A

50

55

60
D

65

70

B

75

75
E

70

65

65

70

75

75

70

65

60

60 65 70

60 65 70
S
N
50 65 60
C
60

W

E

**This Contour Map is part of Section C and should only be used for the answering of the Geologic Geometry Option (Question C-1).**

*(Scale 1:1000)*

*Pre-Leaving Certificate Examination, 2014*

# 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.<br>● Answer **any three** on the A3 sheet overleaf.<br>● All questions in Section A carry **20 marks** each. |
| --- | --- |

| **SECTION B** | ● Three questions are presented.<br>● Answer **any two** on drawing paper.<br>● All questions in Section B carry **45 marks** each. |
| --- | --- |

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

**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's Name in the box below and on all other sheets used.*

**Name:**
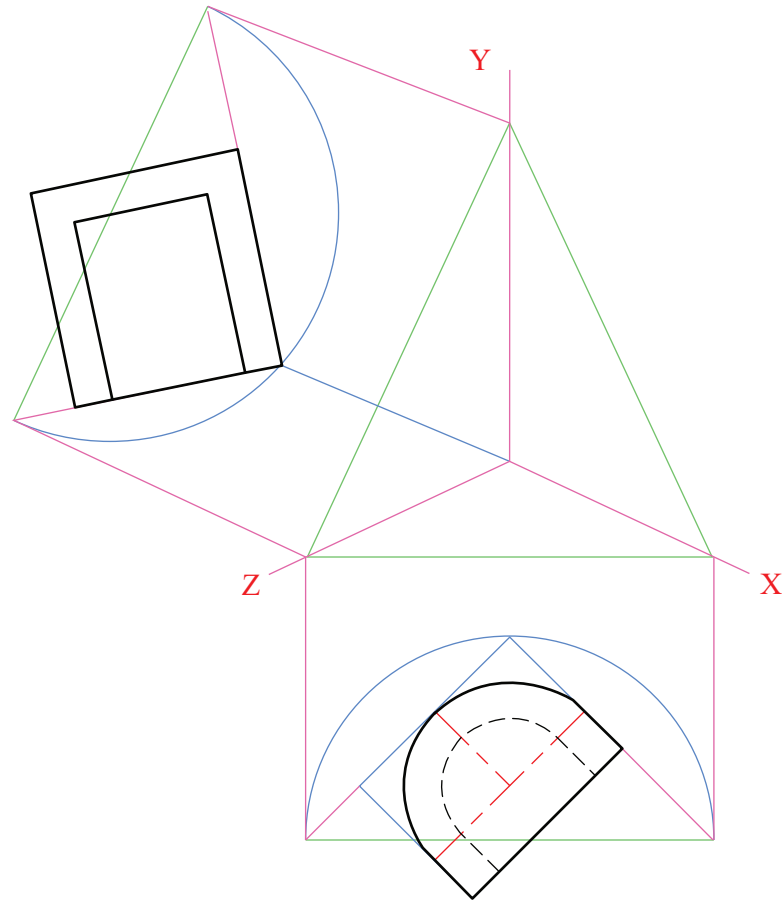
**School Name:**

**Teacher's Name:**

*Page 1 of 3*
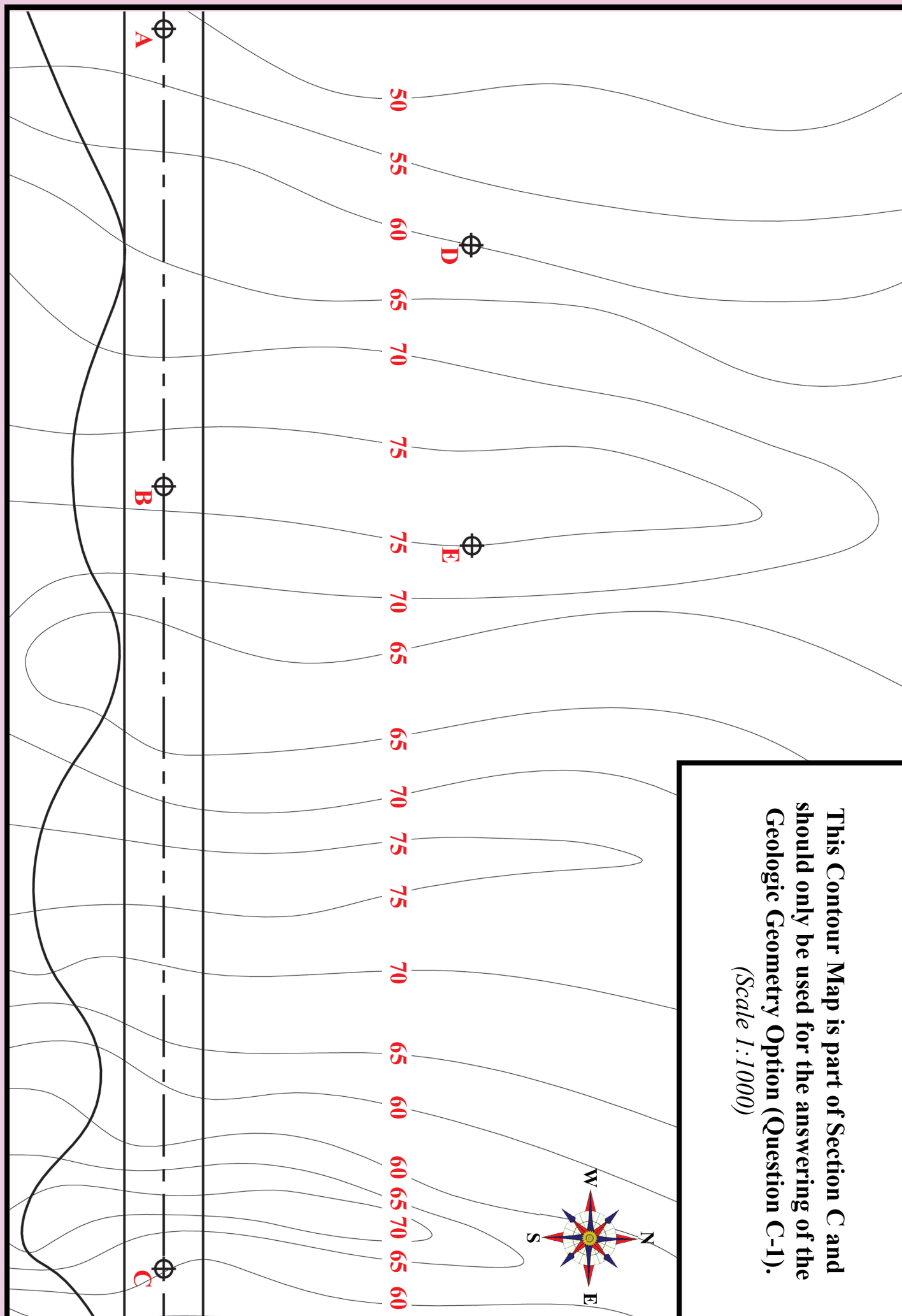
**A-1.** The 3D graphic below shows a concrete stool and table as used in a garden.

A set of diametric axis are shown on the right and the elevation and plan of the table have been positioned as shown.

Draw the axonometric projection of the table.

Y

Z          X

**A-2.** Two swimming pools in a holiday complex are shown opposite. The drawing below shows the plan of the two pools and the adjacent wall as depicted by the two circles and the line **L**.

A third pool is required in the complex. It must be the largest possible while leaving a walkway of 5m all around it.

