



*Pre-Leaving Certificate Examination, 2012*

***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** 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.

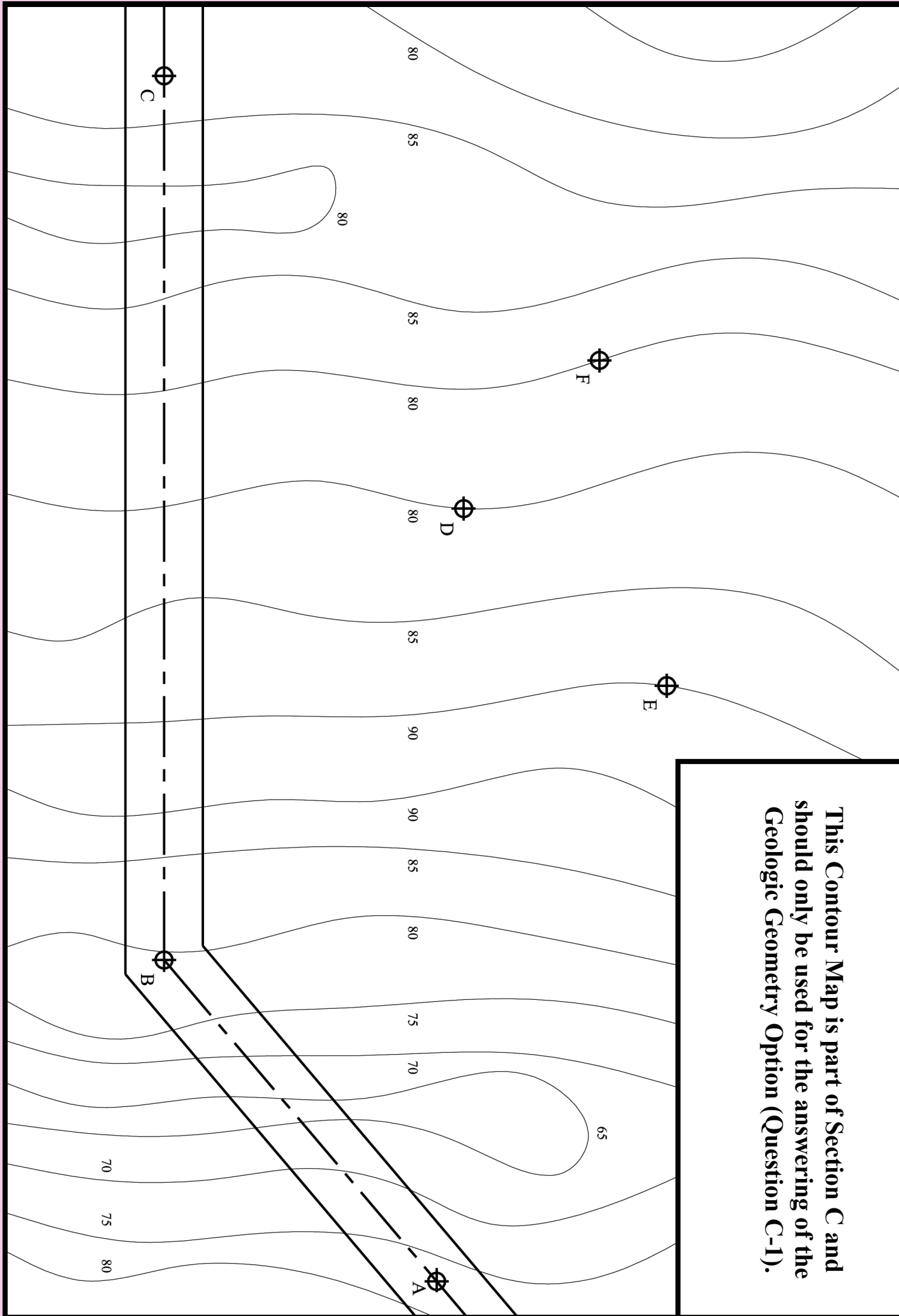
**General Instructions:**

- 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 name in the box below and on all other sheets used.

