

LEAVING CERTIFICATE EXAMINATION, 1989

TECHNICAL DRAWING - HIGHER LEVEL - PAPER I
(Plane and Solid Geometry)

WEDNESDAY, 21 JUNE - AFTERNOON, 2.00 to 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 ABD.

| | | | | | | |
|---|---|-----|---|----|---|----|
| A | = | 220 | - | 15 | - | 10 |
| B | = | 270 | - | 35 | - | 90 |
| C | = | 260 | - | 65 | - | 15 |
| D | = | 230 | - | 60 | - | 75 |

- (a) Determine the dihedral angle between the planes.
- (b) Determine the inclination of the line BD to the plane ABC.
- (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.

2. Fig. 1 shows a quadrilateral ABCD inscribed in a circle.

- (a) Determine the length of BD.
- (b) Draw the circle and the inscribed triangle ABD.
- (c) Complete the quadrilateral ABCD by making the triangle BCD equal in area to a square of 45 mm side.
- (d) On a separate diagram draw two straight lines from A which shall divide the area of the quadrilateral ABCD into three equal parts.

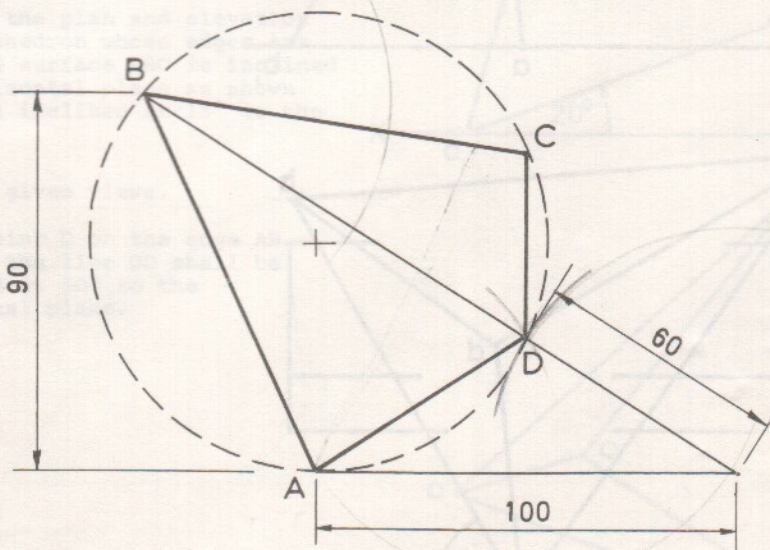


Fig. 1

3. Fig. 2 shows the elevation of two spheres and a cone in contact with one another.

- (a) Draw the elevation and plan of the solids in contact.
- (b) Draw the projections of a sphere C having a diameter of 30 mm which rests on the horizontal plane and is in contact with sphere A and the cone.
- (c) Draw the traces of a plane which touches spheres A and C and which has an inclination of 60° to the horizontal plane.

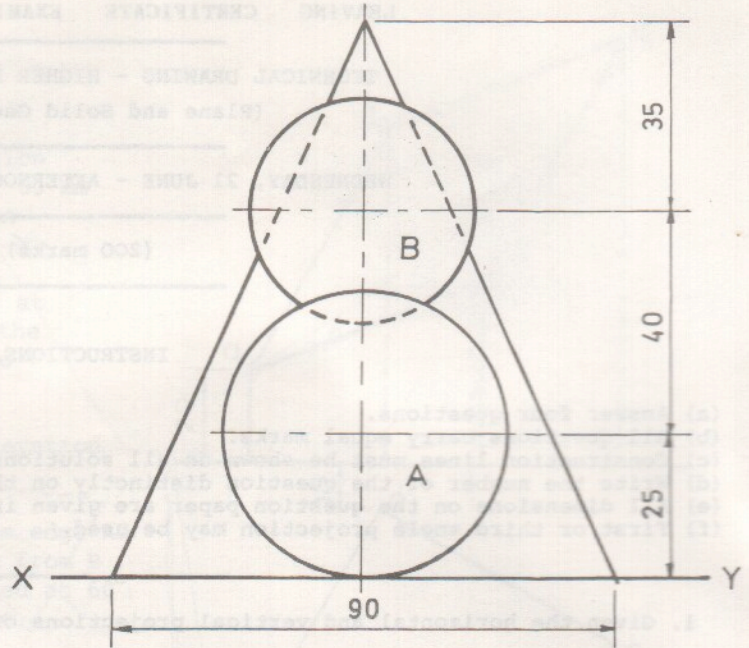


Fig. 2

4. Fig. 3 shows the projections of a pyramid ABCD in which the surface ABD is an equilateral triangle of 100 mm side and in which the edges AC, BC and CD are each 120 mm long

Also shown are the projections of an equilateral triangular prism of 45 mm side which penetrates the pyramid.