Determine the radius of the largest circle that can be drawn in position **A** which has its circumference 5mm from both circles and the line **L**.
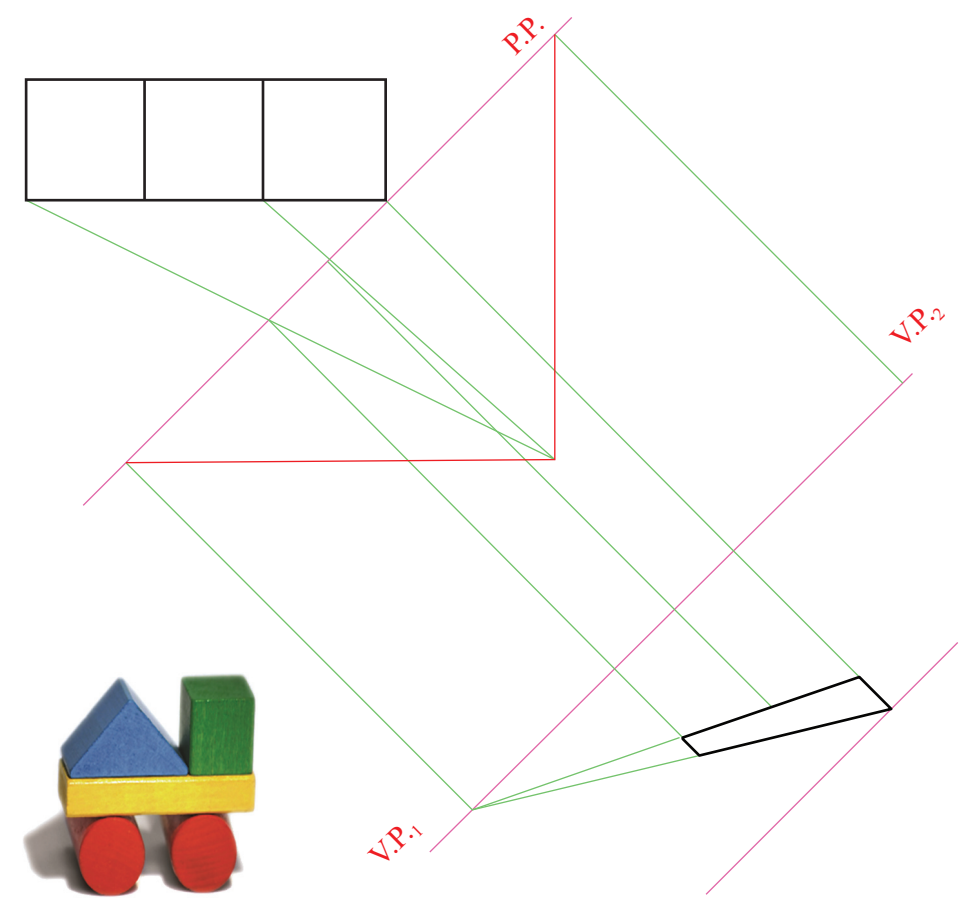Draw the circle.

A

L

**A-3.** The 3D graphic below shows an arrangement of building blocks.

The drawing on the right is a partially completed perspective view of the cube, the cuboid and the triangular based prism.

**(a)** Complete the perspective drawing of the yellow block.

**(b)** Determine an auxiliary vanishing point for the 45° sloping faces of the blue block and complete the drawing.
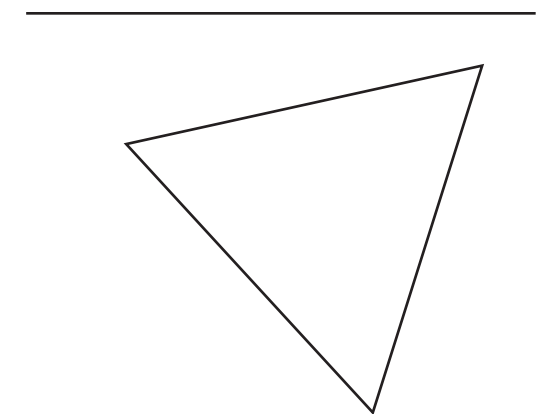
P.P.

V.P.₂

V.P.₁
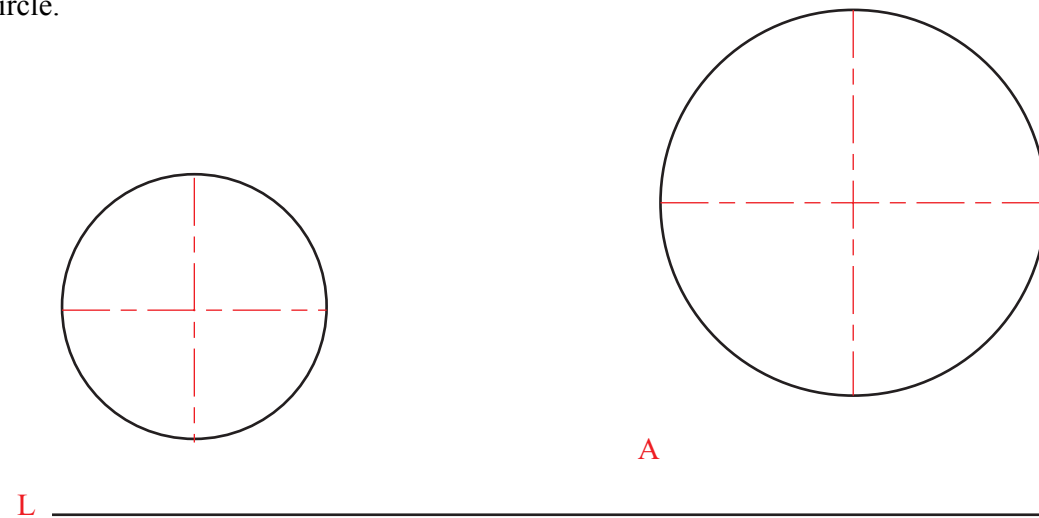
**A-4.** The 3D graphic below shows a sculpture which is based on two intersecting tetrahedrons suspended in a metal disc.

