



Pre-Leaving Certificate Examination, 2010

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)

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

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

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

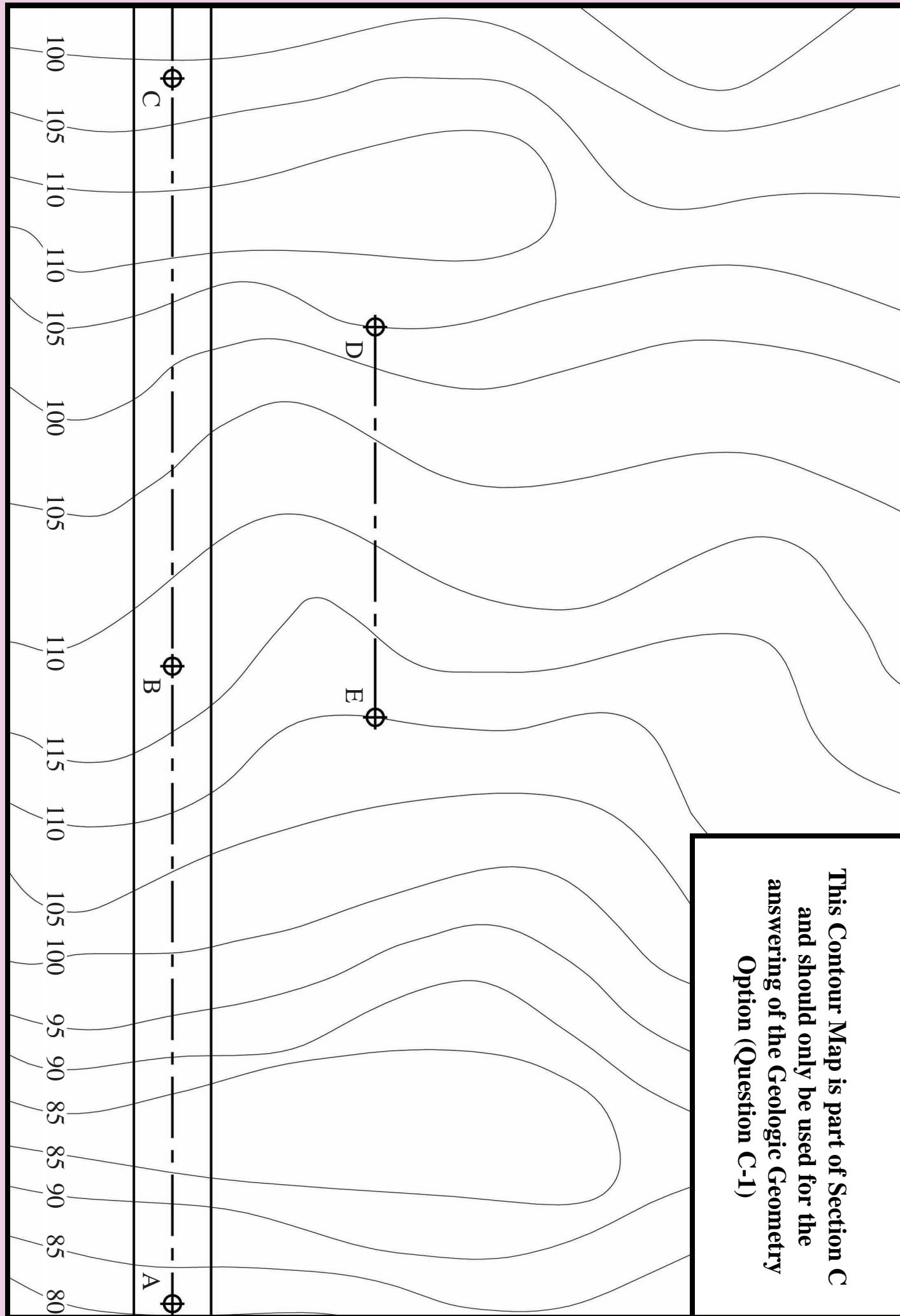
General Instructions:

- 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:

