Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2005

Technical Drawing

Paper 1 - Higher Level
(Plane and Solid Geometry)

(200 Marks)

Thursday 16 June
Morning, 9.30 – 12.30

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 ADE.

A	=	200	---	15	---	110
B	=	150	---	55	---	35
C	=	250	---	100	---	55
D	=	235	---	50	---	20
E	=	160	---	75	---	65

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

(b) Determine the dihedral angle between the planes.

(c) Determine the projections of a horizontal line, drawn from D to the plane ABC. The line is to be inclined at 40° to the plane ABC.

(d) On a separate diagram, draw the projections of the skew lines AE and BC. Show the projections of the shortest horizontal line between them and determine the inclination of this line to the vertical plane.

2. Fig. 1 shows an irregular pentagon ABCDE inscribed in a circle. In the given figure, the line AE is twice as long as the line DE.

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

(b) Join DO and continue a line from O, which shall divide the pentagon into two parts so that their areas are in the ratio of 4:5.

(c) On a separate diagram redraw the circle and the chord CD. Construct an equilateral triangle of side 125mm having two vertices on the circumference of the circle and the third vertex on the line CD.

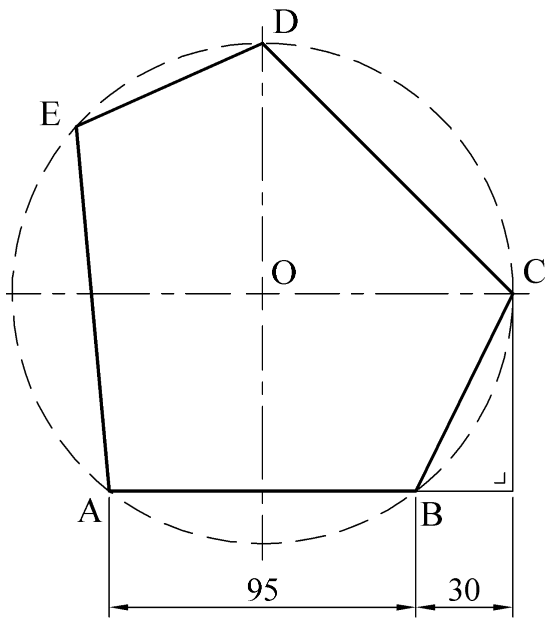

Fig. 1

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 projections of a right cone C, standing on the horizontal plane so that it is in contact with cone A at the point P and touches sphere B at a point 33mm above the horizontal plane.

(c) Draw the traces of a plane which passes through the apex of cone C and is tangential to cone A. Determine the true angle between the vertical trace and the horizontal trace on this plane.

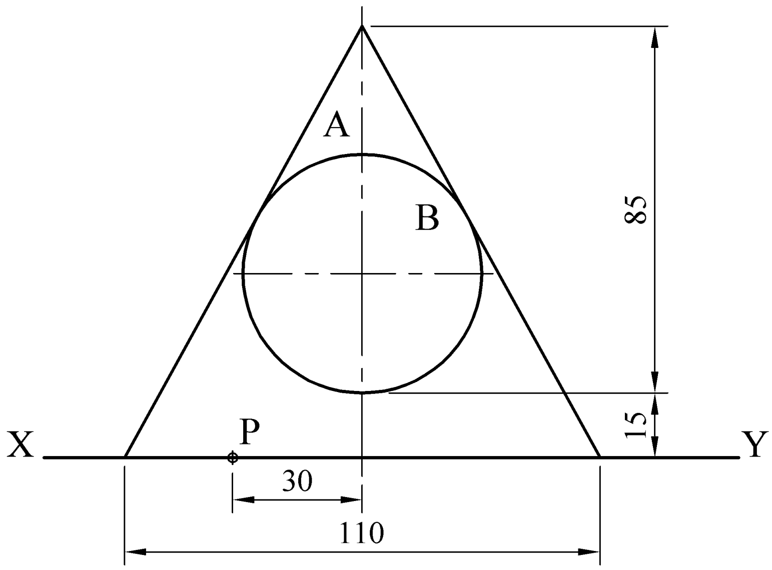

Fig. 2

4. Fig. 3 shows the projections of a rectangular based right pyramid, which has been cut as shown. Also shown are the incomplete projections of a square based prism of 45mm side which penetrates the cut pyramid.

