



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

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**METALWORK**

**6040/01**

Paper 1 Theory, Drawing and Design

**October/November 2007**

**2 hours 45 minutes**

Additional Materials:     A2 Drawing Paper (1 sheet)  
                                  Answer Paper  
                                  Standard drawing equipment



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**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.  
Write in dark blue or black pen.  
You may use a soft pencil for any diagrams, graphs or rough working.  
Do not use staples, paper clips, highlighters, glue or correction fluid.

**Section A**

Answer any **three** questions.  
Write your answers on the separate Answer Paper provided.

**Section B**

Answer **all** questions.  
Use the A2 sheet of Drawing Paper prepared prior to the examination for your answers.  
All dimensions are in millimetres unless otherwise stated.  
Except where pictorial views are used **all** diagrams are in First Angle Projection.

At the end of the examination, fasten together the separate Answer Paper for Section A and place it within your folded Drawing Paper for Section B.  
The number of marks is given in brackets [ ] at the end of each question or part question.

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This document consists of **7** printed pages and **1** blank page.



## Section A

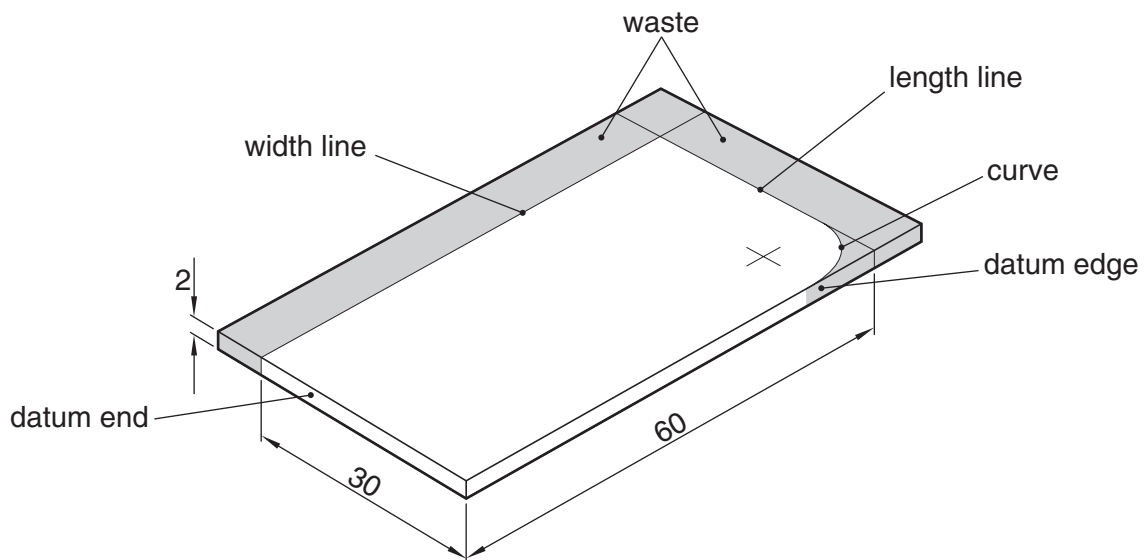
## Theory

Answer any **three** questions in this section.

**Use bold sketches to illustrate your answers wherever possible.**

You are advised to spend 1 hour 15 minutes on Section A.

- 1 Fig. 1 shows a piece of mild steel with lines which are to be worked to.



**Fig. 1**

- (a) Use notes and sketches to explain how you would:

(i) mark out the length; [3]

