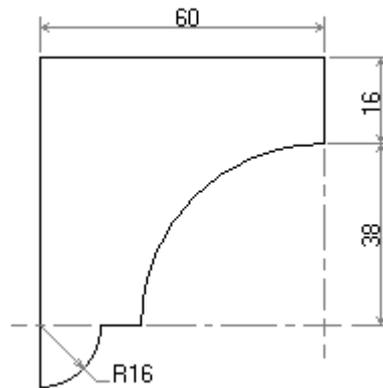


ORDINARY LEVEL PAST PAPERS

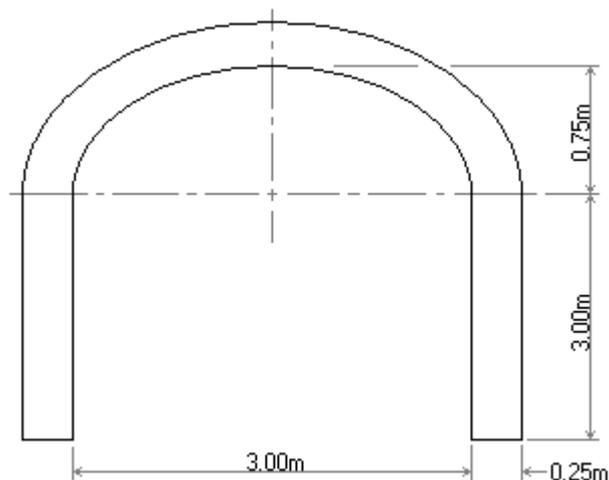
UNEB S4 1982

SECTION I – PLANE GEOMETRY

- Construct a diagonal scale of 40mm to 10mm to read up to 20mm by 0.02mm.
 - Indicate on your scale the following readings.
 - 14.8mm.
 - 16.2mm.
 - 20.6mm.
- A right circular cylinder 40mm diameter stands upon a horizontal plane. A piece of string is wound round the cylinder to give one complete turn parallel to the plane. Trace the locus of one end of the string when it is slowly unwound. Name the curve so produced.
- The figure below shows a section of a moulding of a stairway bracket. Draw a reduced section so that the 60mm dimension becomes 40mm.

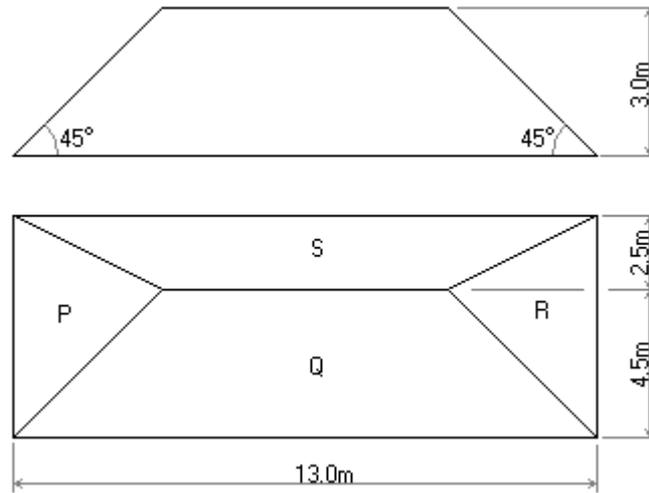


- Shown in the figure below is an elevation of an arch over a door opening. Draw the shape of the arch to a scale of 40mm to 1m.

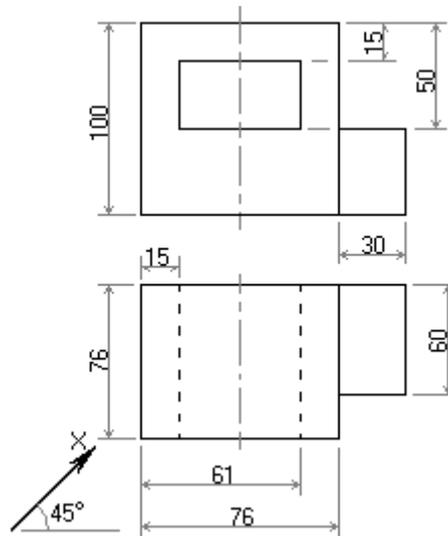


SECTION II – SOLID GEOMETRY

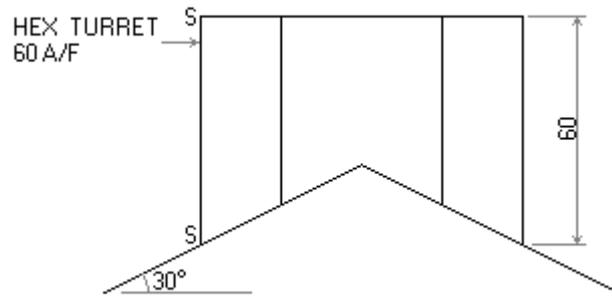
5. The elevation and plan of a hipped roof of an irregular form are given in the figure below. For a special reason the ridge is placed 1m out of centre of the plan. Determine the true shape of surfaces P, Q, R and S. Scale 10mm : 1m.



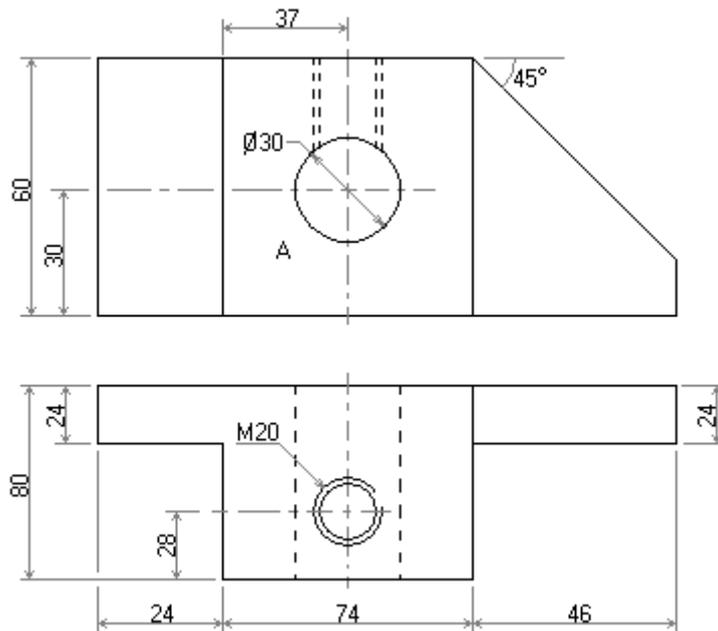
6. The figure below shows the front elevation and plan of a wooden shaped block drawn in first angle projection. Draw full size the given views and project an auxiliary elevation in the direction of arrow X.



7. The figure below shows an elevation of a hexagonal ventilating turret rising centrally through a 30° pitched roof. Draw full size;
- The given view.
 - The full surface development of the turret cut through the seam S-S.

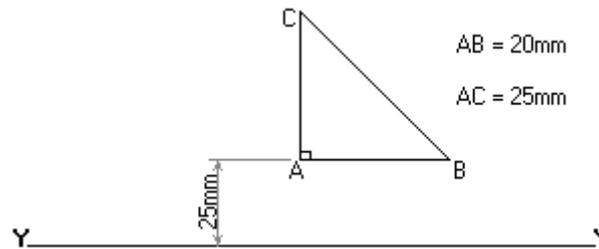


8. The figure below shows two orthographic views of a machined block drawn in first angle projection.
Draw full size an oblique view of the block, making face A the forefront.

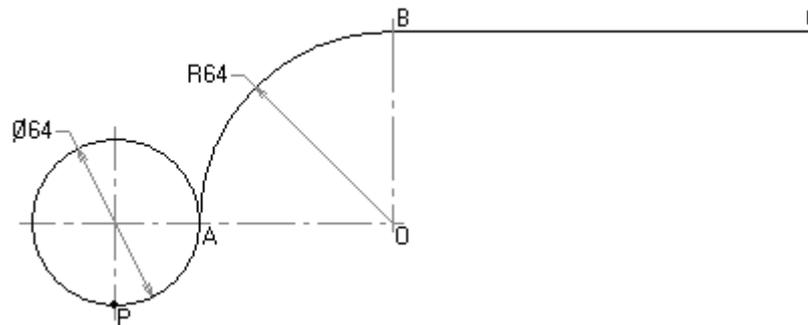


SECTION I – PLANE GEOMETRY.

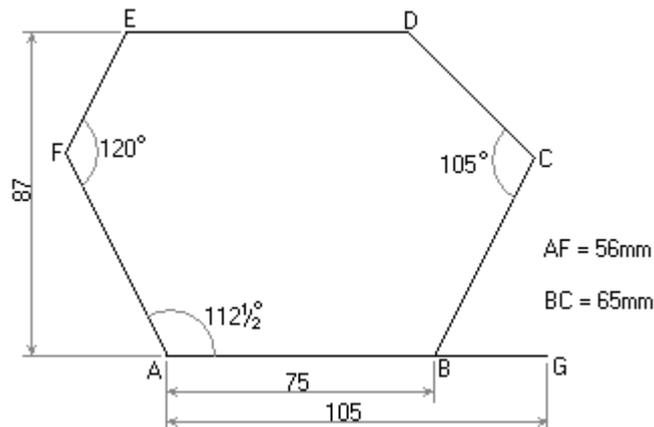
1. (a) Copy the drawing shown in the figure below and draw a circle which will touch the given line YY and contain the given triangle, passing through B and C. State the radius of the circle.
- (b) Construct a triangle having a perimeter of 125mm and a height of 35mm. Draw a circle that touches the sides of the above triangle.



2. The figure below shows a view of a right circular cylinder which rolls along the surface ABC without slipping. Plot the locus of point P on the circumference of the cylinder when the cylinder makes one revolution.



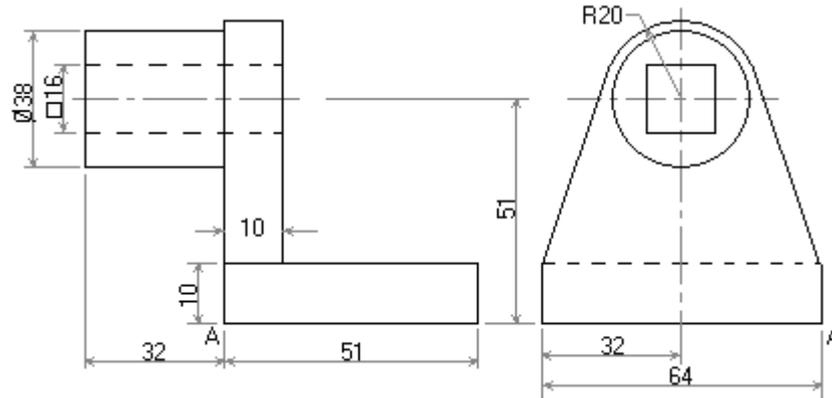
3. Without the use of a protractor, construct the plane figure shown below and transform it into a triangle of equal area.



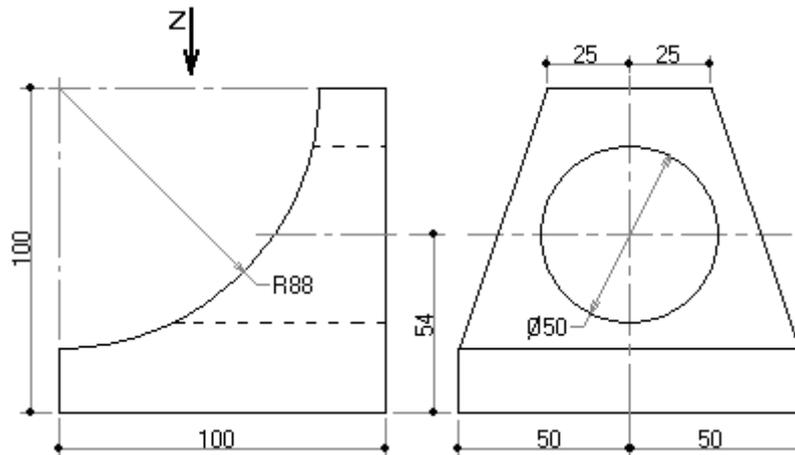
4. Construct a regular pentagon within a circle of 70mm diameter and;
 - (i) Enlarge it to a similar figure of ratio of side 2.5 : 1.
 - (ii) Reduce it to a similar figure of ratio of side 1 : 2.

SECTION II – SOLID GEOMETRY.

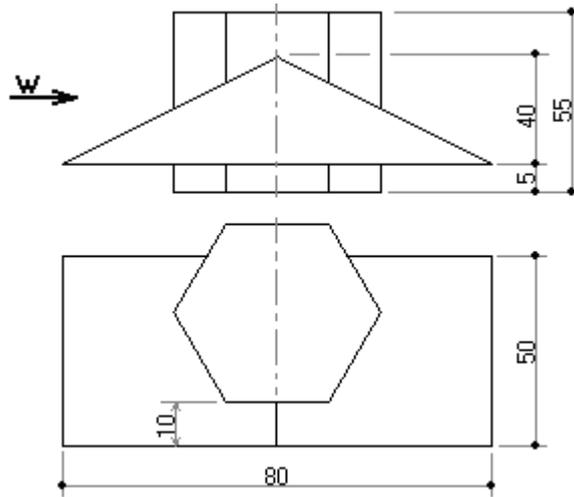
5. The figure below shows two views of a bracket drawn in first angle projection. Draw an isometric view of the bracket making corner A the lowest point. Do not use an isometric scale.



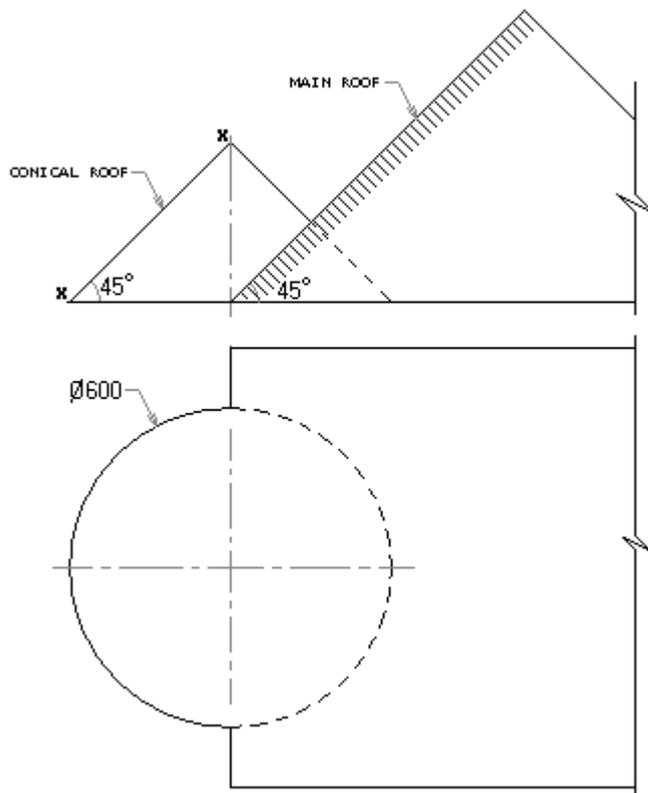
6. Two elevations of a wheel stop are shown in the figure below. Draw full size;
 (a) The given elevations.
 (b) A plan looking in the direction of arrow Z.



7. The figure below shows two incomplete views of a regular hexagonal prism of sides 30mm intersecting a triangular prism.
 (a) Draw the complete views of both solids.
 (b) Project a complete end view, from arrow W.

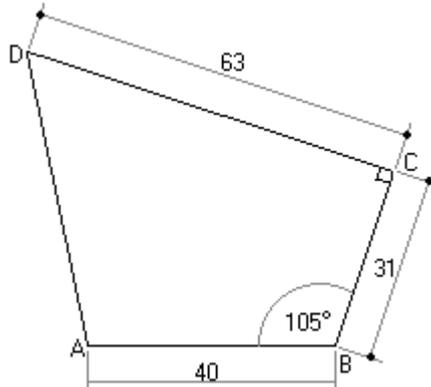


8. The figure below shows views of a conical roof intersecting a pitched roof. Draw the given views, and determine the true shape of the curb on the main roof. Add a surface development of the conical roof making X-X the seam. Scale 1 : 10.

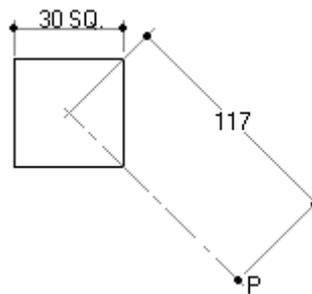


SECTION A; PLANE GEOMETRY.

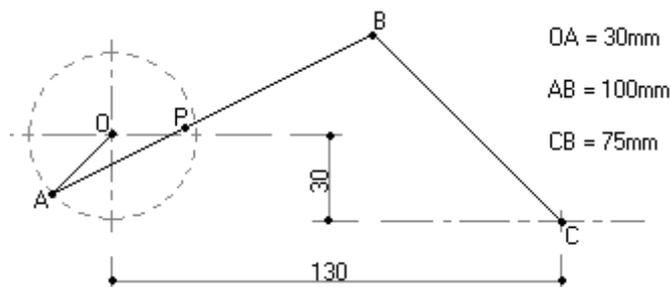
- The figure below shows a quadrilateral ABCD. Draw a figure similar to the given one but only half its area.



- The sides of a triangle are in a proportion of 5 : 7 : 9 and the perimeter is 270mm. Construct the triangle and the circumscribing circle of it. Measure and state the lengths of sides of the triangle and the diameter of the circle.
- Draw an involute of the square given in the figure below and construct a tangent to it at P.

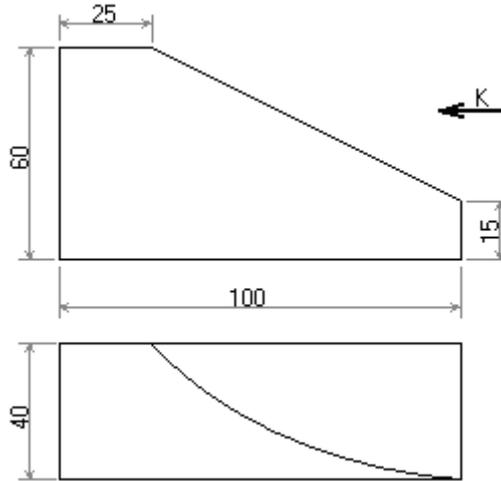


- The figure below shows a kind of a link mechanism. Crank OA rotates about the fixed centre O whilst crank CB oscillates about the fixed centre C. The lever AB is pin-jointed at both ends.
 - Construct the locus of P, which is 60mm from B on the lever AB, for a complete revolution of crank OA.
 - State the total angle of oscillation of crank CB.

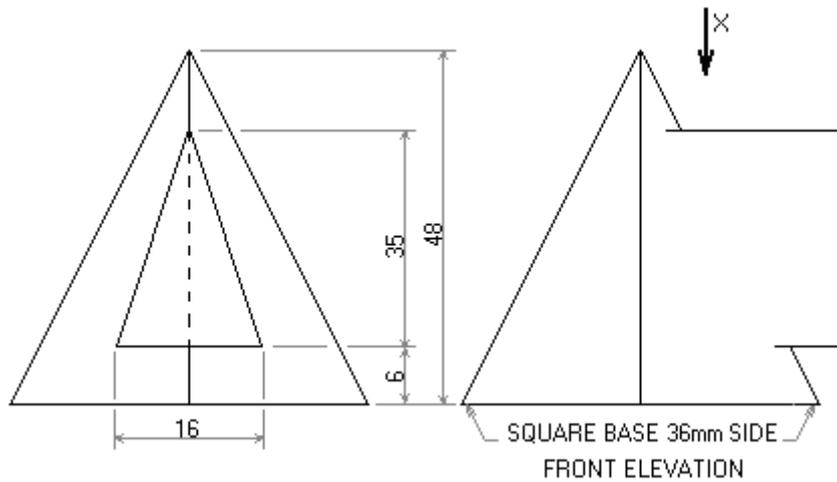


SECTION B: SOLID GEOMETRY.

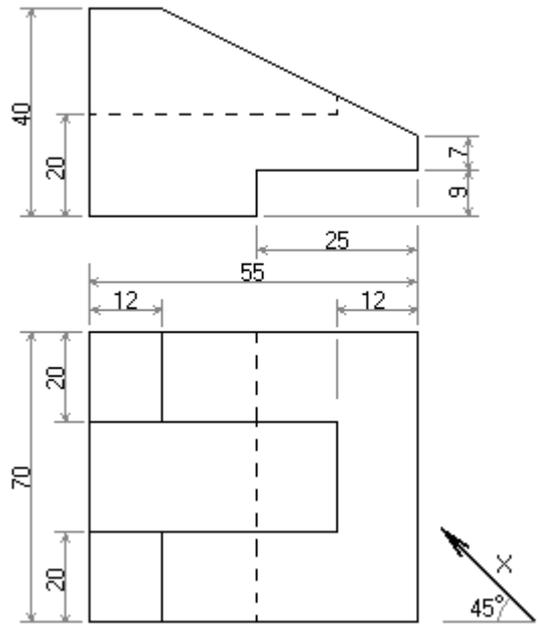
5. The front and the plan views of a moulding are given below.
- Draw the views and show clearly the method of obtaining the curve in the plan.
 - Project an end view of the moulding through arrow K.



6. The figure below shows two views of a right regular square based pyramid pierced by a triangular prism. Draw;
- A complete front elevation.
 - A plan in the direction of arrow X.
 - The full development of the surface of the pyramid.



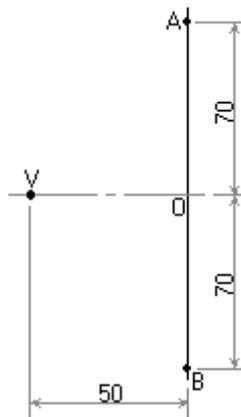
7. The front and plan of a bracket are shown in the figure below. Draw an auxiliary elevation in the direction of arrow X. Show hidden details.



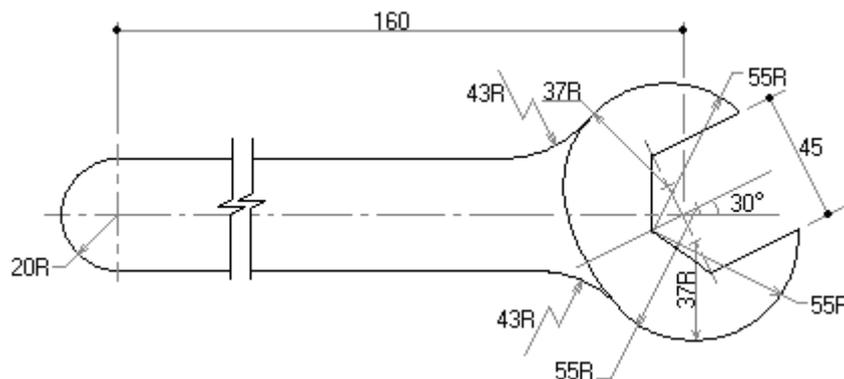
UNEB S4 1986

SECTION A: PLANE GEOMETRY.

1. (a) Draw a triangle having been given the following data:
The base as 100mm
One base angle as 48° and,
The sum of the two remaining sides as 235mm.
(b) Reduce the triangle drawn to $\frac{4}{6}$ its original side.
2. (a) Construct a plain scale, 20mm to represent 10mm, 50mm long, to read 1mm.
Show the following readings on your scale; 21mm, 47mm, 50mm.
(b) Using the plain scale, draw a regular pentagon of sides 25mm long.
Transform this pentagon into a triangle of equal area.
Name the triangle thus formed.
3. (a) The ordinates OA and OB; and the vertex of a parabolic curve are given in the figure below. Draw the curve.
(b) Determine the position of the focus of the curve.
(c) Draw a tangent to the curve from any point P on it.

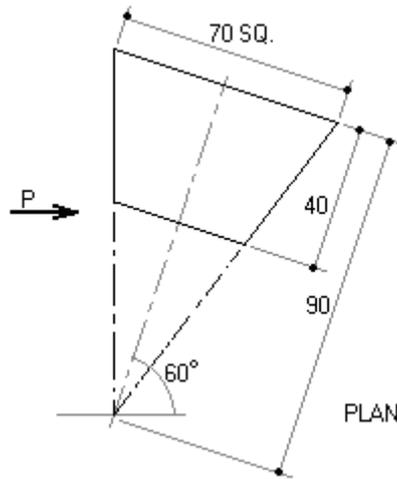


4. Details of a spanner for a hexagonal nut are shown in the figure below. Draw this out line to full size showing clearly all constructions and points of contact.

