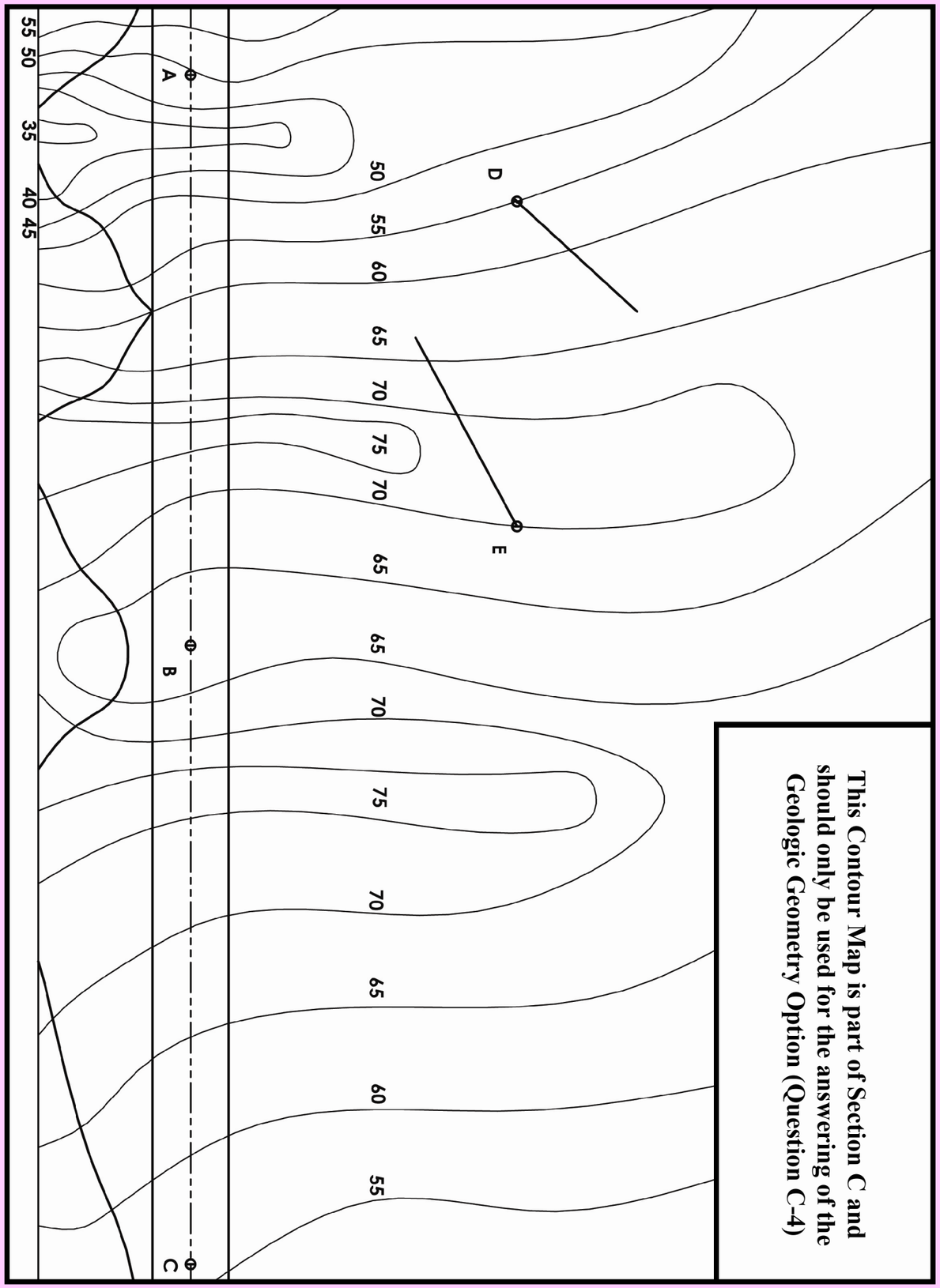


This Contour Map is part of Section C and should only be used for the answering of the Geologic Geometry Option (Question C-4)

Leaving Certificate Examination, 2009

Design & Communication Graphics

Higher Level

Section A (60 Marks)

Time: 3 Hours

This examination is divided into three sections:

SECTION A	(Core - Short Questions)
SECTION B	(Core - Long Questions)
SECTION C	(Applied Graphics - Long Questions)

SECTION A
- Four questions are presented
- Answer **any three** on the A3 sheet overleaf
- All questions in Section A carry **20 marks**

