Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2008

Technical Drawing

Paper 1 - Higher Level
(Plane and Solid Geometry)

(200 Marks)

Friday 13 June
Afternoon, 2.00 - 5.00

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) *Work on one side of the paper only.*
(f) *All dimensions on the question paper are given in metres or millimetres.*
(g) *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	=	110	---	55	---	15
E	=	175	---	25	---	90
F	=	215	---	80	---	15

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

(b) Determine the dihedral angle between the planes.

(c) Determine the projections of a straight line drawn from B, which is 65mm long and is parallel to the line DF. Determine the inclination of this line to the plane ABC.

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

Determine and indicate, in millimetres, the distance from this line to the horizontal plane.

2. Fig. 1 shows an irregular pentagon ABCDE. In the given figure, the quadrilateral ABCE is inscribed in a circle as shown. The lines FD and FB are tangential to the circle.

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

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

(c) Redraw the quadrilateral ACDE. On the diagram, draw a triangle, similar to ABC, having its smallest vertex at E and the other two vertices on the sides AC and CD respectively.

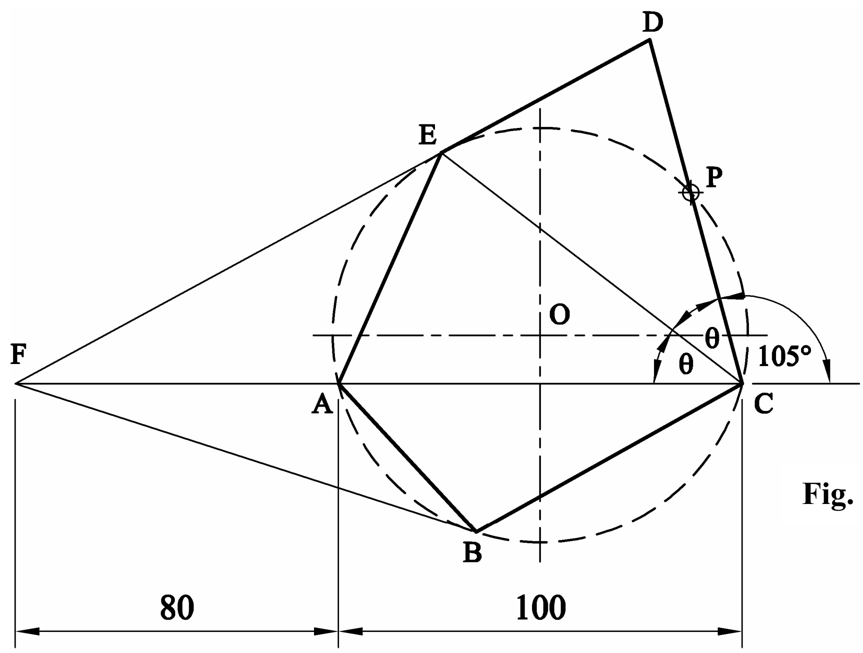


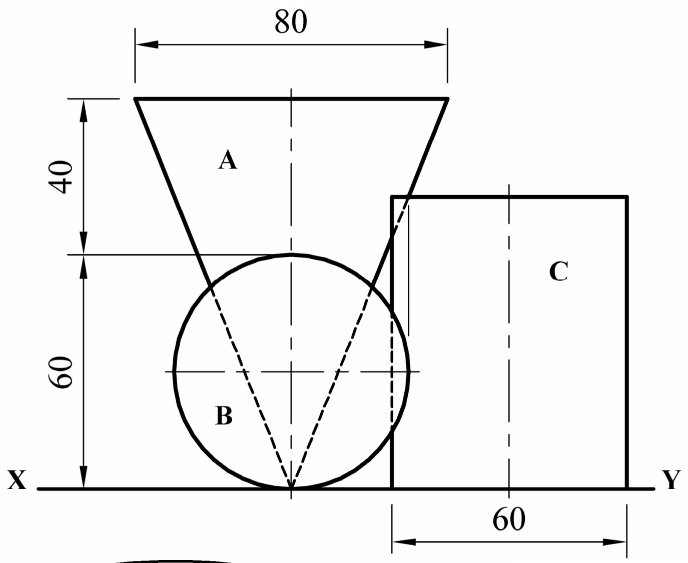
Fig. 1

3. Fig. 2 shows the elevation of a right cone A, a sphere B and a right cylinder C which are in contact with each other. A pictorial sketch is also shown.

(a) Draw the elevation and plan of the right cone A and the sphere B.

(b) Draw the projections of the right cylinder C and show the projections of the point of contact between the cone and the cylinder.

(c) Draw the traces of a plane which is tangential to the sphere B and is inclined at 75° to the horizontal plane. The plane should also touch the edge of the circular base of the inverted cone.