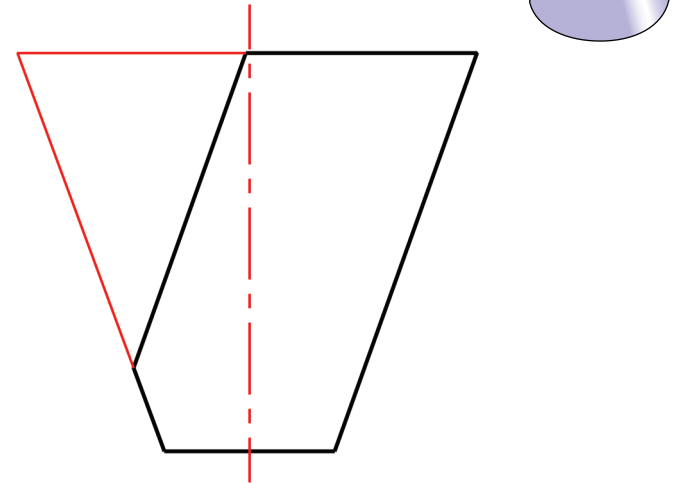
Teacher Name:



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

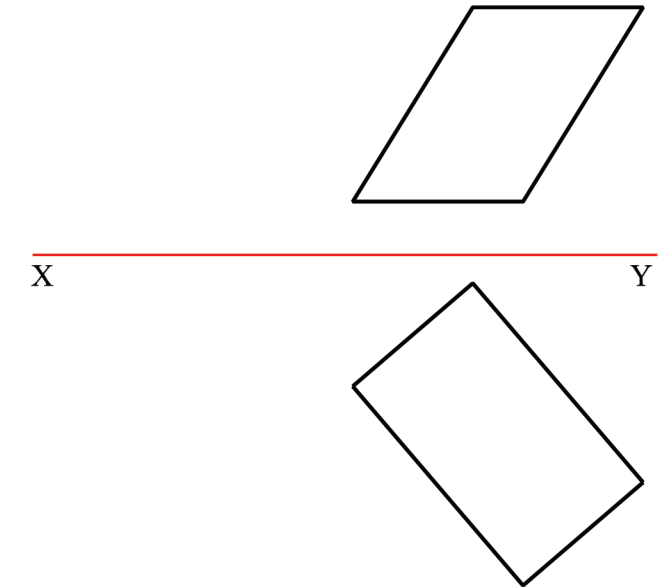
A-1. The 3D graphic on the right shows a tee box marker as used in a golf club. It consists of two truncated cones. The drawing below shows the elevation of the top truncated cone. The true shape of the cut surface is a parabola.

- (a) Use a focal sphere to find the directrix and the focal point of the parabola.
- (b) Draw a portion of the curve.



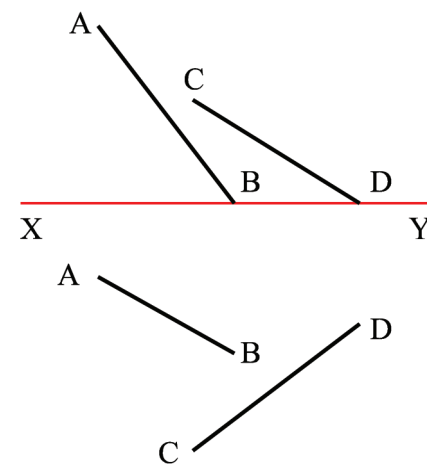
A-3. A photograph of a drawing desk is shown. The elevation and plan of its top sloping surface is shown on the right.

- (a) Draw the traces of the oblique plane which contains this surface.
- (b) Find the angle of inclination of this plane to the vertical plane.



A-2. A photograph of a javelin thrower is shown. The skew lines AB and CD represent the landing position of the two javelins.

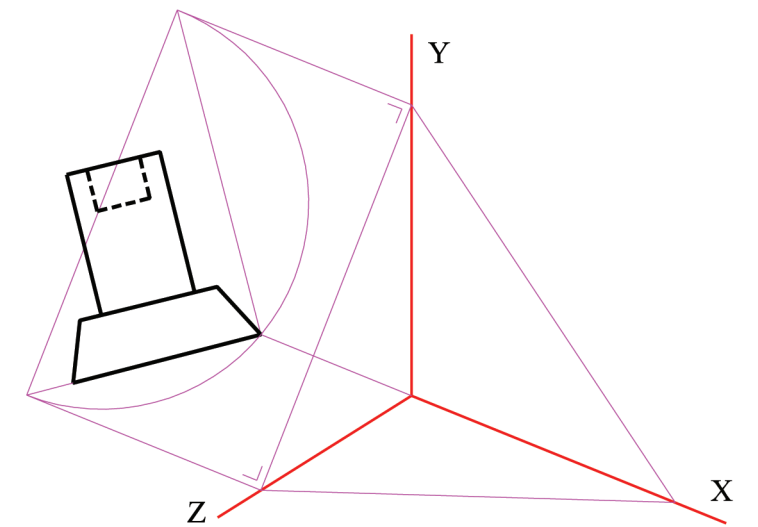
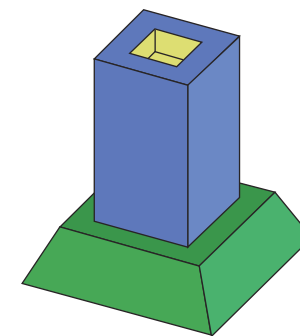
- (a) Determine the true length of the shortest distance between them.
- (b) Find the angle of inclination of the shortest distance to the horizontal plane.