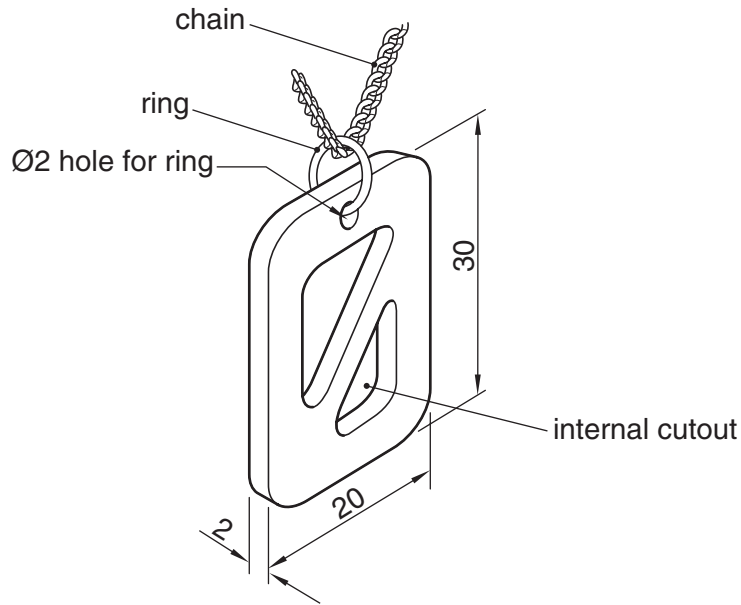
(ii) mark out the width; [3]

(iii) mark out the curve which has a radius of 10mm. [3]

- (b) Use notes and sketches to explain how you would remove the area of waste and finish the surfaces down to the lines marked.

Make sure you name tools for holding, cutting and finishing the steel. [8]

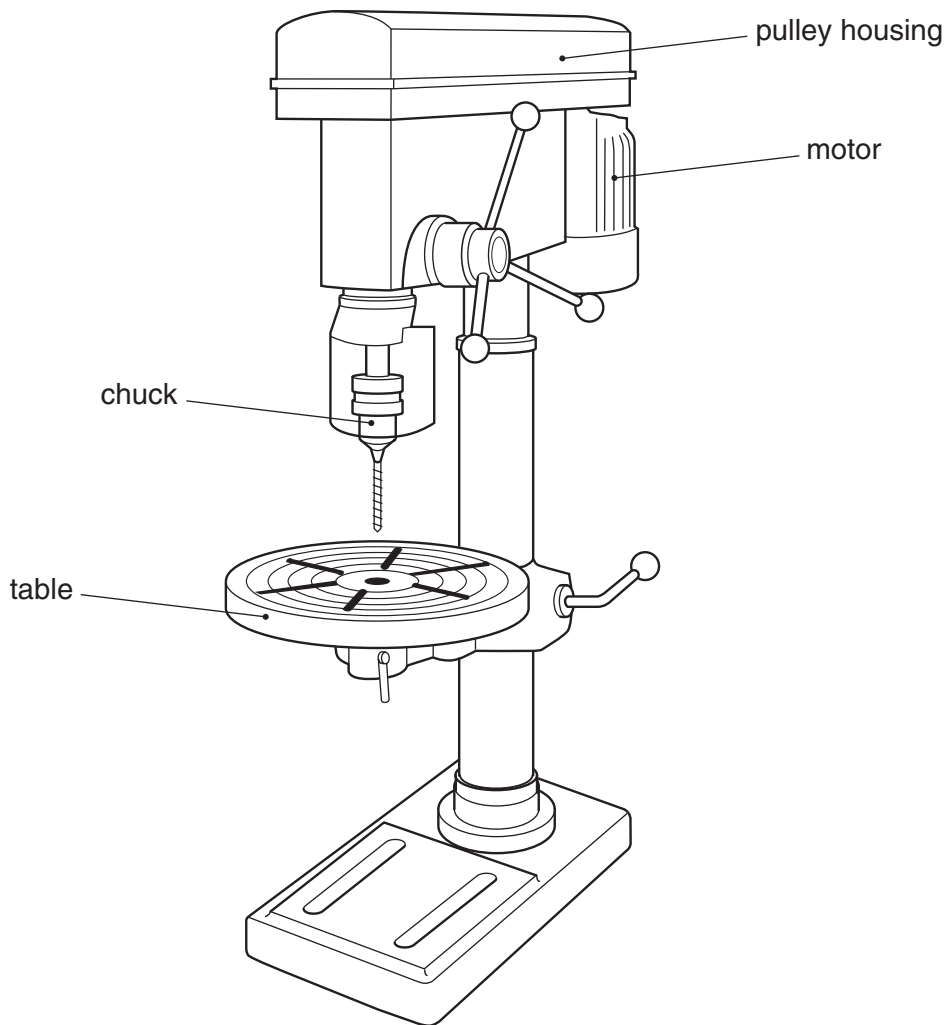
- 2 Fig. 2 shows a design for a pendant to hang on a chain as a necklace. (Drawn larger than full size.)