**Name:**

**School Name:**

**Teacher Name:**

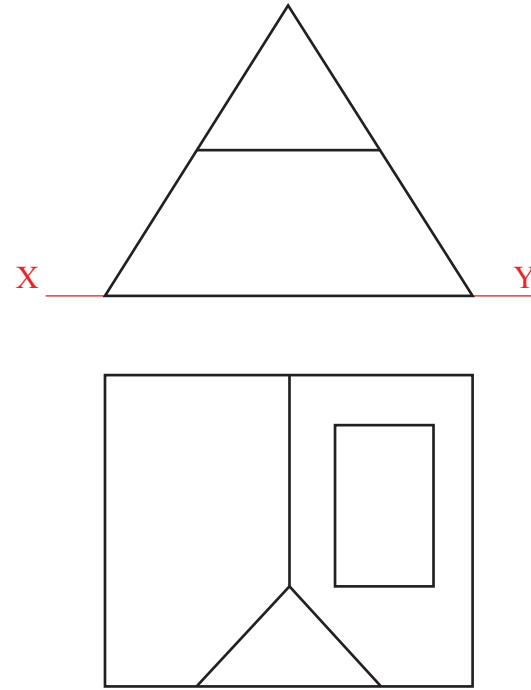



**SECTION A - Core - Answer Any Three of the questions on this A3 sheet**

**A-1.** The graphic below shows a portion of a roof with a solar panel.

The drawing on the right shows the elevation and plan of a portion of the roof including the solar panel.

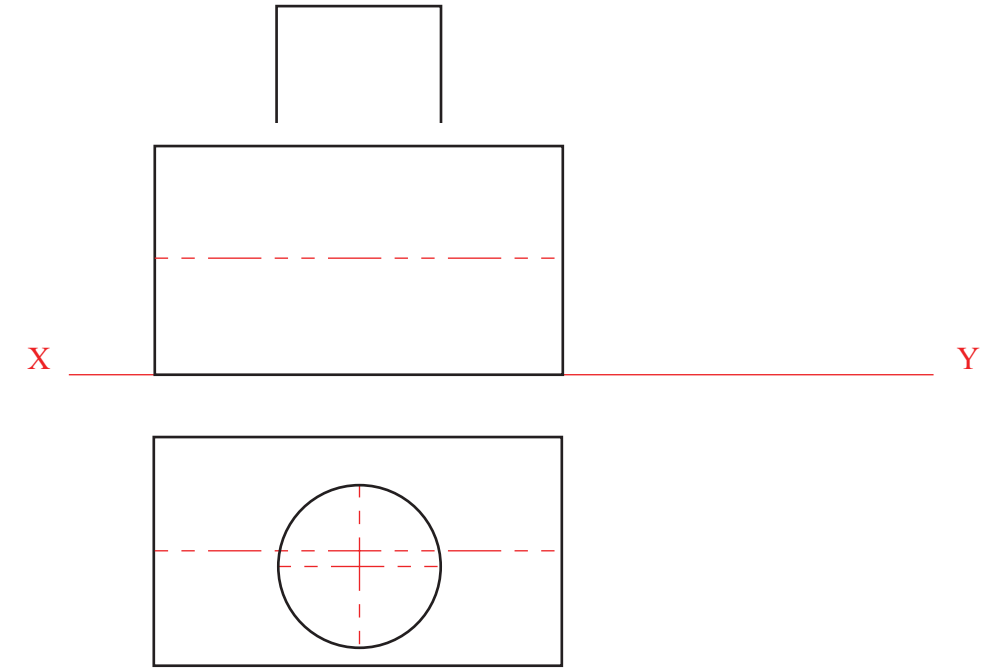
Project an auxiliary plan of the roofing surfaces which will show the true shape of the solar panel.



**A-3.** The graphic below shows two intersecting cylindrical pipes.

The drawing on the right shows the plan and outline elevation of the pipes.

Complete the elevation to show all curves of interpenetration.