SECTION B
- Three questions are presented
- Answer any two on A3 drawing paper
- All questions in Section B carry **45 marks**

SECTION C
- Five questions are presented
- Answer **any two** (i.e. the options you have studied) on the A3 drawing paper
- All questions in Section C carry **45 marks**

General Instructions:
- *Construction lines must be shown on all solutions*
- *Write the question number distinctly on the answer paper in Sections B and C*
- *Work on one side of the paper only*
- *All dimensions are given in metres or millimetres*
- *Write your name, school name and teacher name in the box below and on all other sheets used*

Name:

School Name:

Teacher Name:

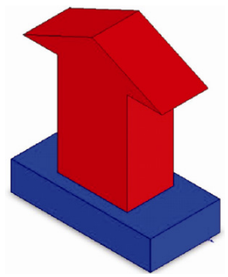
SECTION A - Core - Answer Any Three of the questions on this A3 sheet

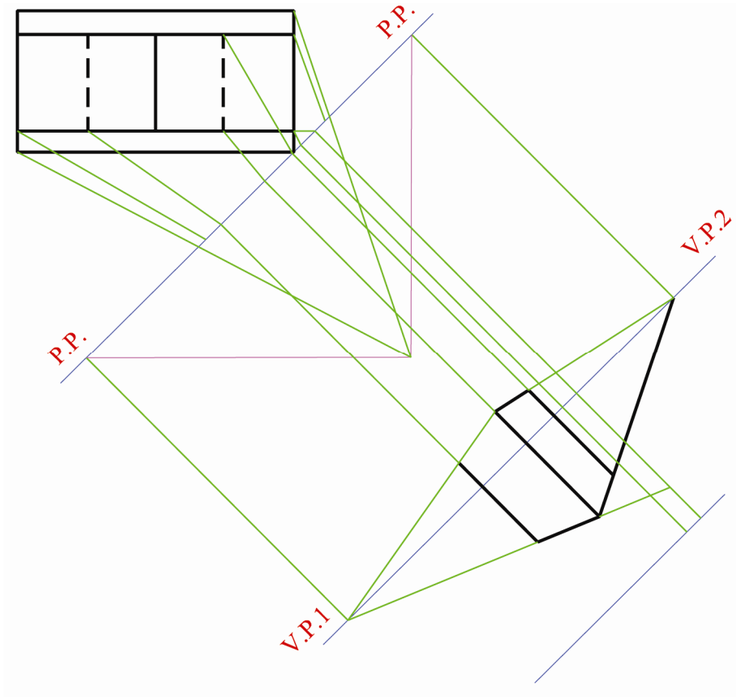
A-1. The 3D graphic shows a proposed design for a traffic directing bollard.

The drawing on the right is a partially completed perspective view of the bollard.

(a) Complete the perspective drawing of the base.

(b) Determine an auxiliary vanishing point for the 25° sloping faces of the top and complete the drawing.



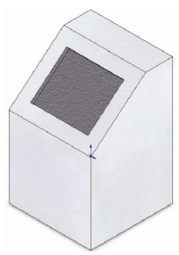


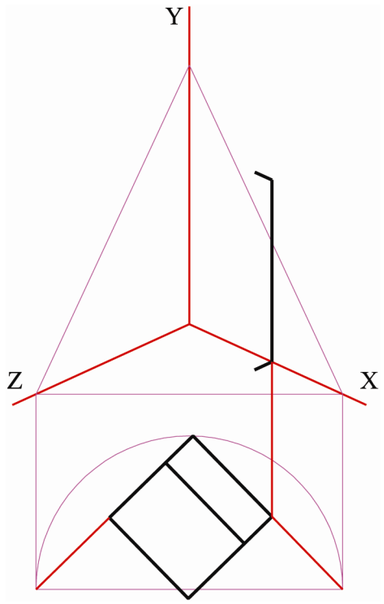
A-2. A kitchen dustbin is shown in the 3D graphic below. It consists of a square based prism which has been truncated as shown. The truncated surface is inclined at 50° to the axis of the prism.

A set of dimetric axes is shown on the right and the plan of the object has been positioned relative to the axes as shown. A partially completed dimetric projection of the object is shown.

Draw the elevation in its correct position and complete the axonometric projection.