**Fig. 2**

- (a) Name a suitable non ferrous metal for the pendant. [1]
- (b) Use notes and sketches to explain how you would:
- (i) mark out and remove the waste from one of the internal cutouts; [4]
  - (ii) finish the edges of the internal cutout; [4]
  - (iii) mark out and cut the  $\text{Ø}2$  hole for the ring; [4]
  - (iv) finish the front surface. [4]

3 Fig. 3 shows a drilling machine.

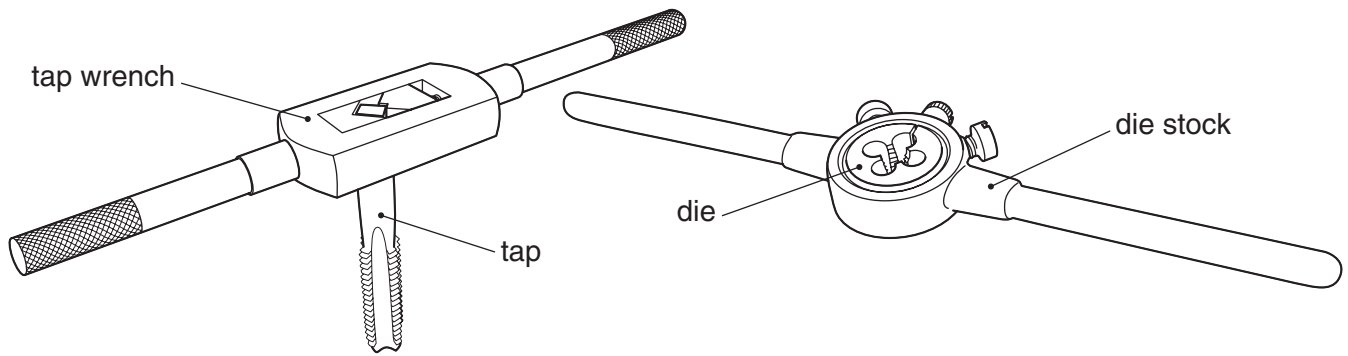


**Fig. 3**

Using notes and sketches explain:

- (a) (i) how the power is transferred from the motor through to the chuck spindle; [4]  
 (ii) how the speed of the chuck spindle can be altered; [3]
- (b) **three** ways in which metal being drilled can be held on the table; [6]
- (c) the methods of altering the height and the angle of the table. [4]

4 Fig. 4 shows tools which are used to cut internal and external threads by hand.



**Fig. 4**

(a) Use notes and sketches to describe how to:

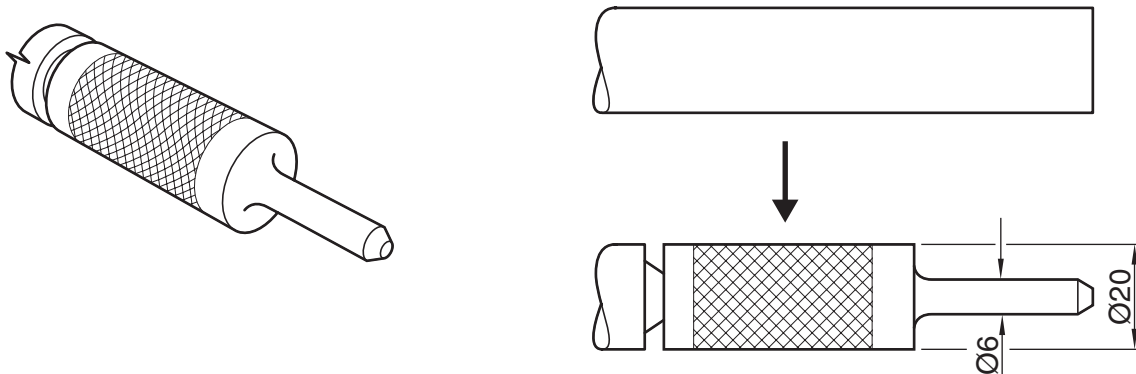
(i) cut an M8 internal thread in 6mm thick mild steel; [8]

(ii) cut an M8 external thread to fit the threaded hole in (i). [7]

(b) Lubricants are essential when cutting threads.