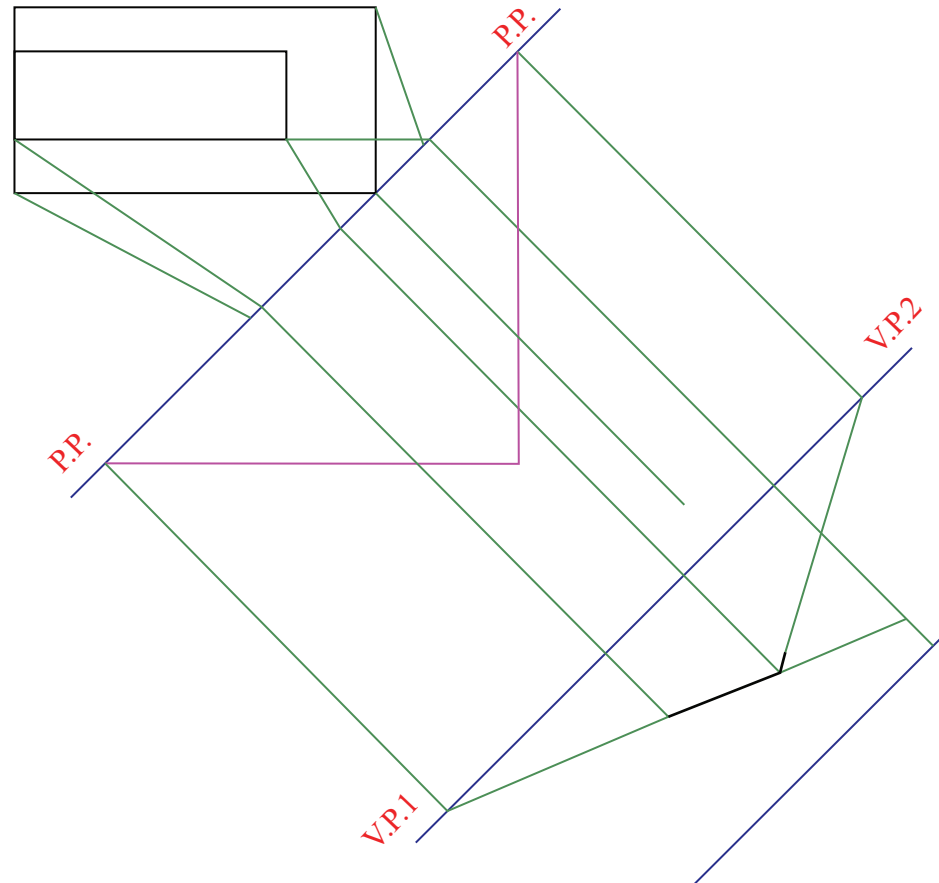


**A-2.** The graphic below shows a pool and a waterslide.

The drawing on the right is a partially completed perspective view of the pool base and the waterslide.

(a) Complete the perspective drawing of the pool base.

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

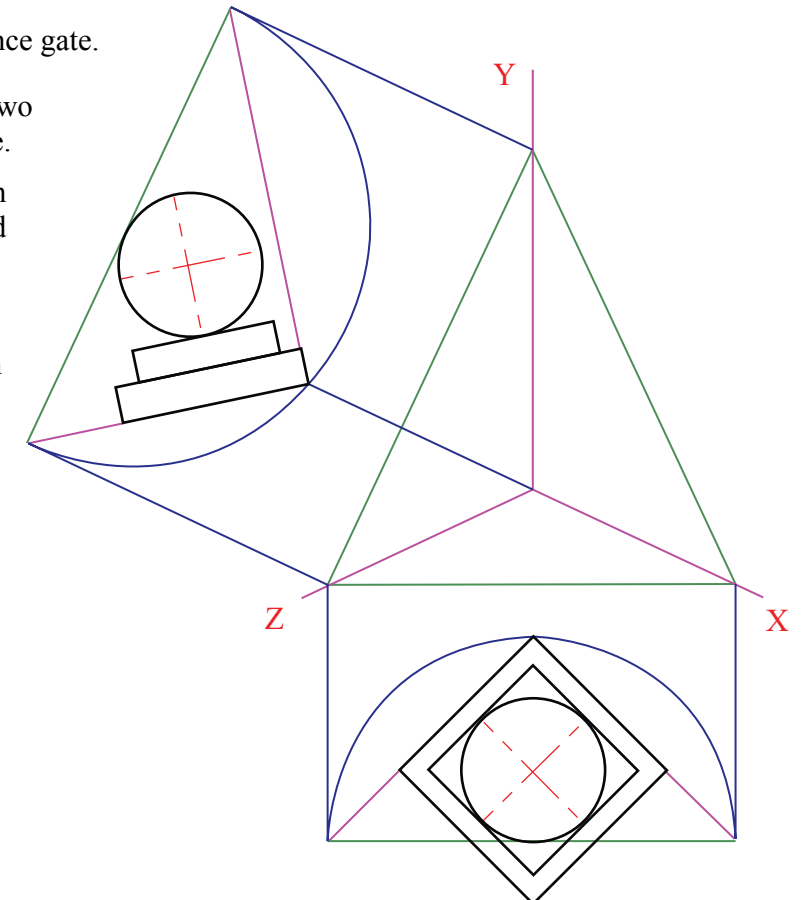


**A-4.** A graphic below shows an entrance gate.

The top of the pillar consists of two square based prisms and a sphere.

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

Draw the axonometric projection of the pillar top.



## *Pre-Leaving Certificate Examination, 2012*

# *Design & Communication Graphics*

## *Higher Level*

### *Sections 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** 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 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.** The 3D graphic on the right shows a building which is located in Dublin.