The drawing on the right shows the plan and elevation of the base of a tetrahedron.

**(a)** Complete the plan of the tetrahedron.

**(b)** Show clearly how to find the altitude of the tetrahedron and complete the elevation.

*Pre-Leaving Certificate Examination, 2014*

# *Design & Communication Graphics*
## *Higher Level*
## *Sections B and C (180 marks)*

## Time: 3 Hours

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**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** each.

---

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

---

**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** each.

---

**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's 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 modern building which is made from a series of plane surfaces is shown in the image below.

Fig. B-1 shows the plan and elevation of a model of a similar building. It includes the identical plane surfaces **ABC** and **ABD**, the equilateral triangular surface **T** and the rectangular surface **R**.

| A | = | 20 | --- | 0 | --- | 30 |
|---|---|-----|-----|-----|-----|-----|
| B | = | 120 | --- | 90 | --- | 80 |
| C | = | 75 | --- | 0 | --- | 95 |
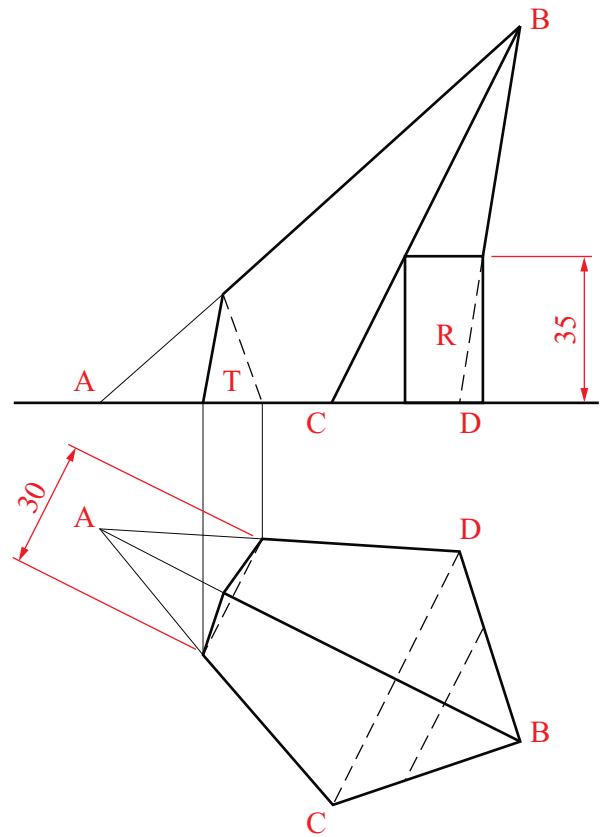
**Fig. B-1**

**(a)** Draw the plan and elevation of the identical surfaces **ABC** and **ABD**.

**(b)** Determine the dihedral angle between the two planes.

**(c)** Complete the elevation and plan by drawing the equilateral triangle **T** and the rectangle **R**.

**(d)** Determine and indicate the horizontal and vertical traces of the oblique plane that contains the surface **BCD**.

**Scale 1:1**

**B-2.** The 3D graphic opposite shows a piece of hollow pipe which is open at both ends and truncated at one end.

The elevation and end elevation of the pipe are shown in Fig. B-2.
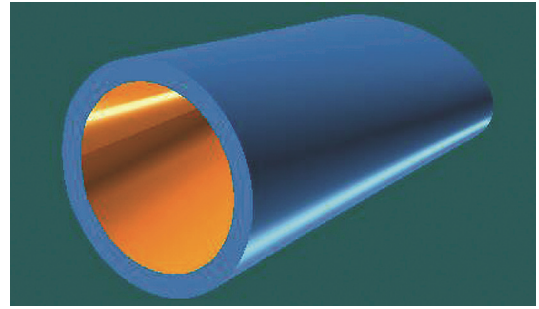
**(a)** Draw the given elevation **A** and end elevation and project a plan from the elevation.

**(b)** The truncation of the pipe produces two ellipses where the internal and external cylindrical surfaces of the pipe are cut. Draw the elevation of one of the focal spheres for the internal ellipse and establish the position of the focal point, the vertex and the directrix for this ellipse.