Explain the purpose of the lubricant in the process. [2]

5 Fig. 5 shows a piece of mild steel bar which has been turned on a lathe.



**Fig. 5**

(a) There are several processes which have been carried out to produce the shape shown in Fig. 5. Use notes and sketches to explain how the shape would be turned on the lathe. [12]

(b) Name the chuck that would be used to hold the mild steel bar and use notes and sketches to describe how the chuck works. [5]

## Section B Drawing and Design

Answer **all** questions in this section.

Use the sheet of A2 drawing paper prepared prior to the examination for your answers.

Set the paper with the long edge to the top of your drawing board and use the space to the right of the line for your freehand sketches in answer to question 6.

**Use only one side of your paper.**

Dimensions not given are left for you to decide.

Fig. 6 and Fig. 7 show incomplete details of a surface gauge. The gauge is used to mark out lines on metal.

- 6** To the right of the vertical line on your paper make a series of sketches leading to the solution of the design problems below. **Brief** notes should be added to identify details such as important sizes and specific materials. It should be possible for the examiner to understand your solutions from these sketches.

To solve these problems you may incorporate additional parts and make minor modifications to the given components. Methods of assembly should **not** include welding, brazing or the use of adhesives.

### Design Problems

A method of securing the scriber to the column so that the scriber can be:

- (a) secured to the column but adjusted in height;
- (b) adjusted so that the scriber can swivel;
- (c) locked at the chosen height.

- 7** Draw full size, in first or third angle orthographic projection, the following views of the surface gauge complete with your solution to the design problems in Question 6.

- (a) A front elevation in the direction of arrow **A**
- (b) A sectional end view in the direction of arrow **B**

Mark allocation:  
 Communication [24]  
 Design [25]

