

**AN ROINN OIDEACHAIS**

**LEAVING CERTIFICATE EXAMINATION, 1995**

**TECHNICAL DRAWING - HIGHER LEVEL**

**PAPER II(A) - ENGINEERING APPLICATIONS**

**MONDAY, 19 JUNE - MORNING, 9.30 to 12.30**

**200 Marks**

**INSTRUCTIONS**

- (a) Answer four questions.
- (b) All questions carry equal marks.
- (c) Drawings and sketches should be in pencil unless otherwise stated.
- (d) Where dimensions are omitted they may be estimated.
- (e) Credit will be given for neat orderly presentation of work.
- (f) Candidates should work on one side of the paper only.
- (g) The Examination Number should be written on each drawing sheet used.
- (h) All dimensions are in millimetres.

1. An elevation and end elevation of an electrode are given in Fig. 1 in third angle projection.

(a) Draw, in first angle projection, the given elevation, an end elevation viewed in the direction of arrow E and a plan viewed in the direction of arrow P. Insert six leading dimensions, the title ELECTRODE and the appropriate projection symbol.

(b) Make a full size isometric drawing of the electrode. The drawing should be made on drawing paper and should have X as its lowest point.

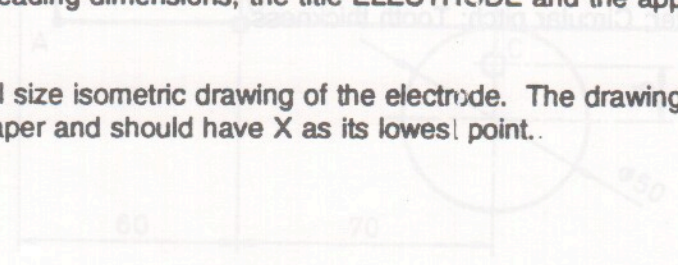


FIG 5

**OVER->**

2. A sectional elevation of a swashplate plunger pump assembly is shown in Fig. 2 on a separate page. This type of pump is used to operate the hydraulic system of aircraft.

The pump is driven by the rotation of the shaft (A) and swashplate (B). The swashplate operates as a cam and with the compression springs causes the plungers of the pump to reciprocate. Plunger movement to the left opens the inlet valve and draws the fluid into the pump. Plunger movement to the right closes the inlet valve and opens the delivery valve which pumps high pressure fluid into the hydraulic system.

The principal components of the pump are: SHAFT, SWASHPLATE, ENDPLATE, FLUID SEAL, BEARING, CIRCLIP, SPRING SEAT, COMPRESSION SPRING, SPIGOT BEARING, INLET VALVE and DELIVERY VALVE. All valves in the drawing are shown in the closed position.

- (i) Name each of the components of the pump directly on to the drawing in the spaces provided. The lettering should be in neat, drawing standard, block capitals.
- (ii) Show, with the aid of arrows on the drawing, the fluid flow through the pump.

**Add your examination number to the page and return it with your drawings in the envelope.**

- (iii) Sketch separately, on a drawing sheet, the delivery valve in the open position.

3. Details of a Bracket (Part 1), Spur Gear (Part 2) and a Spindle (Part 3) are given in Fig. 3. The Spur Gear has 20 involute teeth with module 10 mm and a pressure angle of  $20^\circ$ .

- (a) Draw a full size sectional plan A-A showing the parts assembled. Show one involute tooth, with a full tooth space on each side, when drawing the Spur Gear. (Part 2).

- (b) Insert item references, the title IDLER GEAR and tabulate on the sheet the following values for the Spur Gear:-

Pitch circle diameter; Addendum circle diameter; Dedendum circle diameter; Base circle diameter; Circular pitch; Tooth thickness.

4. (a) The surface development of a cylindrical shape is shown in Fig. 4a. Draw three views of the developed shape in third angle projection with the seam edge in the centre of the front elevation.
- (b) The plan and elevation of a ventilation hood is shown in Fig. 4b.
- (i) Draw the given views.
- (ii) Draw a surface development of the hood with the seam on the shortest edge.
5. (a) Draw the profile and displacement diagram for a cam rotating at 60 revolutions per minute, in an anti-clockwise direction, and imparting the following motion to an in-line knife edge follower:-
- |                      |  |
|----------------------|--|
| $\frac{1}{4}$ Second | Dwell  |
| $\frac{1}{2}$ Second | Rise 42 mm with uniform acceleration and retardation |
| $\frac{1}{4}$ Second | Dwell  |
| $\frac{1}{4}$ Second | Fall 42 mm with simple harmonic motion               |

The minimum distance between the central axis and the cam edge is 45 mm.

