: <ul style="list-style-type: none"> tough/hard-wearing/durable impact resistant/won't dent hard heavy hardened 	1	
2.	(a)	Oddleg callipers	1	
	(b)	(i) Any two of the following: <ul style="list-style-type: none"> recycled metals can be made into something useful saves finite resources/stops metal ore running out less damage to the environment by mining landfill sites will not fill up as quickly so fewer landfills needed 	2	One mark for each unique point (eg cannot be two points about mining)
		(ii) (Steel contains iron therefore it is) Magnetic	1	
	(c)	Any two descriptions covering the following: <ul style="list-style-type: none"> to accurately align the four holes all parts will be the same/consistent reusable neater saves time/faster than re-marking/measuring 	2	
	(d)	Snap head rivet	1	
	(e)	Diagrams 	4	

Question			Expected answer(s)	Max mark	Additional guidance
2.	(f)		It will allow the latch to be screwed flush/flat onto the cubicle door	1	
	(g)	(i)	Micrometer	1	
		(ii)	Reading A = 5.2mm Reading B = 2.88mm	2	
	(h)	(i)	Knurling	1	
		(ii)	Any one of the following: <ul style="list-style-type: none"> • reduce feed rate • reduce speed 	1	
		(iii)	Taper turning	1	
	(i)		Any two of the following: <ul style="list-style-type: none"> • does not rust/corrosion resistant • requires no finish • lightweight • easy to turn (on a metal lathe)/easily machined 	2	
	(j)		Any two of the following: <ul style="list-style-type: none"> • file handle is missing/exposed tang • drill bit in power drill • chuck key in power drill • sheet metal overhanging bench • folding bars overhanging bench • hacksaw blade lying loose • drills lying loose • mallet on top of power drill • cable from power drill unprotected 	2	
3.	(a)	(i)	Centre drill	1	
		(ii)	Machine vice	1	
		(iii)	Work holding issues, ie it is easier to hold the part while it is flat	1	
	(b)	(i)	As the metal is worked and shaped by tools, it becomes harder/more brittle, making it more difficult to shape correctly	1	
		(ii)	Heat the metal to cherry red, then cool slowly (in sand)	2	
	(c)		Any one of the following: <ul style="list-style-type: none"> • spot welding • welding • soldering • riveting • screwing 	1	
	(d)		A mixture of two or more metals	1	

Question		Expected answer(s)	Max mark	Additional guidance																
3.	(e)	Any one of the following: <ul style="list-style-type: none"> resistant to corrosion fairly hard easy to solder polishes to a good finish 	1	Do not accept 'Good conductor of heat and electricity'																
	(f)	(i) Any one of the following: <ul style="list-style-type: none"> polishing bluing (chemical finish) paint powder-dip coating 	1																	
		(ii) Protect from corrosion (rust) Decorative purposes	2																	
	(g)	<table border="1"> <thead> <tr> <th>Part</th> <th>Quantity</th> <th>Length</th> <th>Width</th> </tr> </thead> <tbody> <tr> <td>Shelf</td> <td></td> <td></td> <td>80</td> </tr> <tr> <td>Spacer</td> <td></td> <td>80</td> <td></td> </tr> <tr> <td>Bolt</td> <td>8</td> <td>20</td> <td></td> </tr> </tbody> </table>	Part	Quantity	Length	Width	Shelf			80	Spacer		80		Bolt	8	20		4	
Part	Quantity	Length	Width																	
Shelf			80																	
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Bolt	8	20																		

[END OF SPECIMEN MARKING INSTRUCTIONS]