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

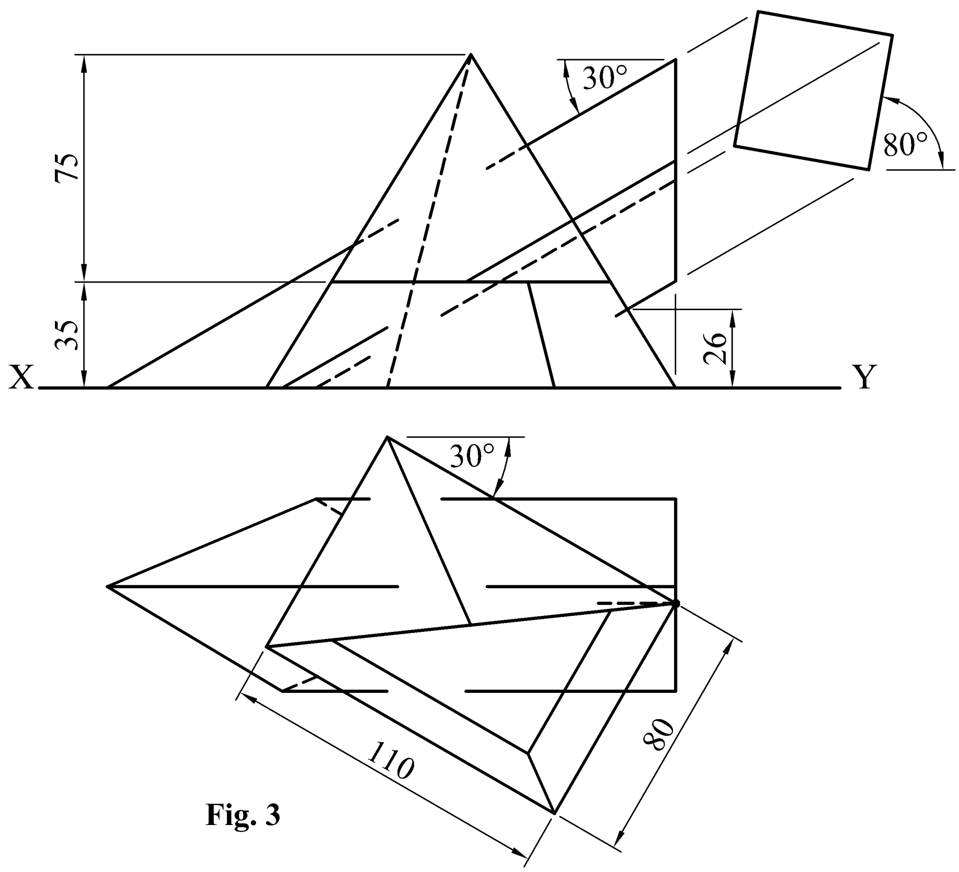

Fig. 3

5. Fig. 4 shows a circle which rests on the profile ABCDEF. The circle rolls clockwise along the profile until it comes to a stop in the notch between D and F.

Draw the locus of point P for this movement.