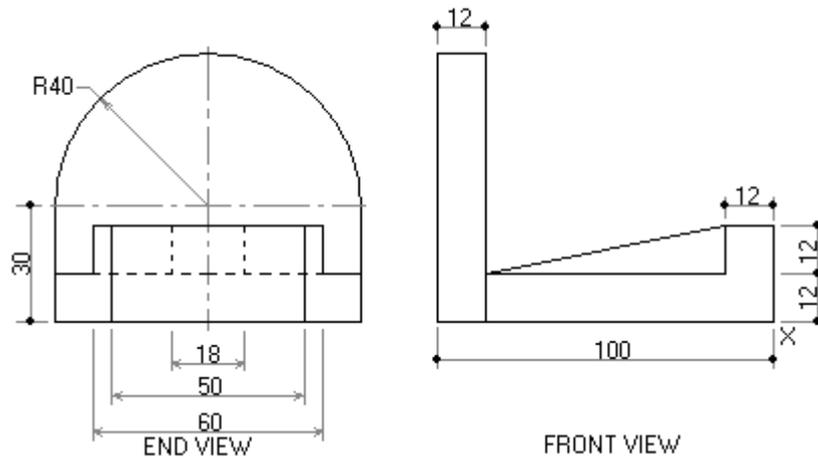


SECTION B: SOLID GEOMETRY.

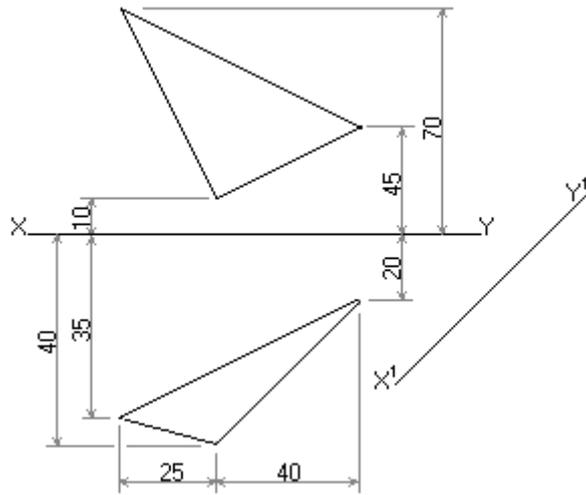
5. The plan view of a cut square base pyramid is given in the figure below. Project the front elevation and an end view from arrow P of the pyramid in first angle projection.



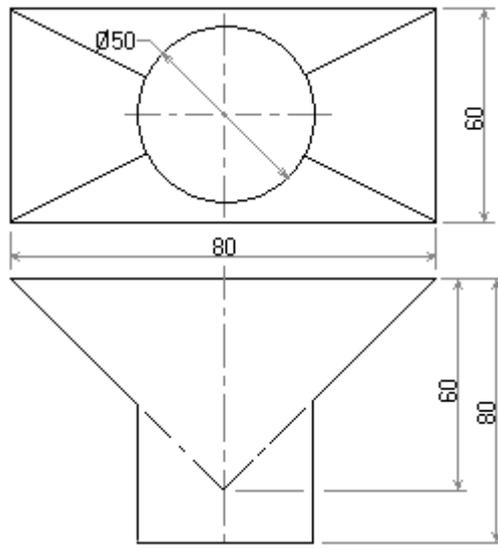
6. The front and end views of a casting are given in the figure below. Draw the isometric view of the casting with corner X in the foreground.



7. The front and plan views of a cut triangular lamina are given below.
 (a) Project the auxiliary plan view of the prism on X^1Y^1 .
 (b) Determine the true shape of the lamina.



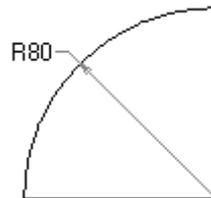
8. The figure below shows the front and plan views of a cylinder pierced by a rectangular base pyramid.
- Determine the curve of interpenetration between the cylinder and the pyramid.
 - Project the end view, from any side.



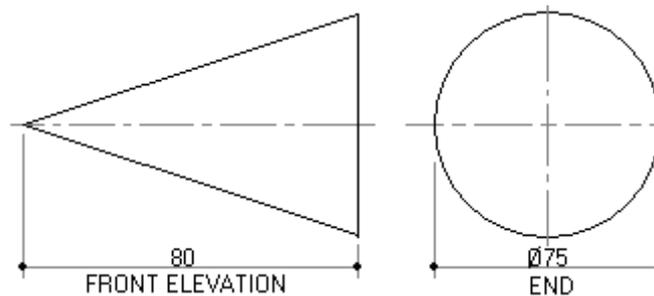
SECTION A: PLANE GEOMETRY

1. The base of a triangle is given as 80mm, the base angle $BAC = 80^\circ$ and the sum of the two remaining sides of the triangle is given as 150mm.
 - (a) Draw the triangle.
 - (b) Divide the triangle into two equal areas.

2. A quadrant is given in the figure below.
 - (i) Draw an inscribed circle of the quadrant.
 - (ii) Draw a tangent to pass through any point on this inscribed circle.



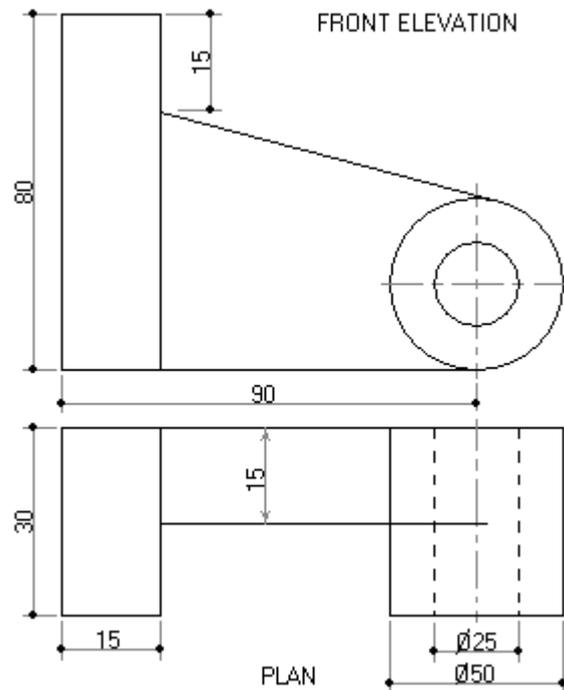
3. The front and end views of a cone are shown in the figure below. Draw its conical spiral.



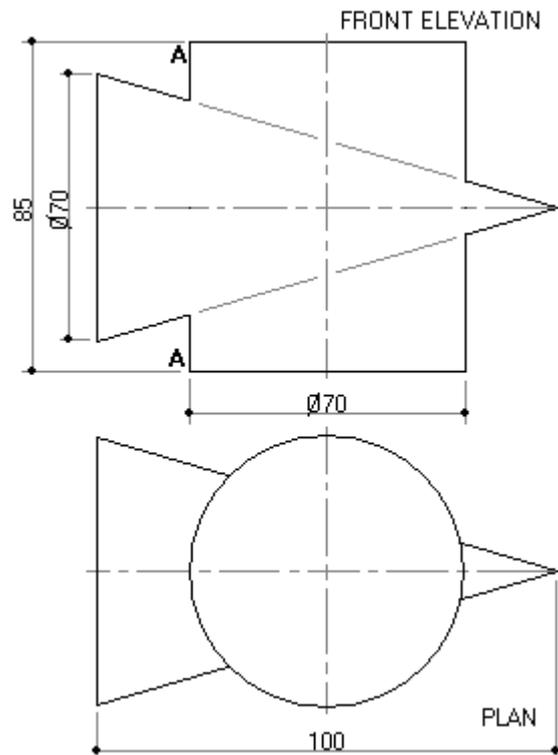
4.
 - (a) Draw a pentagon of sides 60mm.
 - (b) Reduce this pentagon so that its sides become $\frac{4}{6}$ of the original.
 - (c) Transform this new pentagon into a triangle of equal area.

SECTION II – SOLID GEOMETRY

5. The front and plan views of a bracket are given in the figure below. Draw full size, an oblique projection of the bracket using the front elevation face towards you.

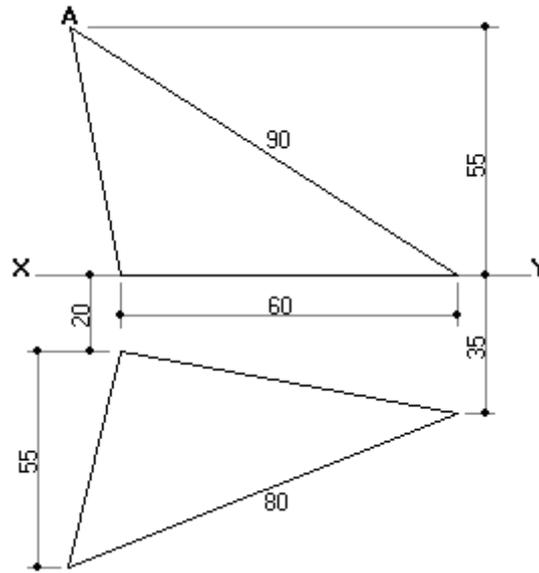


6. The front and plan views of a cylinder pierced by a cone is shown below.
- (i) Determine the curves of interpenetration between them.
 - (ii) Develop the vertical surfaces of the cylinder cut along A-A.

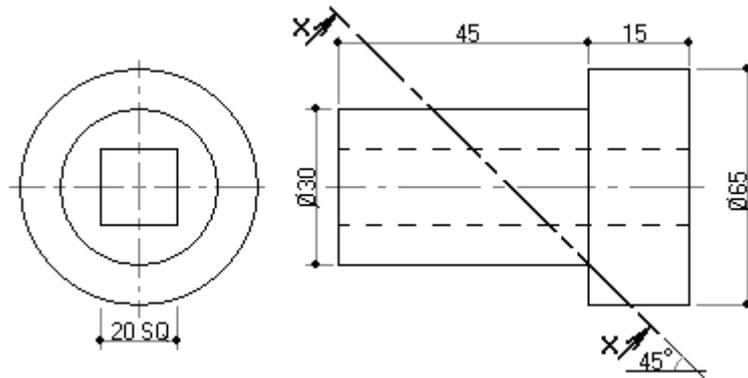


7. The figure below shows two views of a triangle inclined to both the vertical and horizontal planes.
- (i) Project the true length of the perpendicular of the triangle from the apex A to the XY line.

(ii) Determine the true shape of the triangle.

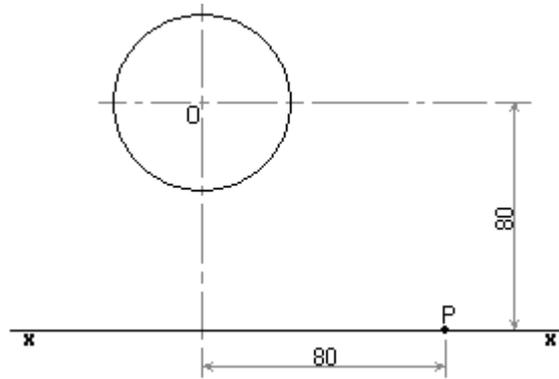


8. Two views of a casting drawn in 3rd angle projection are shown in the figure below. Project the auxiliary view of the surface cut along XX.



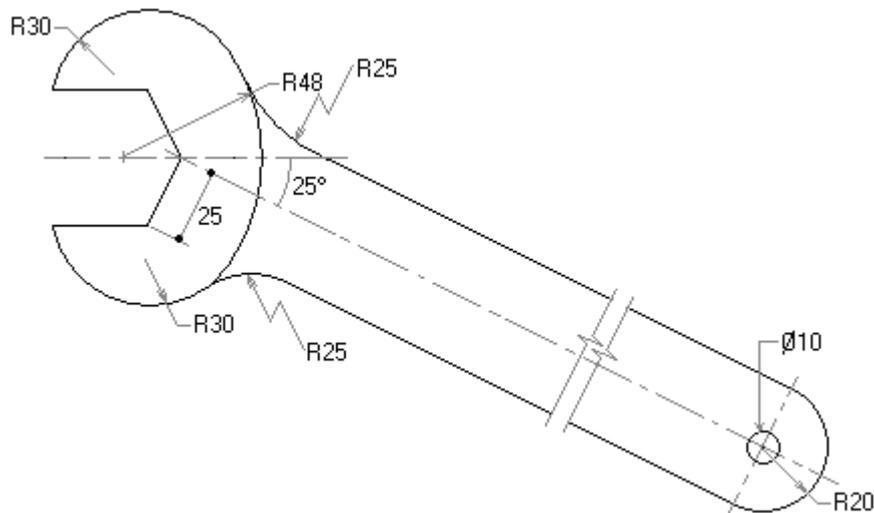
SECTION A. PLANE GEOMETRY.

1. (a) A circle of 58mm diameter with centre O is placed 80mm above a line X – X as shown in the figure below.
 Draw the figure and construct a circle tangent to the given circle and passing through a given point P on the line X – X.

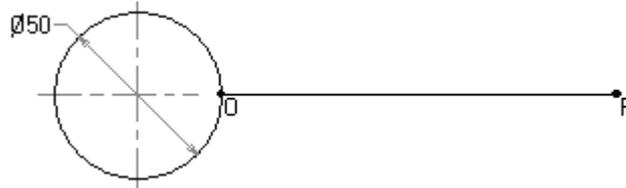


- (b) Construct an isosceles triangle to the given data:
 Perimeter = 190mm.
 Height = 75mm.

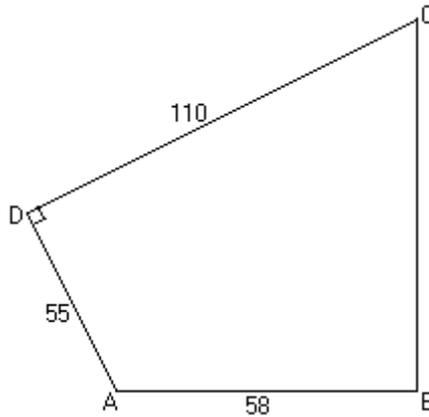
2. The figure below shows a spanner for a hexagonal nut. Draw the spanner showing clearly all construction lines.



3. A piece of thread OP whose length is equal to the circumference of a reel is shown in the figure below.
 (a) Draw the locus of P when the thread is wound around the reel.
 (b) Construct a normal and tangent at any convenient point on the locus.



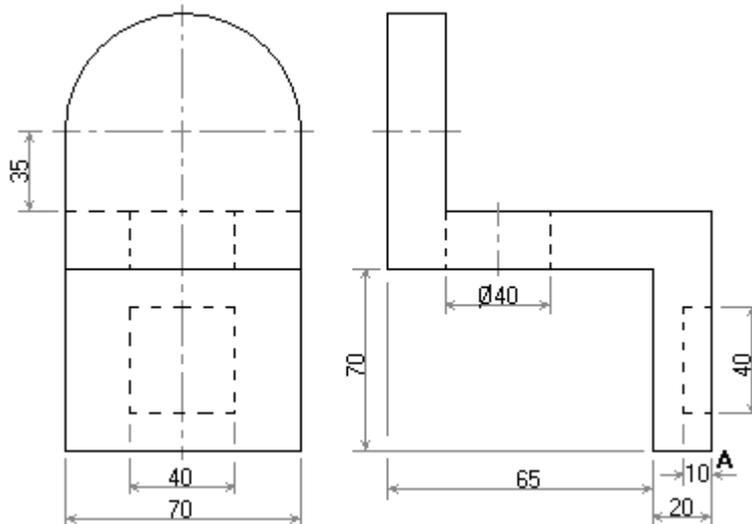
4. A quadrilateral ABCD is shown in the figure below.
- Draw the figure showing clearly your construction. The use of a protractor will be penalised.
 - Transform the quadrilateral into a rectangle and square of equal area.



SECTION B

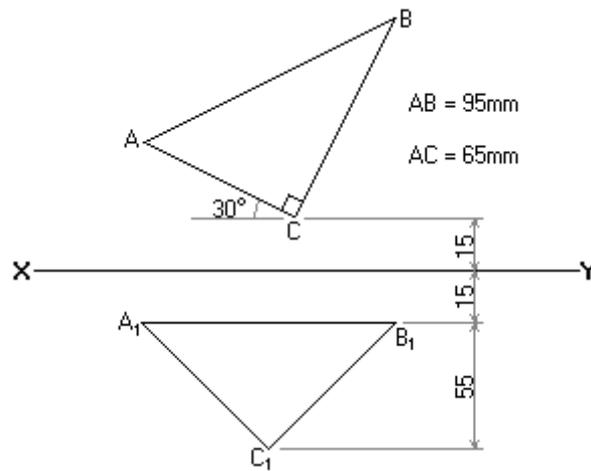
SOLID GEOMETRY

5. The figure below shows the end and front views of a bracket. Draw the isometric projection of the bracket with corner A in the foreground.

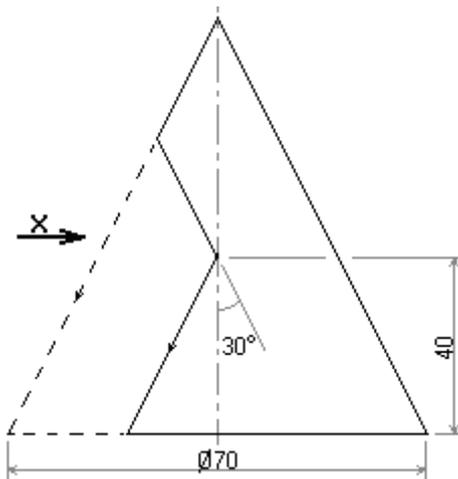


6. The elevation and plan of a triangle are shown in the figure below.
- Draw the given views.
 - Construct and show:
 - The true lengths of AB, BC, and AC.

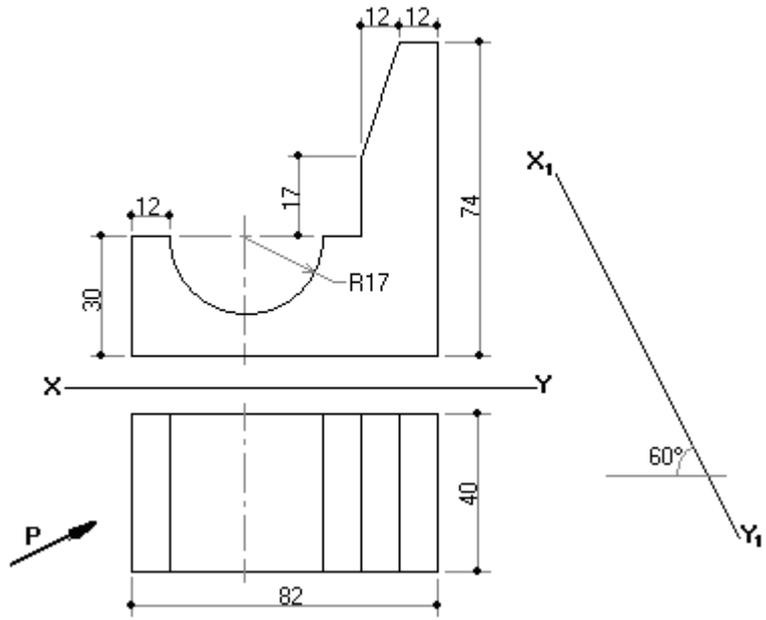
(ii) The true shape of the triangle.



7. The figure below shows an elevation of a truncated cone of vertical height 80mm . Draw:
- The plan.
 - The end elevation as seen in the direction of arrow X .



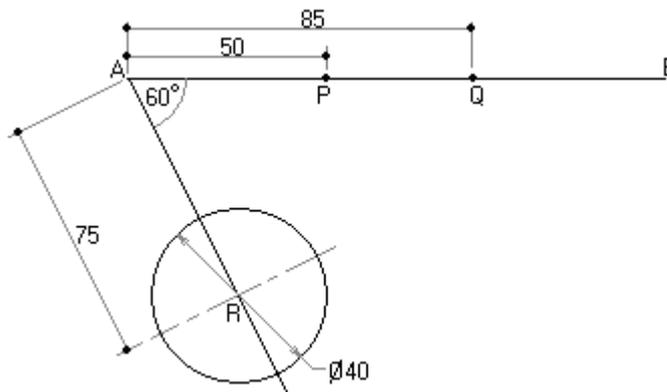
8. Two views of a guide block are shown in the figure below. Project an auxiliary view on the plane X^1Y^1 as seen in the direction of arrow P .



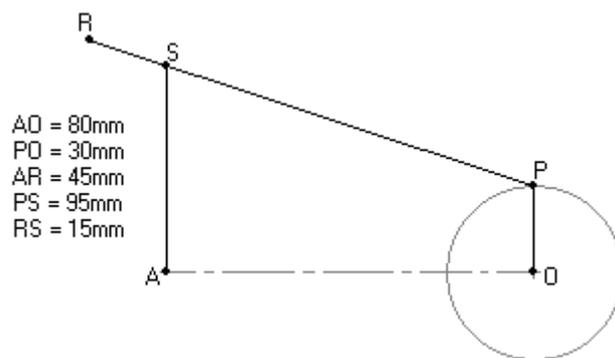
SECTION A. PLANE GEOMETRY.

1. (a) Construct a plain scale 20mm to represent 10mm, 50mm long to read 1mm.
 (b) Using the plain scale you have drawn in (a), draw a regular pentagon of sides 25mm long. Transform this pentagon into a triangle of equal area. Name the triangle.

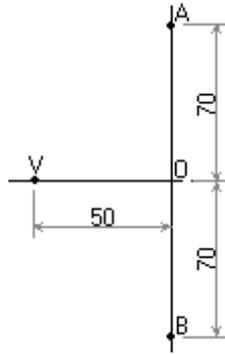
2. The figure below shows the relative positions of two points P and Q on a straight line AB and a circle of 40mm diameter with its centre at R.
 (a) Draw the figure.
 (b) Construct a circle which will pass through points P and Q and touch the given circle. State its diameter.
 (c) Construct another circle of radius 20mm tangent to the two circles you obtained in (a) above.



3. The figure below shows a link mechanism in which PS is hinged to movable rods RA and PO at R and P respectively. As the rod PO rotates in clockwise direction, rod AR and arm PS swings on A and O respectively.
 (a) Using the given data draw the mechanism.
 (b) Plot the locus of S for one revolution of the rod PO.

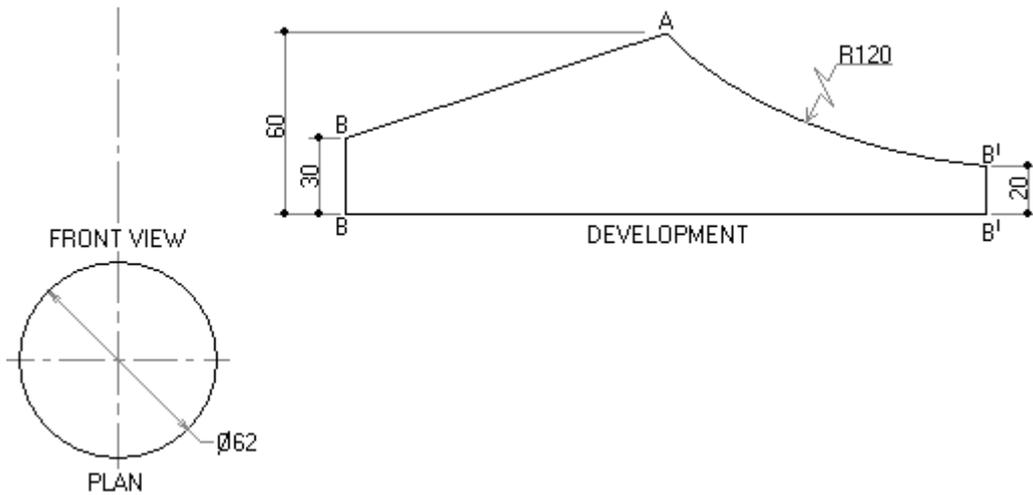


4. The ordinates OA and OB and the vertex V of a parabolic curve are given in the figure below.
 (a) Draw the curve.
 (b) Determine the position of the focus of the curve.
 (c) Draw a tangent to the curve from any point P on it.