A-4. A candlestick holder is shown in the 3D graphic below. It consists of a square-based prism resting on a truncated square-based pyramid.

A set of trimetric axes is shown on the right and the elevation of the object has been positioned relative to the axes as shown.

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



Pre-Leaving Certificate Examination, 2010

*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 accompanying A3 examination paper
 - All questions in Section A carry **20 marks**

- SECTION B**
- Three questions are presented
 - Answer **any two** on 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 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 drawing 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*

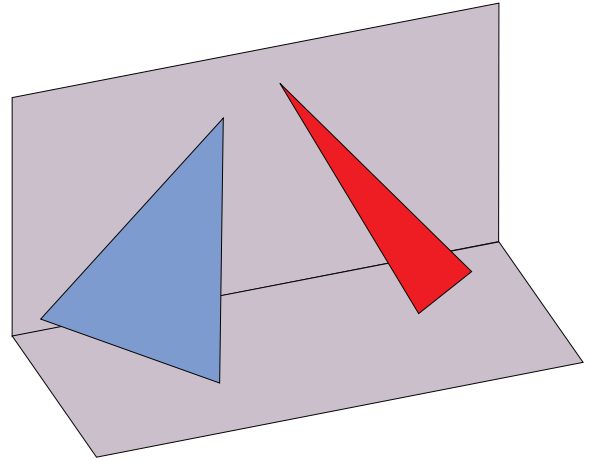
SECTION B - Core

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

- B-1.** A 3D graphic of two planes ABC and DEF is shown. The horizontal and vertical planes of reference are also shown.

The horizontal and vertical coordinates for the outer points of the planes are given below.

A	=	65	---	25	---	25
B	=	125	---	75	---	10
C	=	105	---	20	---	60
D	=	190	---	10	---	15
E	=	135	---	80	---	20
F	=	160	---	25	---	55



- (a) Draw the plan and elevation of the planes.
(Use a horizontal orientation for the A3 sheet to maximise space.)
- (b) Determine the line at which the planes will intersect when extended.
- (c) Determine the dihedral angle between the planes.
- (d) Find the traces of the line of intersection and determine its angle of inclination to the vertical plane.

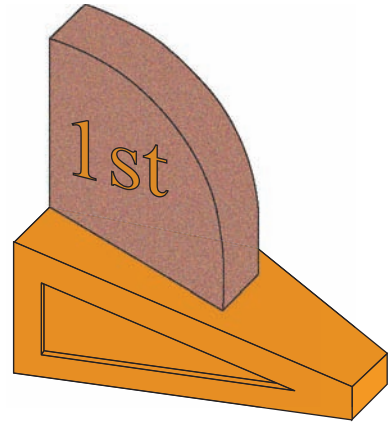
Scale 1:1

B-2. The 3D graphic on the right shows a trophy which is to be awarded for first prize in a sailing competition.

The projections of the trophy are shown in Fig. B-2 below.

Draw a perspective view of the trophy when the picture plane passes through corner A, the spectator S is 200mm from corner A and the horizon line is 60mm above the ground line.

Use auxiliary vanishing points where appropriate.