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

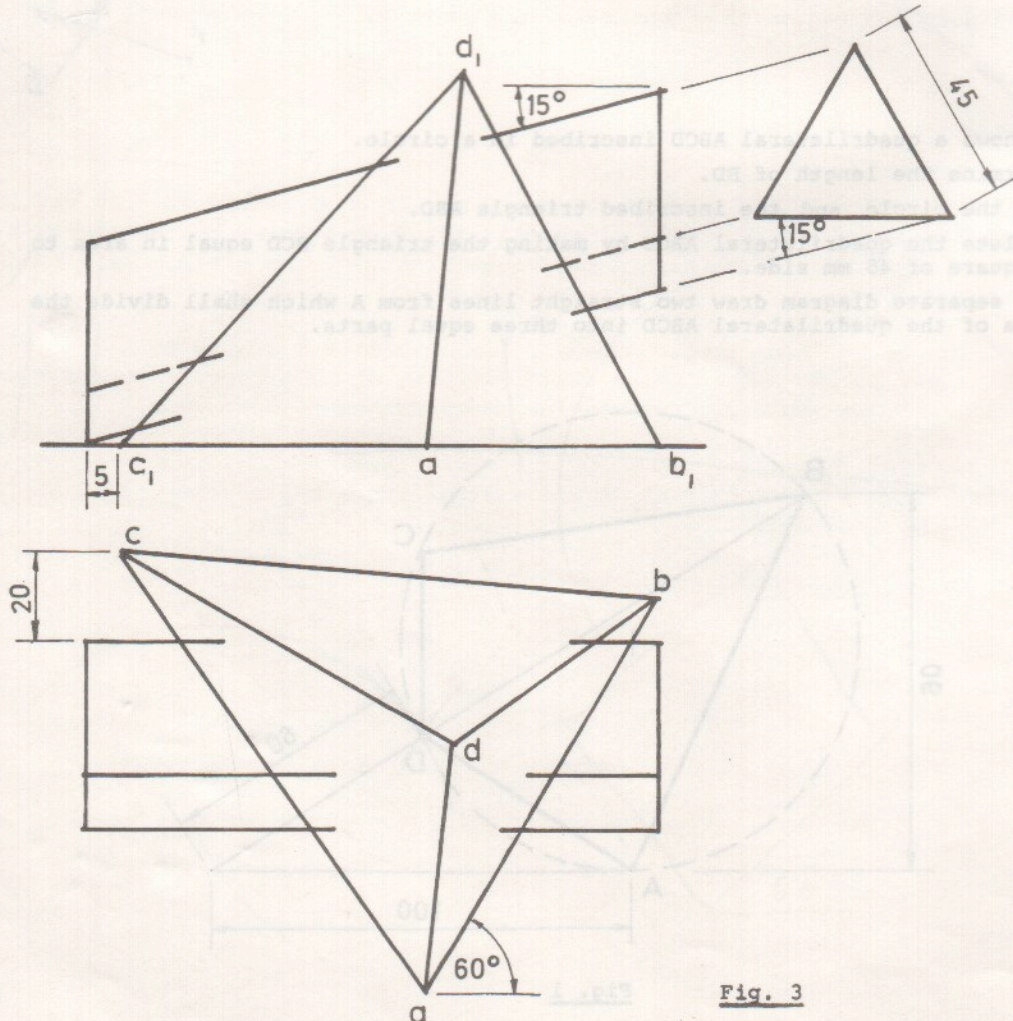


Fig. 3

5. In Fig. 4 the curve ABCO rolls along the line DEF until the point A reaches the point F.

Draw the locus of the point O for this movement.