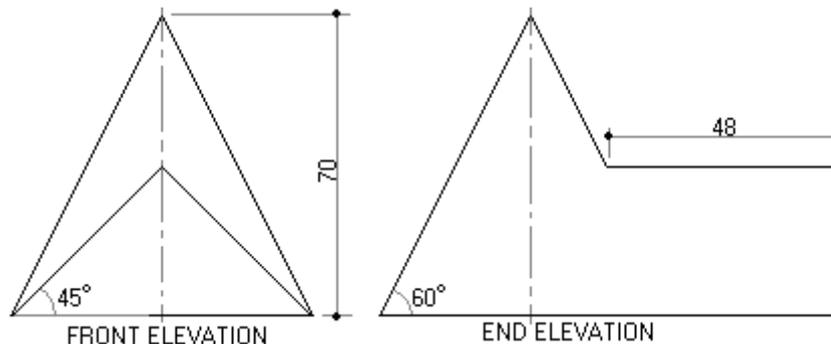


SECTION B. SOLID GEOMETRY.

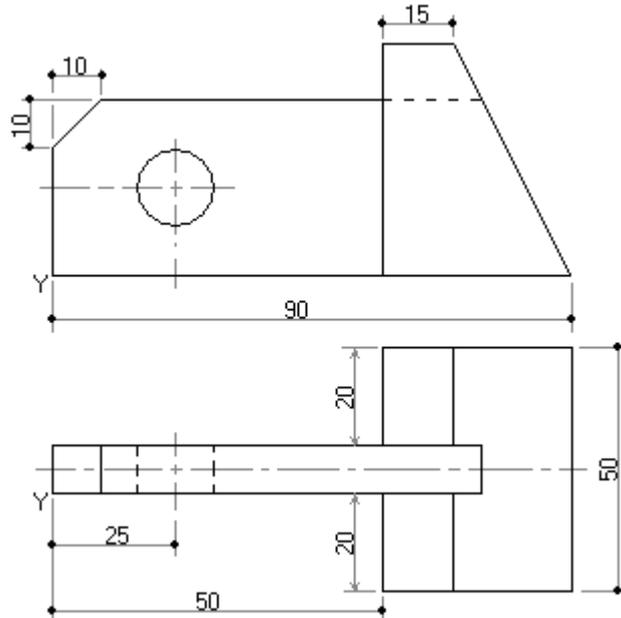
5. The figure below shows the plan and the development of a cut cylinder with the relative position of the front view given. (Neglect the cylinder thickness)
- Draw the given plan and development.
 - Project the front view from the plan and development.



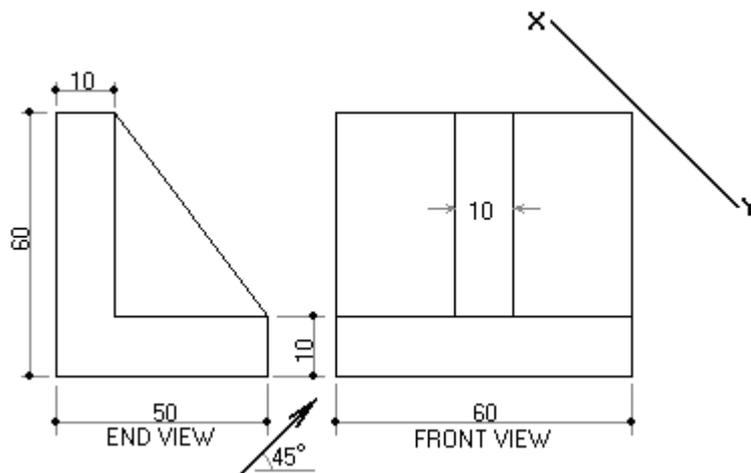
6. The front and end elevation of a triangular prism intersecting with a cone are shown in the figure below. Draw;
- A complete end view.
 - A complete plan showing the curve of interpenetration.



7. The figure below shows two views of a bracket. Draw full size an isometric view of the bracket, taking corner Y as the lowest point. Hidden edges are not to be shown.



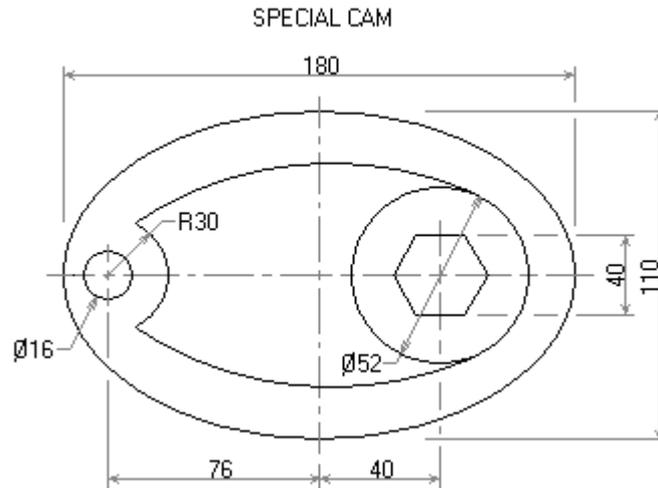
8. Two views of a machine block are shown in the figure below.
 (a) Draw the given views.
 (b) Project the auxiliary view of the block on the X-Y line.



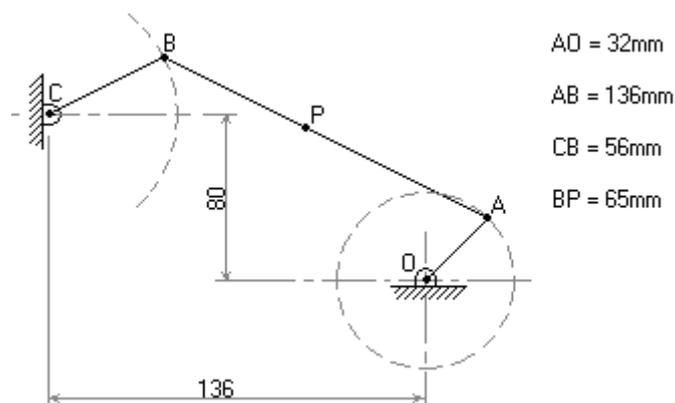
UNEB S4 1990

SECTION A. PLANE GEOMETRY.

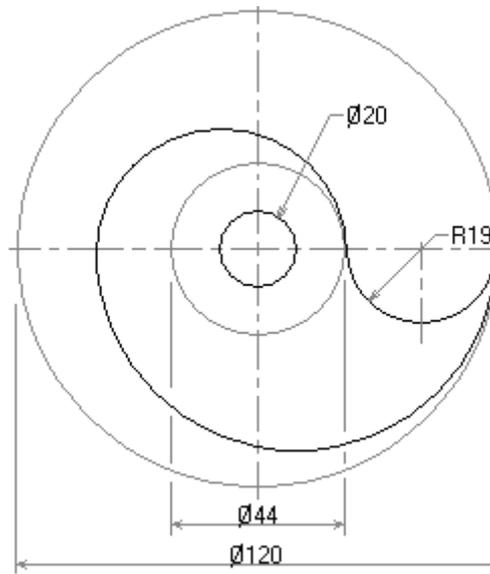
1. It is stated that the diameter of a circle is 80mm.
 - (a) Show how the circumference of this circle can be geometrically determined.
 - (b) State the circumference of this circle in millimetres.
2. The figure below shows the features of a special cam. Draw the cam showing clearly how the features have been obtained.



3. A mechanism is shown in the figure below. A crank OA rotates uniformly about O. A link AB is attached to the rod CB which swings about point C. Plot the locus of P for one revolution of OA.

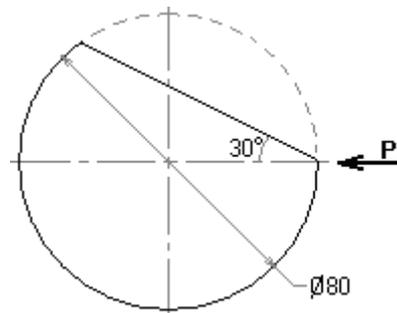


4. The figure below shows the layout of a special cam. Draw the cam showing clearly how this layout is obtained.

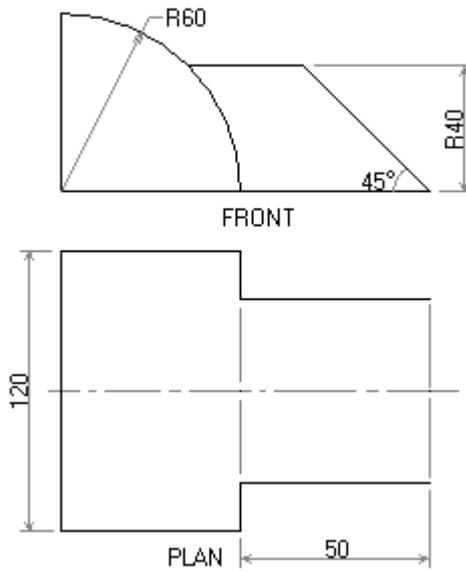


SECTION B. SOLID GEOMETRY.

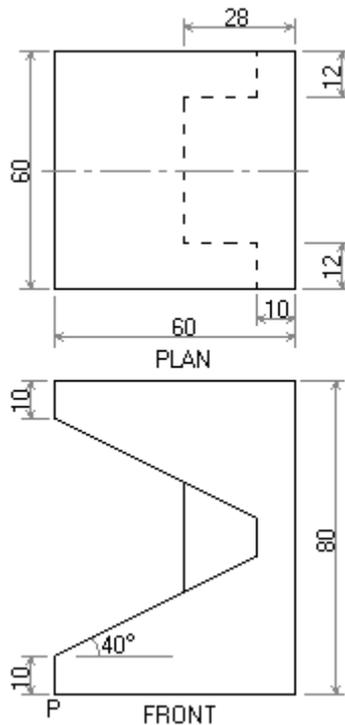
5. The front view of a sphere is shown in the figure below.
- Draw the given view.
 - Project the;
 - End view seen from the direction of arrow P.
 - Plan view.



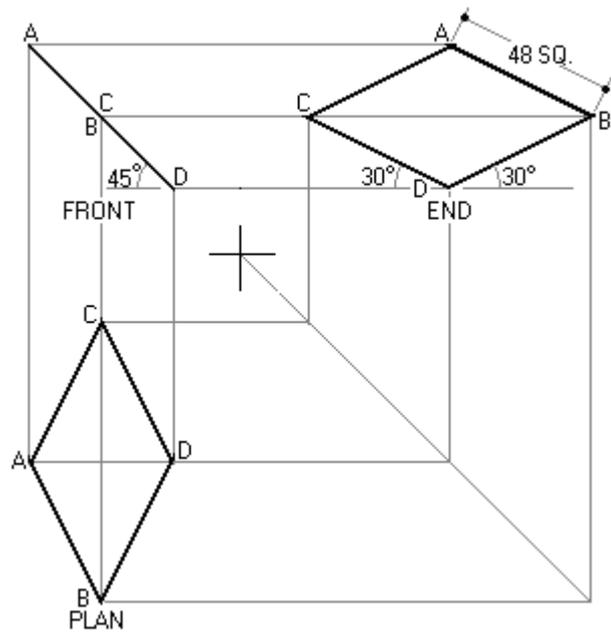
6. The figure below shows the front and plan views of a half cylinder intersecting with one quarter of a cylinder.
- Draw the given elevation.
 - Project the full plan view.



7. The figure below shows two orthographic views of a plastic pattern drawn in third angle projection. Draw full size an isometric view of the pattern, making corner P the lowest point.



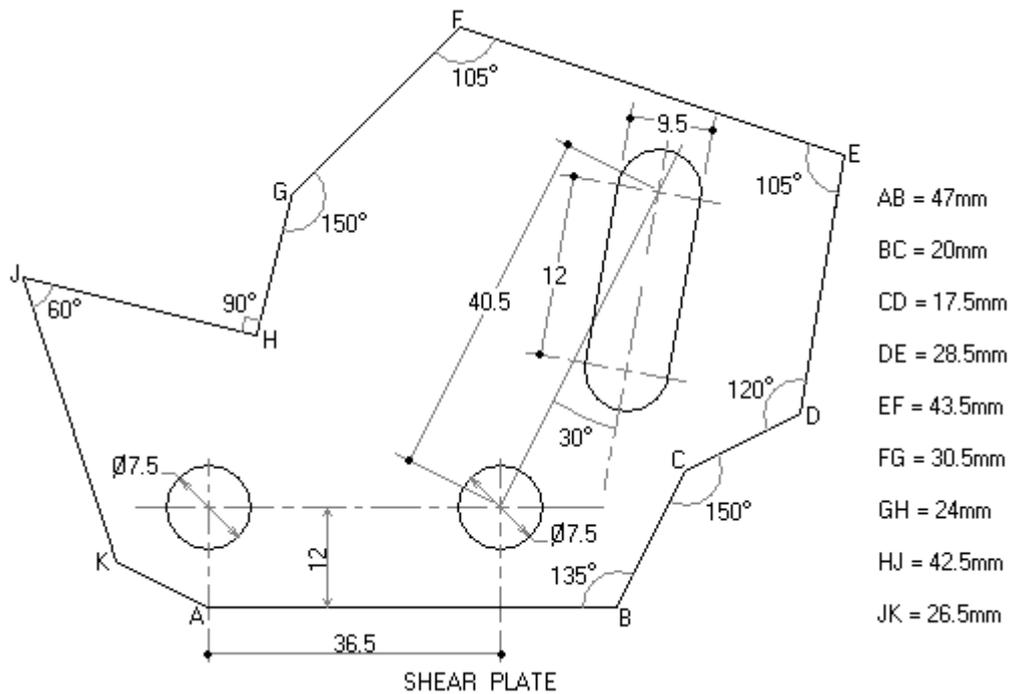
8. The orthographic views of a lamina ABCD are shown in the figure below.
- Draw the lamina as shown.
 - Determine the true shape of the lamina.



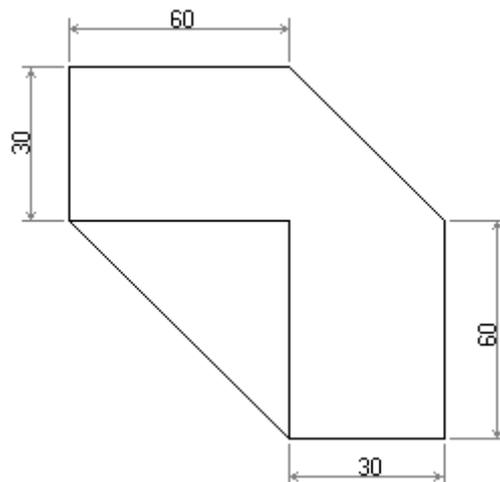
SECTION A – PLANE GEOMETRY

1. The length of one side of a regular pentagon is given as 60mm.
 - (a) Using geometrical methods, construct this regular pentagon.
 - (b) Transform this pentagon into a rectangle of equal area.

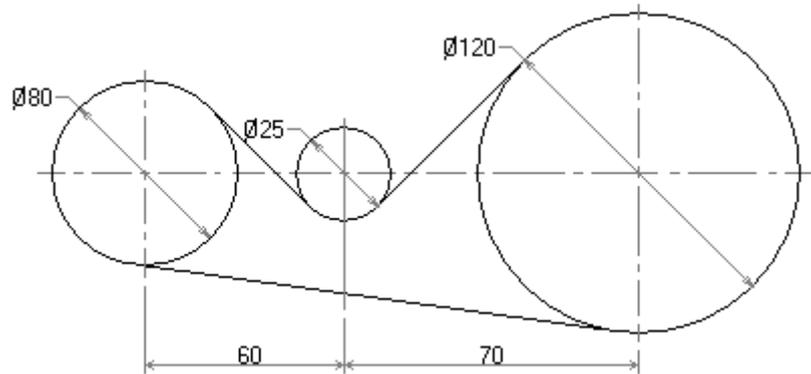
2. The layout of a shear plate is shown in the figure below.
 - (a) Draw the layout of the plate using scale 1:2. Where possible use geometrical methods of constructing angles.
 - (b) State the length of side KA.



3. The figure below shows a view of a wall bracket.
 - (a) Draw the given view.
 - (b) Construct a similar view whose area is in the ratio of 4:5.

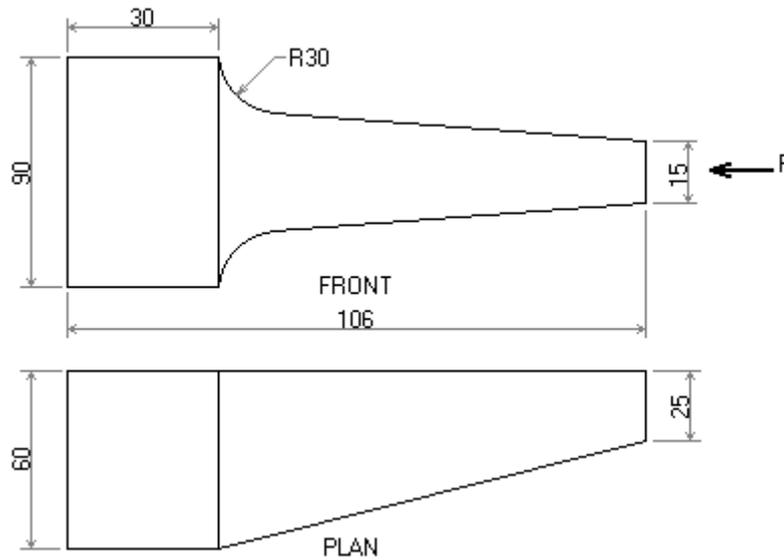


4. The figure below shows an outline of three wheels connected by a taut belt of negligible thickness. To a scale of 1:2 draw the figure showing clearly the construction for obtaining the points of contact of the belt and the wheels.

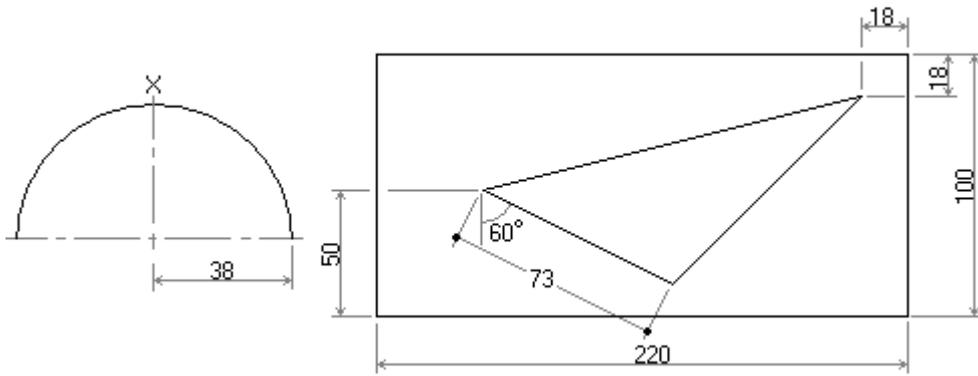


SECTION B – SOLID GEOMETRY

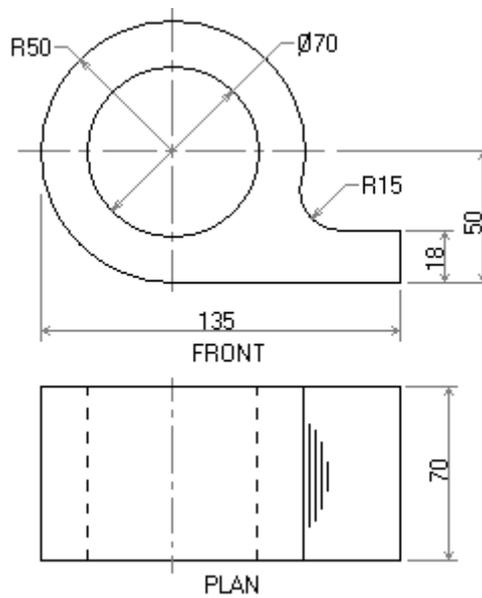
5. Two views of a wooden moulding are given in the figure below.
 (a) Draw the given views.
 (b) Project the end in the direction of arrow P.



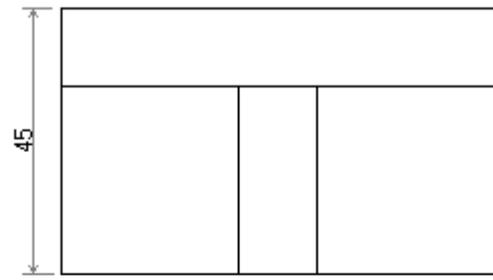
6. The development of a cylinder is given in the figure below. Draw the front view of the cylinder with the cut made along X.



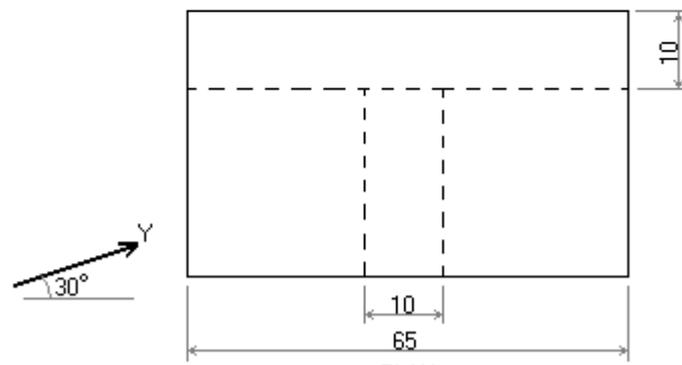
7. The front and plan views of a curtain rail holder are given in the figure below. Draw the oblique projection of the curtain rail holder.



8. The figure below shows the front and plan views of a wooden bracket drawn in first angle projection. Draw full size the given views and project an auxiliary elevation in the direction of arrow Y.



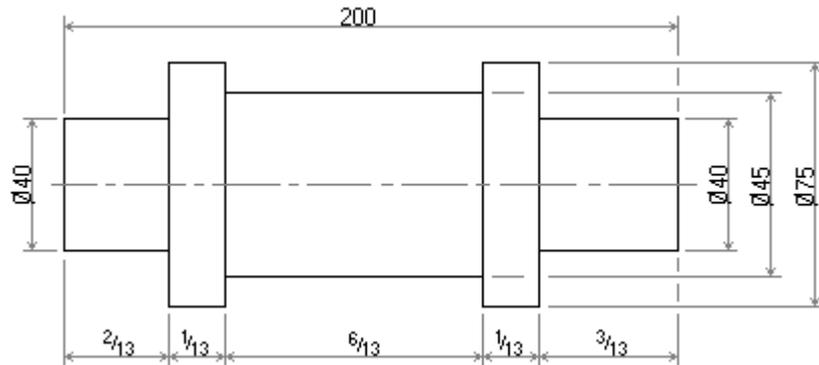
FRONT



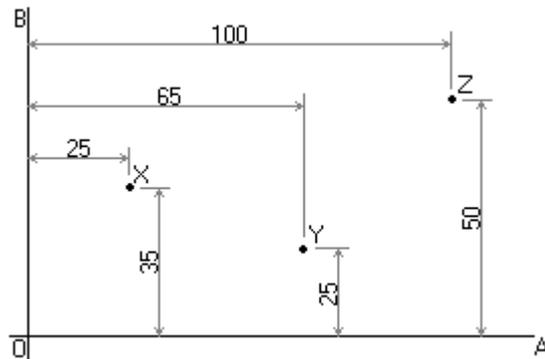
PLAN

SECTION A. – PLANE GEOMETRY.

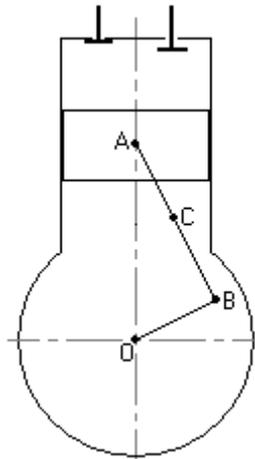
1. (a) A spindle is shown in the figure below. The lengths of the various diameters are expressed as fractions of the total length of the spindle. Draw the spindle showing clearly how the parts are divided geometrically.