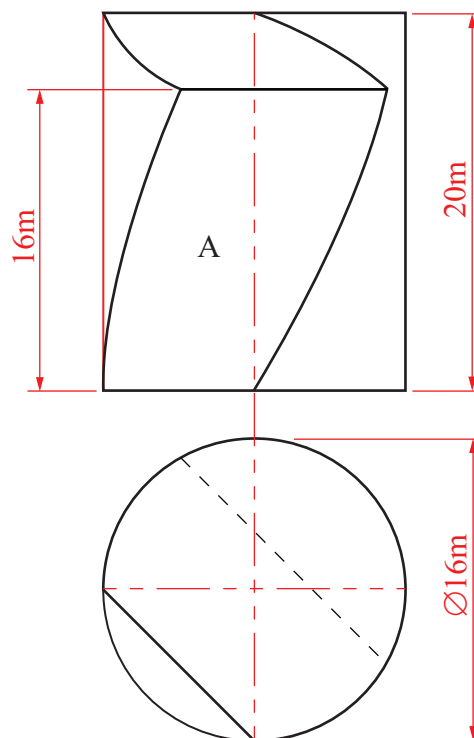
The front portion of the building is comprised of a cylinder which is inclined to the horizontal plane and is cut by two cutting planes. The dihedral angle between the cutting planes is  $90^\circ$ .

Fig. B-1 below shows the outline plan and elevation of the cylindrical portion of the building orientated with its axis in a vertical position.



- (a) Draw the given plan and elevation of the building.
- (b) Determine the horizontal and vertical traces of the oblique plane that contains the surface A of the building.
- (c) Determine the inclination of this oblique plane to the vertical plane.

Scale 1:200



**Fig. B-1**

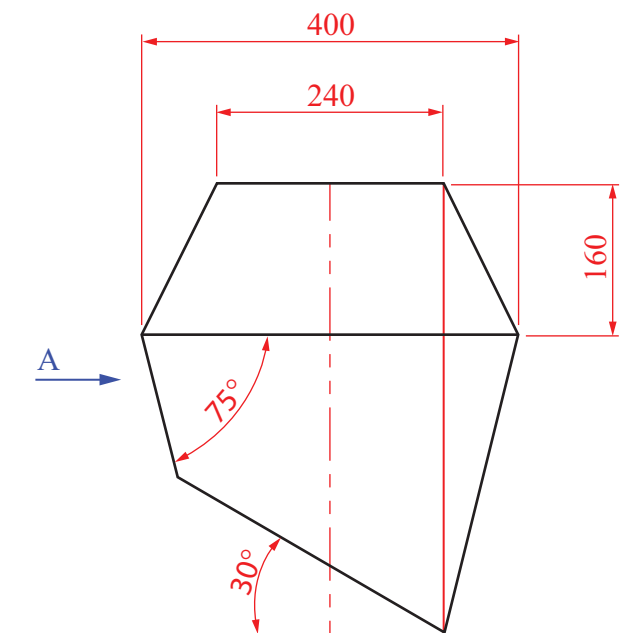
**B-2.** The 3D graphic on the right shows a crusader helmet from a suit of armour. It consists of two truncated cones.



Fig. B-2 below shows the elevation of the helmet.

- (a) Draw the given elevation and project an end view in the direction of arrow **A**.
- (b) Draw the true shape of the elliptical opening.
- (c) Draw the elevation of a focal sphere and, on your drawing, establish the position of the focal point and directrix for the elliptical opening at the bottom of the helmet.