**(c)** Find the true shape of this elliptical opening.

**Scale 1:4**

Ø80

Ø70

80

A

140
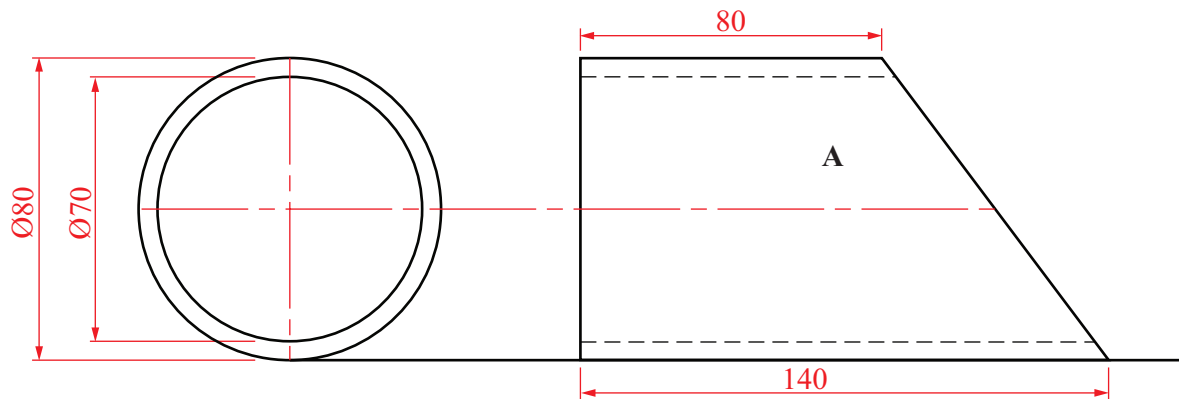
**Fig. B-2**

**B-3.** The image on the right shows a series of intersecting buildings.

Fig. B-3 below shows the incomplete projections of a model of similar intersecting buildings.

**(a)** In the diagram a rectangular-based prism has been shaped, as shown. Draw the plan and elevation of this solid.

**(b)** An equilateral triangular prism, of 40mm side, penetrates the base solid, as shown. Draw the outline plan and elevation of this triangular prism.

**(c)** Complete the drawing, showing all lines of interpenetration.

**Scale 1:1**
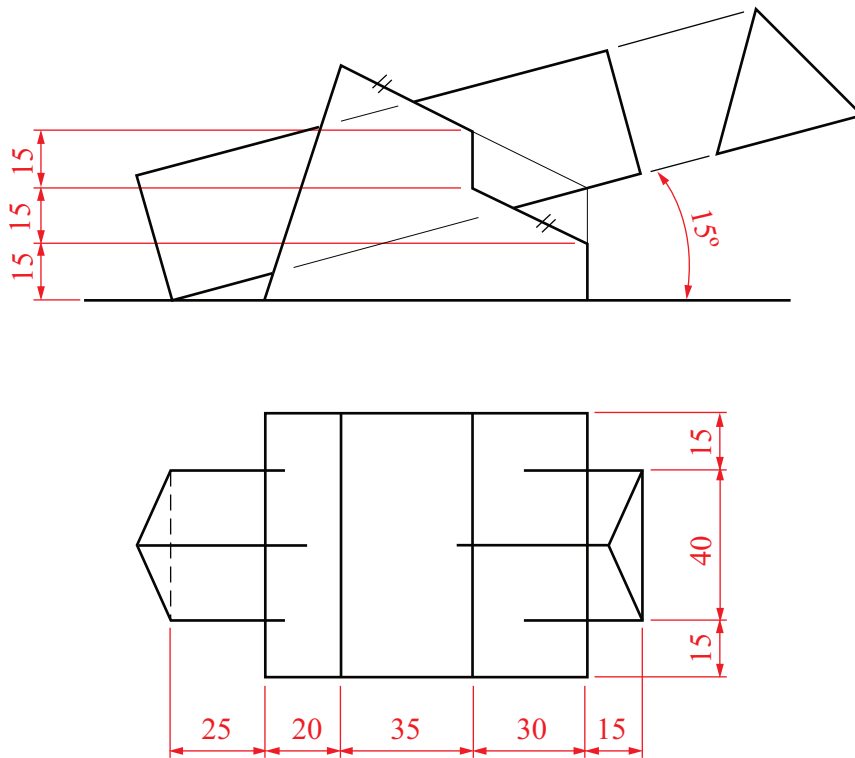


**Fig. B-3**

# SECTION C - Applied Graphics
Answer **Any Two** questions (i.e. the options you have studied)
from this section on drawing paper.

# Geologic Geometry

**C-1.** **(a)** The accompanying map, located on the back page of Section A, shows ground contours at 5m vertical intervals.