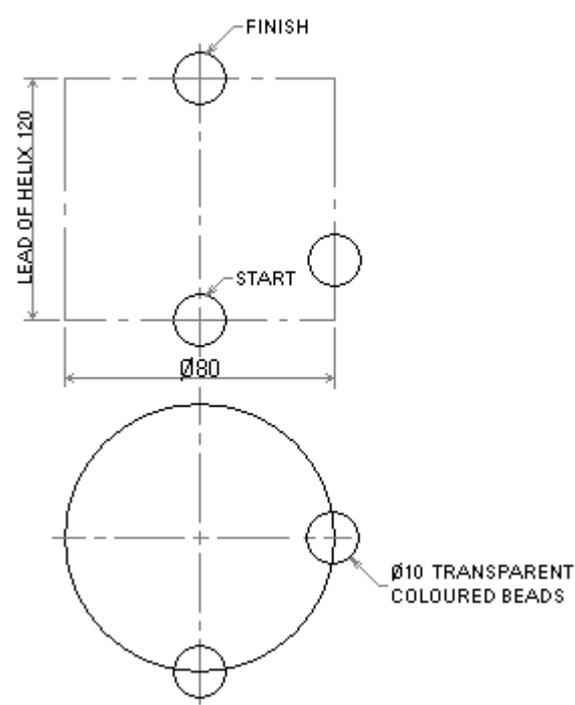
- (b) Three points X, Y and Z are shown in the figure below. Their relative positions from axes OA and OB are as indicated. Locate these points and draw an arc to pass through them.



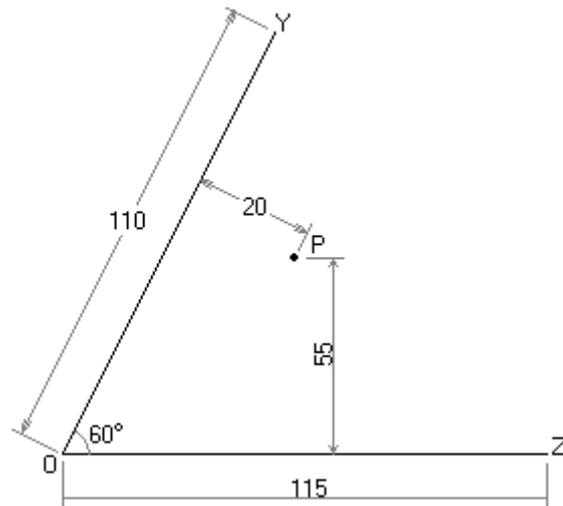
2. The figure below shows the diagram for explaining the principle of an internal combustion engine. AB (84mm) is the connecting rod which is linked to a crank OB (30mm). OB rotates on pivot O. C is a point mid-way of AB. Draw full size the locus of C for one complete revolution of OB in the clockwise direction.



3. An advertising sign consists of a thin wire which is threaded with coloured beads wound into a right hand helix so that the helix is divided into twelve equal sections. Part of the front elevation and plan view are shown in the figure below with three beads in position. Draw the given views showing the helix with all threaded beads on the wire.

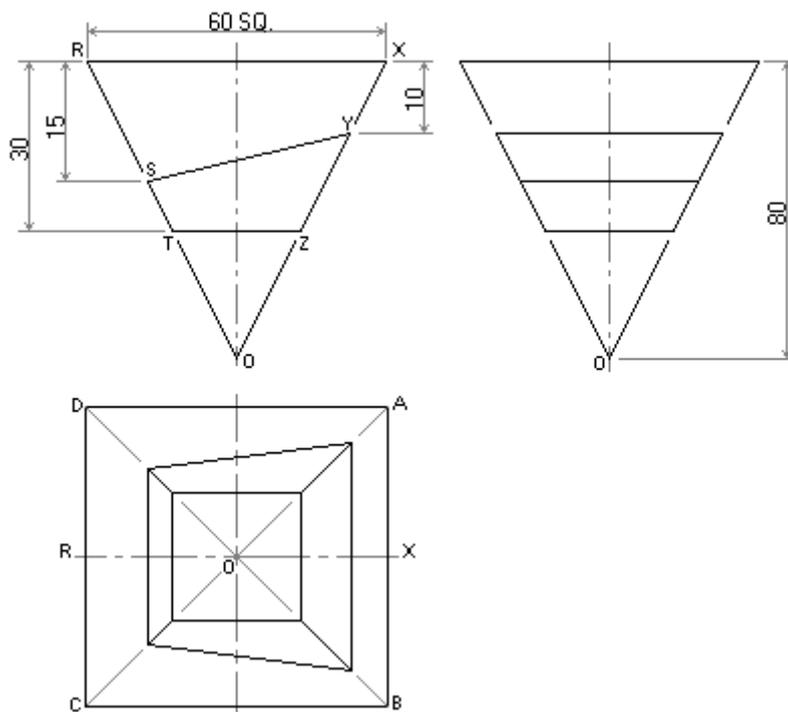


4. The figure below shows a casting for a hyperbolic reflector.
 (a) Draw the curve of the reflector passing through point P.
 (b) Find the directrix and the focus of the curve.

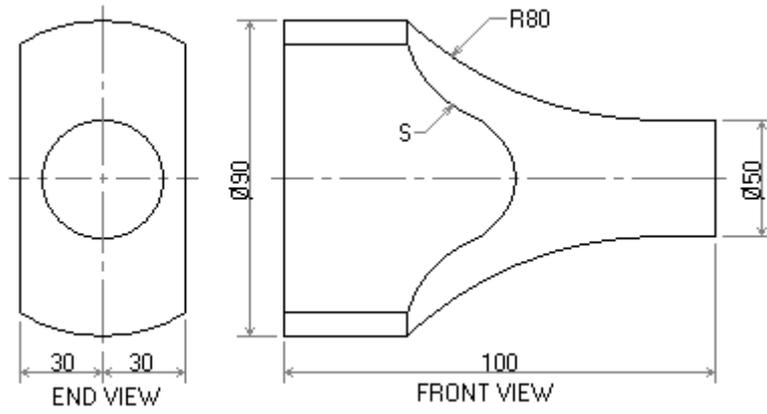


SECTION B. – SOLID GEOMETRY.

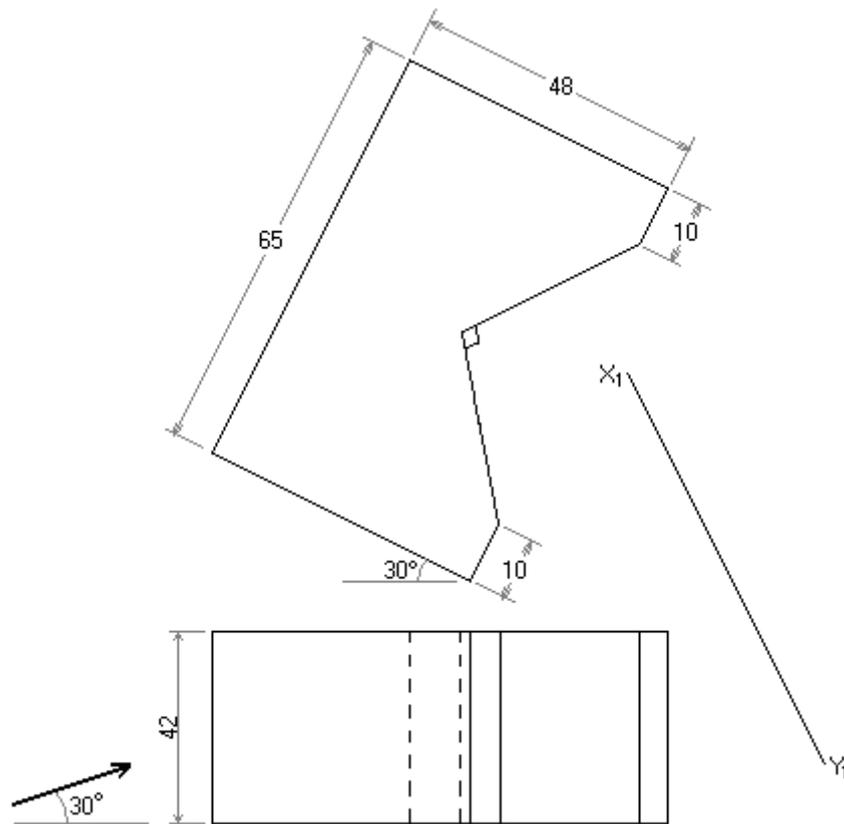
5. Three views of a wheel barrow trough are shown in the figure below. Draw the development of the trough.



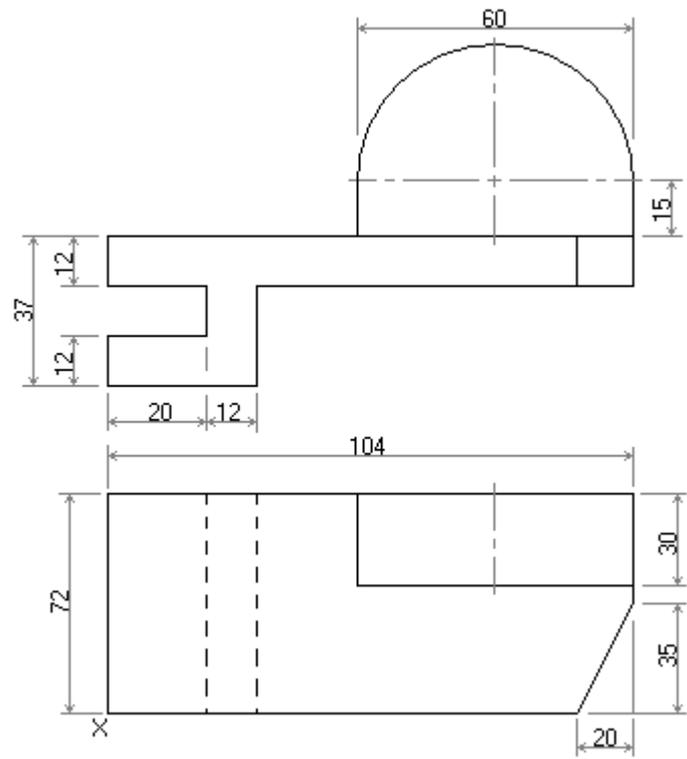
6. The figure below shows a component which has been turned to produce the 80mm radius and milled to leave two flat surfaces at the end view. Show the construction to obtain the shaped curve S on the front view.



7. The orthographic views of a vee block drawn in third angle projection are shown in the figure below.
- Draw the two given views.
 - Project an auxiliary plan on the X_1-Y_1 line. Show all hidden details.



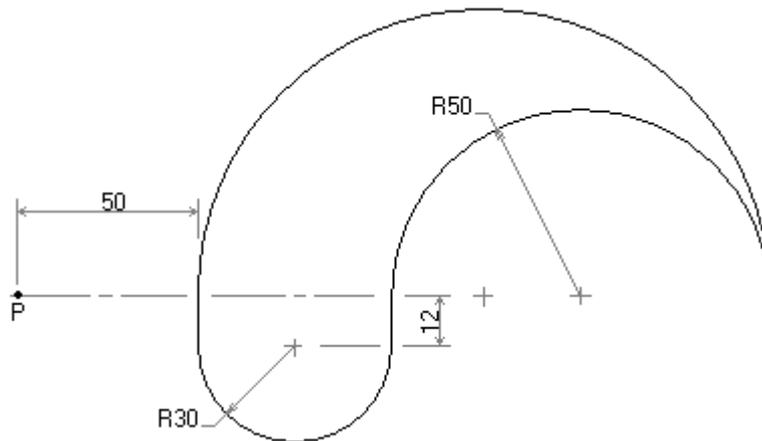
8. Draw full size the isometric view of the bracket shown in the figure below. Corner X being the lowest point. No hidden details are required.



SECTION A PLANE GEOMETRY

1. The perimeter (160mm) and the altitude (60mm) of an isosceles triangle ABC are given.
 - (a) Draw the triangle.
 - (b) Enlarge this triangle to two times the original size.

2.
 - (a) Draw the shape shown in the figure below showing clearly the centres of the semi-circles.
 - (b) Construct a tangent to the shape from point P.



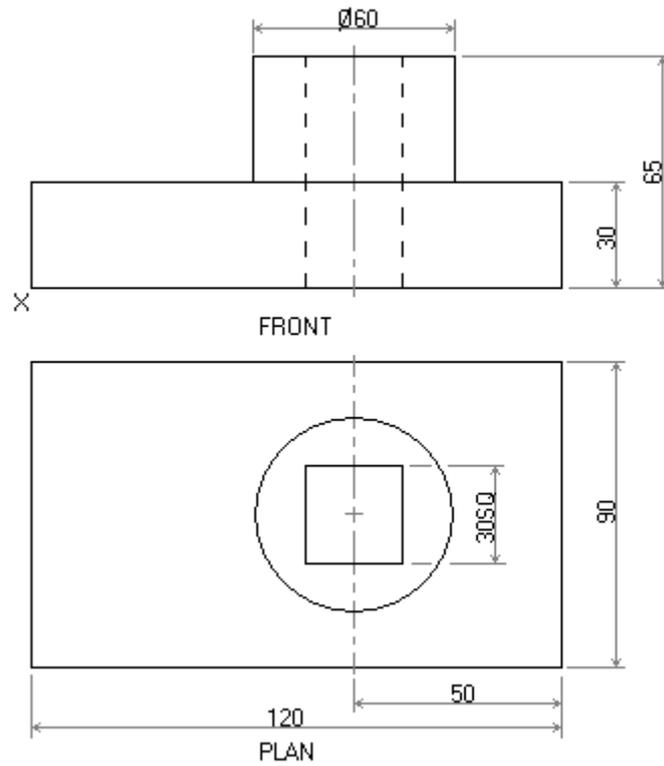
3.
 - (a) Construct a regular pentagon whose sides are 70mm.
 - (b) Transform the pentagon into a triangle of equal area.

4. Using any one method you know, draw the locus of a point which moves so that its distance from a point S and a line RQ is always the same. Label on the diagram;
 - (i) The locus.
 - (ii) Point S,
 - (iii) The line RQ.

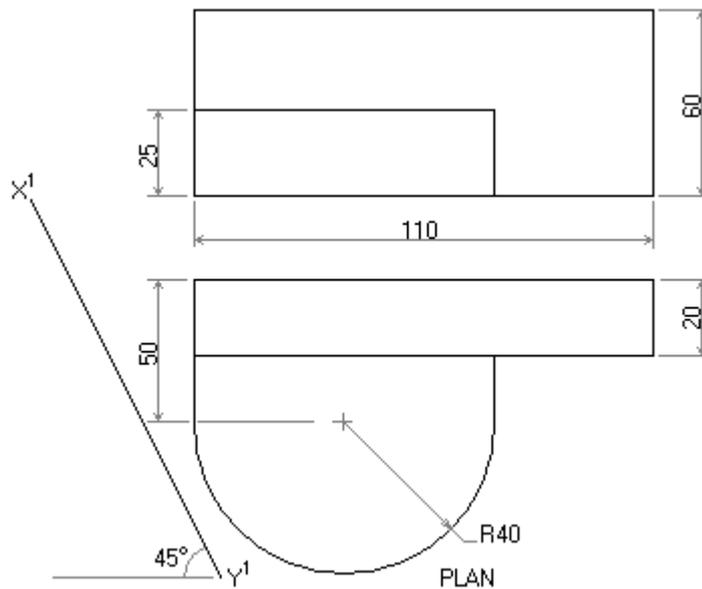
SECTION B

SOLID GEOMETRY

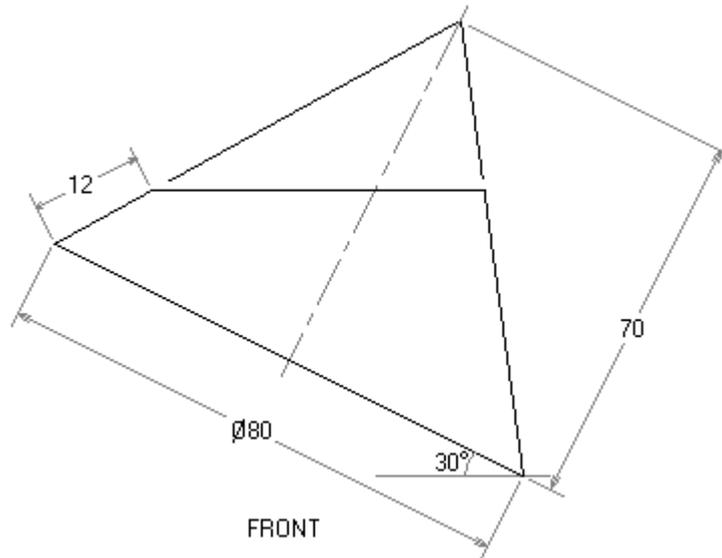
5. The front and plan views of a bracket are shown in the figure below. Draw the isometric view of the bracket with corner X in the foreground.



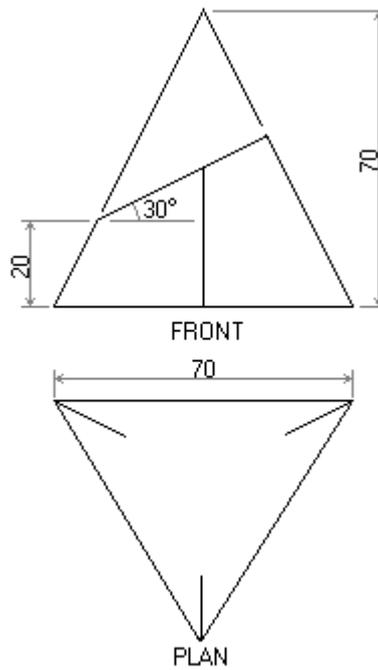
6. Draw the auxiliary view of the bracket shown in the figure below.



7. The figure below shows the front view of a truncated cone.
 (a) Project a complete plan view in first angle projection.
 (b) Project the complete end view.
 (c) Show the true shape of the cut surface.

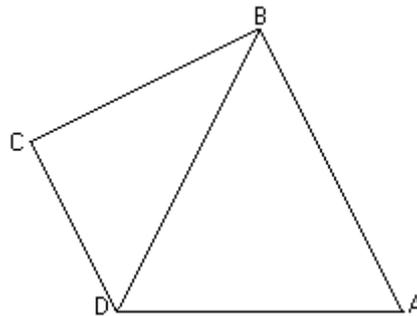


8. The front and incomplete plan views of a triangular base pyramid are given in the figure below.
- Complete plan.
 - Project an end view.
 - Develop the vertical surfaces.
 - Show the true shape of the cut surface.

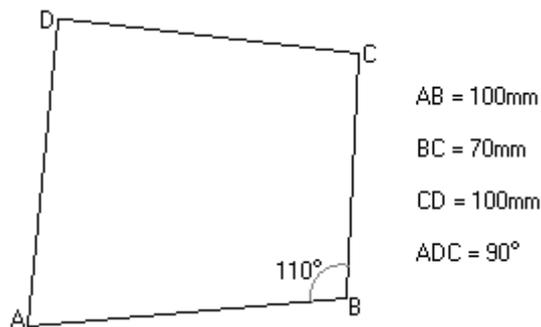


PLANE GEOMETRY

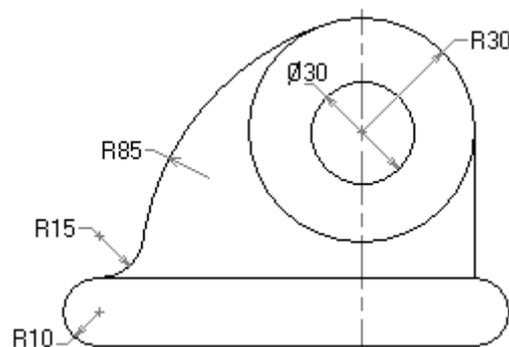
- The following data about a quadrilateral ABCD shown in the figure below is given: $AB = 100\text{mm}$, $BC = 90\text{mm}$, $AD = 120\text{mm}$, $BD = 100\text{mm}$ and angle $BCD = 90^\circ$.
 - Draw the quadrilateral.
 - Measure and state the length of side CD and angles ADC and ABC.



- Draw the quadrilateral shown in the figure below.
 - Reduce the quadrilateral to $\frac{4}{5}$ its original size.



- The front elevation of a rail support is shown in the figure below. Draw the outline showing clearly the how centre of the curve R85 is obtained.

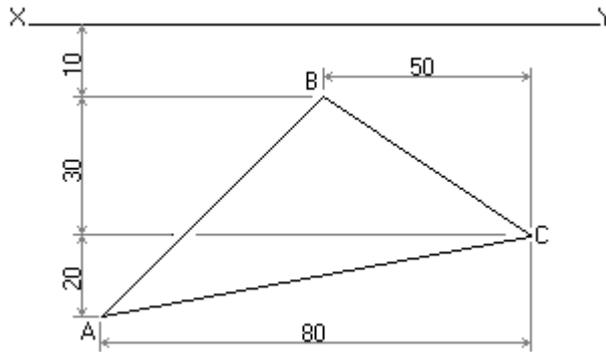


- Two fixed parts which are 100mm apart are given. Plot the locus of P which moves so that its distance from A and B is always in the ratio 2:1 respectively.

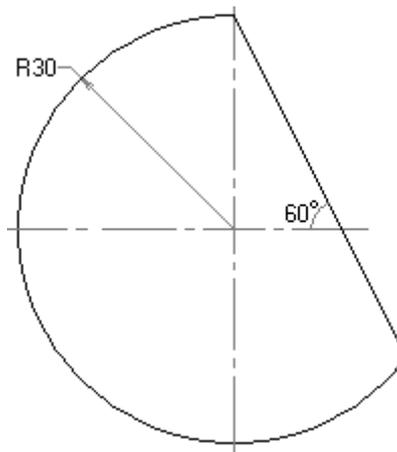
SECTION B

SOLID GEOMETRY

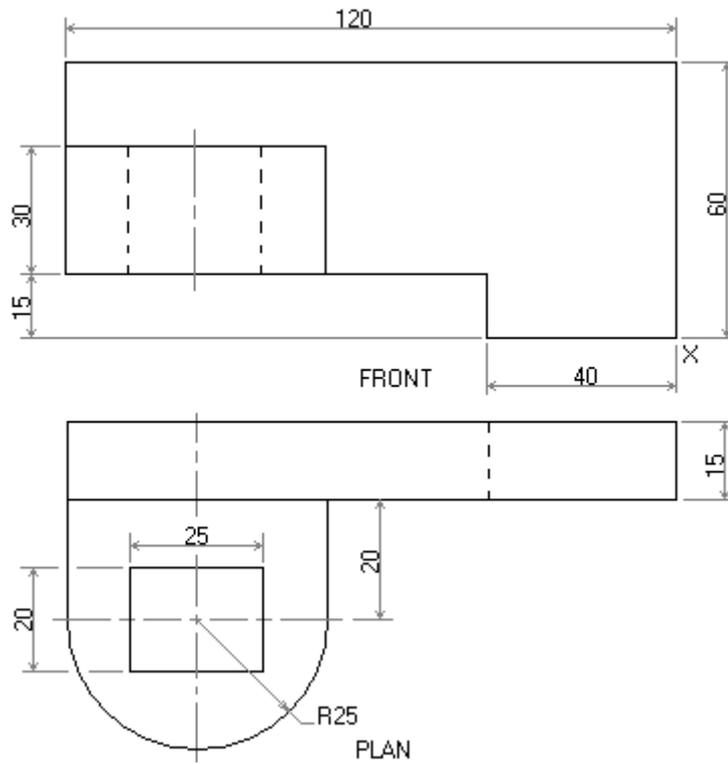
5. The plan of a triangular lamina is given in the figure below. Corner A is 25mm above the horizontal plane, corner B is 5mm above the horizontal plane and corner C is 40mm above the horizontal plane.
- (a) Determine the true lengths of the sides.
 - (b) Draw the true shape of the lamina.



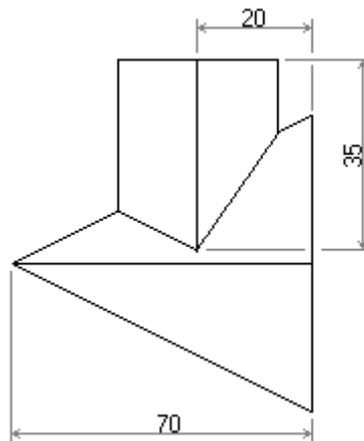
6. The figure below shows the front view of a cut sphere. Draw the given view and project the complete end and plan views.