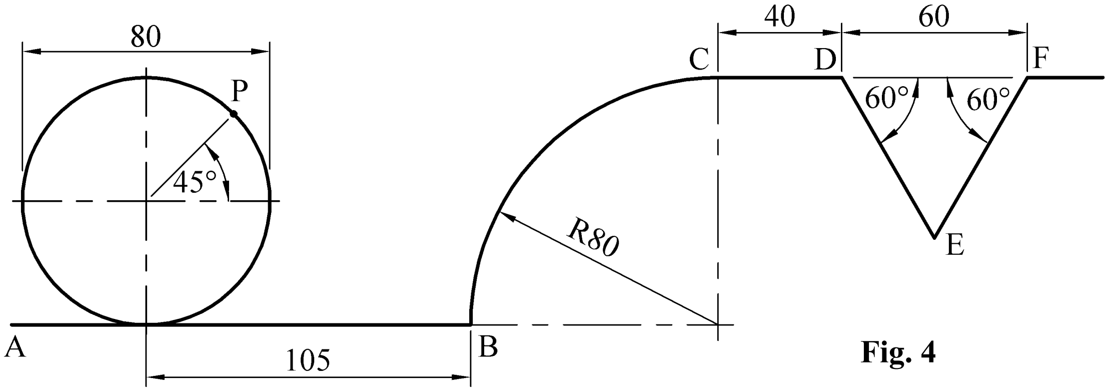

Fig. 4

6. **(a)** Draw a straight line DPF, where DP is 100mm long and PF is 35mm long. F is the focus of a parabola, P is a point on the curve and D is a point on the directrix.

   (i) Draw a portion of the curve.
   (ii) Draw a tangent to the curve which shall be parallel to the line DF.

   (b) Two lines PF and PT meet at an angle of 25°. PF is 45 mm long. F is one of the focal points of a double hyperbola, PT is a tangent to the curve and P is the point of contact. The transverse axis is 90mm long.

   (i) Determine the position of the second focal point and draw a portion of the double curve.
   (ii) Locate a point on the curve 20mm from F and find the centre of curvature for this point.

7. Fig. 5 shows the traces of an oblique plane VTH and a simply inclined plane $V_1T_1H_1$. A square based right pyramid with a side of base 70mm and an altitude of 90mm rests with one of its triangular faces on VTH. One edge of the base lies in the line HT and the apex of the pyramid touches the vertical plane.

   (a) Draw the given traces and the plan and elevation of the pyramid.

   (b) The pyramid is cut by the simply inclined plane $V_1T_1H_1$. Draw the projections of the cut pyramid.

   (c) An equilateral triangular based right pyramid with an altitude of 60mm rests with its base on $V_1T_1H_1$. The line AB is one edge of the base and is positioned as shown. Draw the plan and elevation of the pyramid.

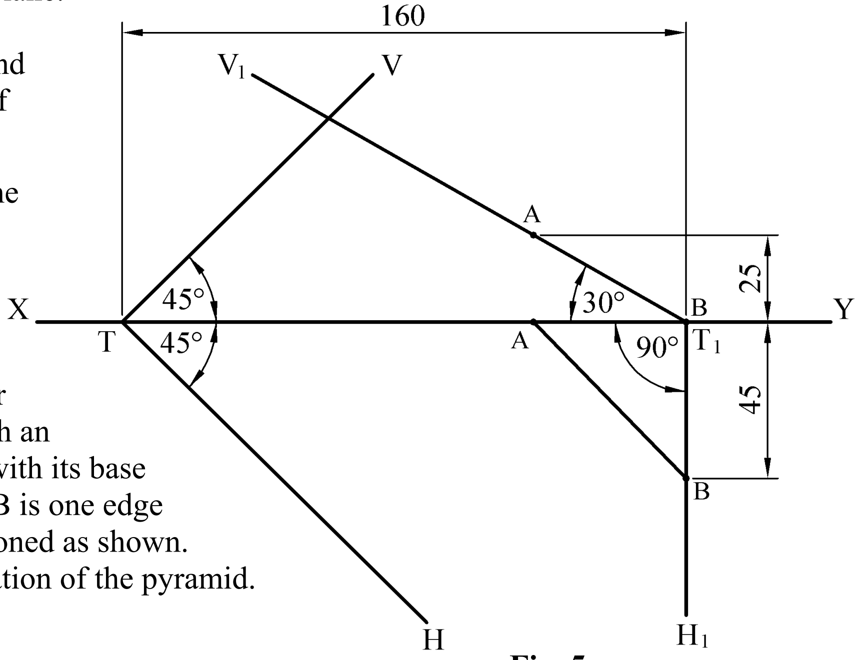

Fig. 5

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