AN ROINN OIDEACHAIS **M.81**

LEAVING CERTIFICATE EXAMINATION, 1996

TECHNICAL DRAWING - HIGHER LEVEL - PAPER I

(Plane and Solid Geometry)

FRIDAY, 14 JUNE - AFTERNOON 2.00 - 5.00

(200 MARKS)

INSTRUCTIONS

(a) Answer four questions.
(b) All questions carry equal marks.
(c) Construction lines must be shown on all solutions.
(d) Write the number of the question distinctly on the answer paper.
(e) All dimensions on the question paper are given in millimetres.
(f) First or third angle projection may be used.

---

1. Given the horizontal and vertical projections of two planes ABC and ABDE.

A	=	185	---	5	---	115
B	=	240	---	20	---	45
C	=	255	---	45	---	80
D	=	220	---	75	---	10
E	=	165	---	50	---	90

(a) Determine the dihedral angle between the planes.

(b) Draw the projections of the shortest horizontal line from C to the plane ABDE.

(c) On a separate diagram draw the projections of the skew lines AC and BD and show the projections of the shortest horizontal distance between them.

OVER→

2. Fig. 1 shows a quadrilateral ABCD inscribed in a circle. The lines AO, BO and CO are 50mm, 30mm and 70mm long, respectively.

(a) Draw the quadrilateral ABCD.

(b) From D draw two straight lines which shall divide the area of the quadrilateral ABCD into three equal parts.

(c) On a separate diagram draw a circle which shall be tangential to the lines AD and BC and shall pass through the point O.

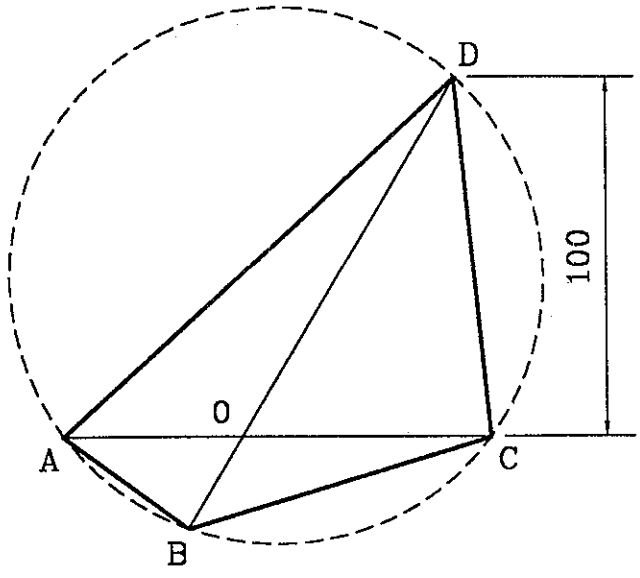

FIG. 1

3. Fig. 2 shows the elevation of two spheres which are in contact with a right cone.

(a) Draw the elevation, end view and plan of the solids.

(b) Draw the traces of a tangent plane to the two spheres which passes **between** the spheres. The tangent plane is to be inclined at 50° to the horizontal plane.

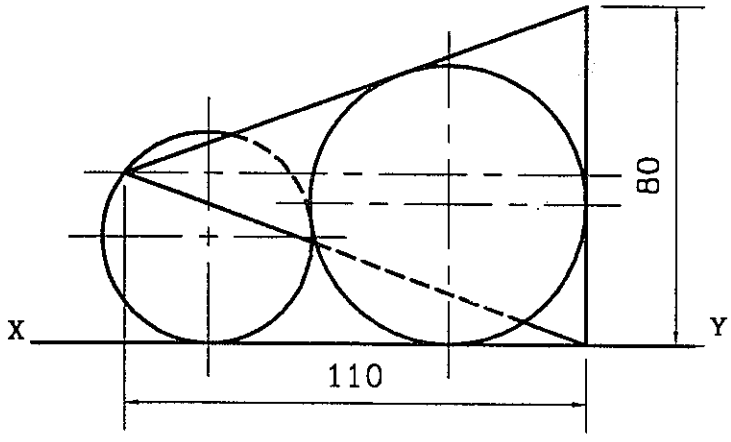

FIG. 2

OVER→

4. Fig. 3 shows the projections of a solid standing on the horizontal plane. The solid is composed of a semi-cone and a pyramid whose base is half of a regular hexagon of 60 mm side.
Also shown are the projections of an equilateral triangular prism of 55mm side which penetrates the solid.

Draw the projections of the solids showing all lines of interpenetration.