7. The front and plan view of a bracket are shown in the figure below. Draw the isometric view of the bracket with corner X in the foreground.



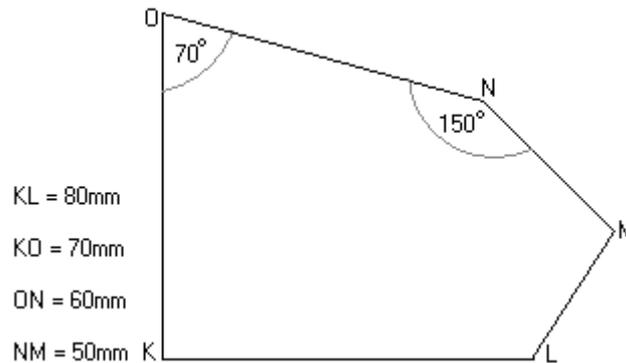
8. The figure below shows a square based pyramid of sides 50mm intersecting with a square prism of side 25mm. Draw the given front view and in third angle projection project the complete plan and end views showing the details of intersection.



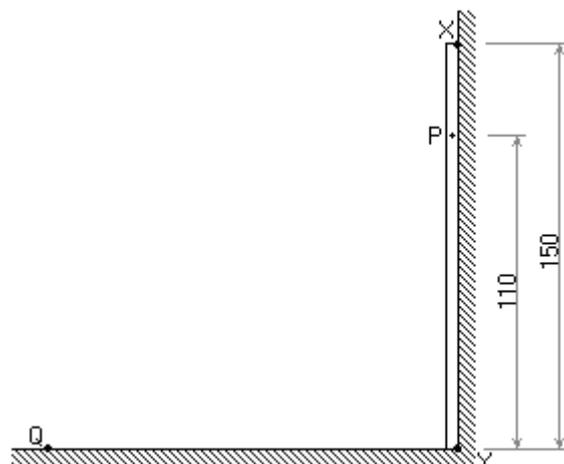
UNEB S4 1995

SECTION A. PLANE GEOMETRY.

1. The following data about a triangle PQR is given. Base PQ is 100mm, vertical angle PRQ is 50° and the altitude is 70mm. Construct the triangle.
2. An irregular polygon is shown in the figure below.
 - (a) Draw this polygon.
 - (b) (i) Enlarge the figure to $\frac{7}{5}$ its original size.
(ii) State the length of LM and L_1M_1 .



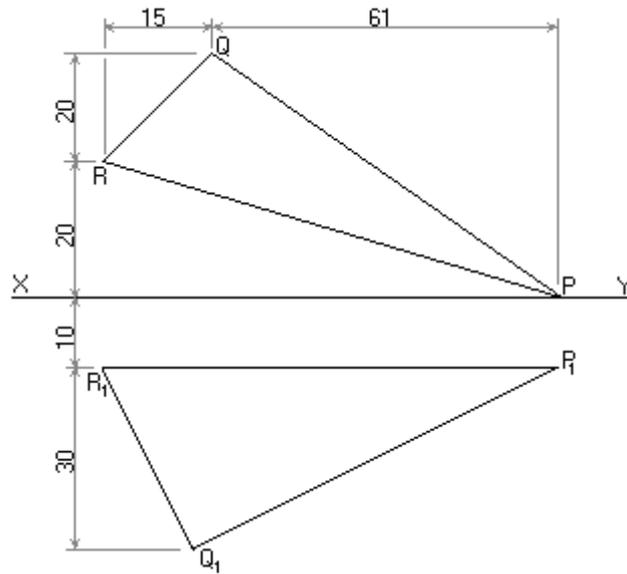
3. Three circles of radii 25mm, 35mm and 45mm respectively touch each other. Draw these circles.
4. The figure below shows a vertical ladder 150mm long which moves in such a way that the end X slides vertically downwards to Y while end Y slides horizontally outwards to Q. Draw the locus of point P as the ladder slides.



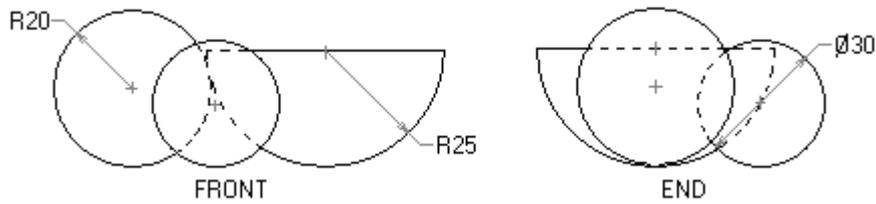
SECTION B.

SOLID GEOMETRY.

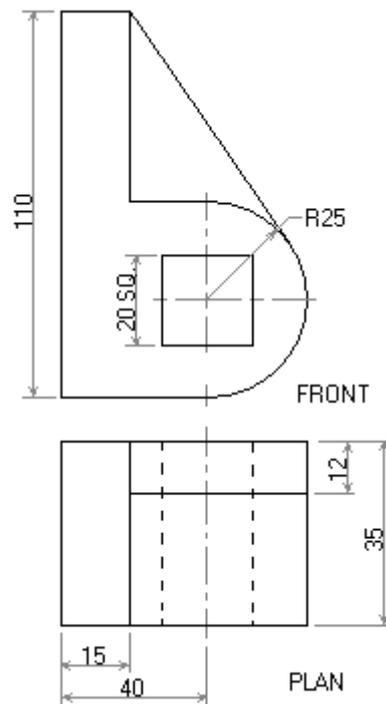
5. (a) Find the true lengths of sides PQ and QR of the triangle shown in the figure below.
(b) Draw the true shape of the triangle.



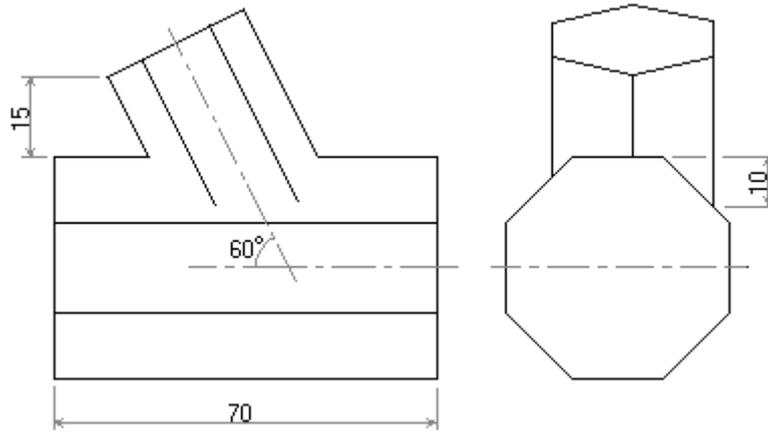
6. Three spheres rest on the horizontal plane in contact with each other as shown in the figure below. Draw the two given views and project the plan view.



7. The front and plan of a bracket are given in the figure below. Draw the oblique view of the bracket.



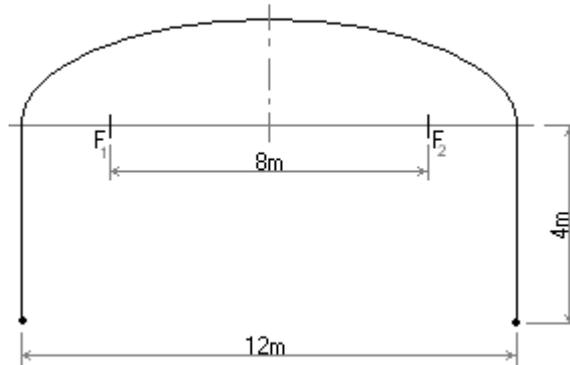
8. The figure below shows an octagonal prism of sides 25mm intersecting with a hexagonal prism of sides 20mm. Determine the shape of interpenetration between them.



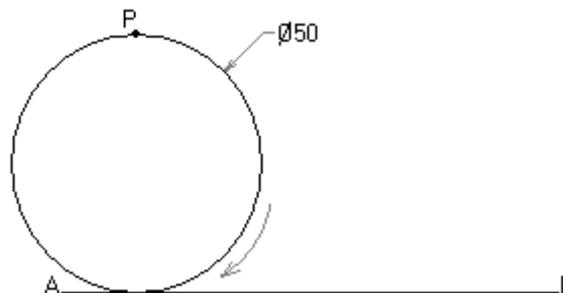
PLANE GEOMETRY

1. (a) Determine graphically the diameter of a circle whose circumference is 160mm. Draw the circle.
- (b) Construct a circle of diameter 80mm and construct a tangent to it from any point 100mm from the center of the circle.

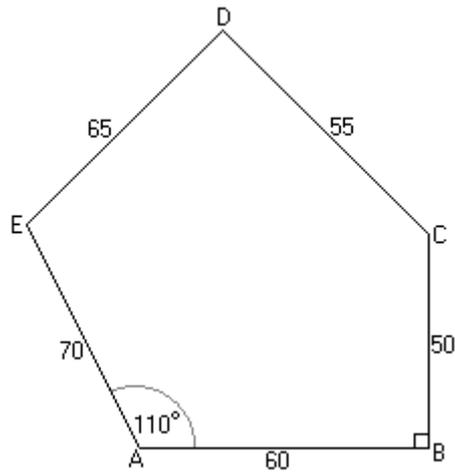
2. (a) The figure below shows a drawing of an elliptical arch with focal points F_1 and F_2 . Using a scale of 10mm, to 1m draw the arch.



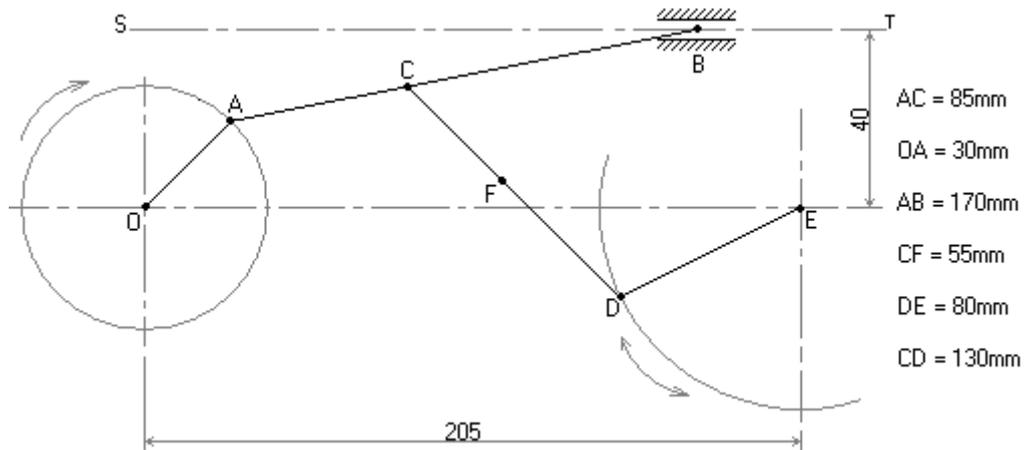
- (b) The figure below shows a point P on the surface of a circular rim which rolls in a clockwise direction along a flat surface AB without slipping.
 - (i) Starting from the given position, draw the locus of P for one revolution of the rim.
 - (ii) Name the locus drawn in (i) above.



3. The figure below shows an irregular plane figure.
 - (a) Draw this figure full size.
 - (b) Transform the figure into a square of equal area.



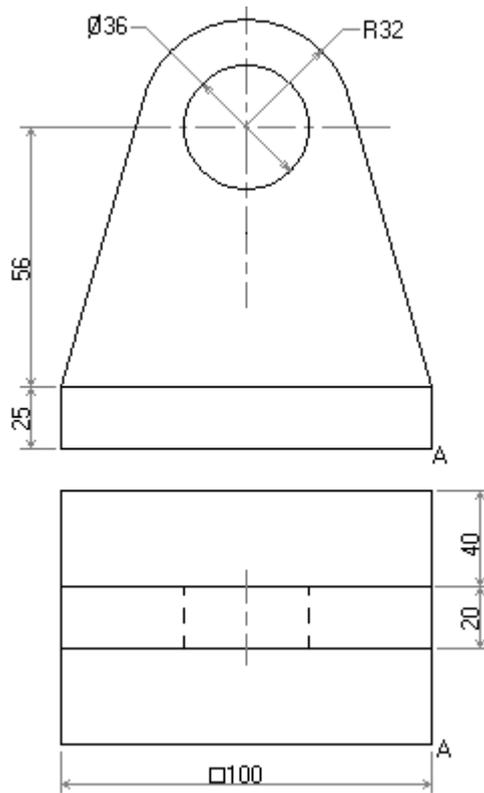
4. The figure below shows a mechanism in which OA rotates clockwise about O while ED oscillates about E. End B of link AB is constrained to reciprocate along axis ST. Plot the locus of C and F for one revolution of OA.



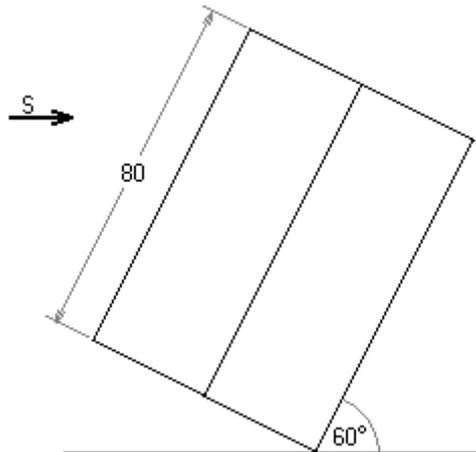
SECTION B

SOLID GEOMETRY

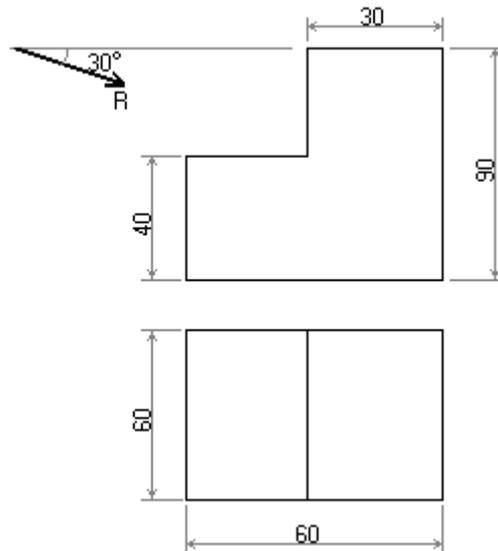
5. The figure below shows two orthographic views of a bracket. Draw full size an isometric view of the bracket making corner A the lowest.



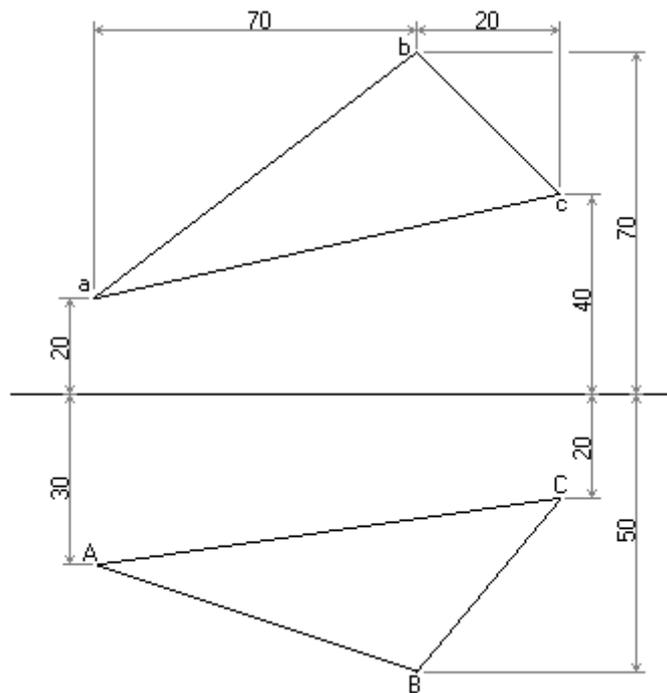
6. The figure below shows an elevation of a hexagonal prism of side 30mm inclined at 60° to the horizontal. Draw full size;
- The given view.
 - The plan in projection with view (a).
 - An end elevation in the direction of arrow S.



7. The figure below shows the elevation and plan views of an object drawn in first angle projection.
- Draw the given views.
 - Project an auxiliary plan in the direction of arrow R.



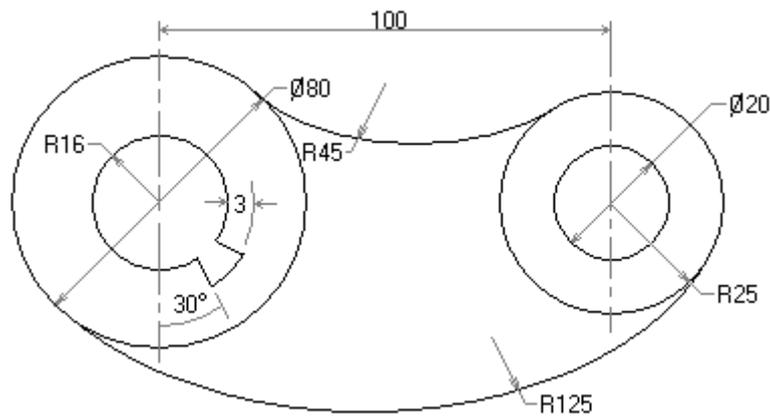
8. The front elevation and plan view of a triangular lamina drawn in first angle projection, are shown in the figure below.
- Draw the given views.
 - Determine the true length of the sides of the lamina.
 - Draw the true shape of the lamina.
 - Measure and state the true lengths and angles of the lamina.



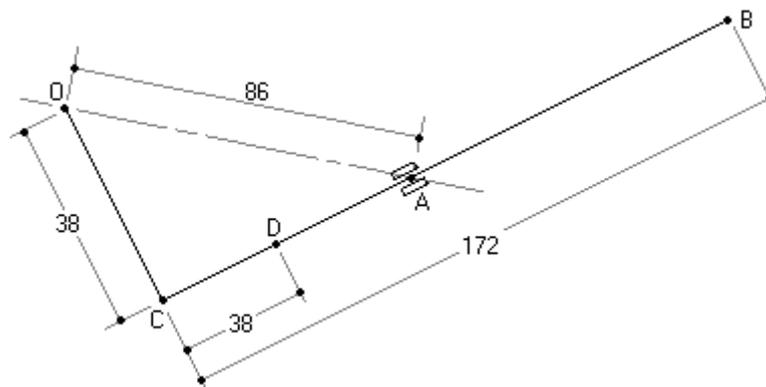
SECTION A PLANE GEOMETRY

1. (a) Construct a diagonal scale of 1 in 2.5 to measure up to 500mm and mark on it the following readings.
 - (i) 276 mm
 - (ii) 292 mm
 - (iii) 319 mm
- (b) Using the scale in (b) above, draw a triangle ABC with AB = 319 mm, AC = 276 mm and BC = 292 mm and construct in it an inscribed circle.

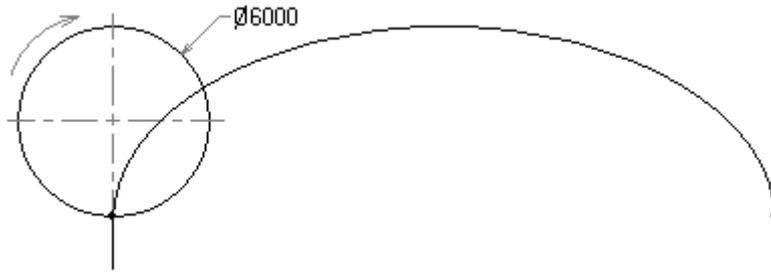
2. Draw the component shown in the figure below. Show all your constructions clearly.



3. The outline of a mechanism is shown in the figure below. OC is a crank which rotates about a fixed centre O and which is connected by a pin-joint at C to the limb CB. Draw the loci of B and D when OC makes one complete revolution and CB is constrained to pass through the point A at all times.



4. (a) The figure below shows part of a cycloidal arch generated by the circle shown. Draw the arch to scale of 1:100.

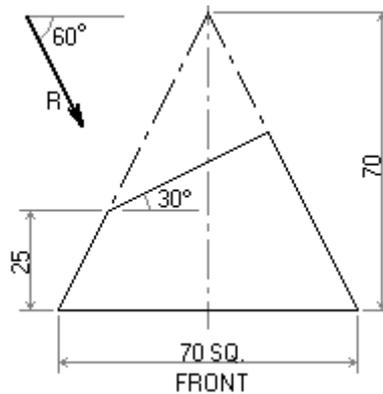


- (b) A parabolic reflector has an axis of $\phi 6000$ mm and a span of 100 mm. Draw the reflector with the axis horizontal.

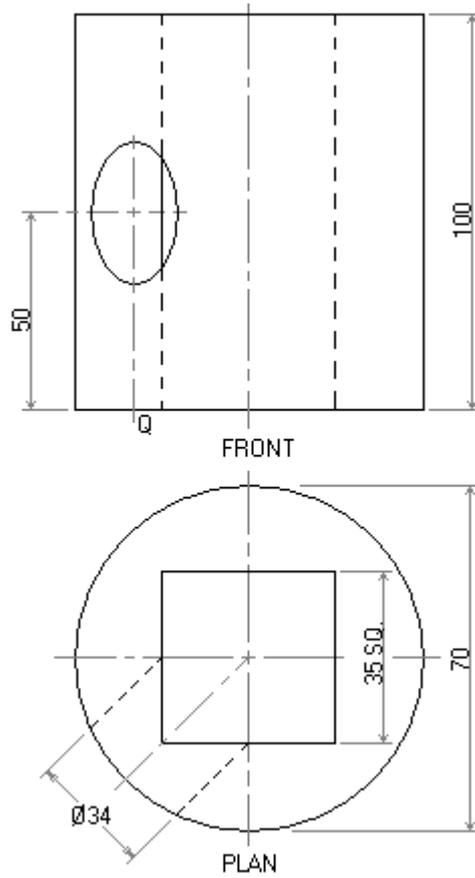
SECTION B

SOLID GEOMETRY

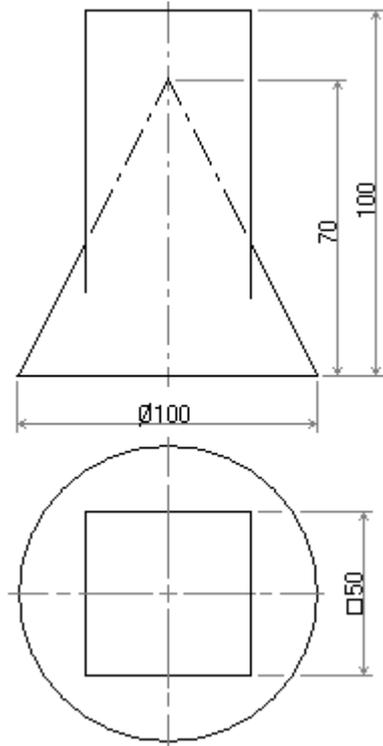
5. The elevation of a square base pyramid is shown in the figure below.
- Project the complete plan view.
 - Draw the auxiliary view of the pyramid in the direction of arrow R.
 - Name this auxiliary view obtained.



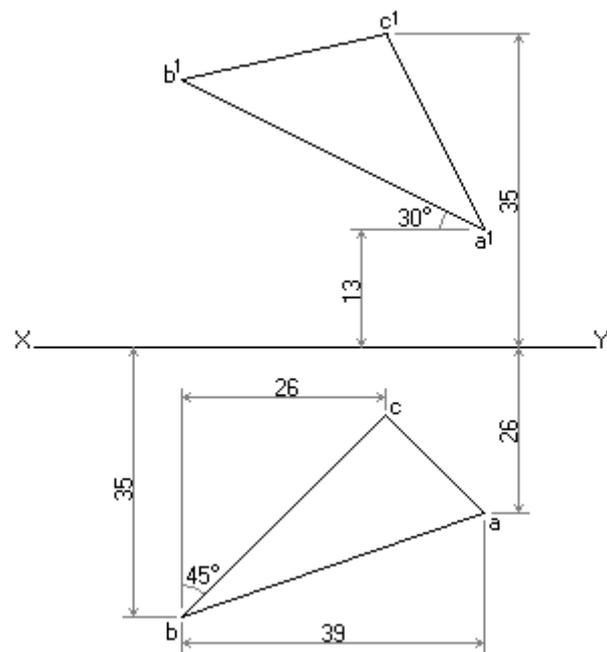
6. Two views of a cylinder are shown in the figure below. Make the isometric drawing of the cylinder with centreline Q in the foreground.