- (b) In the mechanism shown in Fig. 5 the lever AB turns about the fixed point O, due to the rotation of the 50 mm eccentric cam about its axis of rotation C. A connecting rod AD, which is pin-jointed to AB, causes the piston to reciprocate in the cylinder as shown. Draw the mechanism in the position shown and also in the position which shows the piston at the lowest point of travel and the lever AB turned through its maximum angle. Measure and dimension on the drawing both the angle through which the lever turns and the length of stroke of the piston.

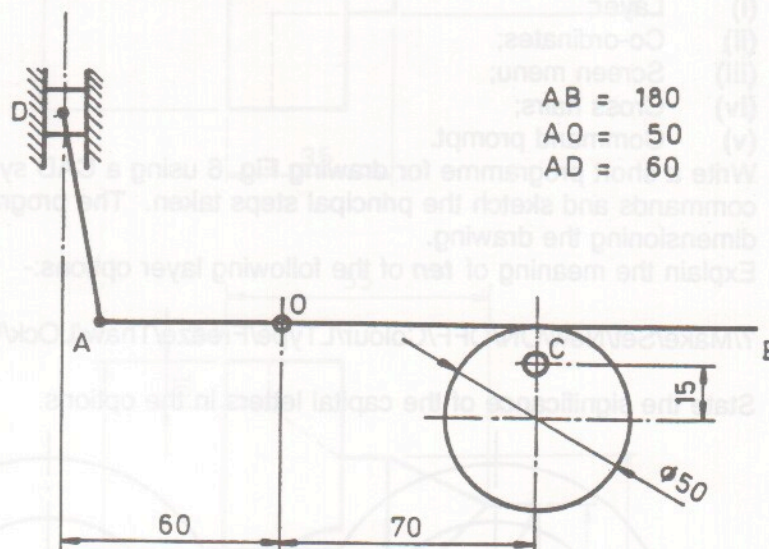


FIG. 5

OVER->

6. Answer SECTION A or SECTION B but not both.

**SECTION A**

(a) Draw two views of a pipe flange using the following data:-

Diameter of flange	130 mm
Nominal bore diameter	50 mm
Pitch circle diameter	100 mm
Number of bolt holes	8
Diameter of bolts	16 mm
Thickness of flange	15 mm

Fully dimension the drawing.

(b) Draw, to a scale twice full size, a single longitudinal view of a hexagonal bolt suitable for joining two of the above flanges. Add the principal dimensions of the bolt.

(c) Sketch freehand the following structural steel sections:-

- (i) Angle;
- (ii) Tee;
- (iii) Channel;
- (iv) Universal beam.

Indicate on the sketches the following parts where they apply: heel, toe, table, stalk or stem, web, flange.

**OR**

**SECTION B**

(a) Using a simple diagram name and describe the basic components of a CAD workstation.

(b) Draw a rectangle to represent a CAD display on a VDU screen.

Indicate where the following data is located on the screen:-

- (i) Layer;
- (ii) Co-ordinates;
- (iii) Screen menu;
- (iv) Cross hairs;
- (v) Command prompt.

(c) Write a short programme for drawing Fig. 6 using a CAD system. List the sequence of commands and sketch the principal steps taken. The programme should not include dimensioning the drawing.

(d) Explain the meaning of *ten* of the following layer options:-

?/Make/Set/New/ON/OFF/Colour/LType/Freeze/Thaw/LOck/Unlock.

State the significance of the capital letters in the options.