**Scale 1:4**



**Fig. B-2**

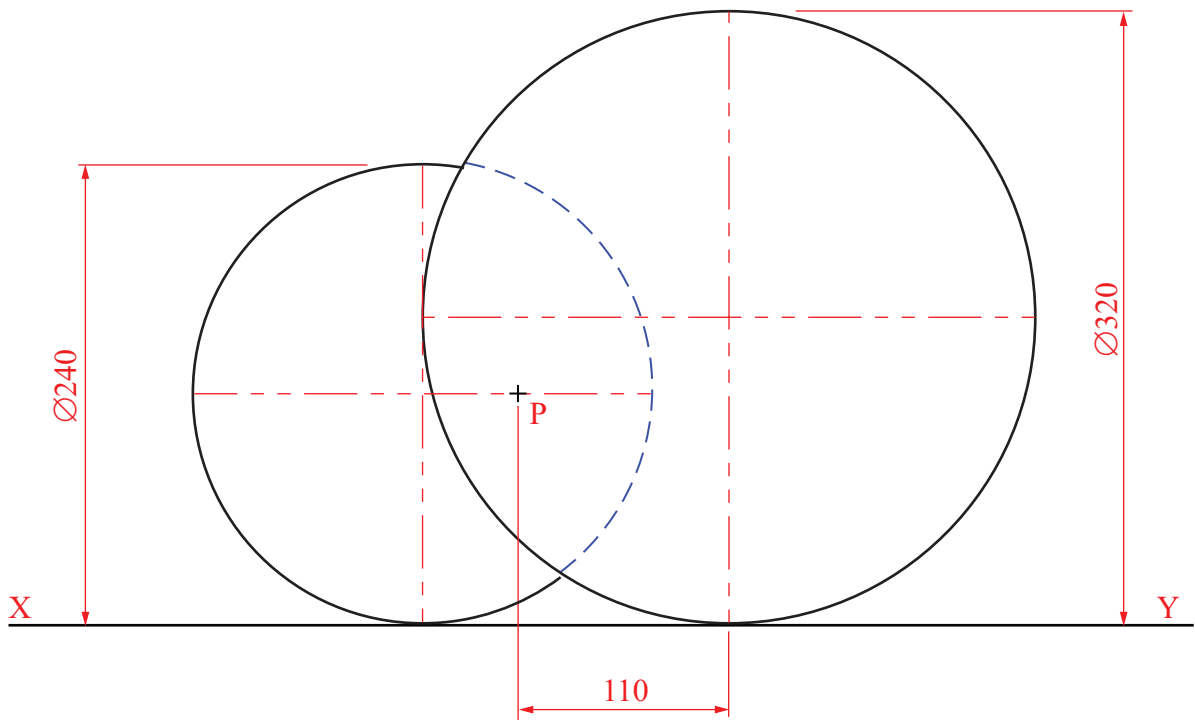
**B-3.** The 3D graphic on the right shows three stability balls. The red and green balls are in contact and the red and orange balls are in contact. All three balls rest on the horizontal plane.



Fig. B-3 below shows the elevation of the red and green balls. The elevation of the point of contact between the red and orange balls is also shown.

- (a) Draw the given elevation and project the plan of the red and green balls.
- (b) Draw the projections of the orange ball in contact with the red ball at point **P**.
- (c) Determine the traces of the tangent plane to the red and orange spheres which passes between spheres.

**Scale 1:4**



**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 five metre vertical intervals.

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

The roadway has the following specification:

- (i) the section of the roadway between **A** and **B** is level at an altitude of 70m
- (ii) the section from **B** to **C** has a gradient of 1 in 20 rising.

Using side slopes of 1 in 1.5 for the cuttings and 1 in 2 for the embankments, complete the earthworks necessary to accommodate the roadway.

**(b)** On the map, **D**, **E** and **F** are outcrop points on the top surface of a stratum of ore.

- (i) Determine the dip and strike of the stratum.

A skew bore-hole at **E** is drilled in a southerly direction in plan and has an actual inclination of  $45^\circ$  to the horizontal plane. It reveals the bottom surface of the stratum at a distance of 35m for **E**.

- (ii) Find the thickness of the stratum.

**Scale 1:1000**

# Structural Forms

C-2. The 3D graphic on the right shows a building which consists of five roofing shells.



Fig. C-2 below shows the projections of one roofing shell. It is created by translating the parabola **ABC** in a vertical position along the parabola **BD** which has its vertex at **D**.

The roofing shell is sectioned as shown and a vertical curved glass wall intersects the roofing shell.

Draw the given views and project an end view of building.