7. The figure below shows the intersection between a cone and a prism.
- (a) Draw full size;
 - (i) The given plan.
 - (ii) A complete elevation.
 - (b) Develop the prism showing clearly the fold lines.

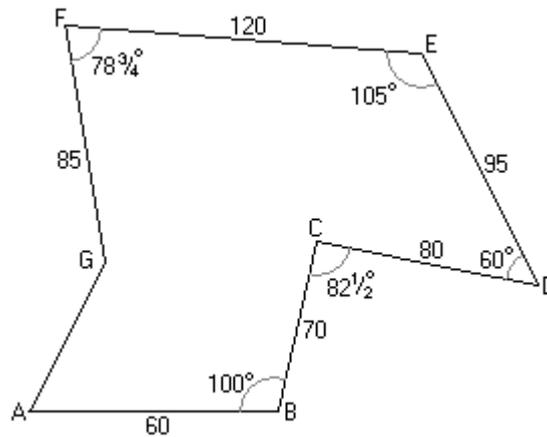


8. The figure below shows the projection of a triangular lamina on the horizontal and vertical planes.
- Draw the given views.
 - Determine the true length of each side of the lamina.
 - Construct its true shape.

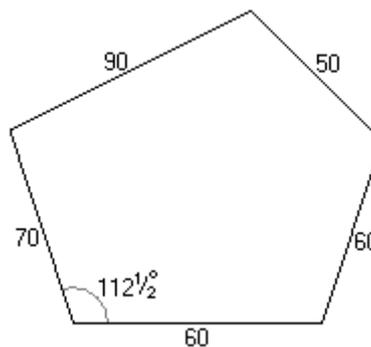


SECTION A PLANE GEOMETRY

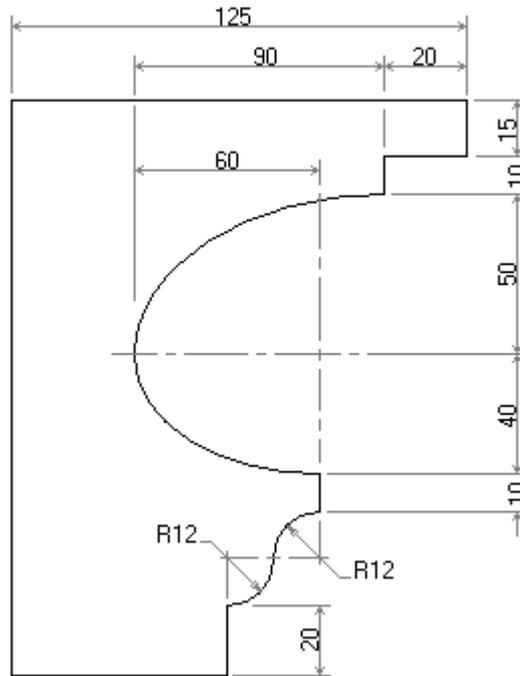
1. (a) A heptagon is shown in the figure below. Using the information given and a scale of 1:1, construct the heptagon without using a protractor.
- (b) Measure and state;
 - (i) Distance AG.
 - (ii) Angle GAB.



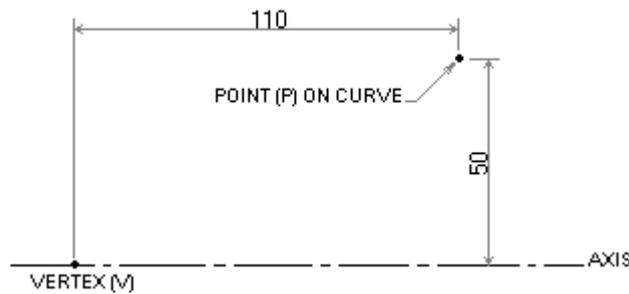
2. (a) (i) Construct a triangle ABC with BC as the base, AC = 80mm, BC = 100mm and CA = 50mm.
- (ii) Convert the triangle drawn in a(i) above into a square of equal area.
- (iii) Measure and state the length of the side of the square.
- (b) (i) Without using a protractor, draw the polygon shown in the figure below.
- (iii) Reduce the polygon into a similar figure with the sides in the ratio of 3:7.



3. A section of a moulding is made up of principally two quarter elliptical curves as shown below. Draw the section full size. Use two different methods of construction for the two elliptical arcs. Construction lines should be clearly shown.



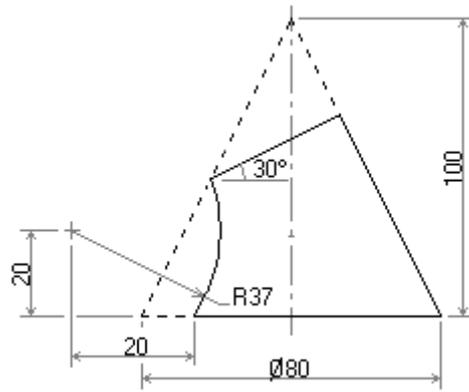
4. (a) Use the information given in the figure below to construct a parabola.
 (b) Determine the focus of the parabola drawn in (a).



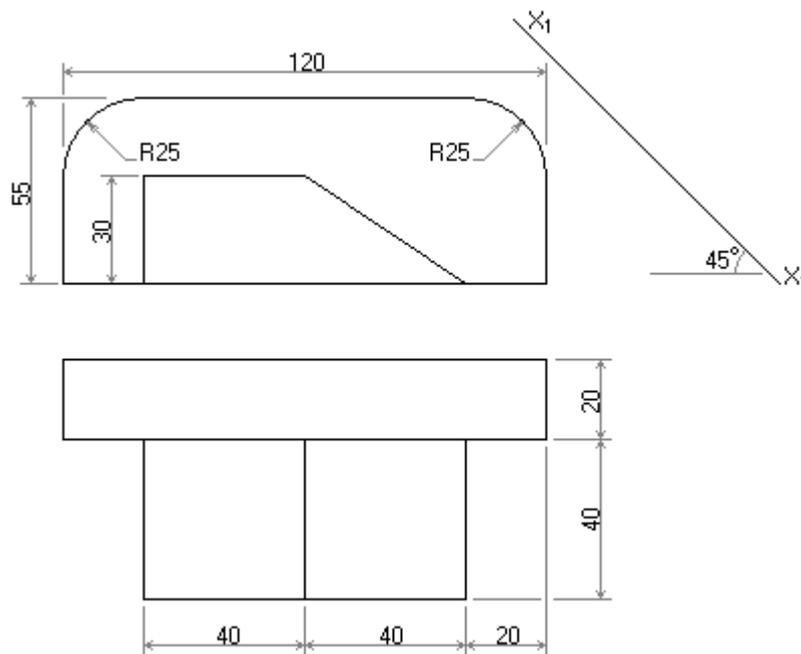
SECTION B

SOLID GEOMETRY

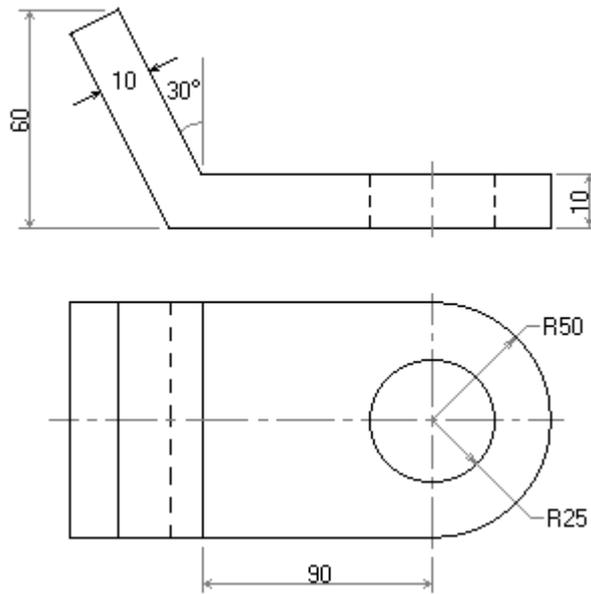
5. The figure below is the elevation of a solid cone with two portions cut as shown. Draw full size the;
 (a) Given elevation.
 (b) Plan showing clearly the cut surface.
 (c) Development of the remaining portion.



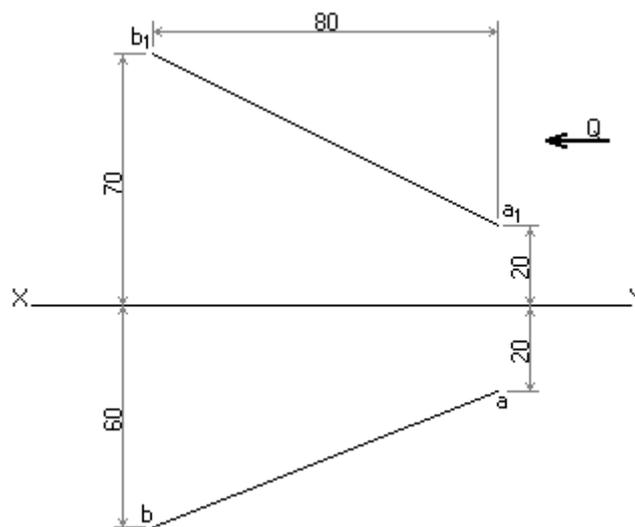
6. The elevation and plan of a shaped block are shown in the figure below. Project an auxiliary elevation using X_1X_1 as the base line.



7. The figure below shows two views of a component. Draw the oblique view of the component.

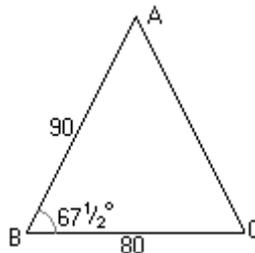


8. Two views of a line, inclined to both the horizontal and vertical planes, in first angle projection are shown in the figure below.
- Draw full size the given views and add an end view in the direction of arrow Q.
 - Determine the true angles of inclination to the;
 - Vertical plane.
 - Horizontal plane.
 - Locate point P which is 50mm above the XY line on the front view and indicate it in all views.



SECTION A : PLANE GEOMETRY

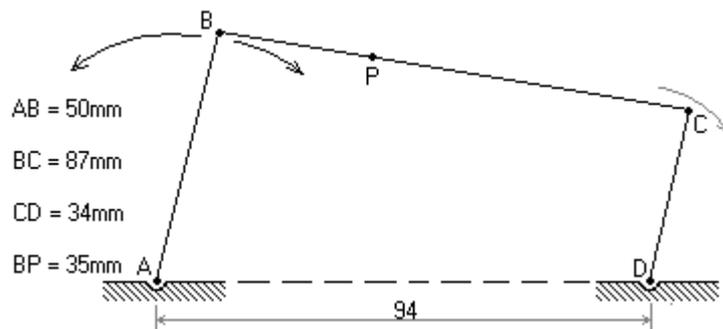
1. (a) Draw the triangle shown in the figure below without using a protractor and convert it to another triangle of equal area but with a height of 50mm.



- (b) (i) Construct an isosceles triangle PQR with base PQ = 130mm and height 80mm.
 (ii) Transform the triangle in b(i) into a rectangle of equal area with one side 50mm and state the length of the other side.

2. The figure below shows a mechanism in which crank AB swings about A while CD rotates clockwise about D.

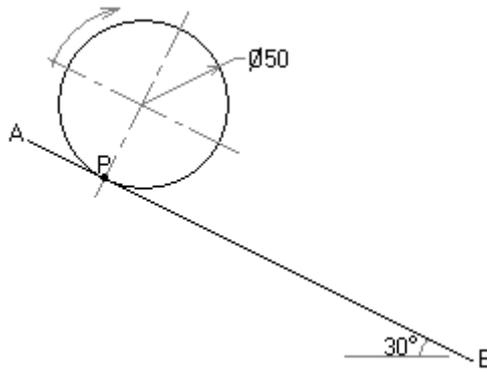
- (a) Draw, full size, the mechanism and plot the locus of point P on the link BC.
 (b) Measure and state the maximum angle of oscillation of AB.



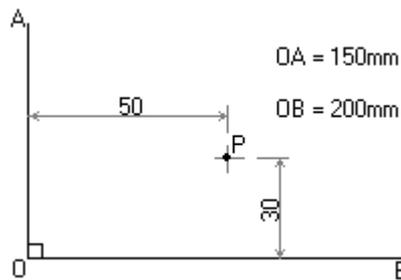
3. (a) A parabolic arch is 80mm wide and 80mm high. Draw the arch and

determine its focal point.

- (b) The figure below shows a circular disc which rolls along surface AB without slipping. Draw the locus of point P on the rim of the disc for one complete revolution along AB.

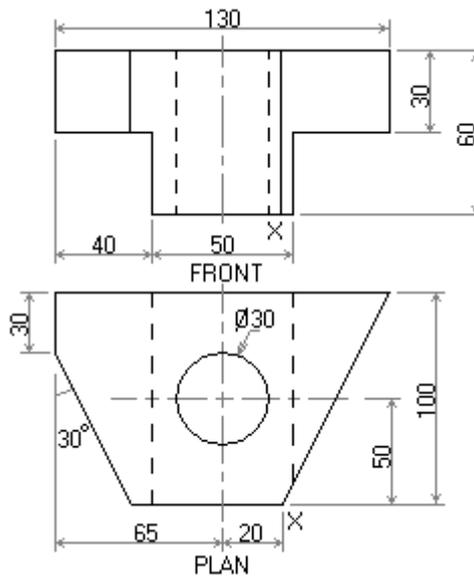


4. The figure below shows the asymptotes of a hyperbola. If P is a point on the curve, construct the hyperbola.



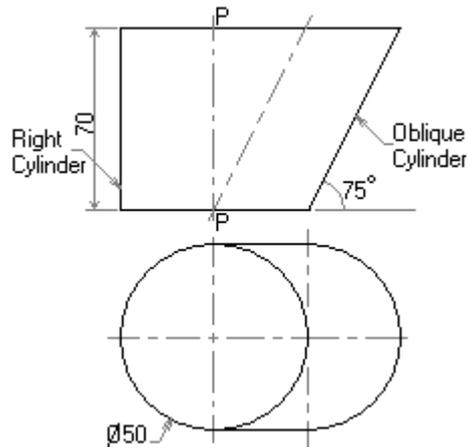
SECTION B : SOLID GEOMETRY

5. Two orthographic views of a machined block drawn in first angle projection are shown in the figure below. Draw full size an isometric view of the block making corner X the lowest point.

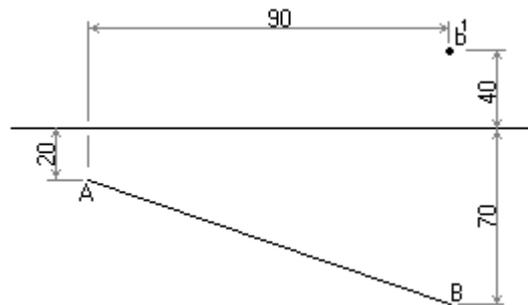


6. The figure below shows a hopper made up of two half cylinders joined by triangular pieces.

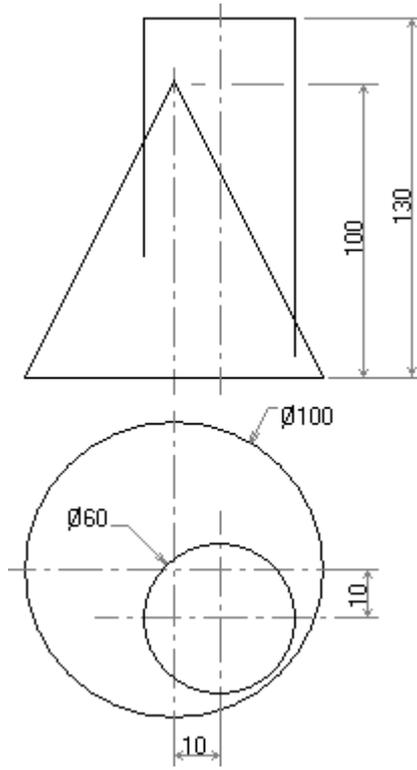
- (a) Draw full size the given views.
- (b) Make a full development of the hopper with the seam at P-P.



7. The figure below shows the plan of a line AB. The elevation of the line has one end given as b^1 . If the true length of the line is given as 105mm;
- (a) Draw the elevation.
 - (b) Determine the true inclination of the line to the;
 - (i) Horizontal plane.
 - (ii) Vertical plane.

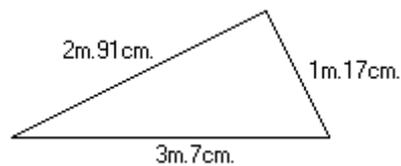


8. The figure below shows a right cone intersecting with a cylinder.
- (a) Draw the given views.
 - (b) Complete the elevation with a curve of interpenetration.

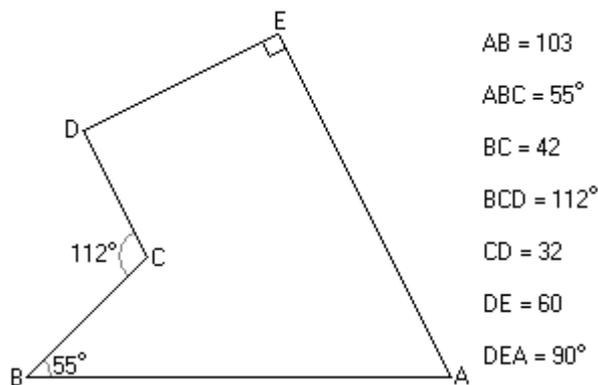


SECTION A : PLANE GEOMETRY

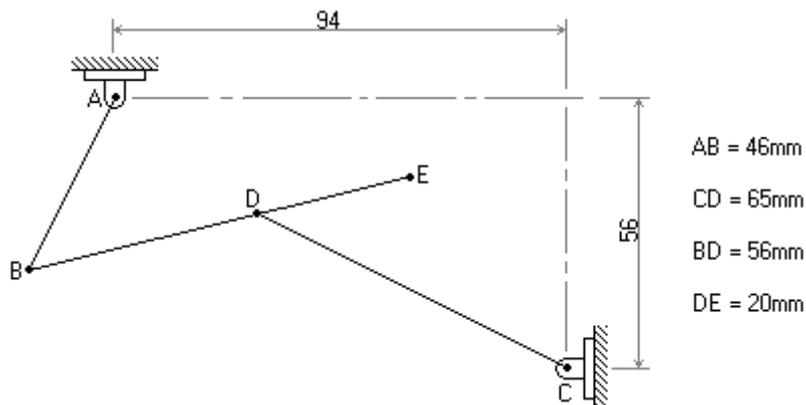
1. (a) Construct a diagonal scale 3cm to 1m to read up to 5m long.
- (b) Show the following readings on the scale drawn.
 - (i) 3m.75cm.
 - (ii) 2m.84cm.
 - (iii) 1m.17cm.
- (c) (i) Use the scale drawn in (a) above to construct the triangle in the figure below.
- (ii) Transform the triangle into a square of equal area.



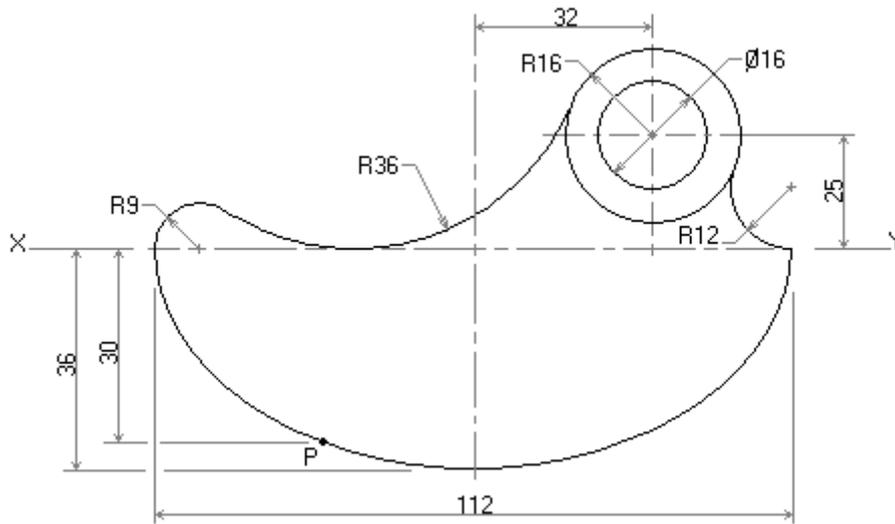
2. The figure below shows a pentagon ABCDE. By means of geometrical construction, transform it into a square having the same area. Measure and state the length of side of the square.



3. The figure below shows a link mechanism in which cranks AB and CD oscillate about A and C respectively. The cranks are connected by the link BE which is pin-jointed at B and D. Draw the locus of E.

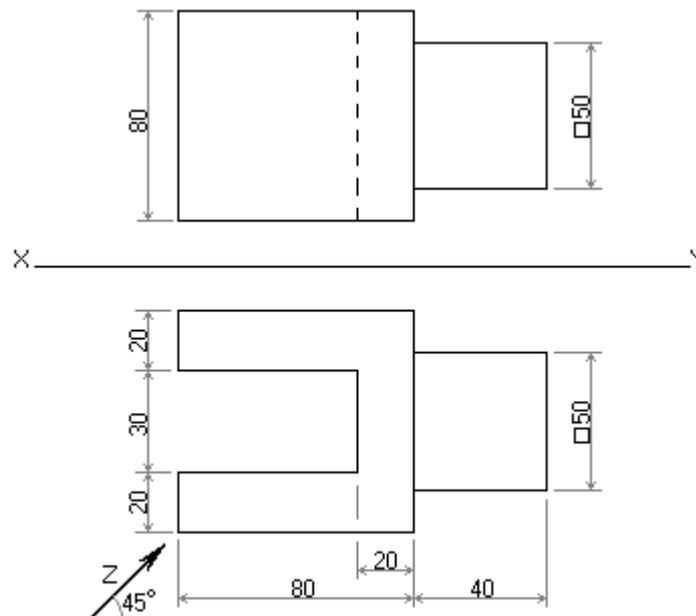


4. The plate cam profile for a locking device is shown in the figure below. The position of the profile below the line XY is a true semi-ellipse. Construct the given profile and a normal at point P. Show clearly the construction lines.

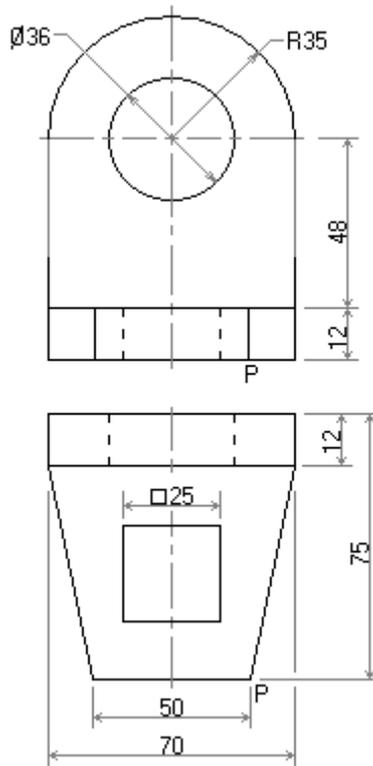


SECTION B: SOLID GEOMETRY

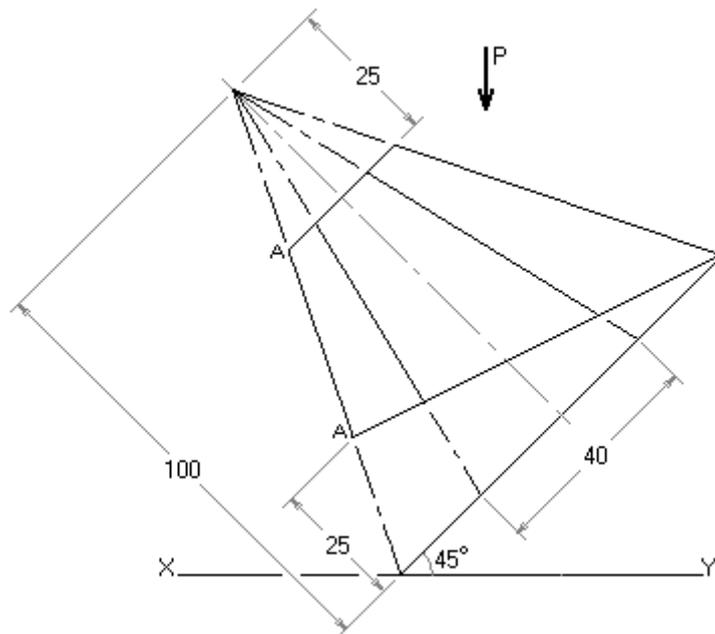
5. The elevation and plan of a fork-bracket are shown in the figure below. Draw;
 (a) The given elevation and plan.
 (b) An auxiliary elevation projected from the direction of the arrow Z.



