UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

METALWORK **6040/01**

Paper 1 Theory, Drawing and Design **October/November 2009**

2 hours 45 minutes

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

0059558054

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.

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.

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 three pairs of metal pieces to be joined together in **three** different ways.

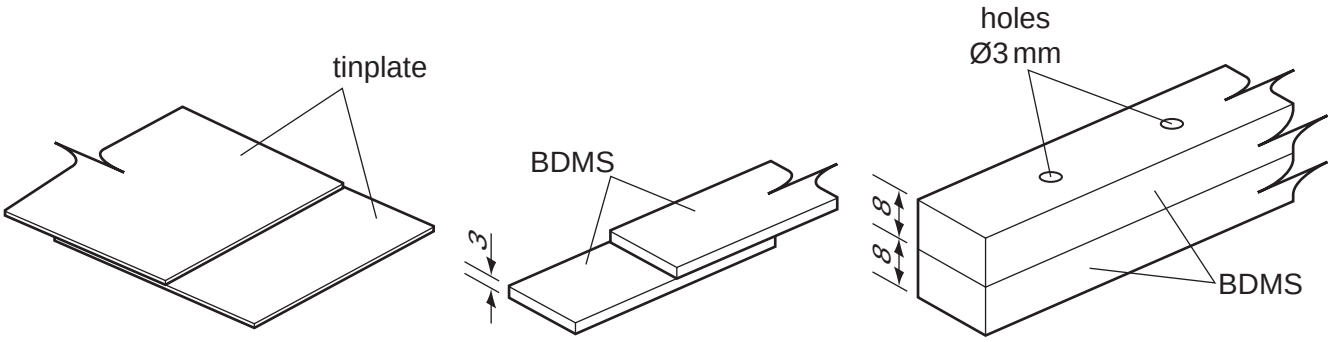

Fig. 1

(a) Name the most appropriate method of joining in each situation:

A a heat method of permanently joining the tinplate;

B a heat method of permanently joining the BDMS;

C a method of joining BDMS so that the pieces could be taken apart. [3]

(b) Use notes and sketches to describe how you would complete **one** of these joints to include details of how to:

(i) prepare the materials for joining; [4]

(ii) complete the stages of the joint, including the tools used and how to hold the materials whilst joining. [10]

2 Fig. 2 shows processes carried out on a centre lathe.

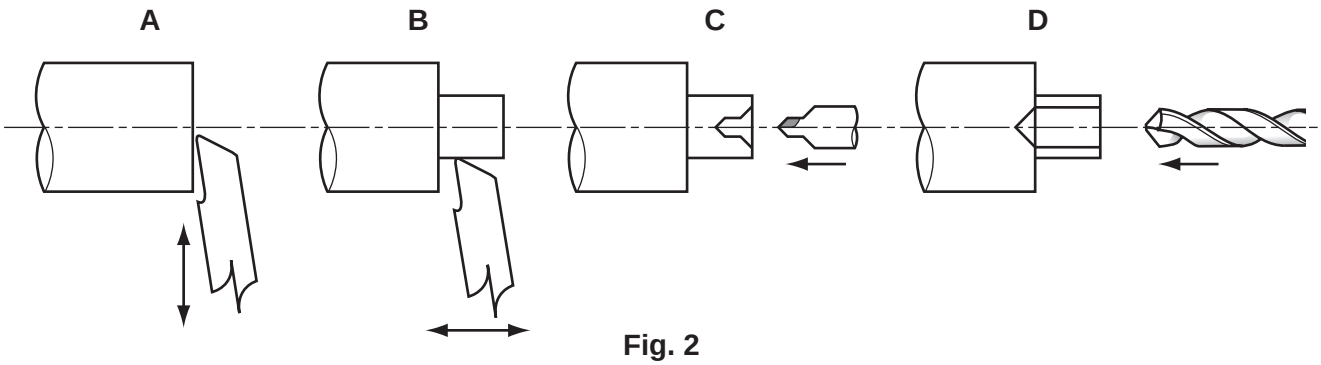

Fig. 2

(a) Name and briefly describe each of the processes (**A**-**D**). [8]

(b) Use notes and sketches to describe:

(i) how the round bar would be held on the centre lathe; [3]

(ii) in processes **A** and **B**, how the tool would be held; [3]

(iii) in processes **C** and **D**, how the tools would be held. [3]