Scale 1:200

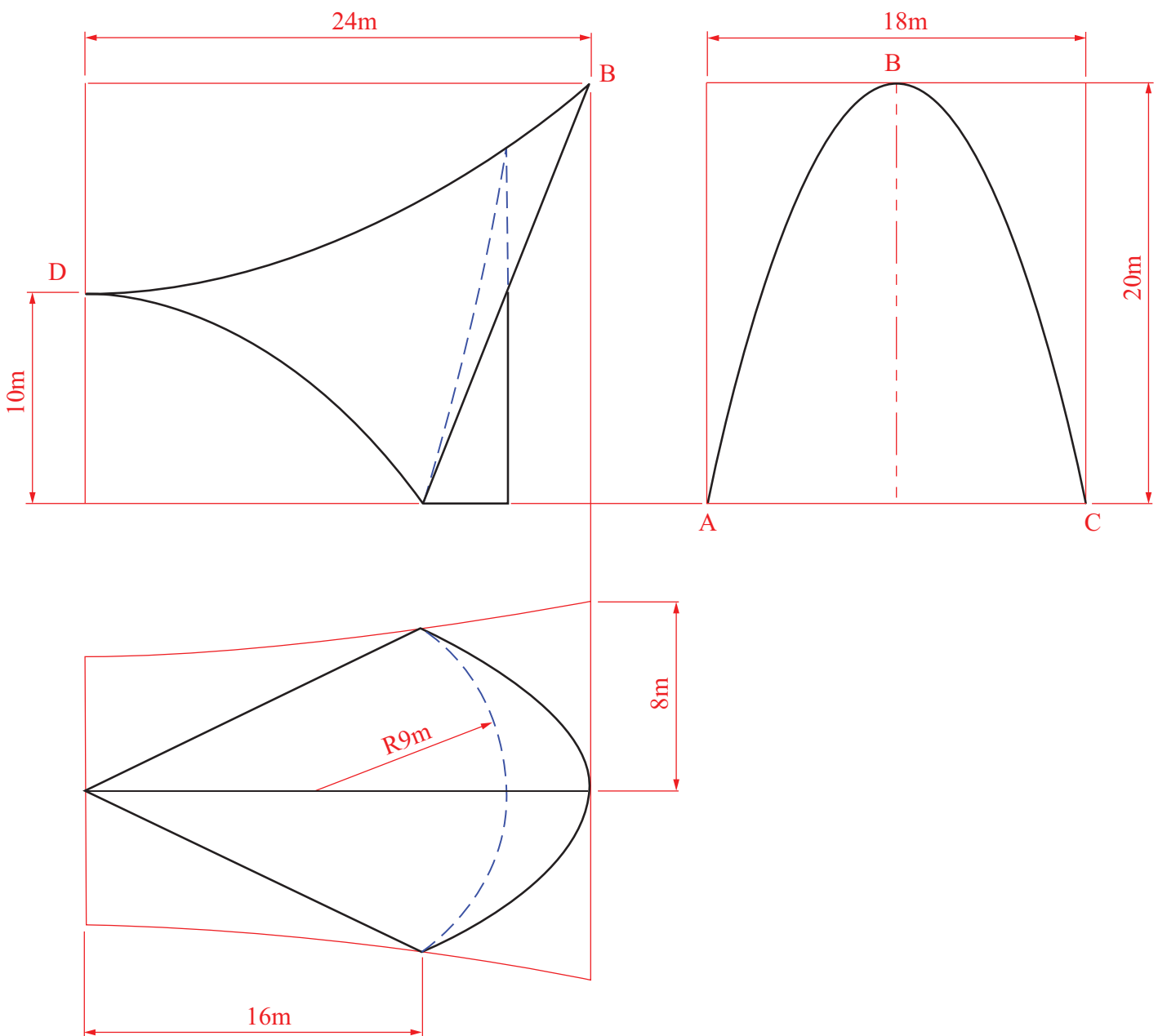


Fig. C-2



# Surface Geometry

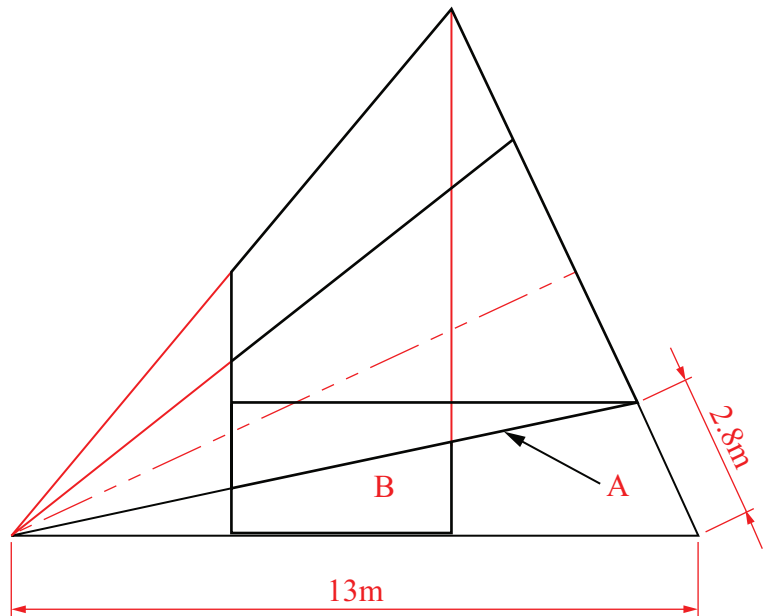
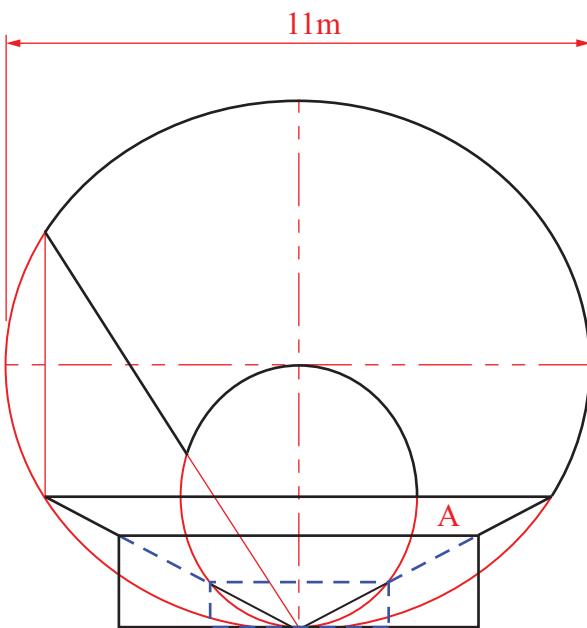
**C-3.** The 3D graphic on the right shows a modern house. It is based on a right cone which rests on one of its elements and is sectioned as shown.