6. The figure below shows two views of a machine block in first angle projection. Draw an isometric view of the block with point P in the foreground. Hidden details are not required.

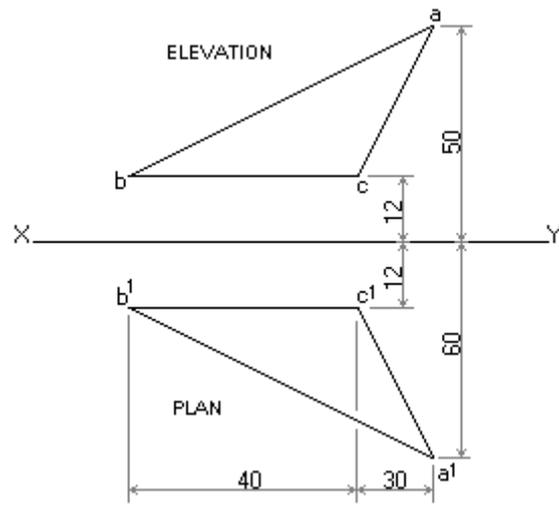


7. The elevation of a hexagonal pyramidal lamp shade is shown in the figure below. Draw;
- The elevation as shown.
 - A plan in the direction of arrow P.
 - The development of the surfaces taking the seam on A-A.



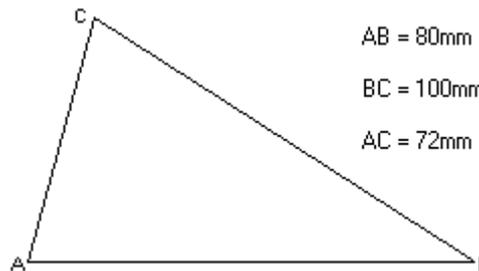
8. The elevation and plan of a triangular lamina (thin plate) are shown in the figure below.
- Draw the true shape of the lamina.
 - Show and state the angle of inclination of edge:

- (i) ab to the horizontal plane.
- (ii) ac to the vertical plane.

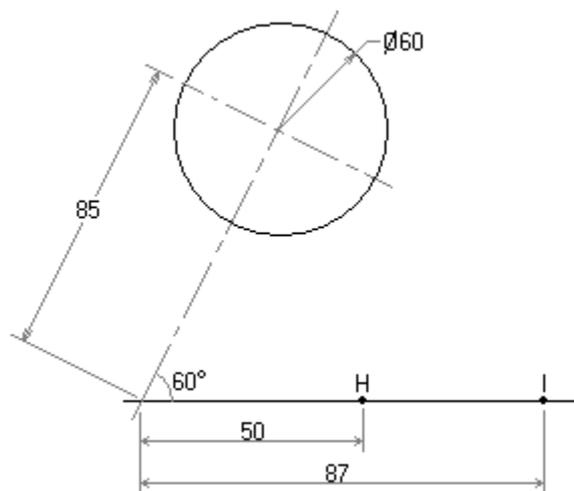


SECTION A – PLANE GEOMETRY

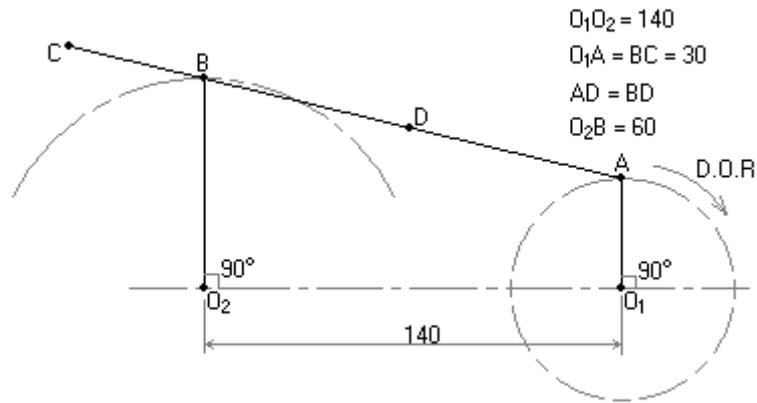
1. (a) (i) Circumscribe a circle to the given triangle ABC in the figure below.
 (ii) Measure and state the diameter of the circle drawn.



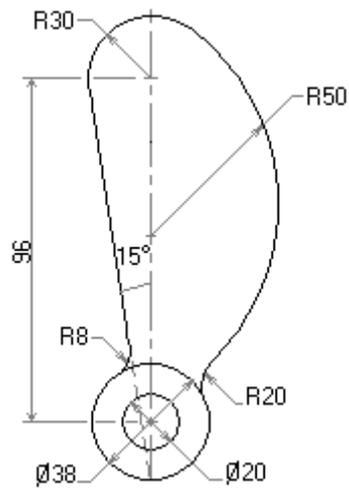
- (b) (i) Copy the drawing shown in the figure below.
 (ii) Draw the circle which passes through points H and I and touches the given circle.
 (iii) State the circle's diameter.



2. (a) Draw one turn of an involute of a regular pentagon of side 30mm long.
 (b) An ellipse has a major axis of 120mm and focal points 20mm from each end. Construct;
 (i) The ellipse.
 (ii) Its normal and tangent.
3. The figure below shows a link mechanism in which crank O_1A rotates about O_1 while O_2B swings about O_2 .
 (a) Copy the given figure.
 (b) Plot the locus of C and D for one revolution of O_1A .
 (c) Indicate and state the maximum angle moved through by O_2B .

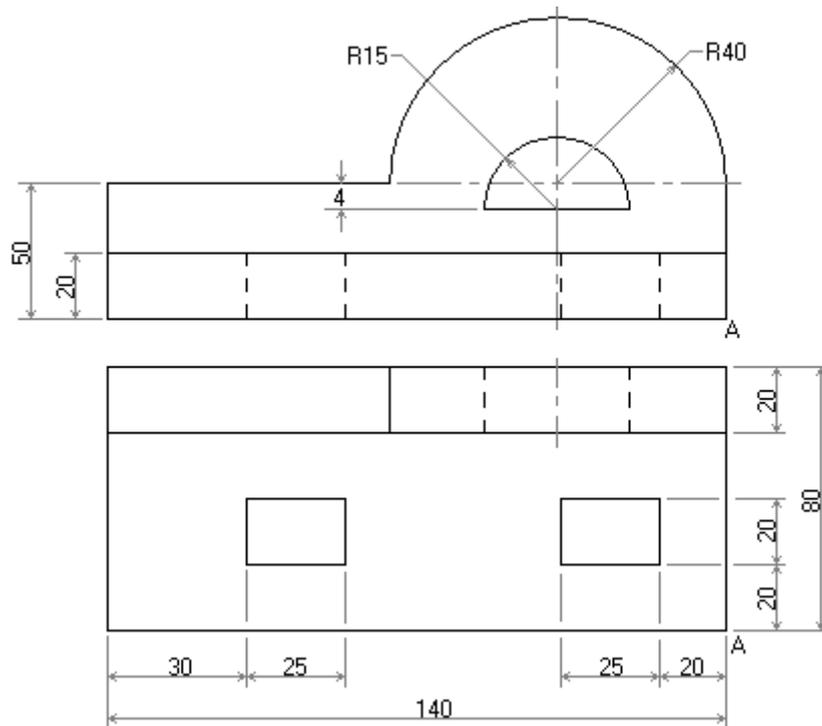


4. Draw the fan blade in the figure below showing clearly all the construction lines.

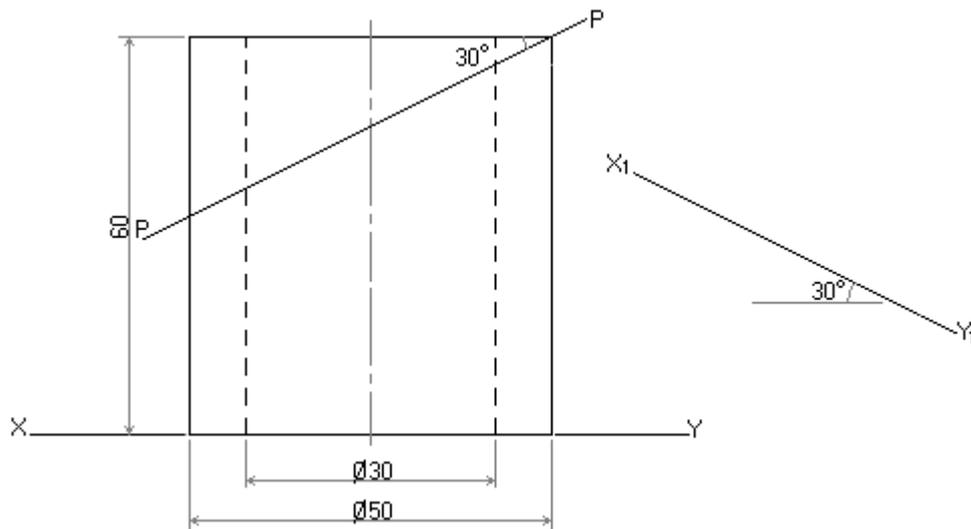


SECTION B – SOLID GEOMETRY

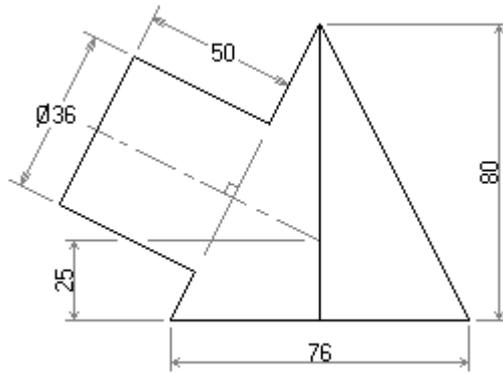
5. The plan and elevation of an angle bracket are shown in the figure below. Draw an isometric view of the bracket with corner A in the foreground.



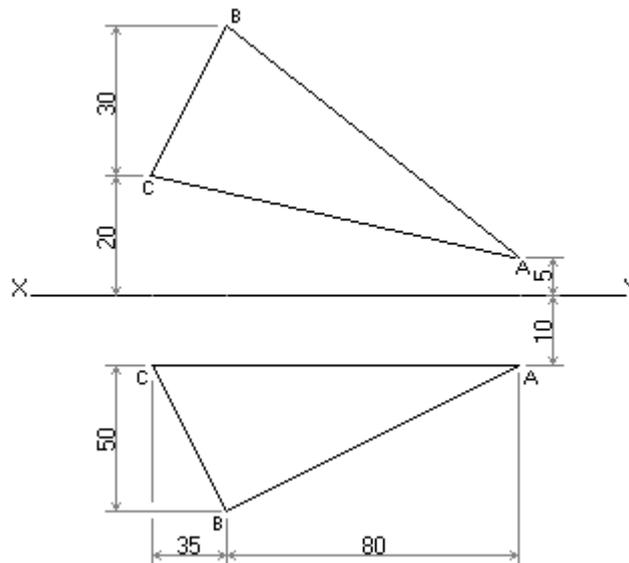
6. A hollow cylinder is cut by a plane P-P as shown in the figure below. Draw;
- The sectional plan.
 - The auxiliary elevation on X_1Y_1 .



7. The figure below shows the front elevation of a square based pyramid intersected by a cylinder. Draw the following views showing the curves of intersection on the;
- Front elevation.
 - The plan.

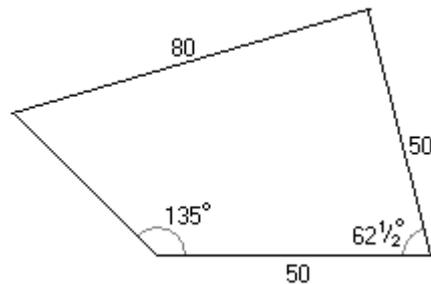


8. The figure below shows the plan and front views of a triangle.
- Determine the true lengths of sides AB and BC.
 - Draw the true shape of the triangle.
 - Measure and state the true angles of the triangle.

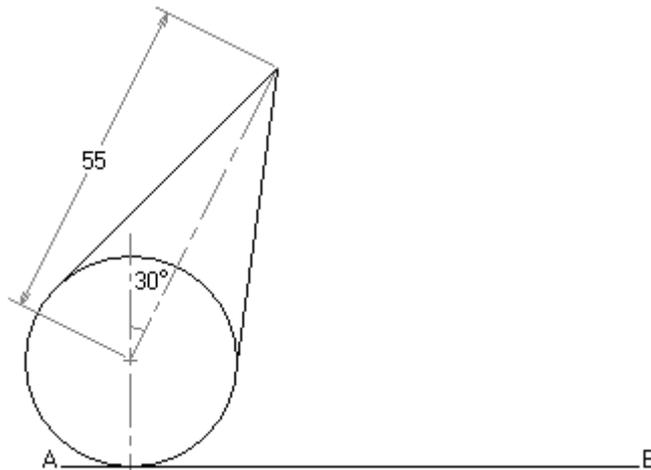


SECTION A – PLANE GEOMETRY

1. (a) A triangle ABC has a base AB of 75mm, side BC = 56mm and its vertical angle is 57° .
 - (i) Construct the triangle.
 - (ii) Draw a square of equal area to the triangle and state the length of side.
- (b) (i) Draw, using constructional methods only, the quadrilateral shown in the figure below.
 - (iii) Enlarge the area of the quadrilateral using a ratio of 7:3.

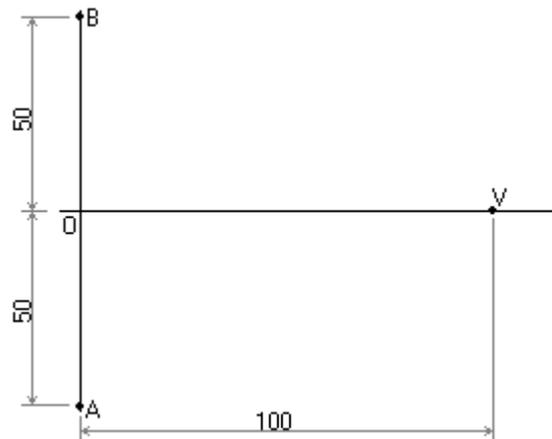


2. A roller of diameter 50mm is attached to a point R as shown in the figure below. Draw the locus of R as the roller rolls for 360° without slipping along the straight line AB in the clockwise direction.



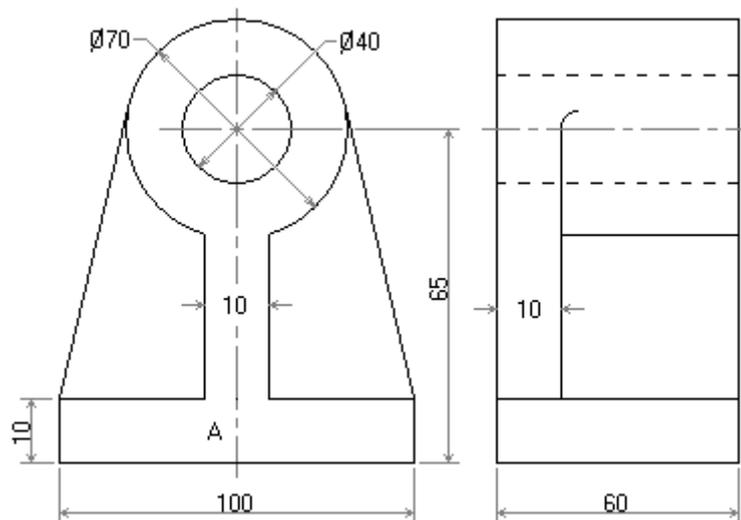
3. (a) A round bar of 60mm diameter has a right hand start thread machined on it. Draw the plan and elevation of the bar for a lead of 100mm.
 - (b) Construct a regular pentagon in a circle of 50mm diameter without using a protractor and draw its involute.
4. A parabola has ordinates OA and OB and the vertex V as shown in the figure below.
 - (a) Draw the parabola.
 - (b) Determine the;
 - (i) Focal point.
 - (ii) Directrix of the curve.
 - (c) Draw a tangent to the curve from a point P which is 30mm from and

above the focus.

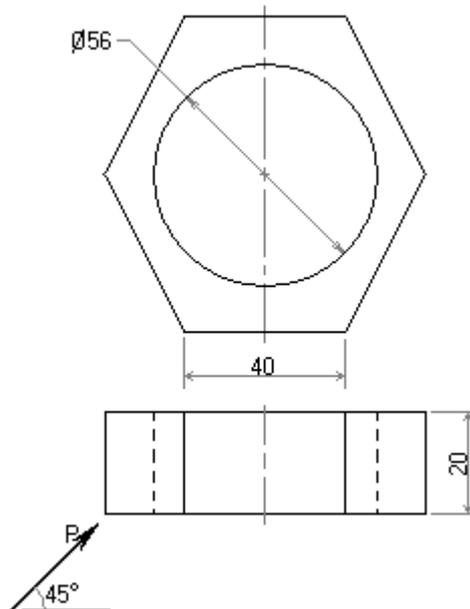


SECTION B – SOLID GEOMETRY

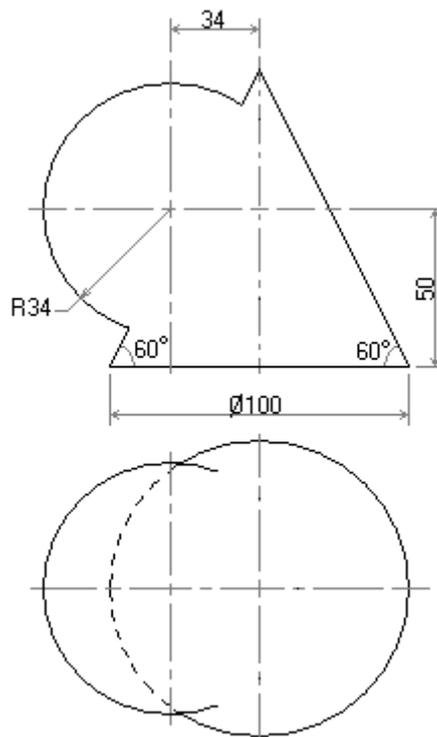
5. The figure below shows two views of a bracket.
- (a) Copy the views.
 - (b) Draw an oblique view of the bracket with the face marked A in the foreground.



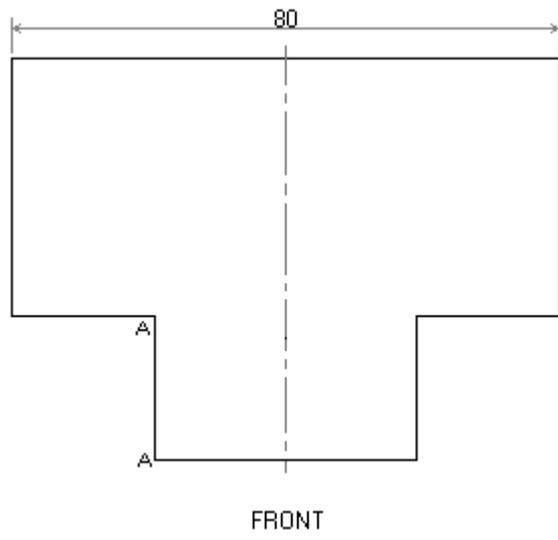
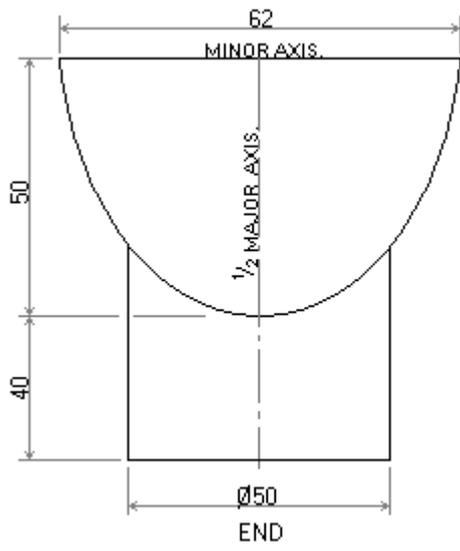
6. The figure below shows orthographic views of a regular hexagonal ring.
- (a) Draw the given views.
 - (b) Project an auxiliary elevation in the direction of arrow P.



7. The figure below shows a right circular cone intersecting a sphere. Draw showing the curves of intersection the complete;
- Elevation.
 - Plan.



8. The figure below shows two views of a junction between a semi elliptical gully and a cylindrical pipe. Draw;
- The end elevation.
 - A complete front elevation.
 - The development of the pipe making A-A as the seam.

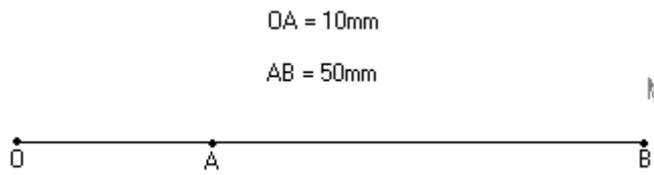


SECTION A – PLANE GEOMETRY

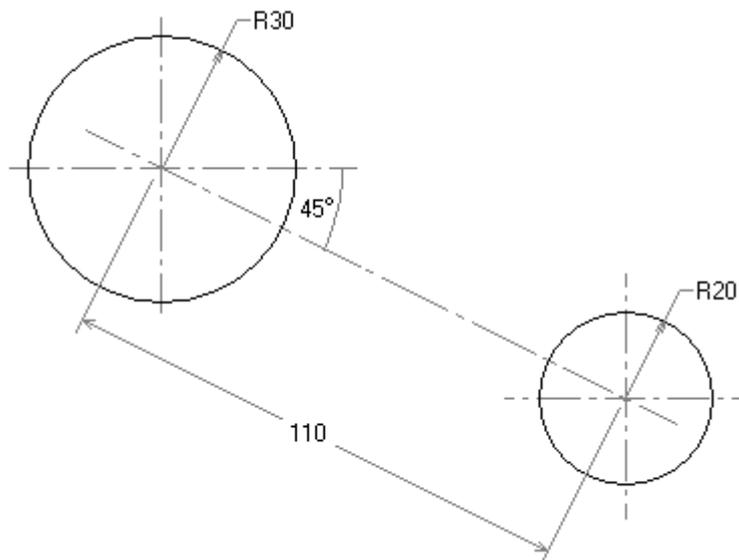
1. (a) Construct a plain scale of 40mm to 1m to read in steps of 100mm up to 5m.
- (b) (i) Using the scale constructed in (a) above, draw a polygon ABCDE, which has the following dimensions;

$AB = 1.6\text{m}$, $BC = AE = 1\text{m}$, $DE = 1.8\text{m}$
 $AD = 2\text{m}$, $\angle ABC = 135^\circ$, and $\angle BAE = 120^\circ$.
- (ii) Construct a similar polygon to (b)(i) above, having an area of $\frac{3}{5}$.