Note: *The opening in the dustbin may be ignored for the purposes of your drawing.*



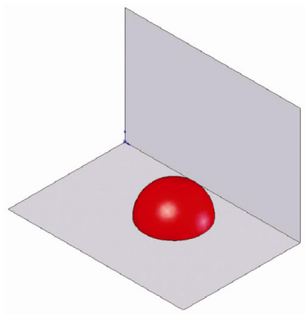


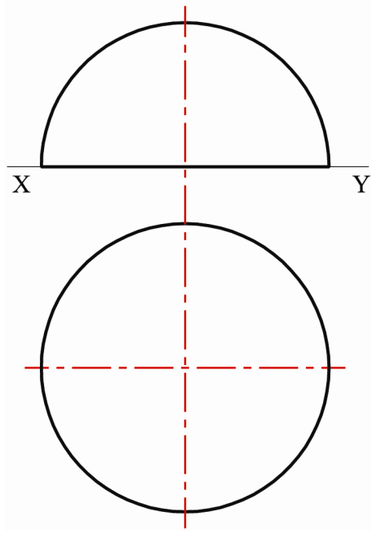
A-3. The plan and elevation of a hemisphere are shown. The 3D graphic shows the hemisphere and the planes of reference.

A sphere is positioned so that it is in contact with the vertical plane and the hemisphere. The line joining the centres of the solids is inclined at 30° to the horizontal plane and 45° to the vertical plane.

(a) Show the projections of the point of contact between the solids.

(b) Show how to find the radius of the sphere.

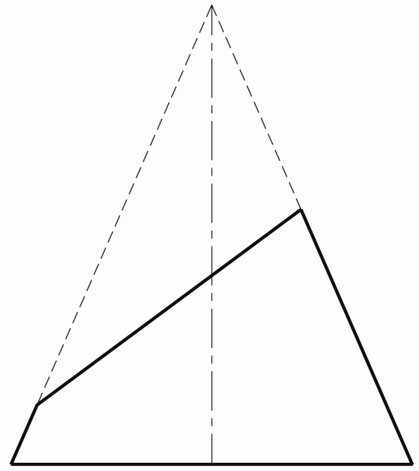




A-4. The 3D graphic shows a proposed design for a nail varnish bottle. The screw-on lid consists of a cylinder and a truncated cone as shown. The diagram on the right shows the elevation of the truncated cone. The true shape of the cut surface is an ellipse.

(a) Use a focal sphere to find the directrix and a focal point of the ellipse.

(b) Draw a portion of the curve.



This examination paper must be returned at the end of the Examination – You must include your Name, School Name and Teacher's Name on the front cover

Leaving Certificate Examination, 2009

Design & Communication Graphics
Higher Level
Section B and C (180 Marks)

Time: 3 Hours

This examination is divided into three sections:

SECTION A	(Core - Short Questions)
SECTION B	(Core - Long Questions)
SECTION C	(Applied Graphics - Long Questions)

SECTION A
- Four questions are presented
- Answer **any three** on the A3 sheet overleaf
- All questions in Section A carry **20 marks**

SECTION B
- Three questions are presented
- Answer **any two** on A3 drawing paper
- All questions in Section B carry **45 marks**

SECTION C
- Five questions are presented
- Answer **any two** (i.e. the options you have studied) on the A3 drawing paper
- All questions in Section C carry **45 marks**

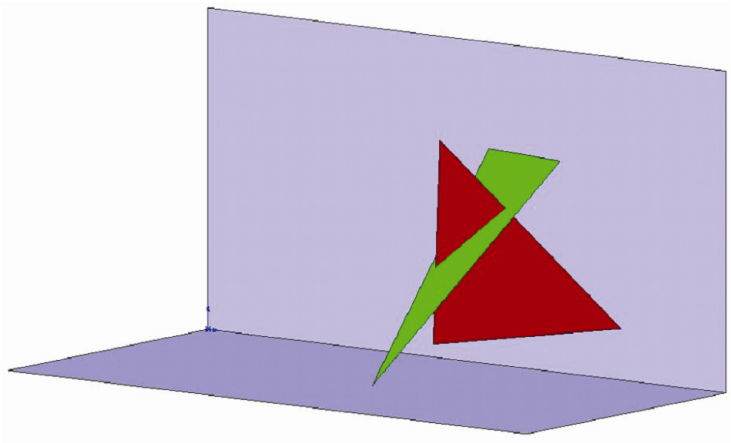
General Instructions:
- *Construction lines must be shown on all solutions*
- *Write the question number distinctly on the answer paper in Sections B and C*
- *Work on one side of the paper only*
- *All dimensions are given in metres or millimetres*
- *Write your name, school name and teacher name in the box provided on Section A and on all other sheets used*

SECTION B - Core

Answer **Any Two** questions from this section on A3 drawing paper

B-1. The 3D graphic in Fig. B-1 shows two intersecting planes, ABC and DEF. The horizontal and vertical planes of reference are also shown.