Scale 1:2

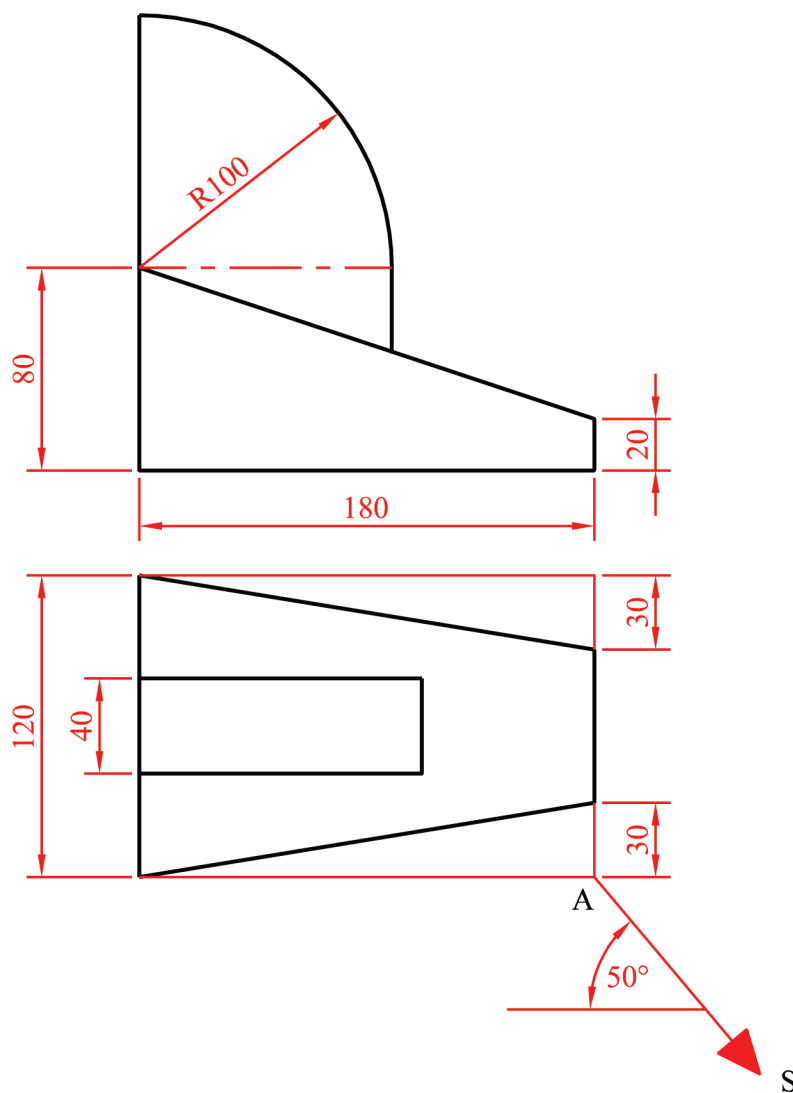
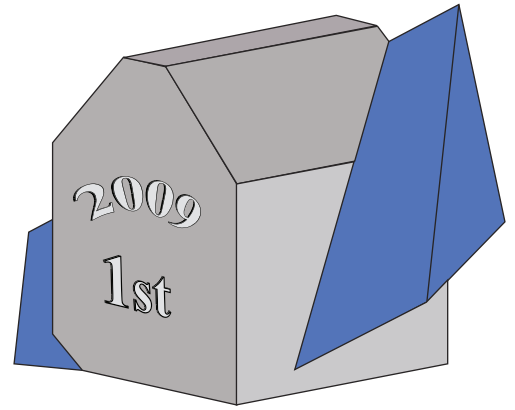


Fig. B-2

B-3. The 3D graphic on the right shows a trophy to be presented to the winner of an architectural competition.

The projections of the trophy are shown in Fig. B-3 below.

The trophy consists of a square based solid which has been cut as shown. This solid is penetrated by an equilateral triangular based prism, of 130mm side, as shown.



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

(The 3D graphic shows engraved text, which should be ignored for the purpose of your drawing).