Fig. C-3 below shows the projections of the outline of the house.

- (a) Draw the given views.
- (b) Find the dihedral angle between surfaces **A** and **B**.

Scale 1:100



**Fig. C-3**

# Dynamic Mechanisms

C-4. (a) The 3D graphic below shows a cylindrical storage container.

Fig. C-4(a) on the right shows the projections of the storage cylinder.

A helical stairs is to be fitted to the outside of the storage cylinder to act as a fire escape. It will travel from top to bottom of the cylinder and pass through points A and B.

- (i) Draw the given views.
- (ii) Draw the elevation of the helix.

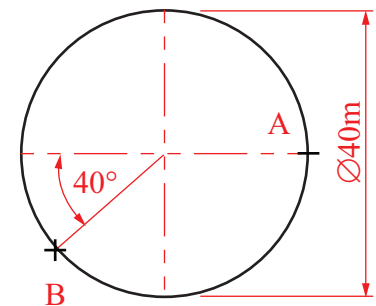
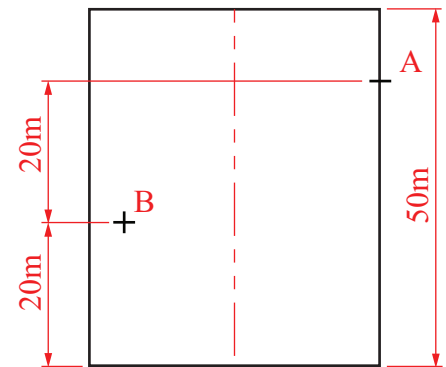


Fig. C-4(a)



Scale 1:50

(b) The 3D graphic on the right shows a person on a swing.

Fig. C-4(b) below is a line diagram showing the movement of the swing.

Point P shows the position of the person's hands when the swing is in a stationary position and about to rotate to the right.

As the swing rotates to the right through an angle of  $90^\circ$  and back to its pre-set position she moves her hands along the rope from P to P<sub>1</sub>.

Plot the locus of point P for the combined movement.



Scale 1:10

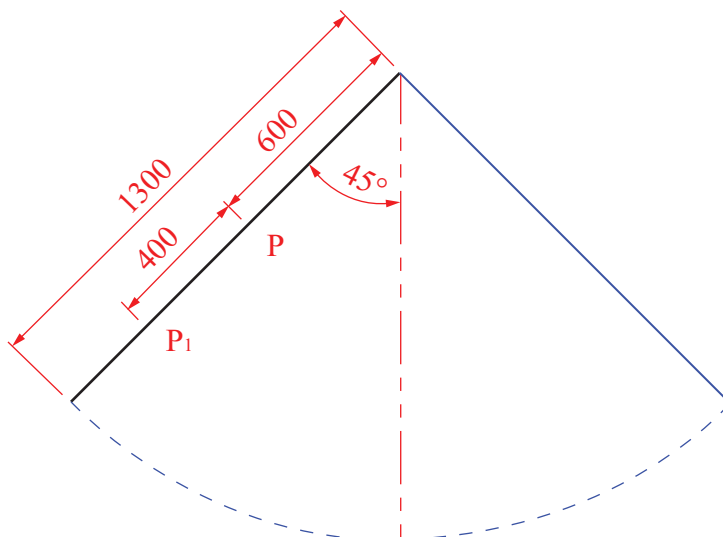


Fig. C-4(b)