Fig. B-1



The horizontal and vertical coordinates for the intersecting planes are given below.

A	=	120	---	70	---	15
B	=	125	---	5	---	80
C	=	190	---	80	---	70
D	=	175	---	20	---	20
E	=	155	---	85	---	85
F	=	110	---	10	---	30

(a) Draw the plan and elevation of the intersecting planes.
(Use a vertical orientation for the A3 sheet to maximise space.)

(b) Determine the line of intersection between planes.

(c) Determine the projections of the shortest line from point A to the line DF.

(d) Determine the dihedral angle between the planes.

Scale 1:1

B-2. Fig. B-2 shows the plan and elevation of a square based gate pillar with a shaped capping.

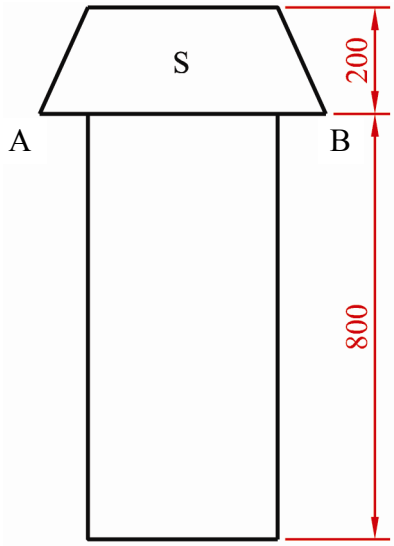
A 3D graphic of a pillar is also shown.

(a) Draw the plan and elevation of the pillar where point A is 40mm from the vertical plane and the line AB is inclined at 60° to the vertical plane.

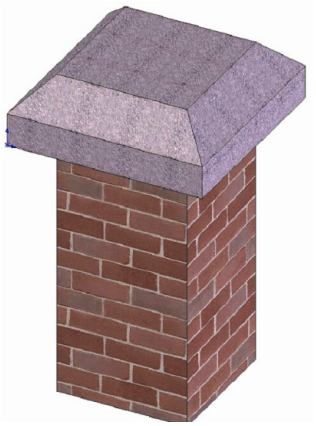
(b) Draw the traces of the oblique plane VTH which contains the surface S.

(c) Draw the traces of the oblique plane which contains point A and is perpendicular to the oblique plane VTH.

(d) Show the line of intersection between the oblique planes and find its true inclination to the vertical plane.



Scale 1:10



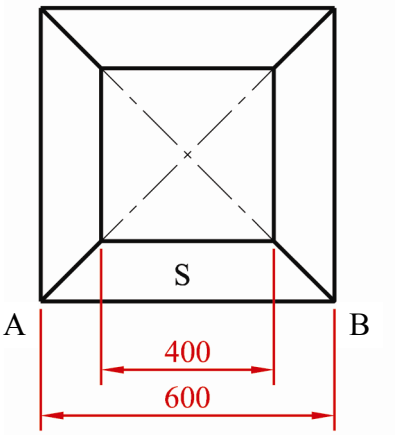
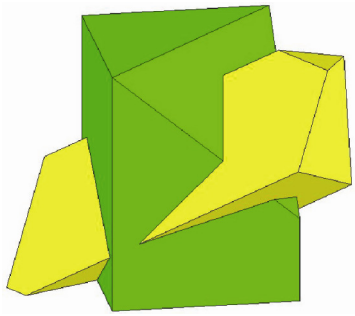


Fig. B-2

B-3. Fig. B-3 shows the projections of a square based prism of 65mm side, which has been cut as shown. Also shown are the incomplete projections of an equilateral triangular based prism, of 55mm side, which penetrates the square based prism.

A 3D graphic of the interpenetrating solids is also shown.