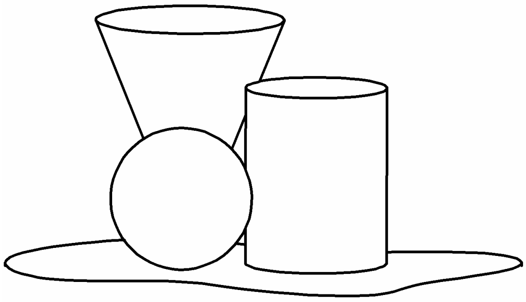


Fig. 2

4. Fig. 3 shows the projections of an oblique triangular pyramid. Also shown are the incomplete projections of a square based prism of 55mm side which penetrates the triangular pyramid.

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

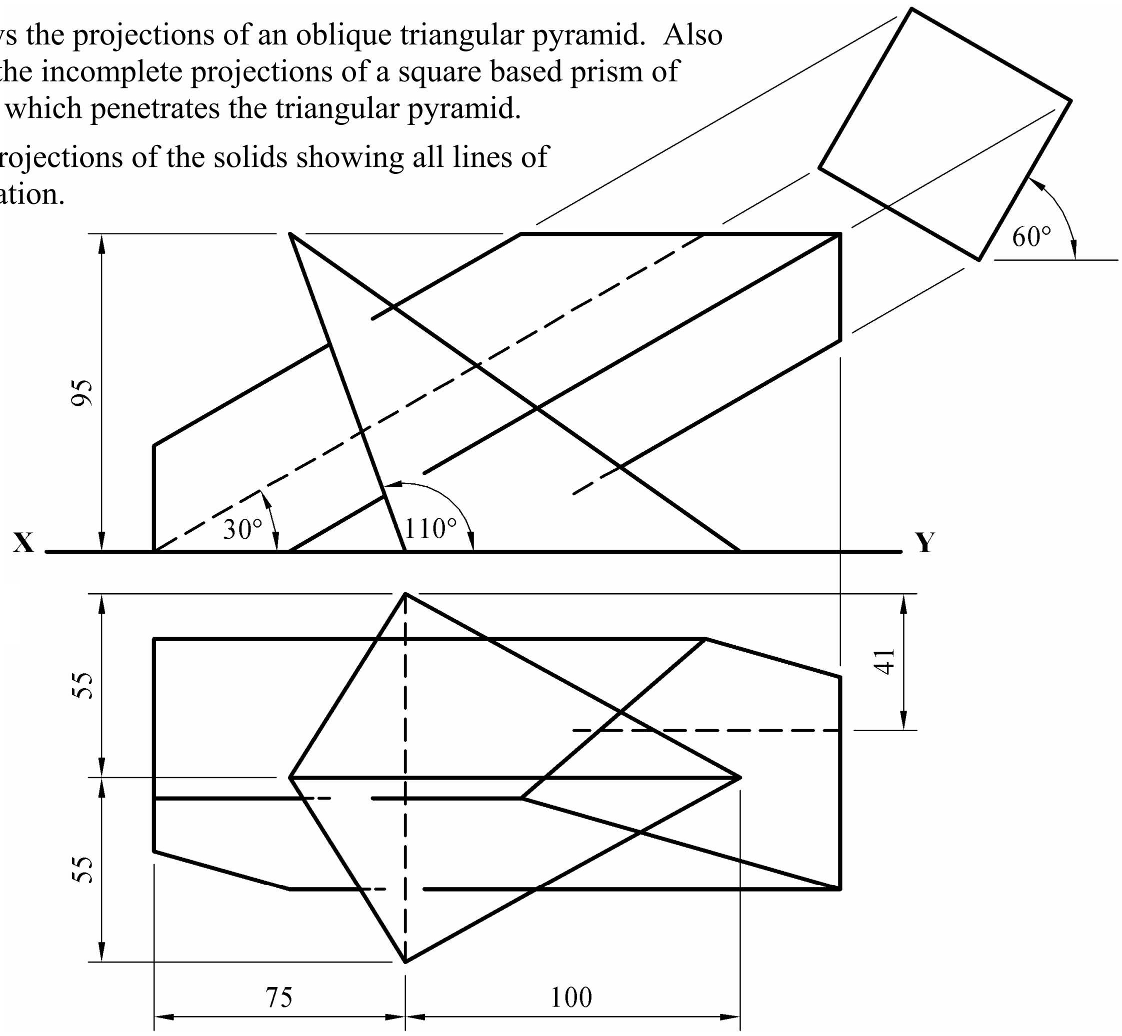


Fig. 3

5. Fig. 4 shows a circle C, which rolls clockwise along the line AB for three-quarters of a revolution. During this rolling, the point P moves, from its initial position, along the lines PO and OA to A.

(a) Draw the locus of point P for the combined movement.

