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LEAVING CERTIFICATE EXAMINATION, 2000

TECHNICAL DRAWING - HIGHER LEVEL - PAPER I

(Plane and Solid Geometry)

THURSDAY, 15 JUNE - AFTERNOON 2.00 p.m. - 5.00 p.m.

(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.

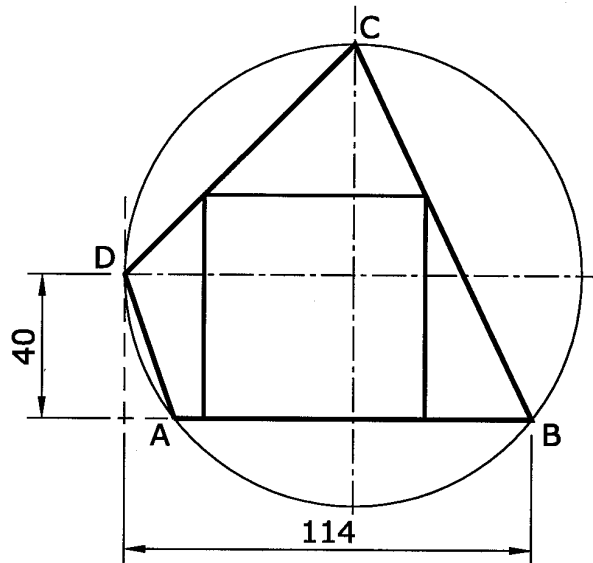
1. Given the horizontal and vertical projections of two planes ABC and ADE.

A	=	150	---	85	---	65
B	=	120	---	45	---	10
C	=	180	---	5	---	45
D	=	100	---	30	---	40
E	=	190	---	50	---	20

- (a) Determine the line of intersection between the planes.
- (b) Determine the dihedral angle between the planes.
- (c) Find the position of a point P on the plane ABC, which is 35mm above the horizontal plane and 20mm from the plane ADE. Draw a line from D to P and determine its true length.
- (d) On a separate diagram, draw the projections of the skew lines BC and DE and show the projections of the shortest distance between them.

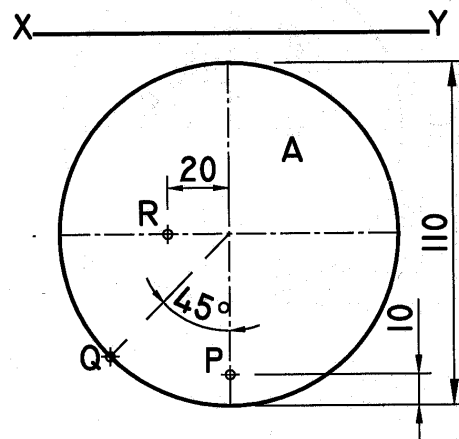
2. Fig. 1 shows a quadrilateral ABCD inscribed in a circle. Also shown is a square inscribed in the quadrilateral.

- (a) Draw the given figure.
- (b) On a separate diagram, draw a figure similar to the quadrilateral ABCD and having an area equal to a square of 65mm side.



**FIG. 1**

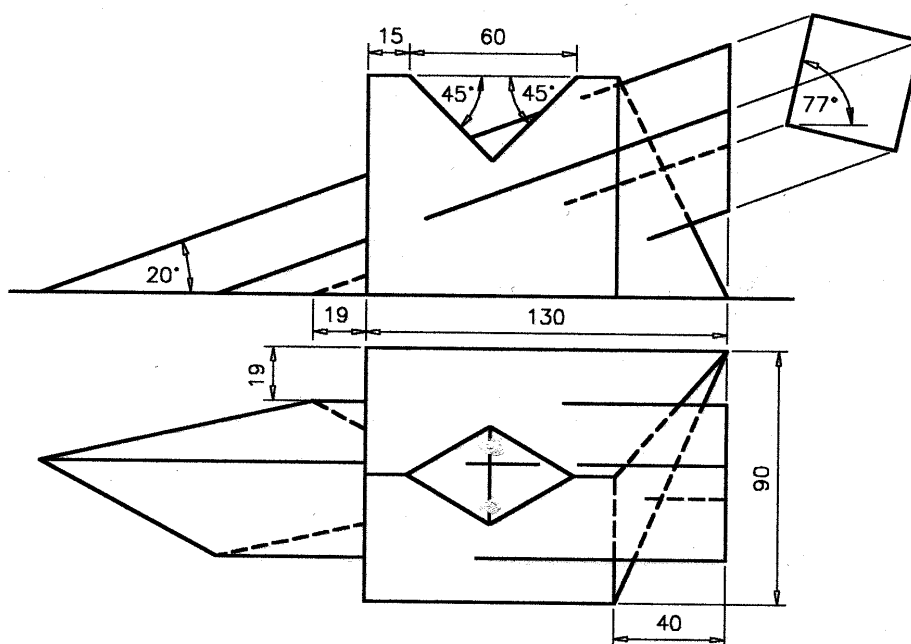
3. Fig. 2 shows the plan of a right cone A, having an altitude of 80mm, standing on the horizontal plane.
- Draw the plan and elevation of the cone and show the projections of a sphere B which rests on the horizontal plane and touches the cone A at point P.
  - Show the projections of a right cylinder having an altitude of 70mm which stands on the horizontal plane so that it is in contact with the cone A at the point Q and also touches the sphere B.
  - Draw the projections of another sphere so that it touches the cone at the point R and is also in contact with the cylinder.