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



Scale 1:1

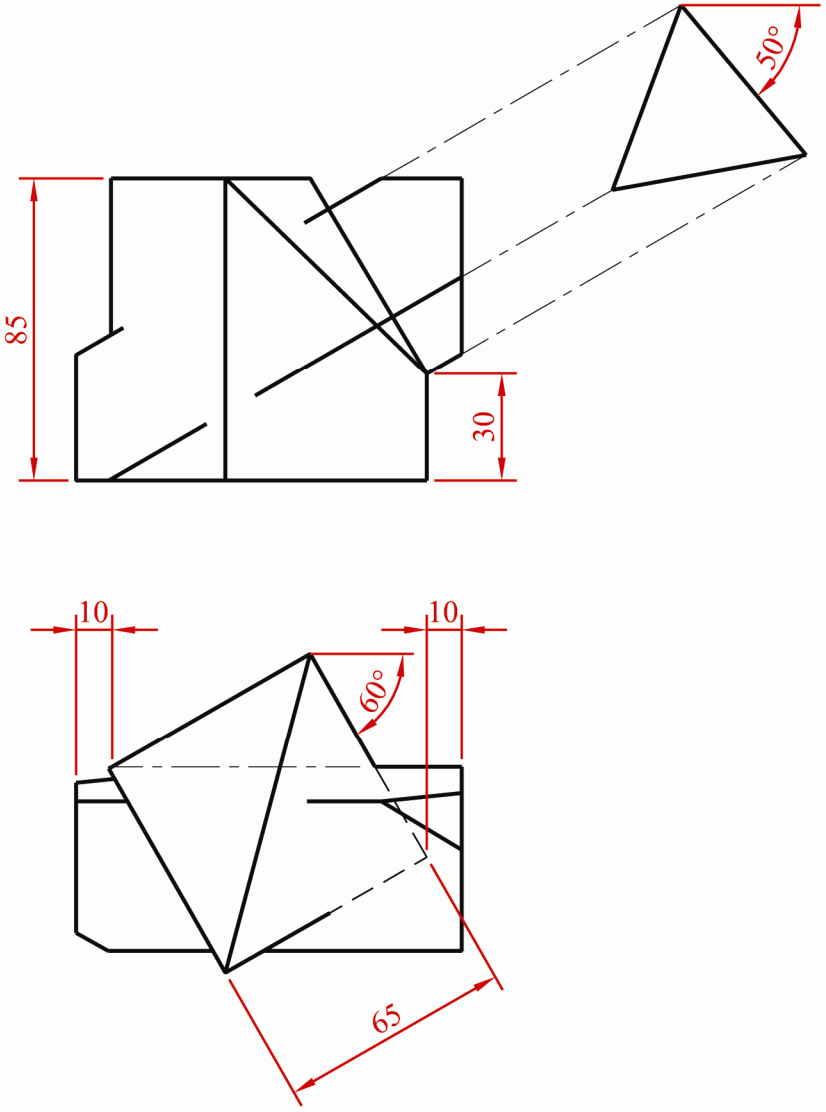


Fig. B-3

SECTION C - Applied Graphics

Answer **Any Two** questions (i.e. the options you have studied)
from this section on A3 drawing paper

Dynamic Mechanisms

C-1. **(a)** Draw the profile and displacement diagram for a plate cam rotating in a clockwise direction and imparting the following motion to an inline roller follower of 16mm diameter.

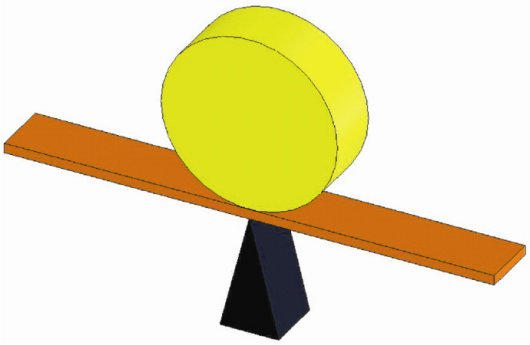
0 – 120	:	Simple harmonic motion rise of 30mm
120 – 150	:	Dwell
150 – 330	:	Uniform acceleration and retardation rise of 30mm
330 – 360	:	Fall 60mm with uniform velocity

The camshaft diameter is 20mm and the nearest approach of the roller centre to the camshaft is 35mm.

Scale 1:2

(b) Fig. C-1 shows the elevation of a see-saw which is presently balanced in a horizontal position with a cylinder resting on it as shown. A 3D graphic is also shown.
When the cylinder rolls to the right, the see-saw pivots about the fixed point O. The cylinder rolls through 1/3 of a revolution along the see-saw during the time it takes point B to reach the XY line.

Plot the locus of point P for the combined movement.