Scale 1:2

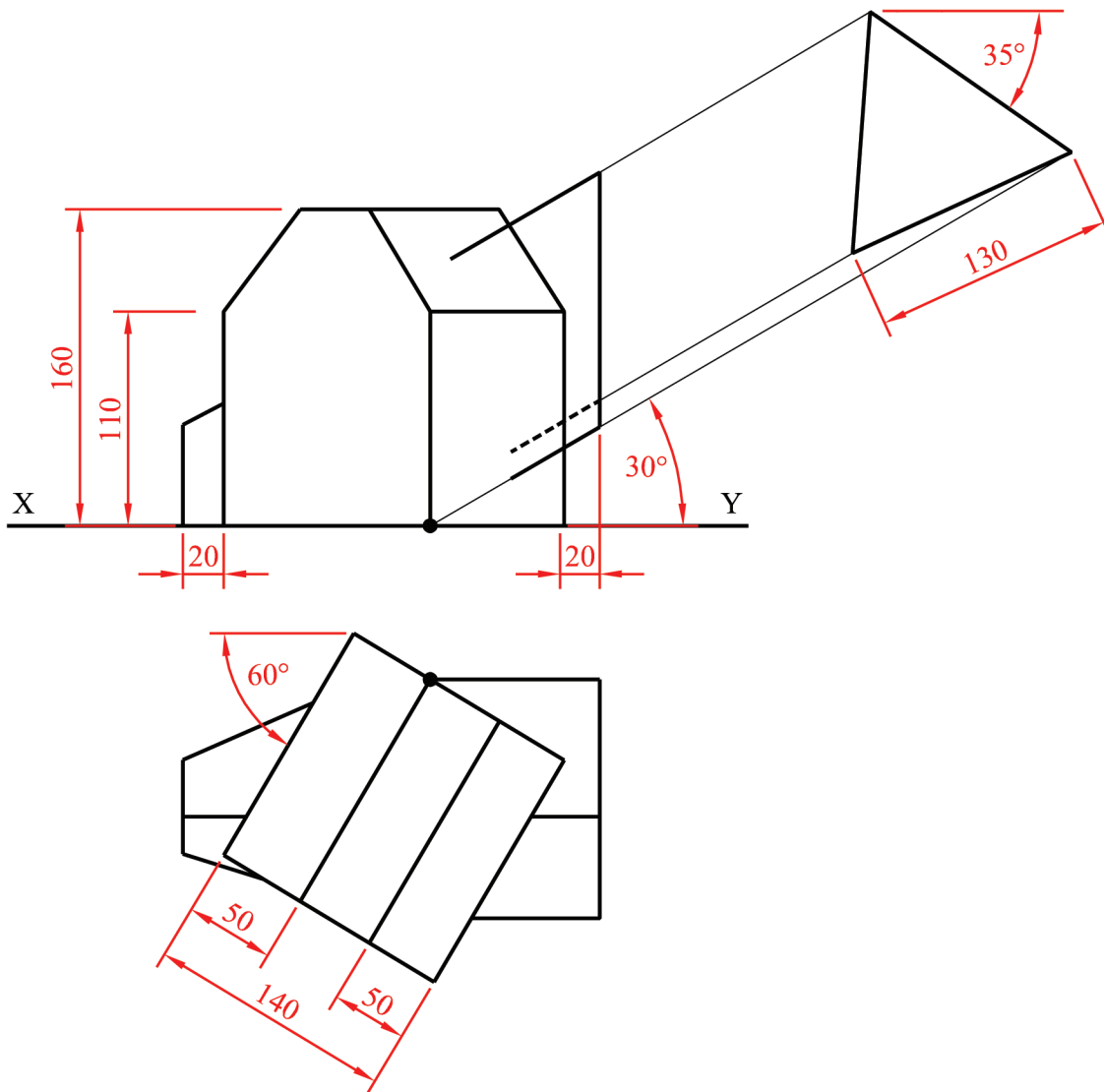


Fig. B-3

SECTION C - Applied Graphics

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

Geologic Geometry

- C-1. (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 100m. 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 earthworks necessary to accommodate the roadway.

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

A skew borehole at D is drilled in a northerly direction in plan and has an actual inclination of 70° to the horizontal plane. It reveals the top and bottom surfaces of a stratum of ore at altitudes of 65m and 40m, respectively.

A vertical borehole is drilled at E and it reveals the top and bottom surfaces of the stratum at altitudes of 65m and 40m, respectively.

- (i) Determine the dip, strike and thickness of the stratum.
- (ii) Find the apparent dip of the stratum in an easterly direction in plan.

Scale 1:1000

Structural Forms

- C-2. (a)** A photograph of a sports arena is shown. Fig. C-2(a) below shows the plan of a roof structure which is inspired by the same design. The perimeter of the roof is an ellipse in plan. The roof is formed by extending the hyperbolic paraboloid surface ABCD.



Points A and C have altitudes of 35m while points B and D have altitudes of 10m.

- (i) Draw the plan and elevation of the roof.
- (ii) Find the angle of inclination between the plane director and the vertical plane.