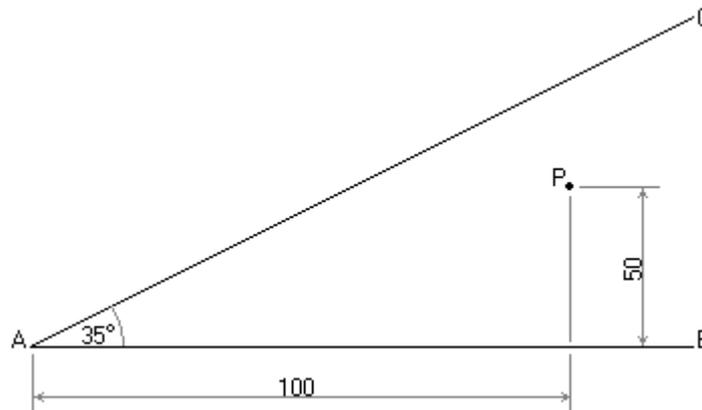
2. (a) Plot the locus of point P which moves in a clockwise direction at a constant speed from the centre for a radial distance of 80mm in one revolution. Name the locus.
- (b) The figure below shows a line, OB which is pivoted at O and constantly rotates anti-clockwise. When the line makes a half a turn about O, point A will have moved to B and then back to its original position at constant speed when the turn is full. Plot the locus of A for this movement.



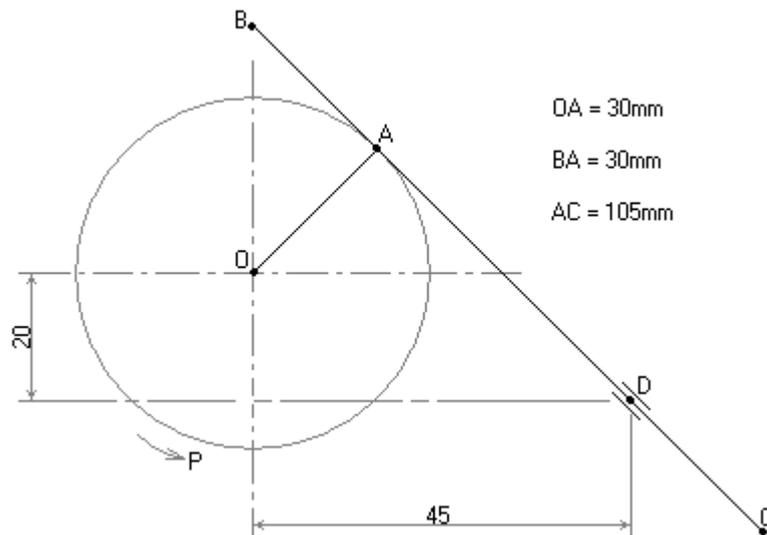
3. (a) Construct a common internal tangent to the circles shown in the figure below.



- (b) Construct a circle which passes through point P and touches the arms of the angle BAC shown in the figure below.

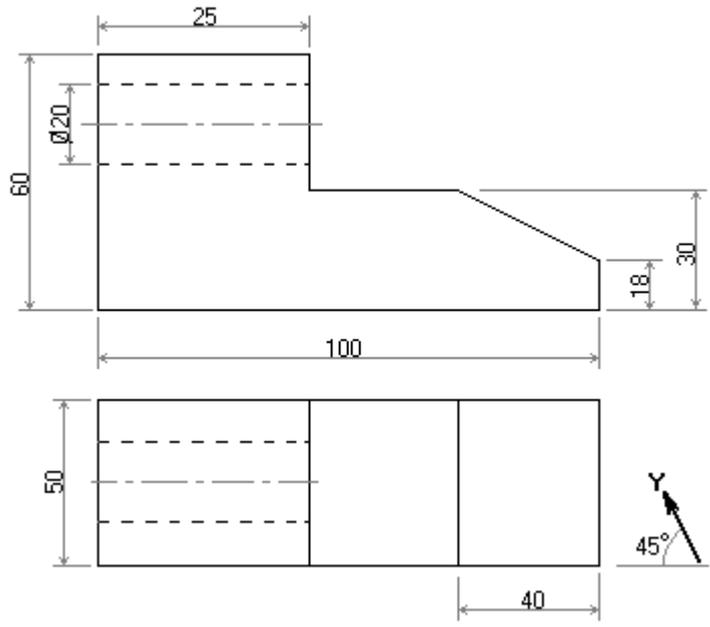


4. In the figure below, the crank OA revolves about a fixed centre O. The rod BC is pin-jointed to the crank at A and is constrained to slide through the swivel point D. Draw the loci B and C for one revolution of the crank, OA in the direction of arrow P.

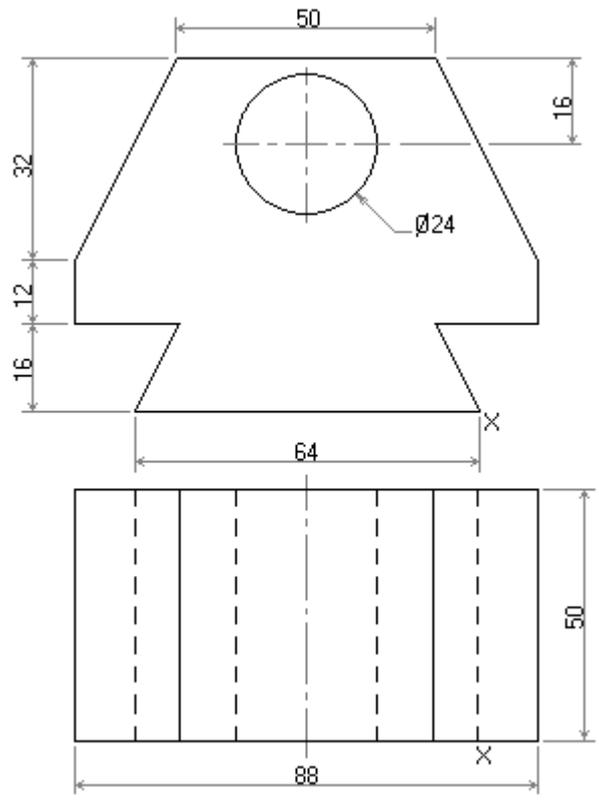


SECTION B – SOLID GEOMETRY

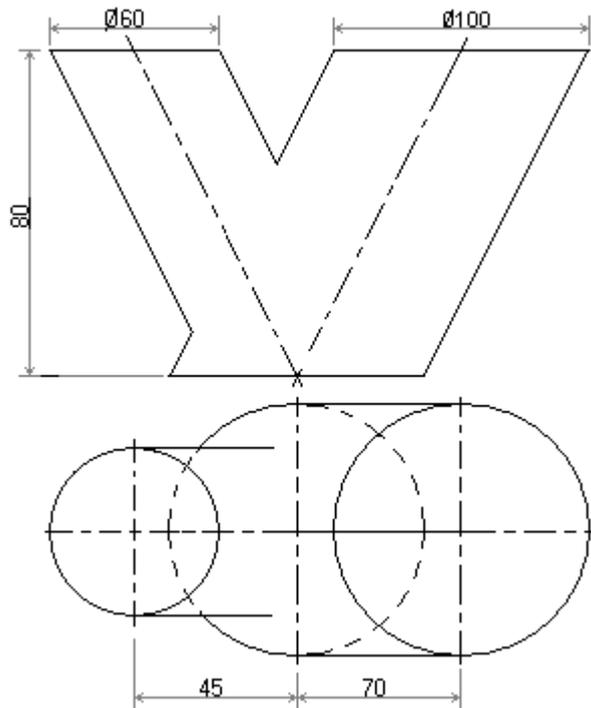
5. The figure below shows the front elevation and plan of a block drawn in first angle projection.
- (a) Copy the given views.
- (b) Draw an auxiliary elevation of the block as seen from arrow Y. (Omit hidden details.)



6. The figure below shows the plan and elevation of a machine slide drawn in first angle projection.
 Draw an isometric view of the slide showing corner X at the lowest point.

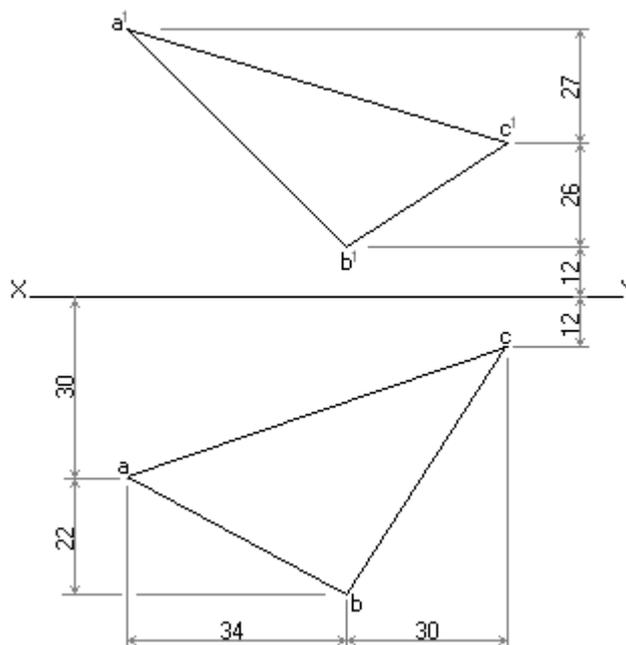


7. The figure below shows a junction made up of oblique cylinders.
 Draw full size the given views completed with the curves of intersection.



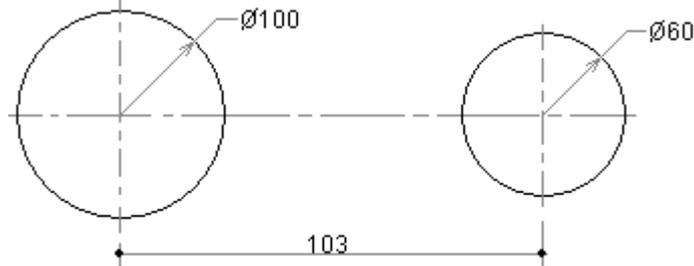
8. The elevation and plan of a triangular lamina (thin plate) are shown in the figure below.

- (a) Copy the given views.
- (b) Draw the true shape of the lamina.
- (c) Show and state the true angle of inclination of the lamina to the horizontal plane.
- (d) Measure and state the length of the sides of the lamina.

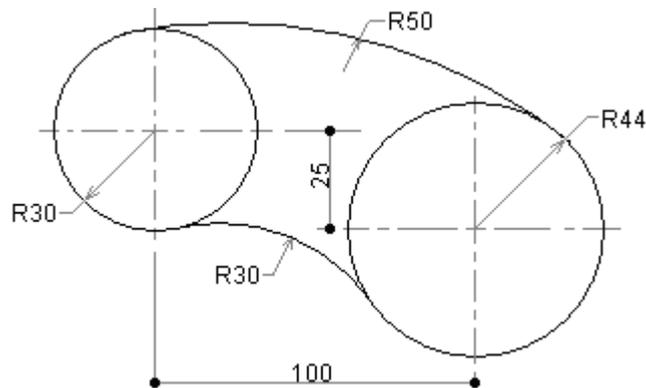


SECTION A - PLANE GEOMETRY.

1. (a) Draw the circles given in the figure below and construct internal and external tangents to them.

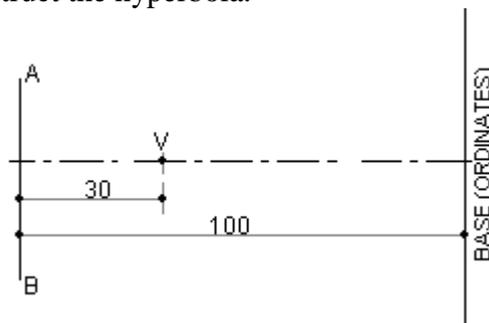


- (b) Construct the figure below showing clearly the methods of getting centers for tangential arcs.



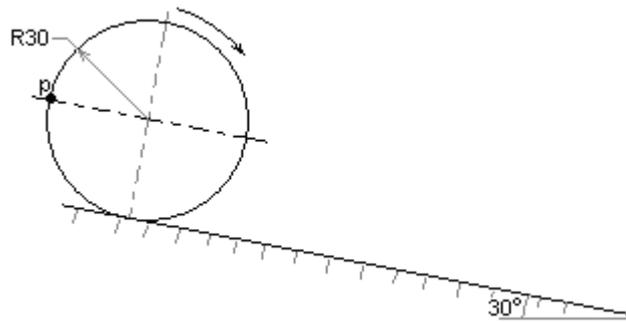
2. The figure below shows the directrix AB, the axis and the base (ordinates) of a hyperbola. The hyperbola has a ratio of $\frac{3}{2}$ and the distance from the directrix to the vertex V is 30mm.

- (a) Determine its focal point by construction.
 (b) Construct the hyperbola.

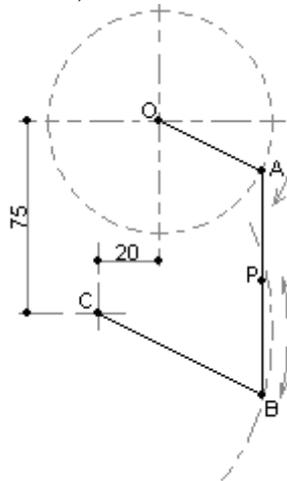


3. The figure below shows a circular disc which rolls down along a straight smooth surface inclined at 30° as shown.

- (a) Plot the locus of a point P for one complete revolution starting in the given position.
 (b) Name the locus.

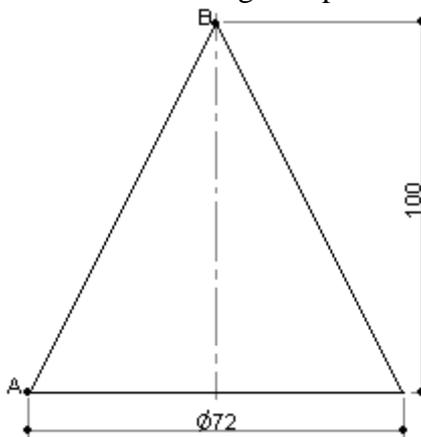


4. The mechanism shown in the figure below consists of a crank OA which rotates about centre O, an arm CB which oscillates about centre C and a link AB which connects the crank and the arm. Plot the locus traced out by mid point P of link AB for one complete revolution of crank OA.
 OA = 50mm, AB = 75mm, and BC = 70mm.



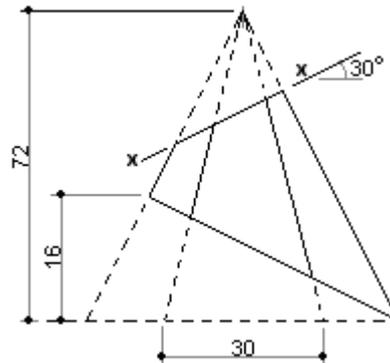
SECTION B - SOLID GEOMETRY.

5. The figure below shows a right cone, draw the:
 (a) Archimedean spiral from A to B.
 (b) Complete plan.
 (c) Development of the cone including the spiral.

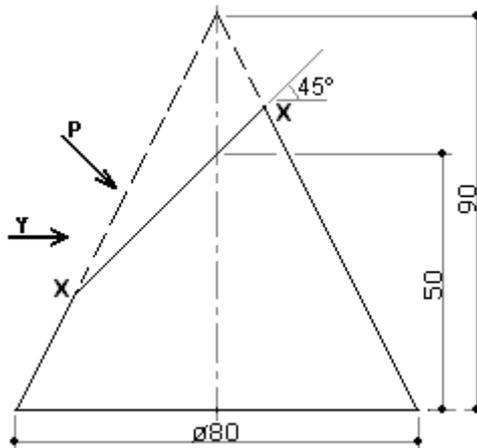


6. The figure below shows an elevation of a hexagonal pyramid cut as shown. Draw the:

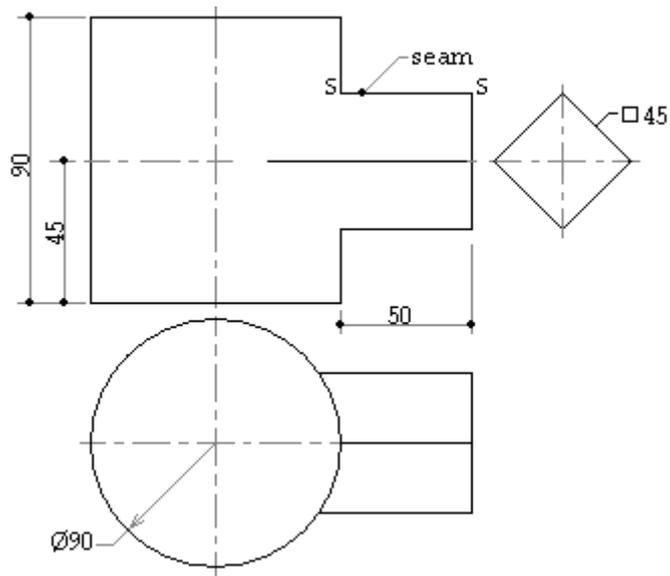
- (a) Elevation.
- (b) Complete plan.
- (c) True shape of section X - X.



7. A solid right cone is cut by a plane as shown in the figure below. Draw the given elevation and project:
- (a) A complete plan.
 - (b) A complete end view as seen from arrow Y.
 - (c) The true shape of the cut surface on X - X.
 - (d) The auxiliary view in the direction of P.



8. The figure below shows a right circular pipe interpenetrated by a square section pipe. Draw the:
- (a) Complete elevation showing the line of interpenetration,
 - (b) Full development of the square pipe with the seam at S - S.



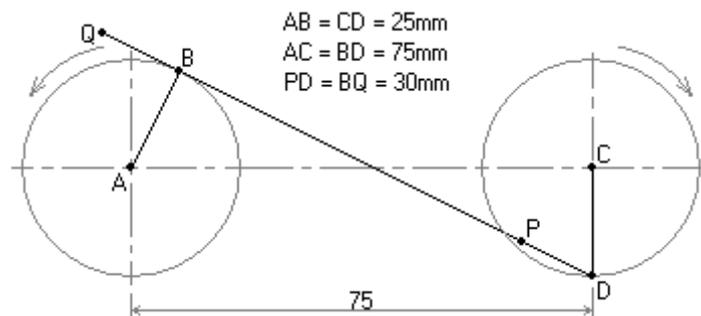
SECTION A – PLANE GEOMETRY.

1. (a) Construct a triangle of perimeter 160mm with sides in the ratio of 3:5:6. (07 marks)
- (b) (i) Inscribe a regular heptagon in a circle of diameter 100mm. (09 marks)
- (ii) Transform the heptagon drawn in (i) above into a square of equal area. (09 marks)

2. In the figure below, two equal cranks **AB** and **CD** connected by a link **BD**, rotates in opposite directions.

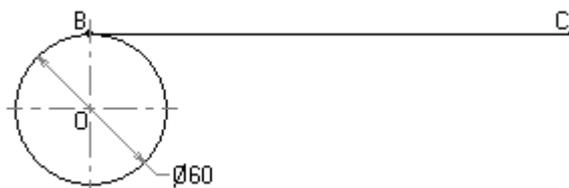
Draw one complete revolution the locus of

- (a) Point **P**. (13 marks)
- (b) Point **Q**. (12 marks)

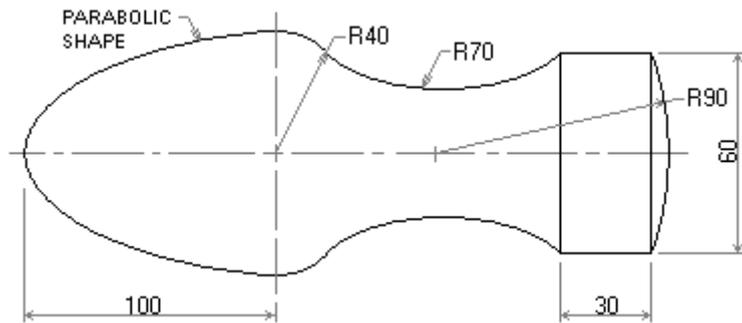


3. Shown in the figure below is a piece of string **BC** equal in length to the circumference of a cylinder, around which it is to be coiled in a clockwise direction.

- (a) Plot the path of end **C** of the string as it coils round the cylinder for a complete loop. (13 marks)
- (b) Name the curve you have drawn. (02 marks)
- (c) Draw a tangent and a normal at any point on the curve. (10 marks)

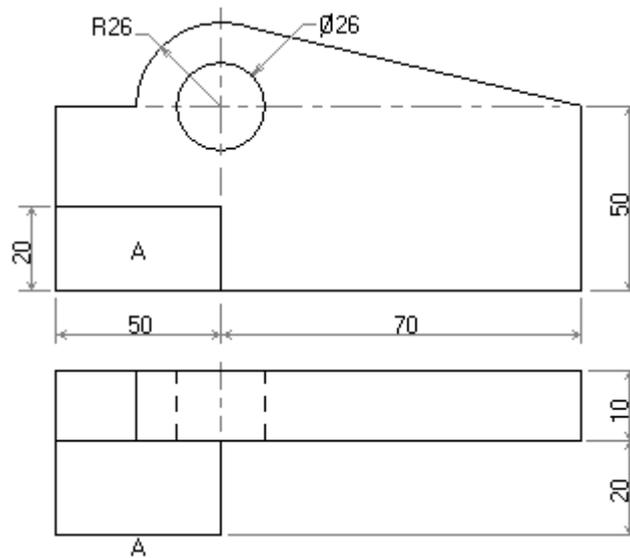


4. Draw the tool handle shown in the figure below showing all construction lines. (25 marks)



SECTION B – SOLID GEOMETRY.

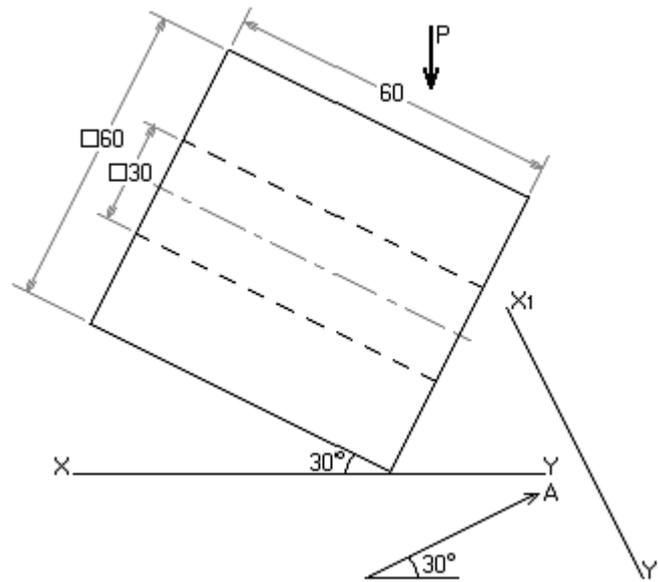
5. The orthographic views of a casting are shown in the figure below. Draw the oblique projection with face A in the foreground. (25 marks)



6. The figure below shows the elevation of a 60mm square prism with a 30mm square hole passing centrally through it.

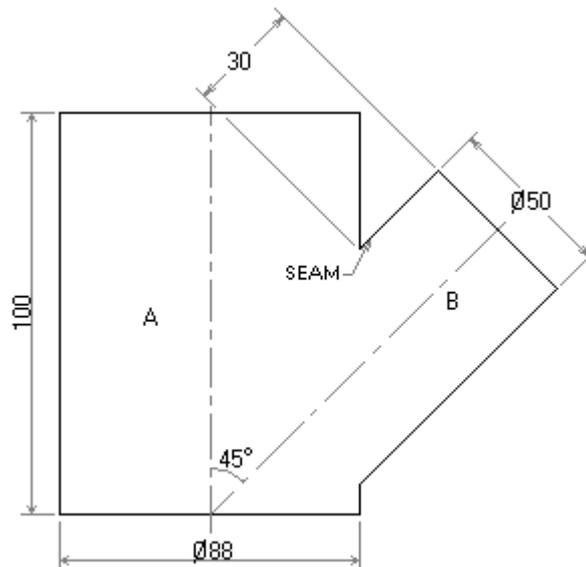
Draw:

- The given elevation, (05 marks)
- The plan of the solid in the direction of arrow P, (08 marks)
- An auxiliary elevation in the direction of arrow A showing hidden details. (12 marks)



7. Two cylinders which meet at 45° are shown in the figure below.

- Draw the:
- (a) Curve of intersection between the two cylinders, (09 marks)
 - (b) Complete plan, (07 marks)
 - (c) Development of cylinder B. (09marks)



8. The figure below shows the incomplete plan and an elevation of a cut regular pentagonal pyramid drawn in third angle projection.

- (a) Draw:
- (i) The given elevation,
 - (ii) Complete plan,
 - (iii) The end elevation in the direction of the arrow X,

- (iv) The true shape of the cut surface.
- (b) Make the development of the pyramid with the seam at S-S.

