Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination, 2003

Technical Drawing

Paper 1 - Higher Level
(Plane and Solid Geometry)

(200 Marks)

Thursday 12 June
Afternoon, 2.00 to 5.00

- ***(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 metres or millimetres.*
- ***(f)*** *First or third angle projection may be used.*

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

A	=	100	---	35	---	70
B	=	160	---	15	---	10
C	=	210	---	95	---	55
D	=	175	---	20	---	90
E	=	220	---	80	---	10
F	=	110	---	55	---	25

(a) Determine the line of intersection between the planes.

(b) Determine the dihedral angle between the planes.

(c) Show the projections of a line, 70mm in length, drawn from D, which touches the plane ABC at a point 75mm from the horizontal plane.

(d) On a separate diagram, draw the projections of the skew lines AC and DF and show the projections of the shortest distance between them.

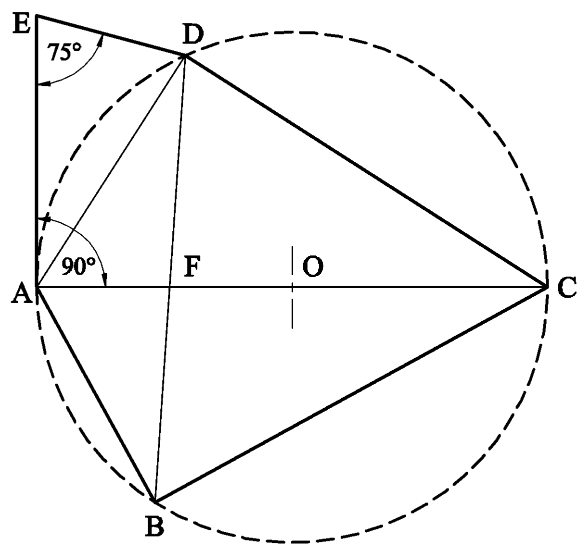
2. Fig. 1 shows an irregular pentagon ABCDE. The lines AF, BF and DF are 40mm, 65mm and 70mm long respectively.

(a) Draw the given figure, showing clearly how the points C, B, D and E are obtained.

(b) Draw a straight line from A, which shall divide the area of the pentagon ABCDE into two equal parts.

(c) On a separate diagram, inscribe an equilateral triangle in the pentagon ABCDE having one vertex at B and the other vertices on the sides AE and CD respectively.

FIG. 1



3. Fig. 2 shows the elevation of a right cone A and a sphere B which are in contact with each other. Also shown is the position of a point P on the front of the cone.

   (a) Draw the elevation and plan of the solids in contact.

   (b) Draw the traces of a tangent plane to the cone A and the sphere B. Determine the point of contact between sphere B and the tangent plane.

   (c) Draw the projections of a second sphere, so that it is in contact with the cone A at the point P and also touches the sphere B.

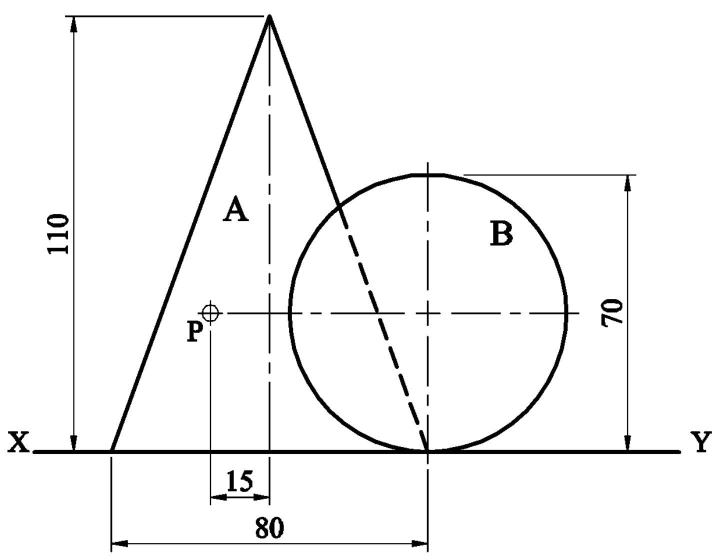


FIG. 2

4. Fig. 3 shows the projections of an equilateral triangular prism of 90mm side which lies on the horizontal plane and is shaped as shown. Also shown are the incomplete projections of a square based prism of 45mm side which penetrates the solid.