Scale 1:2

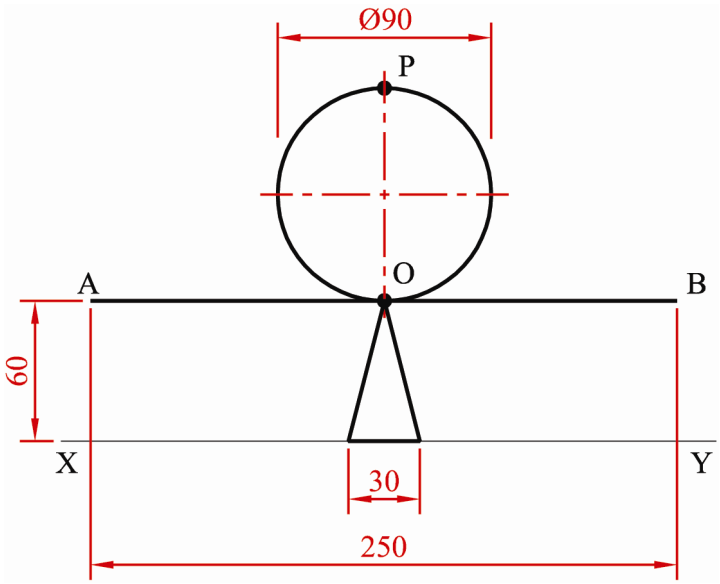
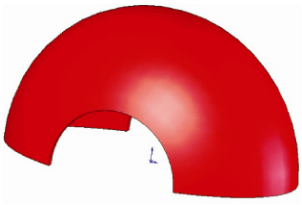


Fig. C-1

Structural Forms

C-2. **(a)** Fig. C-2(a) shows the elevation of a child's garden play centre. A 3D graphic of the structure is shown on the right.



The curved surface is generated by translating the parabola ABC in a vertical position along the parabola DEF. The generating parabola ABC is represented by a dotted line in the end view.

Draw the given elevation and project a plan of the structure.

Scale 1:40

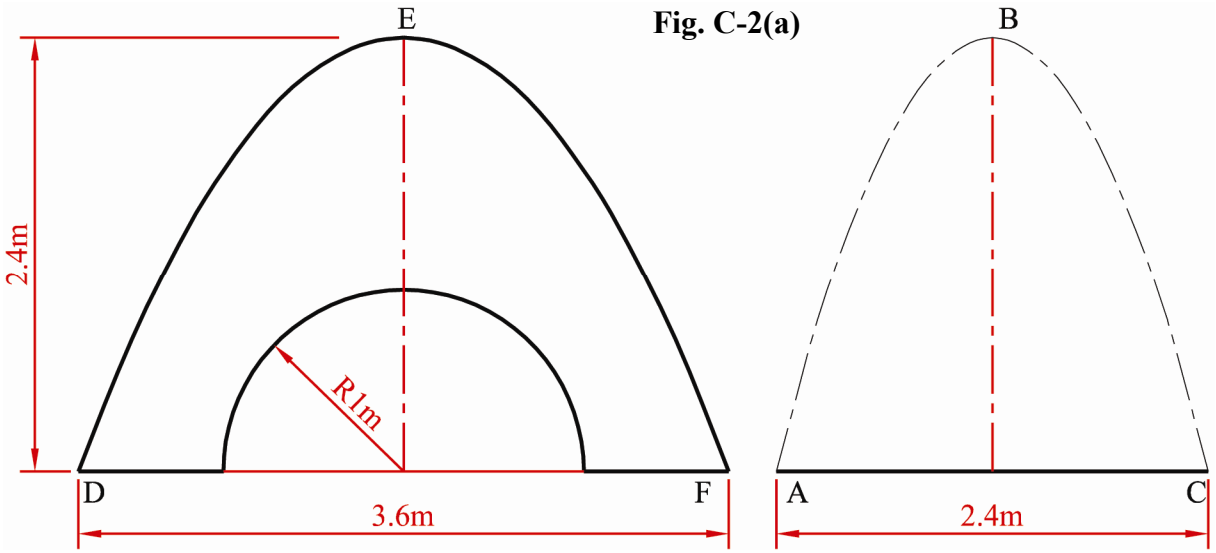


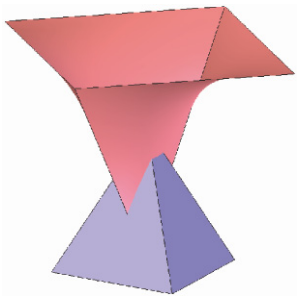
Fig. C-2(a)

(b) The projections of a flower vase are shown in Fig. C-2(b). A 3D graphic is also given. The vase consists of two hyperbolic paraboloid surfaces which rest on a square based pyramid.

(i) Using six elements in each direction, draw the plan and elevation of the entire hyperbolic paraboloid surface ABCD, orientated as shown.

(ii) Determine the traces of the plane director for the edges AB and DC of the surface.