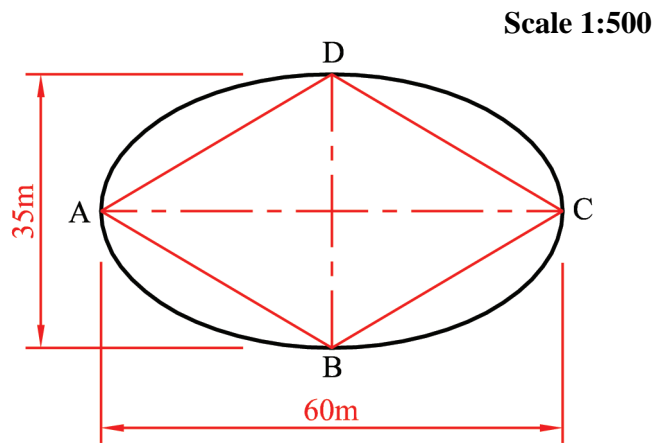
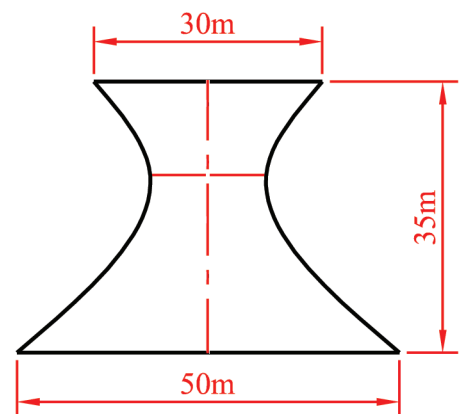


Fig. C-2(a)

- (b)** A photograph of a building is shown, the roof of which is in the form of a hyperboloid of revolution.

Fig. C-2(b) shows the plan and elevation of the roof.

Draw the given plan and elevation.



Scale 1:500



Fig. C-2(b)

Surface Geometry

C-3. The 3D graphic on the right shows a church. The roof of the building consists of a conical portion at one end, a semi-hexagonal portion at the other end and two connecting roof surfaces.

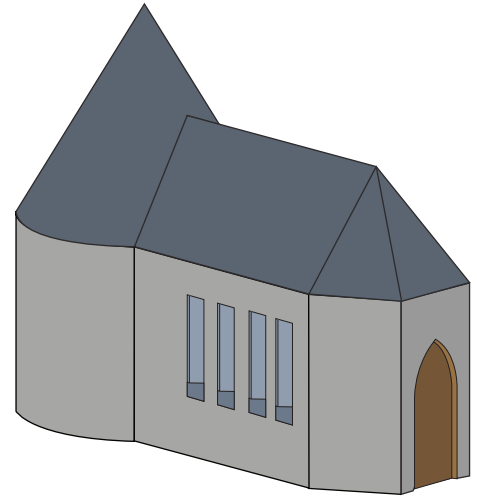


Fig. C-3 below shows the plan and elevation of the roof surfaces.

- (a) Draw the given plan and elevation.
- (b) Find the dihedral angle between surfaces A and B.
- (c) Draw the development of the conical surface.