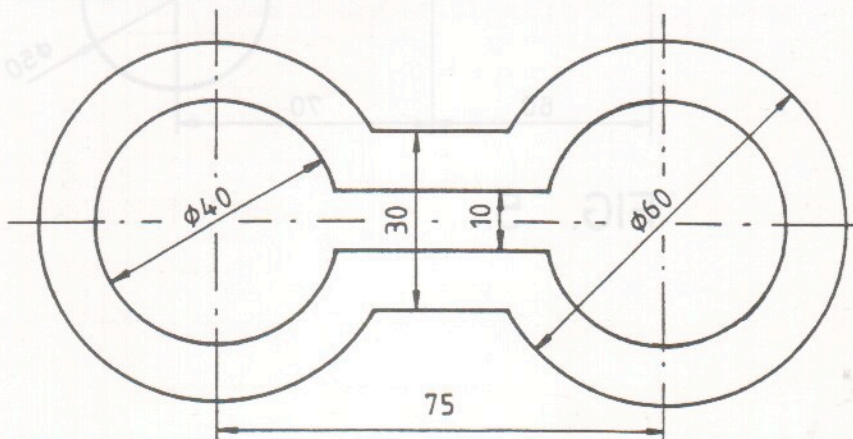


FIG. 6

# TECHNICAL DRAWING - HIGHER LEVEL

1995

## PAPER II(A)

### ENGINEERING APPLICATIONS

FIG. 1  
FIÖR 1

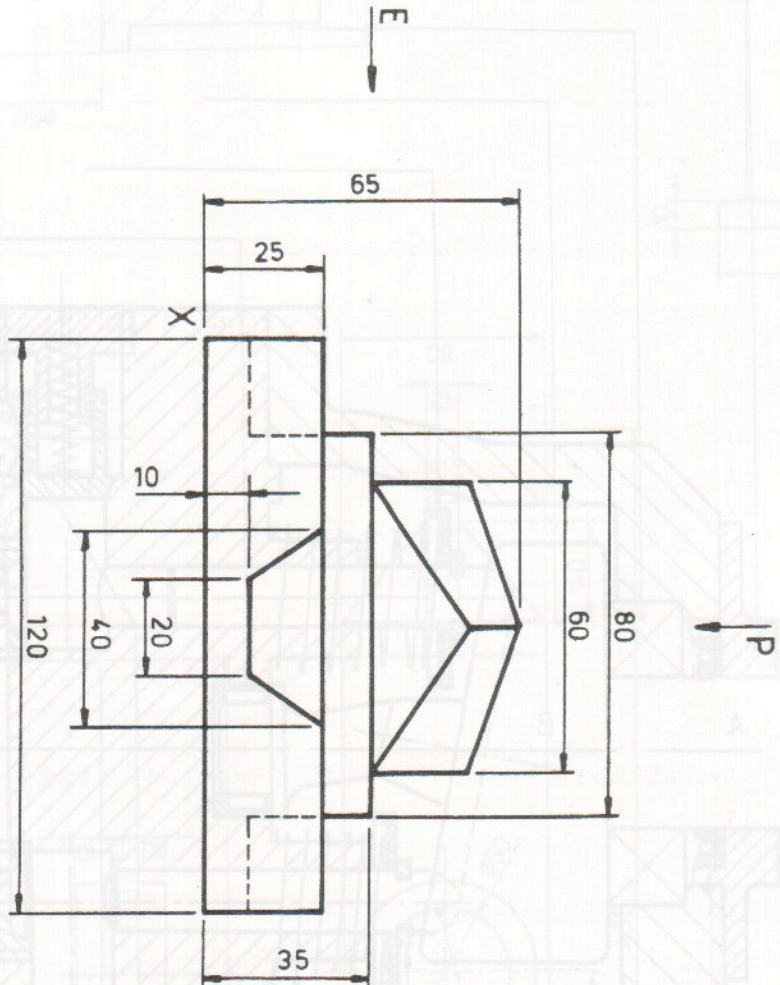


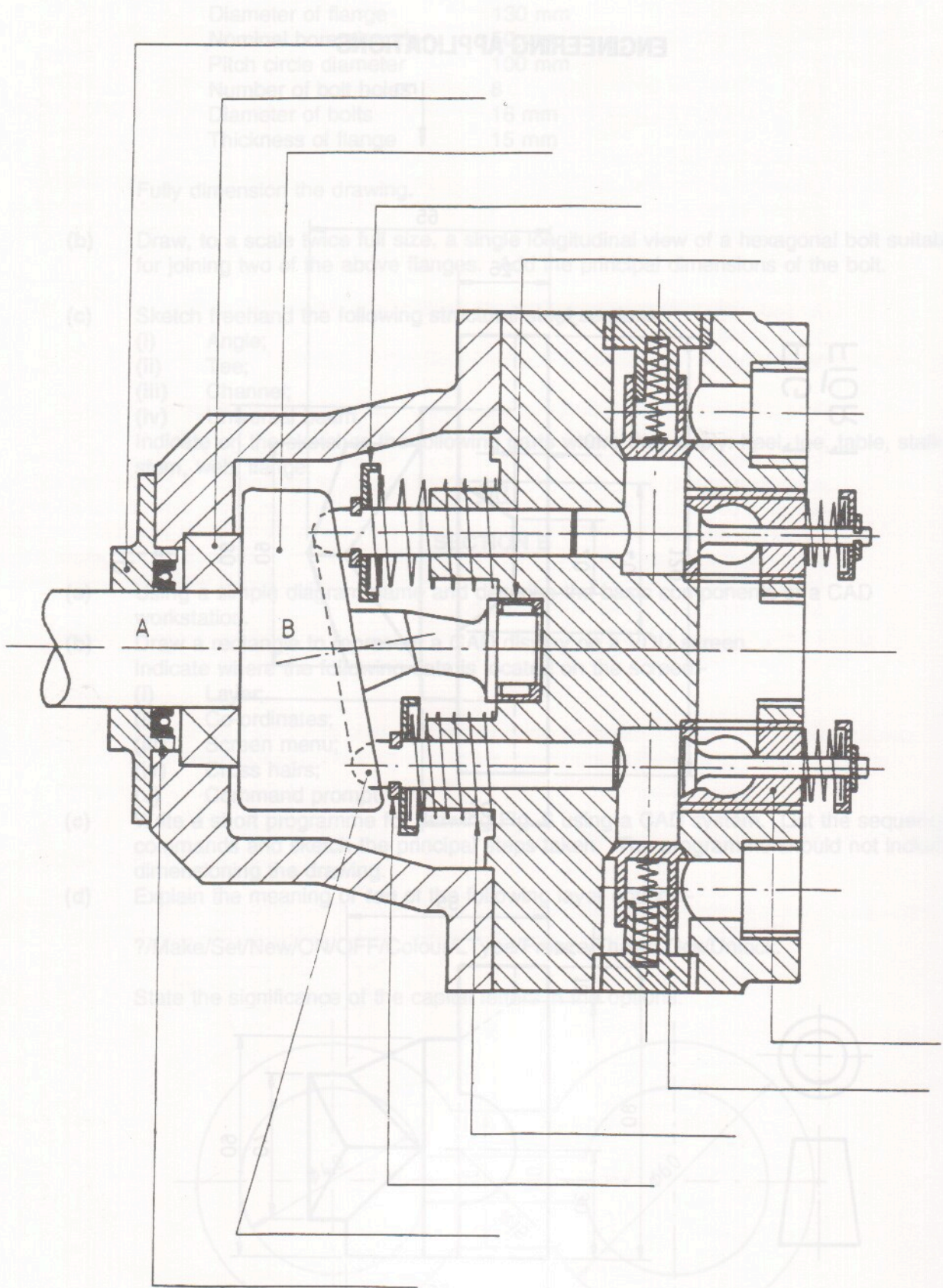
FIG. 3  
FIÖR 3

**SCRÚDÚ ARDTEISTIMÉIREACHTA, 1995**  
**CEIST 2 - FEIDHMIÚCHÁIN INNEALTÓIREACHTA**

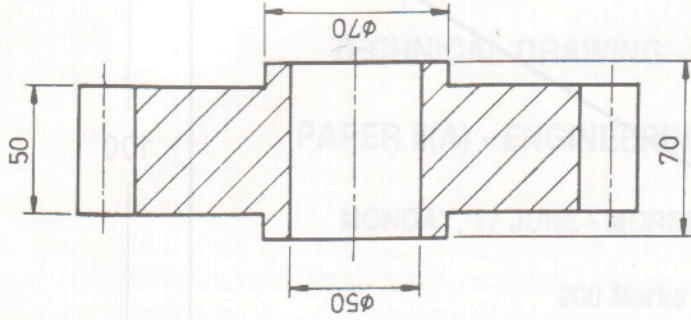
Cuir do scrúduimhir ar an leathanach seo agus cuir ar ais é mar aon leis na líníochtaí sa chlúdach.