Scale 1:4



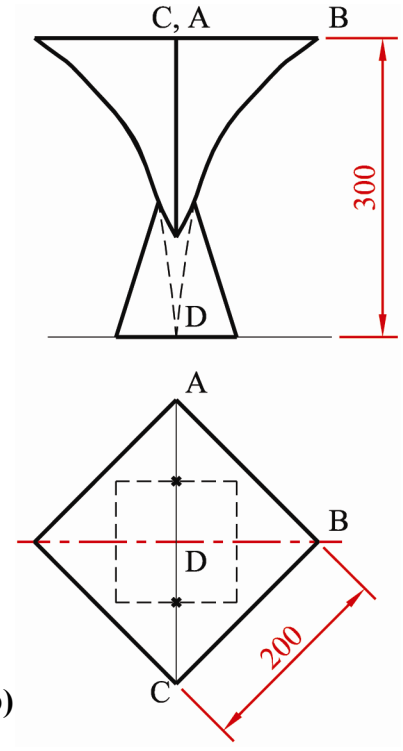


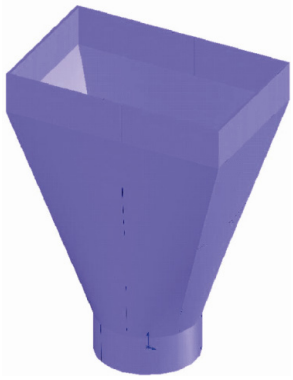
Fig. C-2(b)

Surface Geometry

C-3. **(a)** Fig. C-3(a) shows the projections of part of a transition piece from the ducting of a house's rain water collection system. A 3D graphic of the entire transition piece is also shown. The transition piece starts as a rectangle at one end and ends as a circle as shown.

Draw a one-piece surface development of the portion of the transition piece shown in Fig. C-3(a).

Scale 1:2



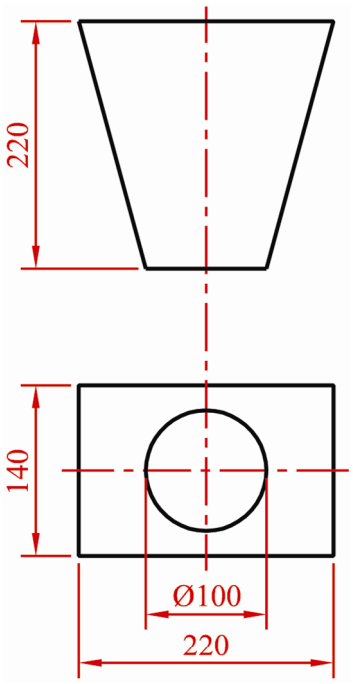


Fig. C-3(a)

(b) A photograph of a hopper is shown. Fig. C-3(b) shows the plan and elevation of a part of the hopper.

(i) Draw the plan and elevation of surface A.

(ii) Surface B is sloped at 70°. Determine the baseline (horizontal trace) for this surface and find the dihedral angle between the surfaces A and B.

(iii) The dihedral angle between surfaces A and D is 90° and the surfaces A and C are inclined at the same angle to the horizontal plane.

Complete the plan and elevation of the hopper.

Scale 1:5

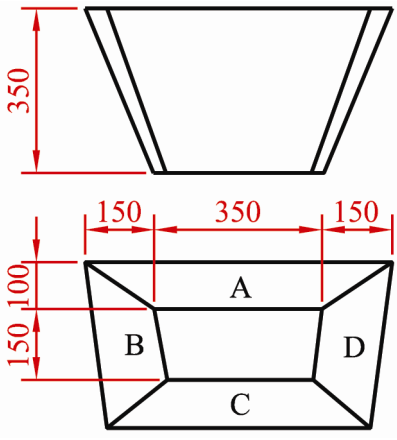


Fig. C-3(b)

Geologic Geometry

C-4. (a) The accompanying map, located on the back page of section A, shows ground contours at five metre vertical intervals.

ABC is the centreline of the proposed roadway. The section of roadway between A and B is level at an altitude of 60m. The section from B to C has a gradient of 1 in 20 falling.

Using side slopes of 1 in 1 for the embankments and 1 in 1.5 for the cuttings, complete the earthwork necessary to accommodate the roadway.

Note: *The earthworks on the southern side of the roadway have already been completed.*

(b) On the map, D and E indicate the location of two points on the ground.

A skew borehole at D is drilled as shown and has an actual inclination of 50° to the horizontal plane. It reveals the top and bottom surfaces of a stratum of ore at altitudes of 35m and 25m respectively.