Scale 1:200

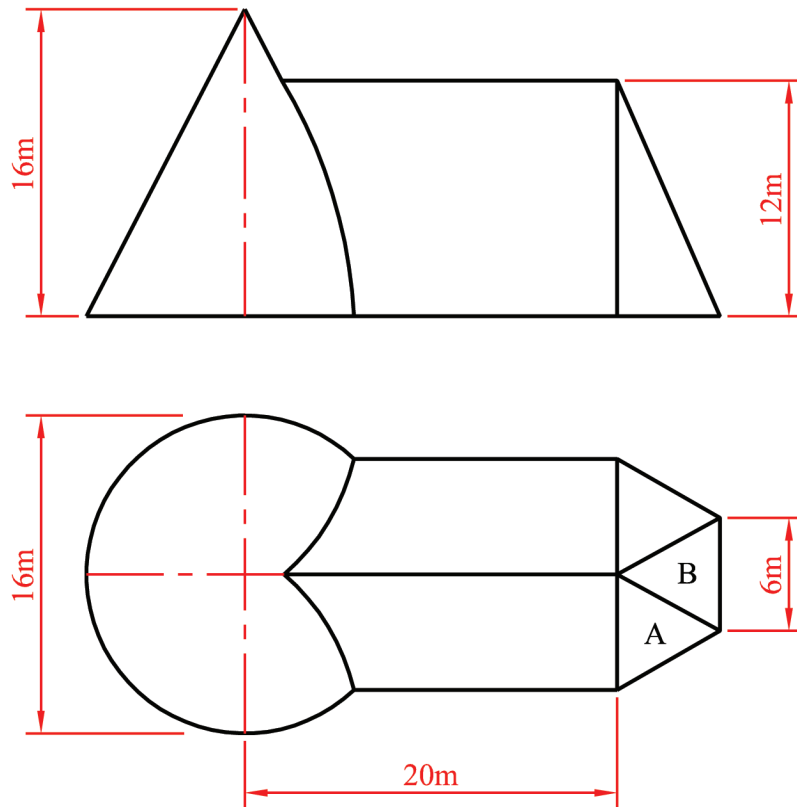


Fig. C-3

Dynamic Mechanisms

- C-4. (a)** A photograph of a pull-along toy is shown. An in-built mechanism causes the tail to wag as the toy rolls.

The mechanism is shown in line diagram format in Fig. C-4(a) below.

In the diagram, the circle rolls clockwise along the line L for half of one revolution. The link AP is constrained to slide through the point B which remains vertically above the point O for the entire movement. A is a pin joint.

Draw the locus of point P for the movement.

Scale 1:1

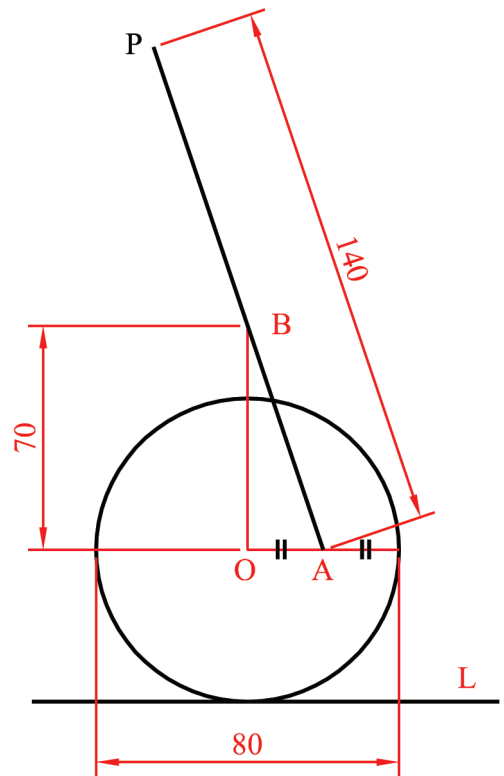


Fig. C-4(a)

- (b)** A photograph of two conical buildings is shown. Fig. C-4(b) shows the projections of one of the buildings. A fire escape stairs is to be attached to the outside of the building which will trace out the path of a conical spiral as it travels from point A to point B in a single revolution.

Draw the elevation and plan of the spiral.

Scale 1:500

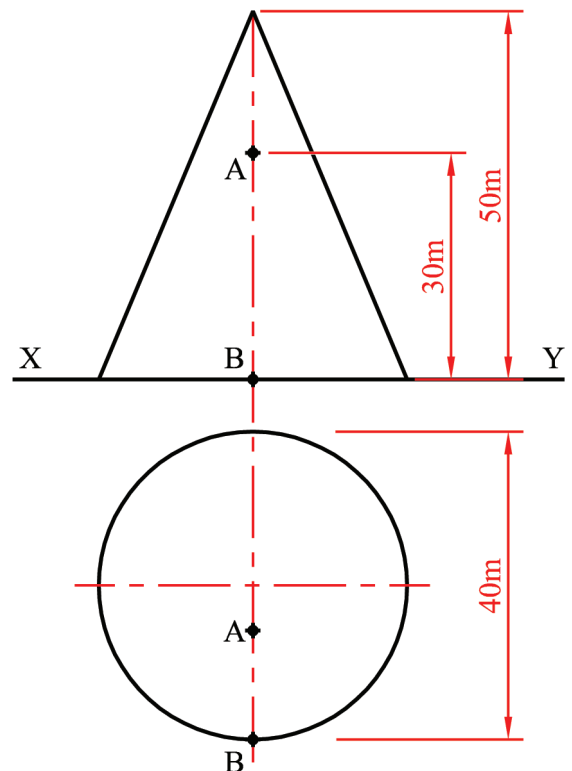


Fig. C-4(b)

Assemblies

C-5. Details of a hanging bracket for a data projector are shown in Fig. C-5. The parts list is given on the right. A 3D graphic of the parts is also shown.

- (a) Draw a full-size elevation and project a sectional elevation on A-A showing the parts fully assembled. The ceiling bracket and the hanging bracket should be at the least level of extension and the swivel head should be in a horizontal position.