**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 40mm side, which penetrates the solid.

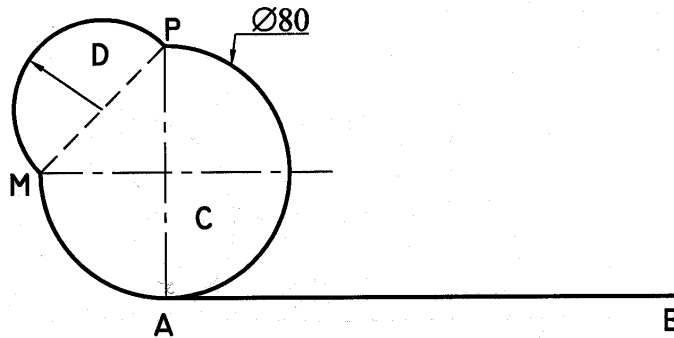
Draw the projections of both solids showing all lines of interpenetration.



**FIG. 3**

5. Fig. 4 shows a circle C and a semi-circle D. The circle C rolls clockwise along the line AB for half a revolution. During the rolling of the circle, a point P is unwound from P to M as an involute to the semi-circle.

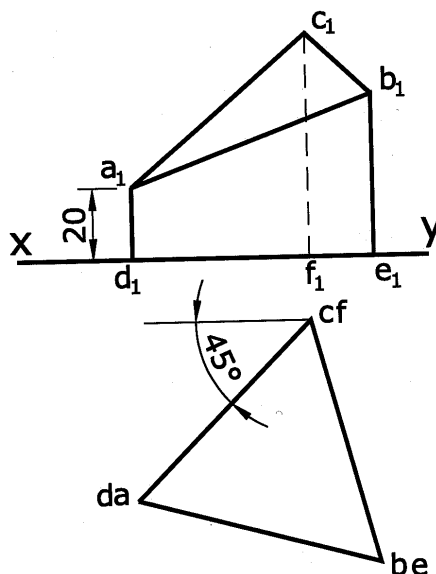
Draw the locus of P for the combined movement.



**FIG. 4**

6. (a) Draw a triangle  $DPD_1$  where  $DD_1$  is 40mm long,  $D_1P$  is 85mm long and the angle  $DD_1P$  is  $90^\circ$ . P is a point on a parabola, PD is a tangent to the curve and D and  $D_1$  are points on the directrix.
- Locate the focus and draw a portion of the curve.
  - Locate the centre of curvature for a point on the curve 45mm from the directrix.
- (b) Draw a straight line  $FPP_1$  where  $FP = 25\text{mm}$  and  $PP_1 = 120\text{mm}$ . F is one of the focal points of a double hyperbola, P is a point on one branch of the curve and  $P_1$  is a point on the other branch. The transverse axis is 90 mm long.
- Locate the second focal point and draw a portion of the double curve.
  - Draw the asymptotes to the curve.
7. Fig. 5 shows the plan and elevation of an equilateral triangular based prism of 70mm side, which has been cut as shown. The edge AB is inclined at  $20^\circ$  to the horizontal plane and the surface ABC is inclined at  $30^\circ$  to the horizontal plane.

- (a) Draw the given plan and elevation.
- (b) On a separate diagram, draw a plan and elevation of the prism when the corner D rests on the horizontal plane and the corners E and F are 15mm and 40mm, respectively, above the horizontal plane.



**FIG. 5**