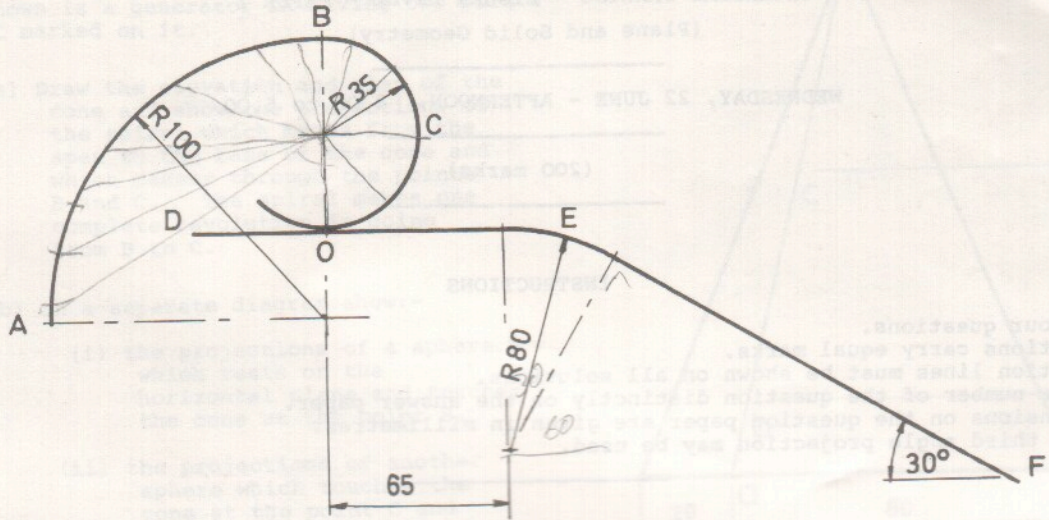
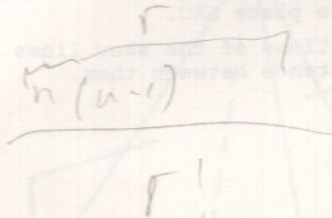
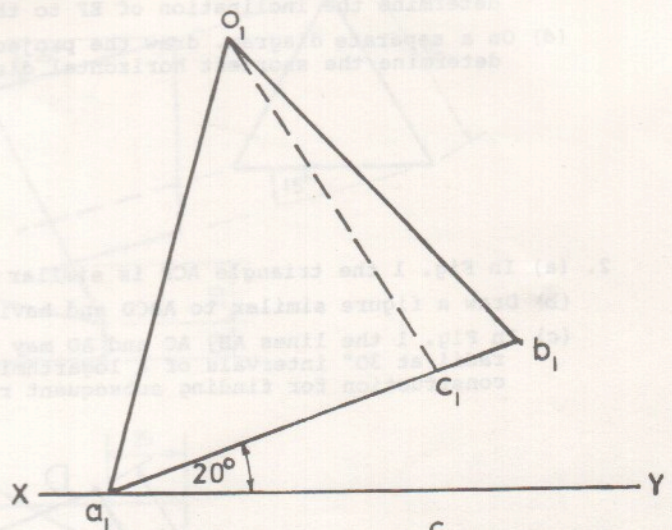


Fig. 4

6. (a) Draw a straight line AFB where $AF = 60$ mm and $FB = 80$ mm. If A and B be two points on the curve of a hyperbola whose focus is F and whose eccentricity is 1.4, draw the curve.
- (b) Draw a triangle FPQ in which $FP = 35$ mm, $FQ = 100$ mm and $PQ = 90$ mm. F is one of the focal points on a double hyperbola, P is a point on one branch of the curve and Q is a point on the other branch. The transverse axis is 60 mm long.
 - (i) Determine a position for the second focal point and draw a portion of the branch of the hyperbola which contains the point P.
 - (ii) Find the centre of curvature of the point P.



7. Fig. 5 shows the plan and elevation of a regular tetrahedron whose edges are 120 mm long. The surface ABC is inclined at 20° to the horizontal plane as shown and the edge AC is inclined at 15° to the horizontal plane.



- (a) Draw the given views.
- (b) Find a point D on the edge AB so that the line OD shall be inclined at 60° to the horizontal plane.

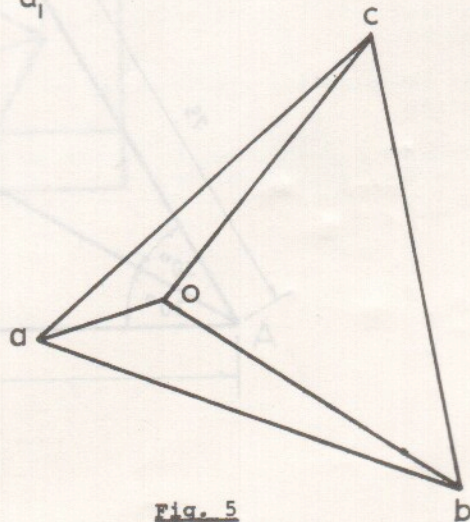


Fig. 5