3 Fig. 3 shows a piece of equipment used in forgework.

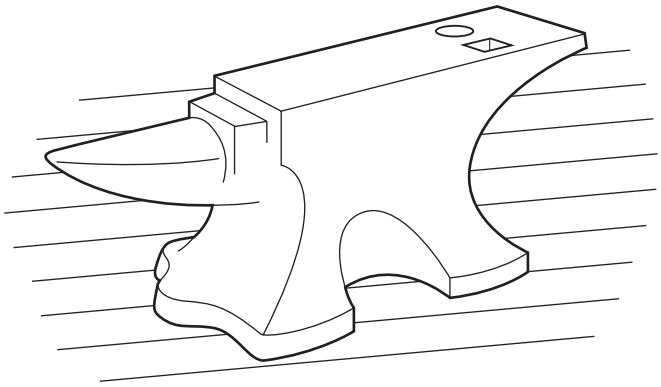

Fig. 3

(a) (i) Name the piece of equipment in Fig. 3. [1]

(ii) Name and briefly describe **three** processes which can be completed on hot metal using this piece of equipment. [9]

(b) Fig. 4 shows an eye that has been formed from 6 mm square steel.

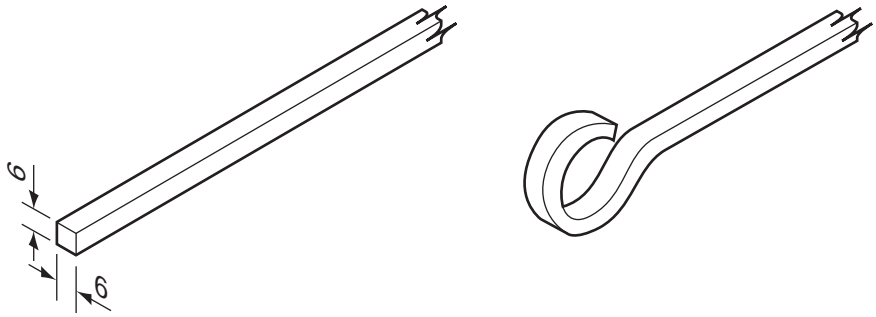

Fig. 4

Using notes and sketches, describe each of the stages of forming the eye. [7]

4 **(a)** Name **two** ferrous metals and **two** non ferrous metals and briefly describe what each could be used for. [8]

(b) Fig. 5 shows the corner of a piece of non ferrous sheet metal which has been shaped and drilled.

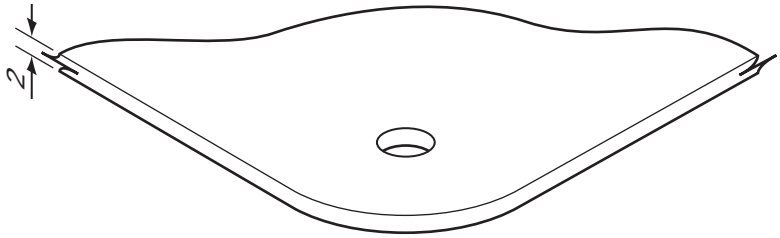

Fig. 5

Use notes and sketches to show how you would:

(i) mark out the metal before cutting; [3]

(ii) drill the hole and shape the corner. [6]

5 Fig. 6 shows a drilling machine.

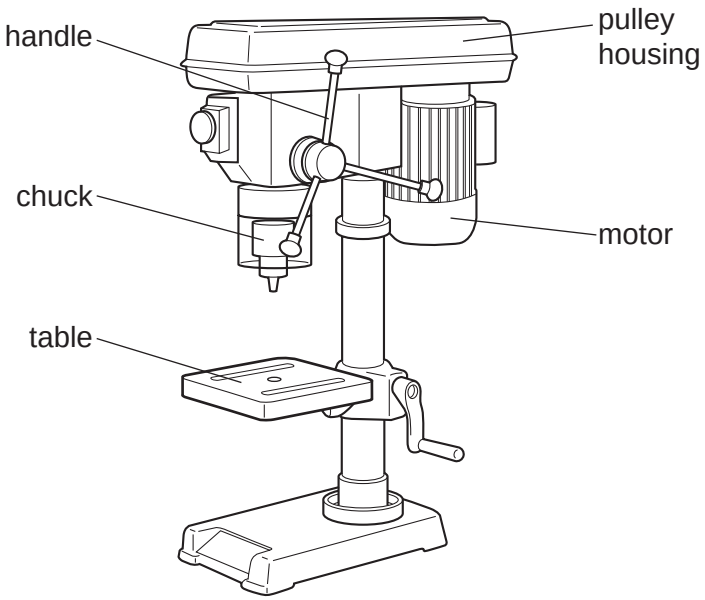

Fig. 6

(a) Use notes and sketches to describe how:

(i) the motor drives the chuck; [6]

(ii) the handle lowers the chuck. [6]

(b) Use notes and sketches to show how to drill a stopped hole. [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. 7 shows details of the base and arm of an adjustable desk lamp. Details of the lamp and shade have not been included. The base, including the support, is made from a single casting in aluminium.