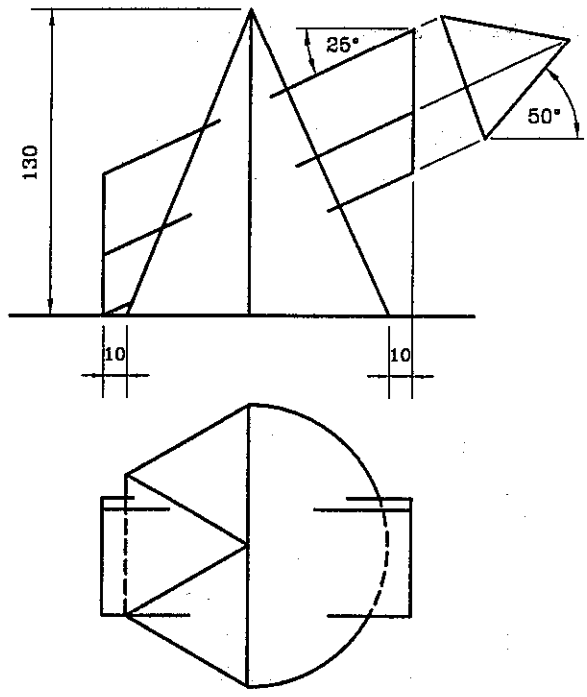

FIG. 3

5. Fig. 4 shows a circle and one convolution of a logarithmic spiral. The spiral has an initial radius of 45mm and the lengths of succeeding radii decrease in the ratio of 8:9 over successive 30° intervals.

(a) Draw the given circle and logarithmic spiral.

(b) The circle rolls along the line AB for one complete revolution. During the rolling of the circle the point P moves along the straight line to C.

Draw the locus of the point P for the combined movement.

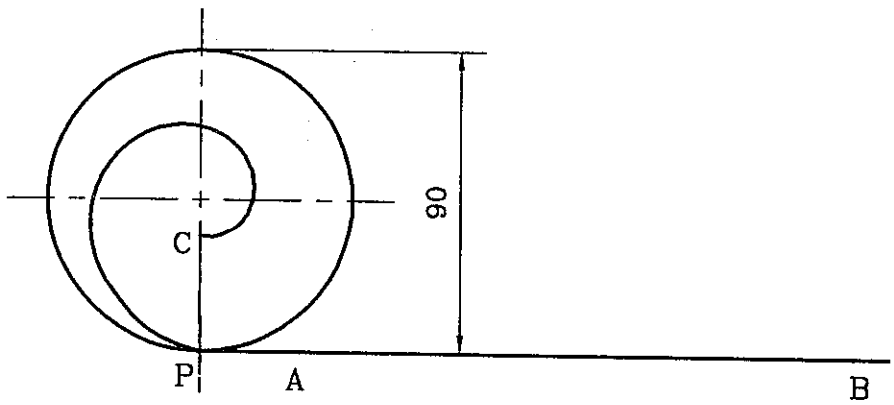

FIG. 4

OVER→

6. **(a)** The distance of the focus from the vertex of a hyperbola is 15mm. A point P on the curve is 90mm from the focus and 70mm from the directrix. Draw a portion of the curve.

(b) Draw a triangle FPF_1 where FP = 130mm, PF_1 = 70mm and FF_1 = 100mm. F and F_1 are the foci of a double hyperbola and P is a point on the curve.

(i) Draw a portion of the double hyperbola.

(ii) Determine the asymptotes to the curve.

7. Fig. 5 shows the plan and elevation of a solid. The edge AB of the solid is inclined at 15° to the horizontal plane. Surface C is inclined at 20° to the horizontal plane and surface D is inclined at 30° to the vertical plane.

Draw the given plan and elevation.

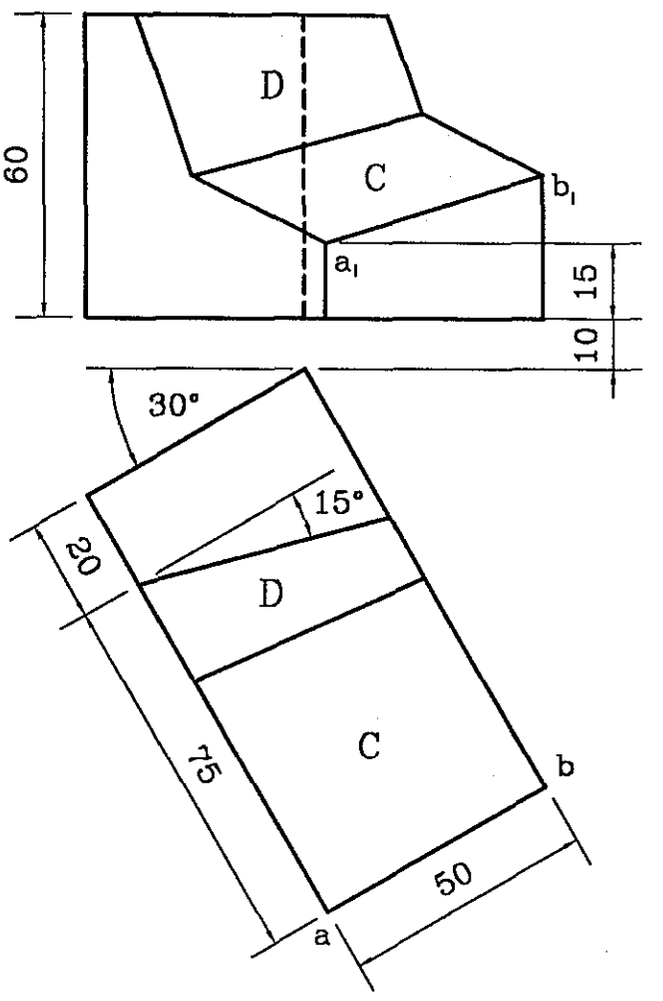

Fig. 5