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

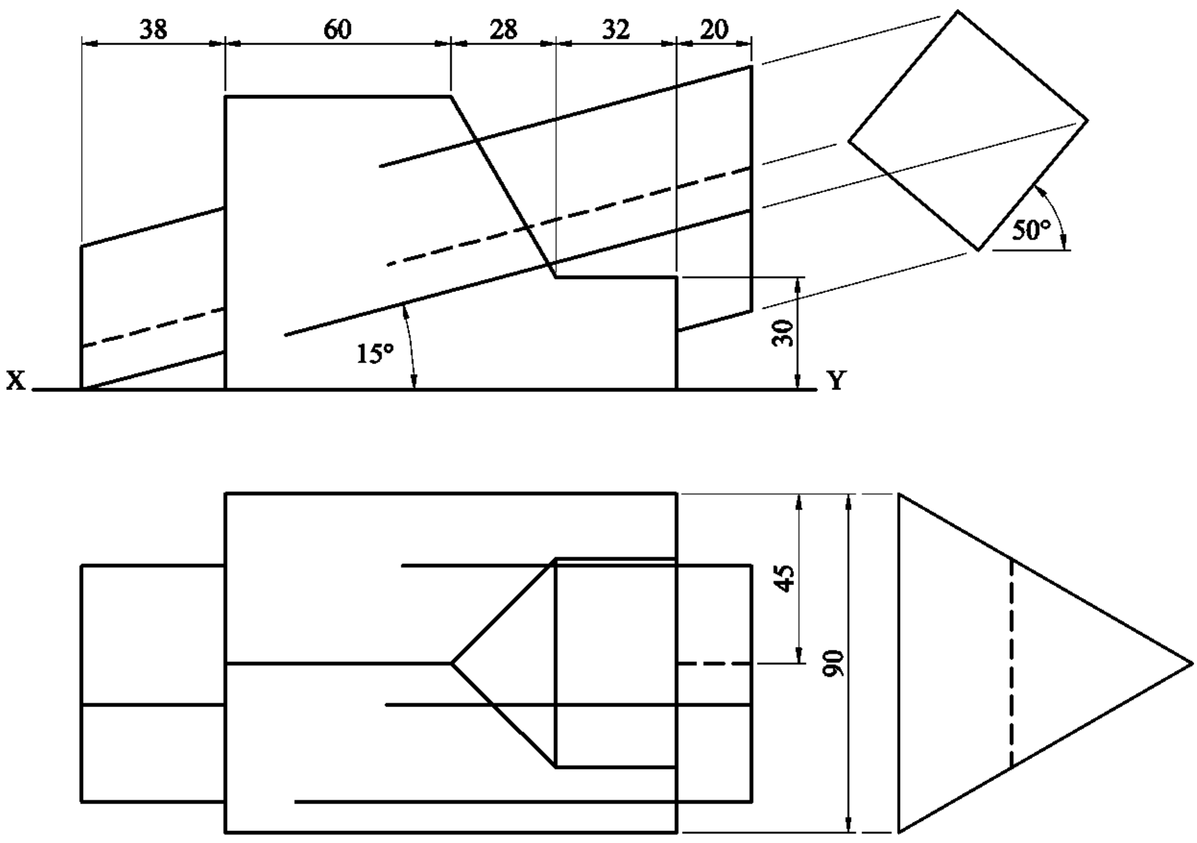


FIG. 3

5. Fig. 4 shows a circle, which touches the profile ABCD at the point P.
The circle rolls clockwise along the profile ABCD until point P reaches the arc CD.

Draw the locus of point P for the movement.

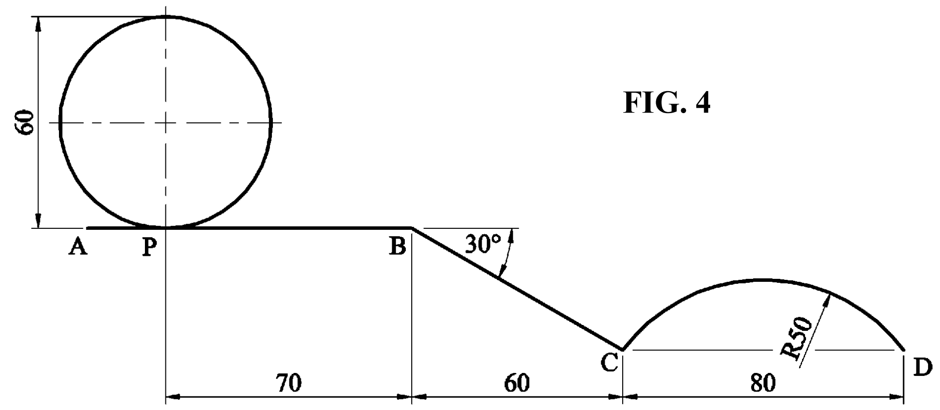


FIG. 4

6. **(a)** Draw a straight line DFV, where DF is 45mm long and FV is 120mm long.
F is the focus of an ellipse, V is a vertex and D is a point on the directrix.

Draw the complete ellipse.

(b) Draw a triangle ABF where AB is 100mm long, AF is 35mm long and BF is 105mm long.

F is one of the focal points of a double hyperbola, A is a point on one branch of the curve and B is a point on the other branch. The transverse axis is 50mm long.

(i) Determine a position for the second focal point and draw a portion of the double curve.

(ii) Determine the asymptotes to the curve.

7. A regular hexagonal right pyramid has a side of base 45mm and an altitude of 90mm.

The pyramid rests with one edge of its base on the horizontal plane and one triangular face parallel to the vertical plane as shown in plan in Fig. 5.

The pyramid is cut by an oblique plane as shown. The cut surface is inclined at 40° to the horizontal plane.

Draw the plan and elevation of the cut pyramid.

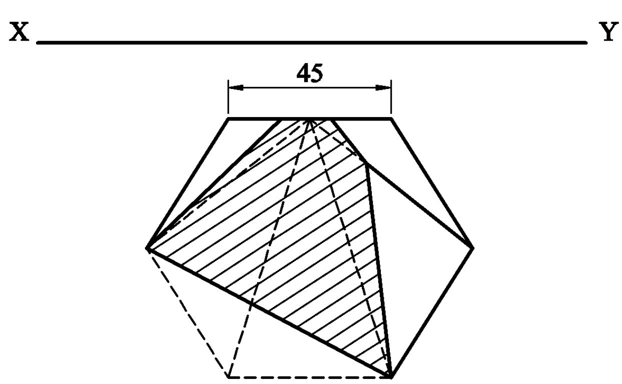


FIG. 5

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