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 clarify 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 the use of adhesives.

Design Problems

(a) A method of locking the base arm to the support in the position shown in Fig. 7 so that it cannot be adjusted.

(b) A method of adjusting the angle of the top arm with a device which allows the unlocking and locking of the pivot points. This method of locking needs to ensure that the arm and lamp bracket do not slip once locked.

7 Draw full size in either first or third angle orthographic projection the following views of the assembled adjustable lamp, complete with your solution to the design problems in Question 6.

(a) A front view in the direction of arrow **Y**

(b) A sectional end view in the direction of arrows **X**–**X**

Mark allocation:
Communication [25]
Design [24]

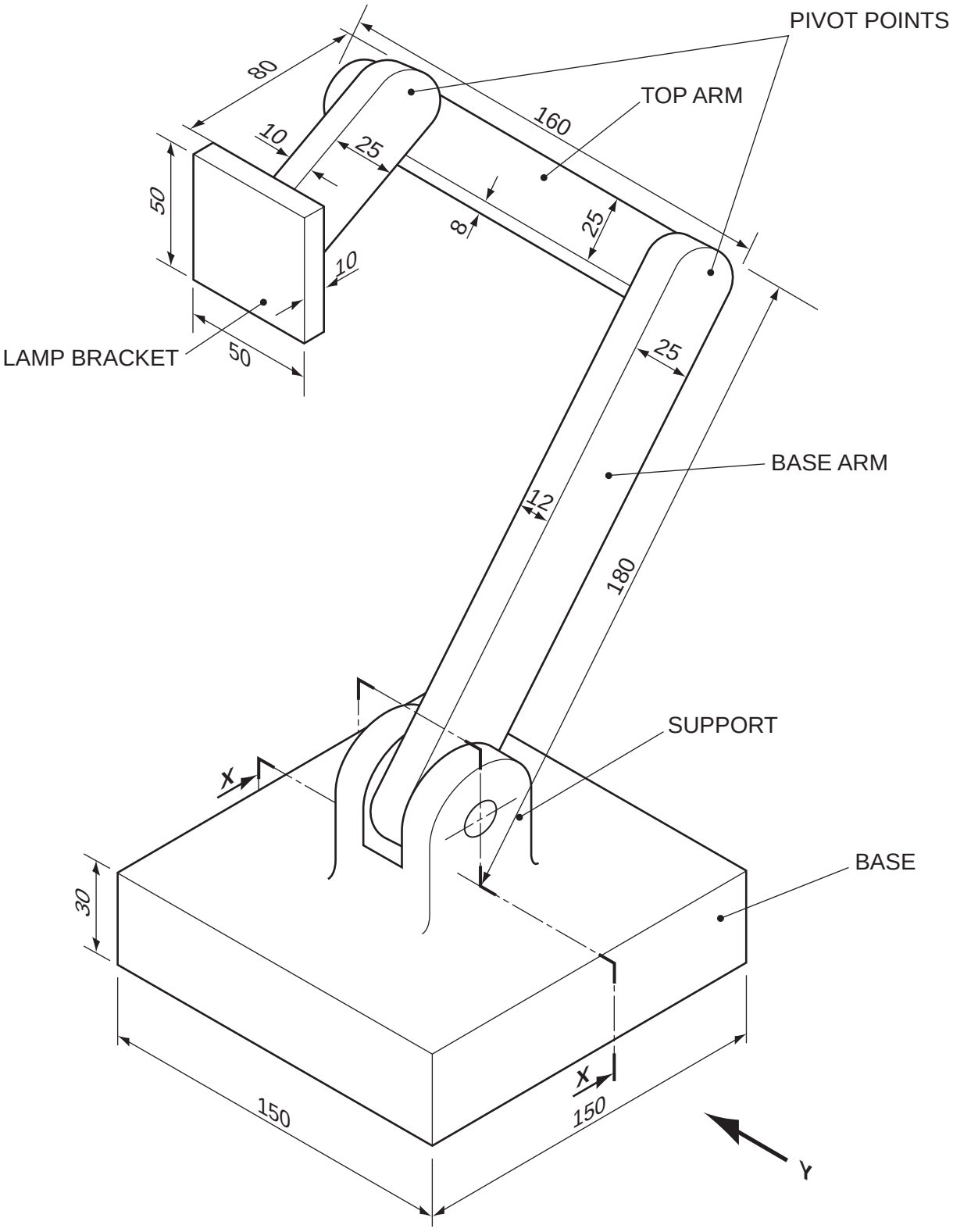

Fig. 7

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