A skew borehole at E is drilled as shown and has an actual inclination of 60° to the horizontal plane. It reveals the top and bottom surfaces of the stratum at altitudes of 55m and 10m respectively.

Determine the dip, strike and thickness of the stratum.

Scale 1:1000

Assemblies

C-5. Fig. C-5 shows the plan and elevation of a machined part.

(i) Draw the plan and elevation of the part.

(ii) Draw a full-size sectional elevation A-A of the machined part.

(iii) An isometric view of the sectioned elevation with point P as the lowest point on the pictorial.

Scale 1:1

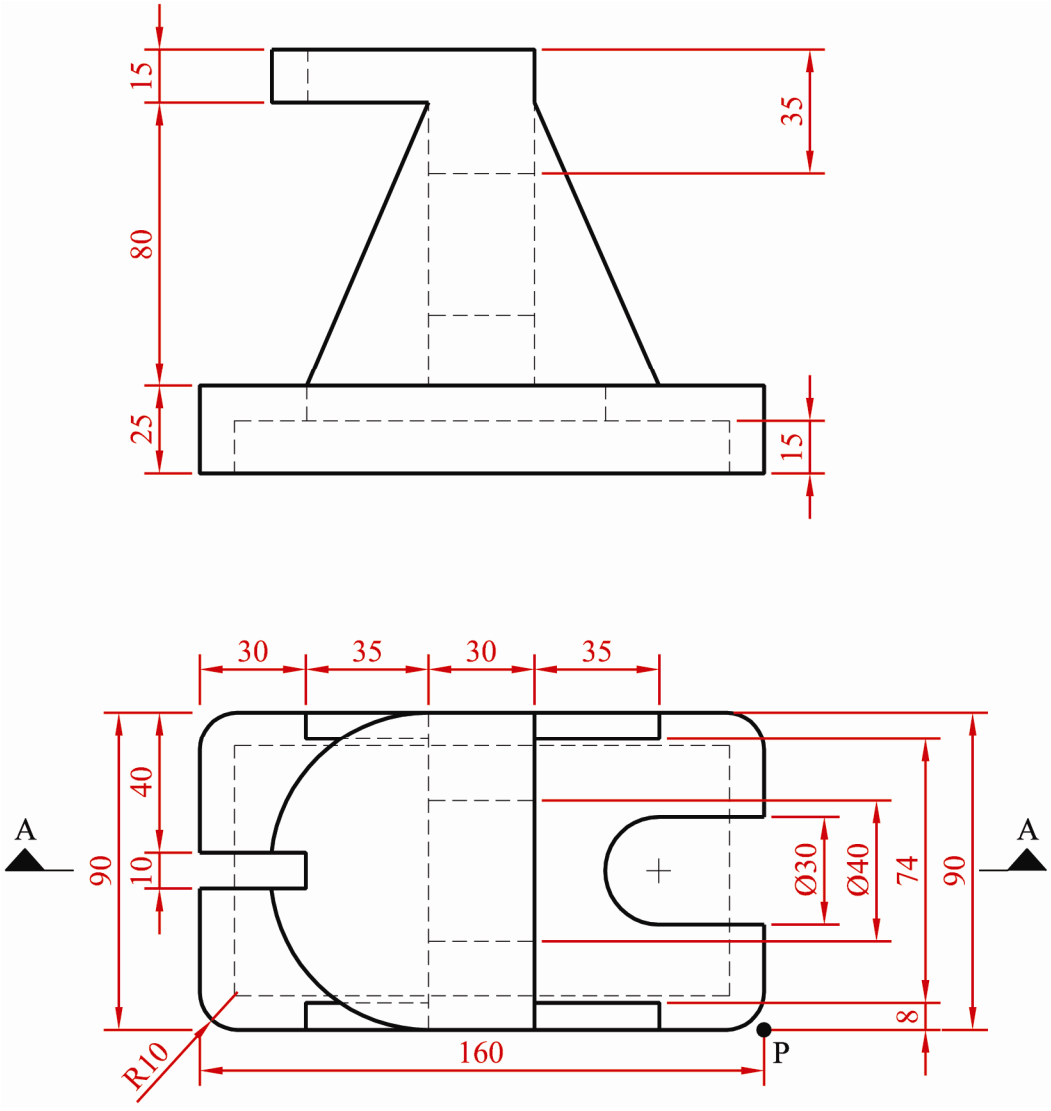


Fig. C-5

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