**ABC** is the centreline of a proposed roadway.

(i)   the section of the roadway between **A** and **B** is level at an altitude of 65m

(ii)  the section from **B** to **C** is falling uniformly to a level of 50m at **C**.

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 on its northern side.

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

**(b)** A borehole is drilled from **E** which has an altitude of 75m in a south westerly direction in plan and has a true inclination of 50º to the horizontal plane.

(i)   Draw the projections of this borehole.

The shortest borehole between point **D** which has an altitude of 60m and the borehole at **E** is required.

(ii)  Draw the plan of this borehole.

**Scale 1:1000**

# Structural Forms

**C-2.** The graphic on the right shows a building in the form of a hyperboloid of revolution.

Fig. C-2 below shows the plan and elevation of a model of this building which is cut by a vertical section as shown.

**(a)** Draw the given plan and elevation.

**(b)** Project an end elevation of the building which will show the true shape of the cut surface.
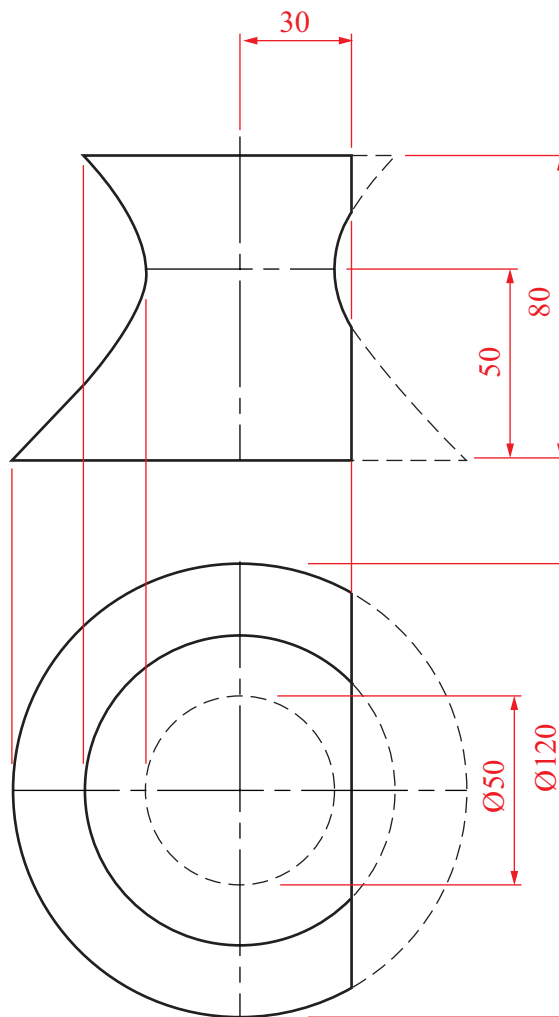
**Scale 1:1**



**Fig. C-2**

# Surface Geometry

**C-3.** The graphic on the right shows a litter bin.

Fig. C-3 below shows the plan and elevation of a model of a similar litter bin.

**(a)** Draw the given plan and elevation.

**(b)** Project an end elevation in the direction of arrow **A**.

**(c)** Draw the development of the top surface of the litter bin.
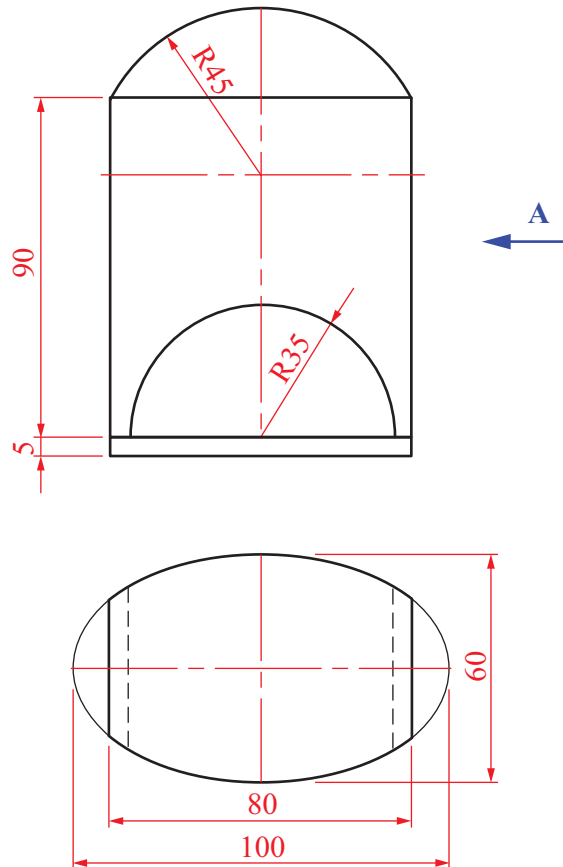
**Scale 1:1**