**LEAVING CERTIFICATE EXAMINATION, 1995**  
**QUESTION 2 - ENGINEERING APPLICATION**

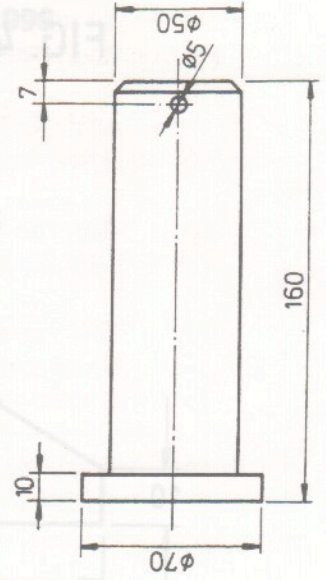
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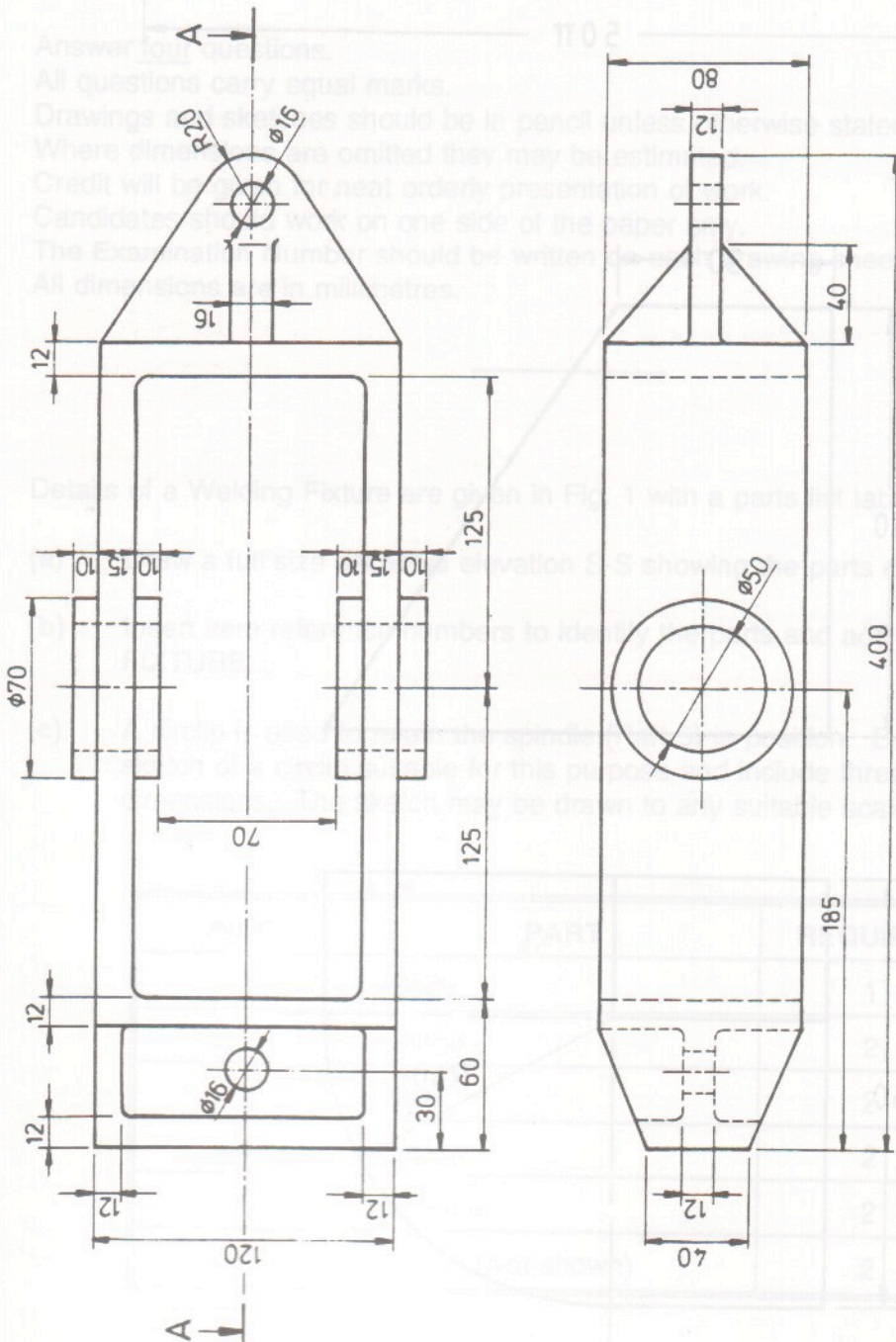