# Assemblies

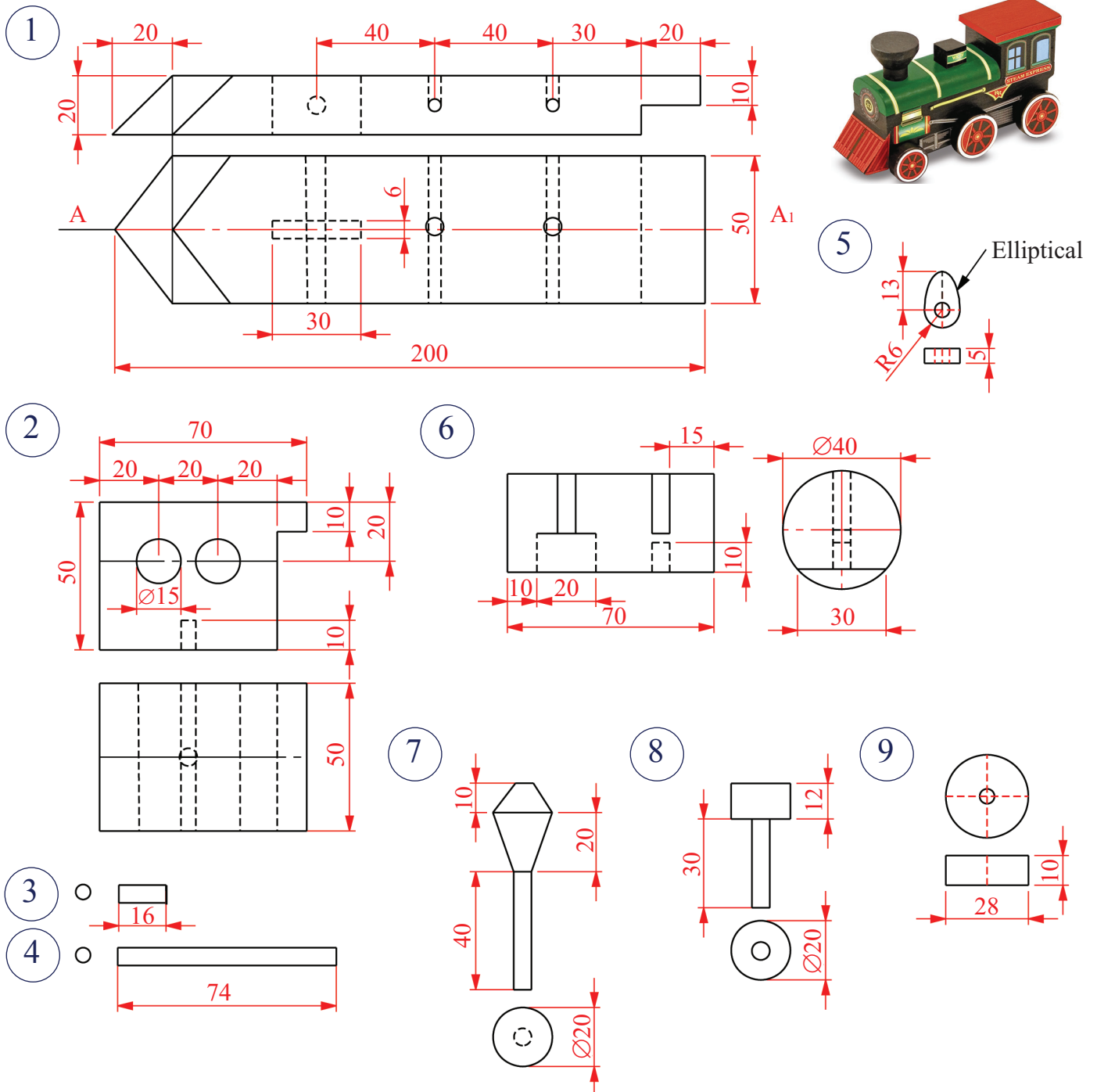
**C-5. (a)** Details of a disassembled *Toy Train* are shown in Fig. C-5. The parts list is given on the right and a 3D Graphic of the assembled *Toy* is also shown.

Part	Name	Qty.
1	Base	1
2	Cabin	1
3	Dowel	2
4	Axle	3
5	Cam	1
6	Engine	1
7	Moving Stack	1
8	Chimney	1
9	Wheels	6

Draw a full size sectional elevation on A-A<sub>1</sub> showing the parts fully assembled.  
(All drilled holes are 5mm diameter and can be drawn freehand.)

**(b)** Establish the height difference that can be achieved by the chimney.

**Scale 1:1**



**Fig. C-5**

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