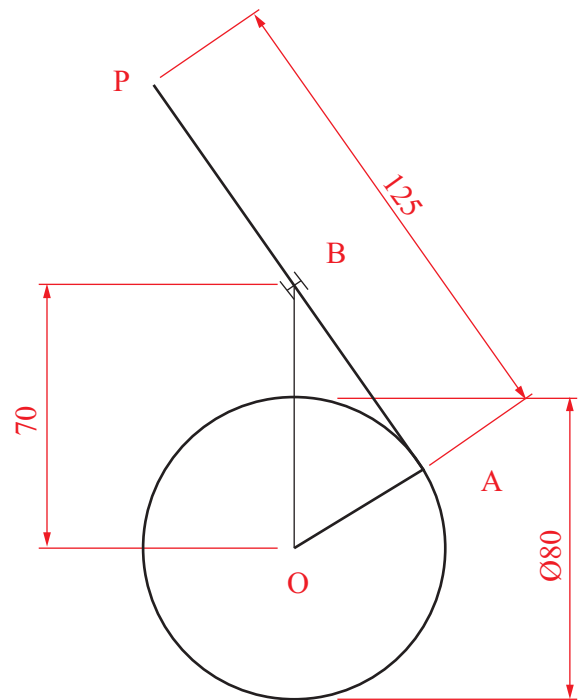
**Fig. C-3**

# Dynamic Mechanisms

**C-4. (a)** The 3D graphic below shows a pull-along toy.

A link mechanism which moves the head of the toy as the wheels rotate is shown in line diagram format in Fig C-4(a).

Crank **OA** rotates anticlockwise about point **O** for one revolution. Crank **OA** is pivot-jointed to the arm **AP** at the point **B**, as shown.

Plot the locus of point **P** for one movement.

**Scale 1:1**



**Fig. C-4(a)**

**(b)** The graphic below shows a spiral staircase which is being constructed. The central spine of the staircase is in the form of a helix.

Fig. C-4(b) on the right shows the elevation of a cylinder with points **A** and **B** on the front of the cylinder. These points represent the top and bottom point of the central spine of the staircase.

(i) Draw the given elevation and project a plan.

(ii) Determine in the elevation the helical path between **A** and **B**.

(iii) Determine and indicate the length of the central spine.

**Scale 1:20**
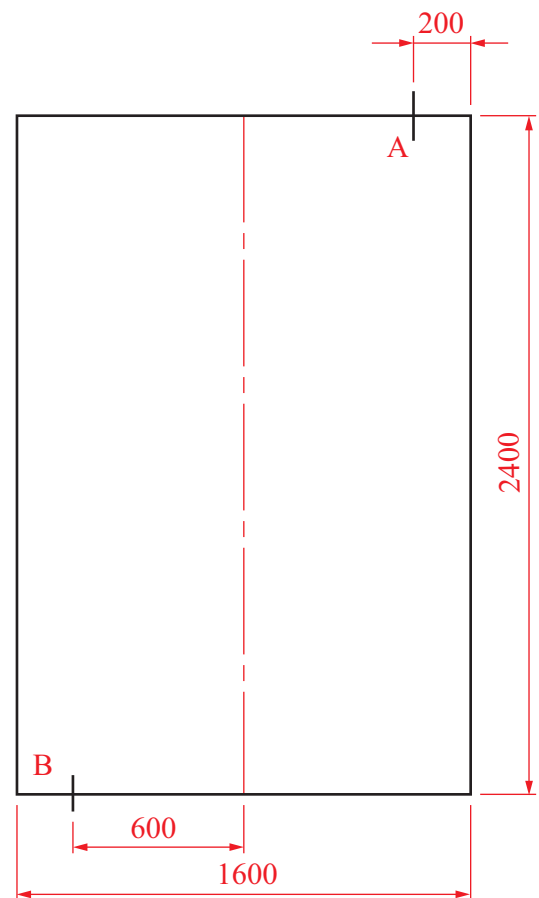


**Fig. C-4(b)**

# Assemblies

**C-5.** **(a)** Details of a Wall-Mounted Hand Basin are shown in Fig. C-5.
The parts list is given on the right.
Draw a full-size elevation and the sectional elevation A-A,
showing the parts fully assembled.
*(Any omitted dimensions may be estimated.)*