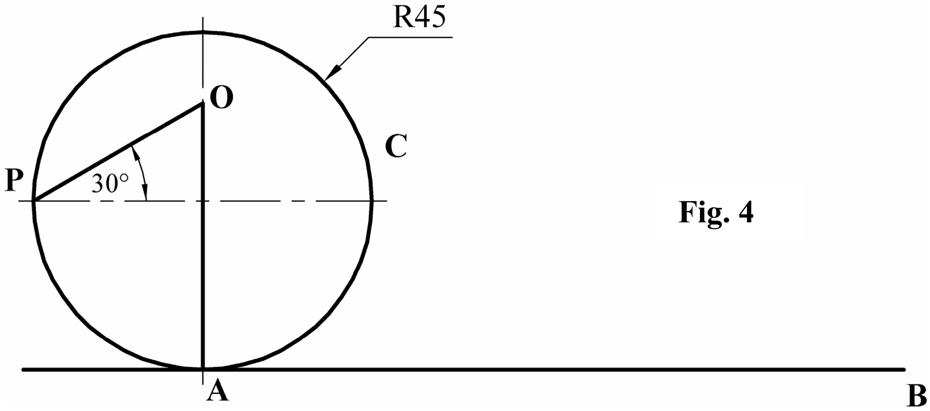


Fig. 4

(b) On a separate diagram redraw the lines OA and OP. P and A are points on a logarithmic spiral with centre O. OP is the shortest radius.
Draw half of one convolution of the logarithmic spiral passing through A.

6. **(a)** Two lines AF and FP meet at an angle of 90° and FP is 50mm long. F is a focal point of a hyperbola, P is a point on the curve and A is a point on the axis. The eccentricity of the hyperbola is 1.25.

(i) Locate the directrix of the hyperbola and draw a portion of the curve to include the point P.
(ii) Determine the centre of curvature for the point P.

(b) Draw a triangle ABC where AB is 200mm long, BC is 115mm long and the angle ABC is 90°. A point F is located on the line AB, 25mm from B. F is a focal point of an ellipse, CA and CB are tangents to the curve and A and B are points on the major axis.

(i) Determine the position of the second focal point and draw half the curve.
(ii) Determine a directrix of the ellipse.

7. Fig. 5 shows the projections of a rectangular based right pyramid and the traces of two oblique planes VTH and $V_1T_1H_1$. The point O lies in the oblique plane $V_1T_1H_1$.

(a) Draw the projections of the pyramid and the traces of the two oblique planes.

(b) The pyramid is cut by the oblique plane VTH. Draw the projections of the pyramid when it has been cut by this plane. Determine and indicate, in degrees, the inclination of the cut surface to the vertical plane.

(c) A square based right pyramid with an altitude of 85mm rests with one of its triangular faces on the oblique plane $V_1T_1H_1$. One edge of the base lies in the line H_1T_1 and the apex is located at the point O. Draw the plan and elevation of this other pyramid.

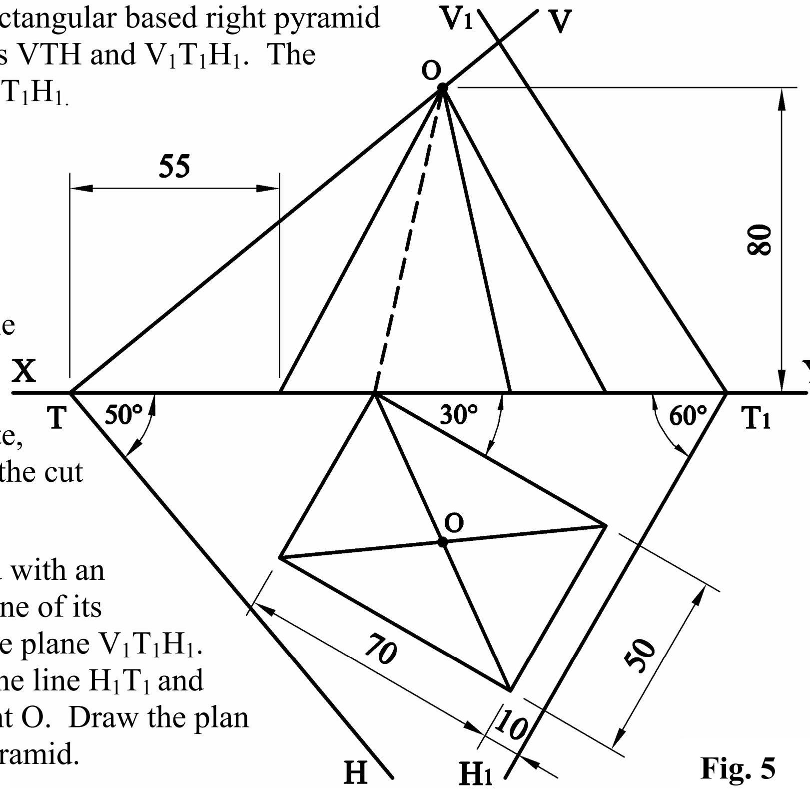


Fig. 5

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