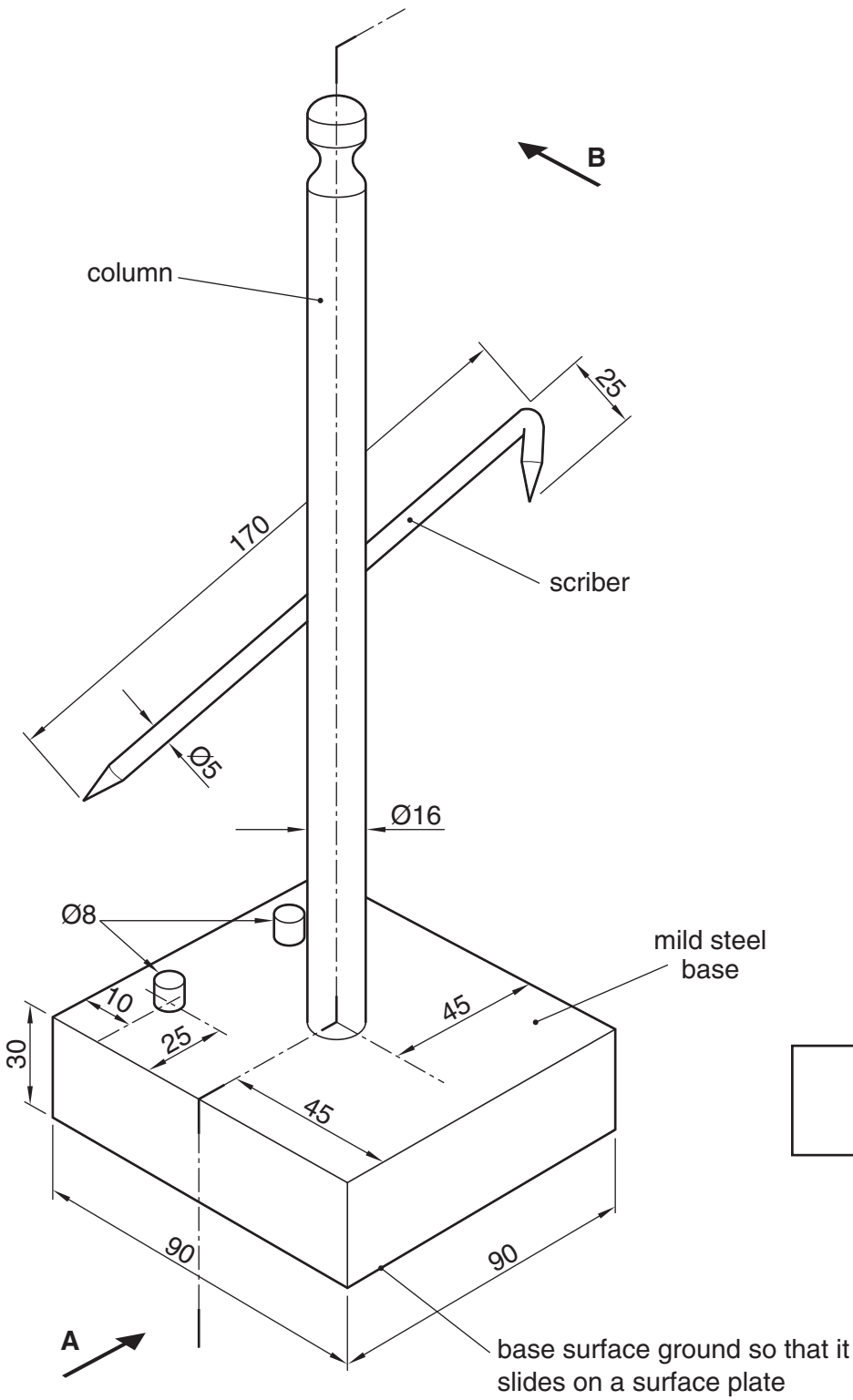


Fig. 6

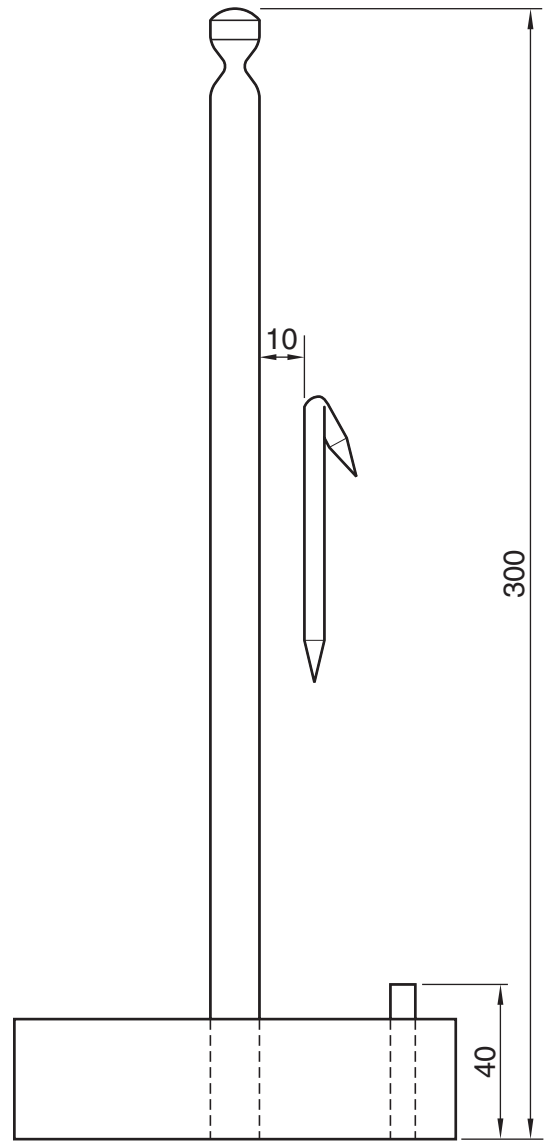


Fig. 7

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