**(b)** The table which holds the basin can rotate about the support.
Determine and indicate in millimetres on your drawing the
difference between the minimum and maximum distance of
the basin from the wall.

| Part | Name | Qty. |
|------|------|------|
| 1 | Wall plate | 1 |
| 2 | Table | 1 |
| 3 | Connect piece | 1 |
| 4 | Basin | 1 |
| 5 | Support | 2 |

**Scale 1:2**



**Fig. C-5**

*Page 9 of 9*
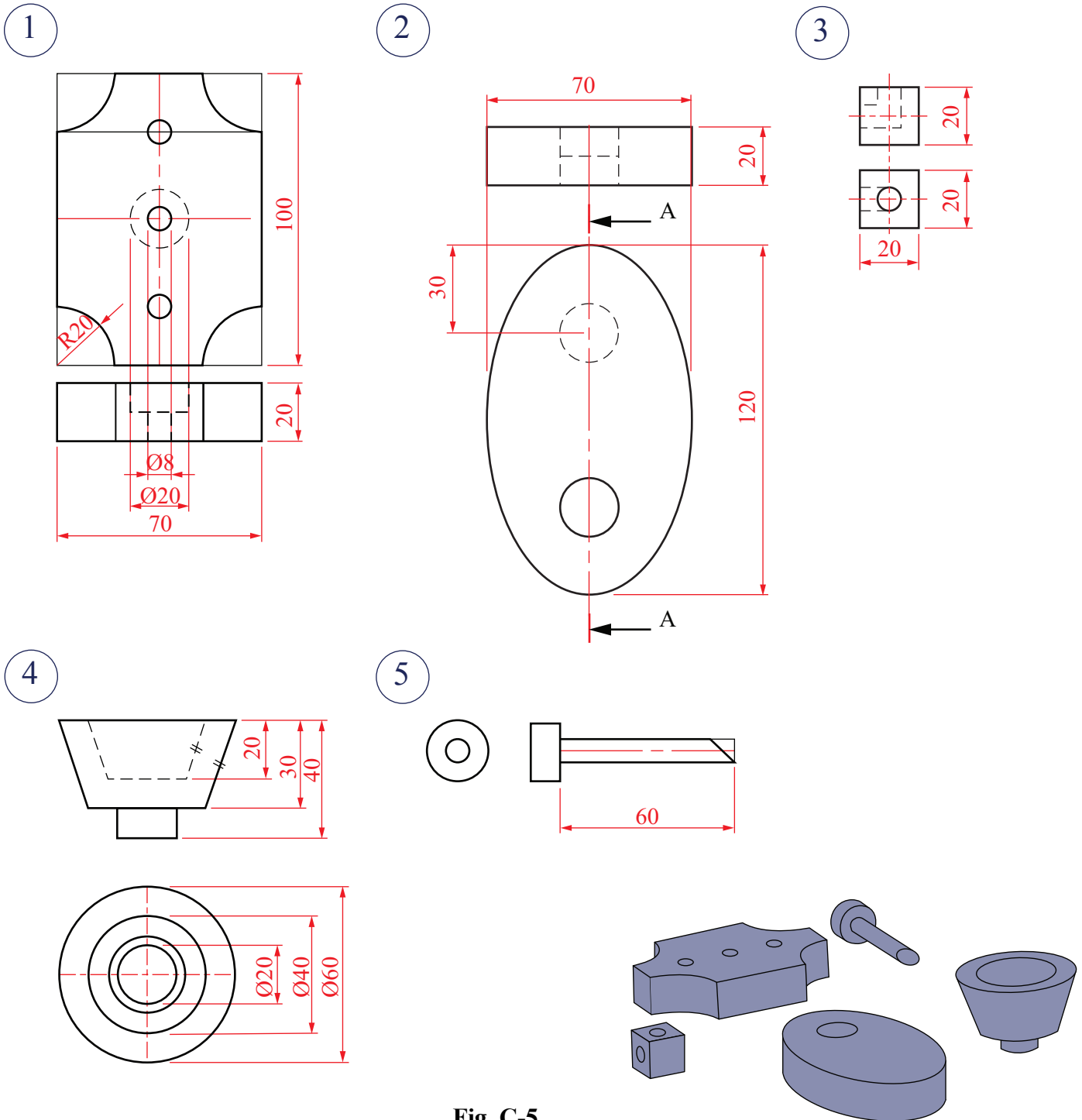
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