FIG. 3  
FIÖR 3

FIG. 4a. FÍOR 4a

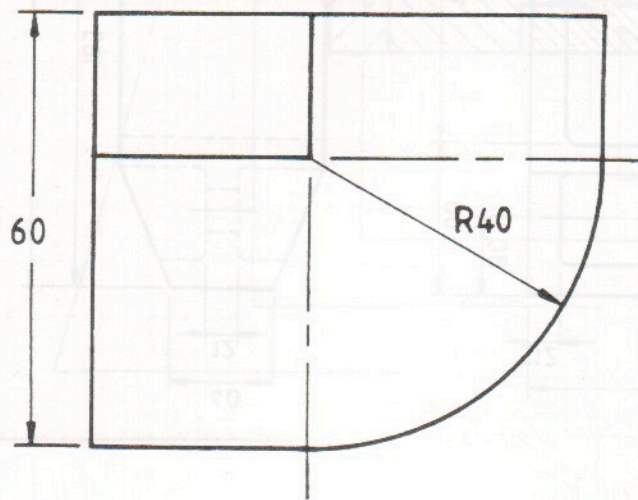
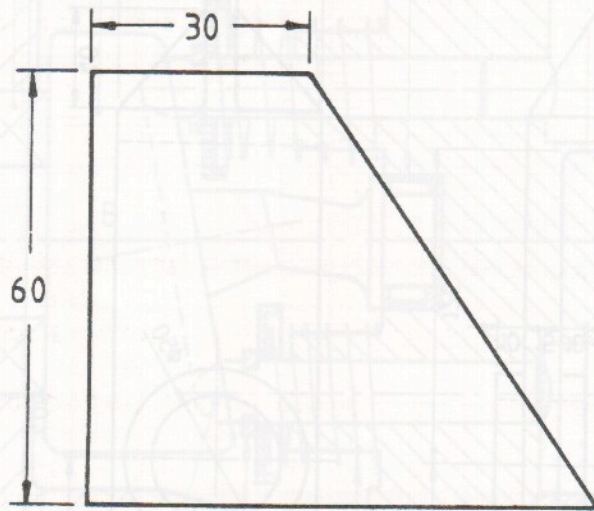
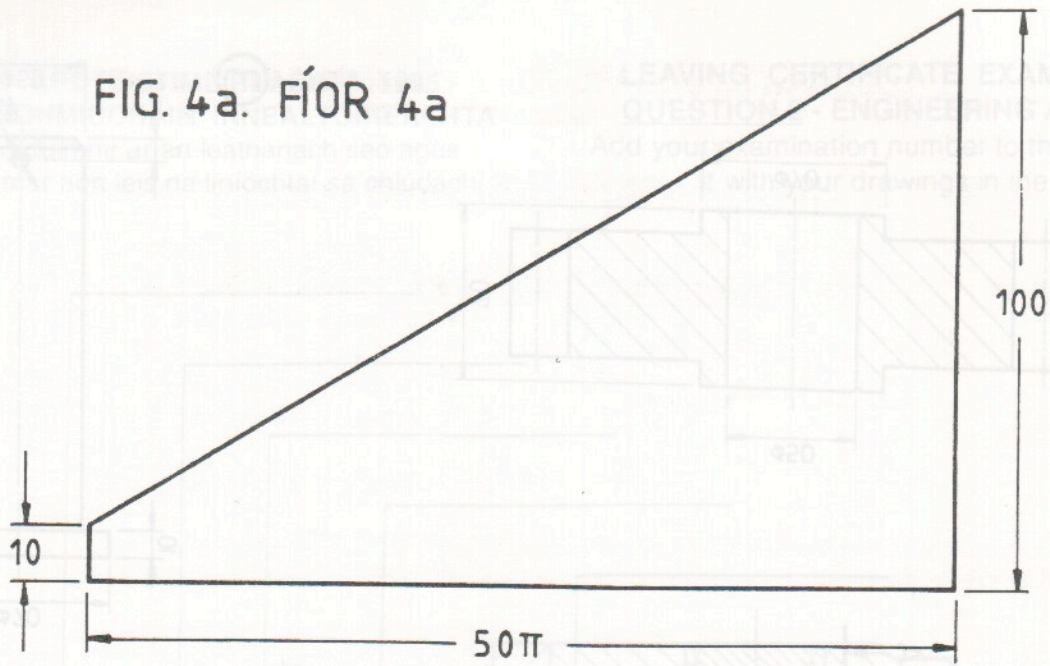


FIG. 4b. FÍOR 4b