Note : All fillets are 15mm.

- (b) The swivel head rotates to allow adjustment of the projected image. Determine the maximum and minimum angles of inclination that can be achieved.

PART	NAME	QTY.
1	Ceiling Mount	1
2	100mm M10 Bolt	1
3	Swivel Head	1
4	50mm M10 Bolt	1
5	M 10 Nut	2
6	Washer	2
7	Hanging Bracket	1

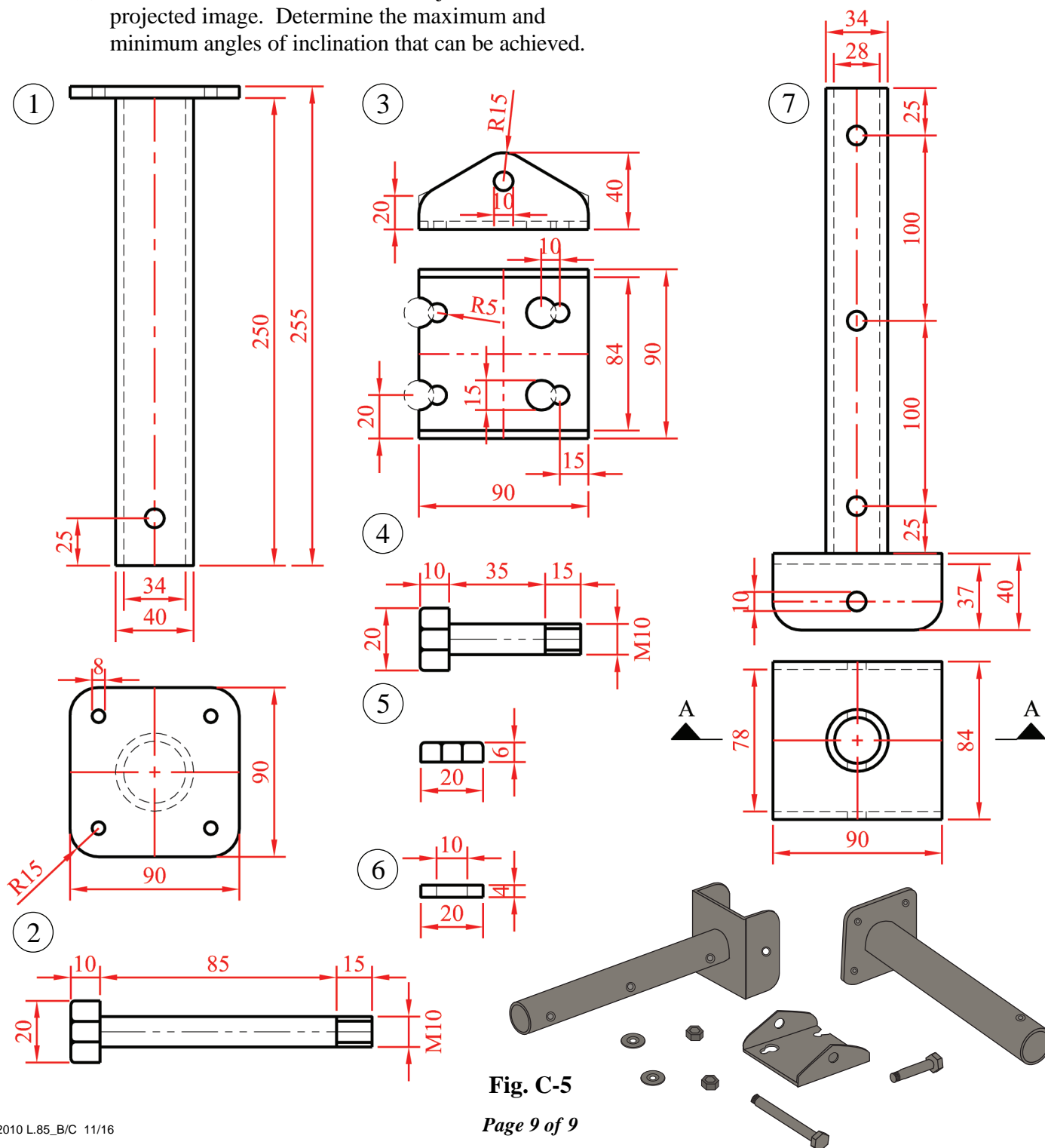


Fig. C-5

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