



2019. M80A

**Coimisiún na Scrúduithe Stáit**  
**State Examinations Commission**

2019L562GAEL

***Leaving Certificate Examination, 2019***

# ***Design & Communication Graphics***

## ***Ordinary Level***

### ***Section A (60 marks)***

Centre No.

**Thursday, 20 June**  
**Morning, 9:30 - 12:30**

**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 Examination number in the box below and on all other sheets used.*

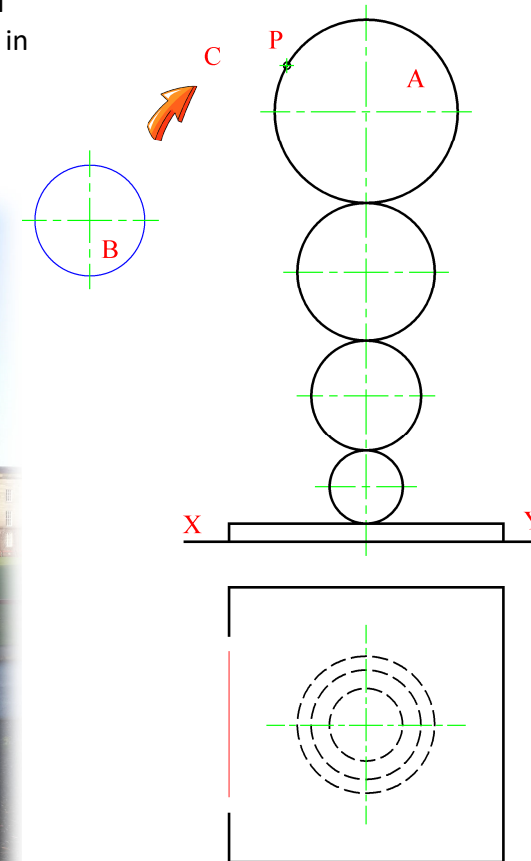
**Examination Number:**

## SECTION A - Core - Answer any three of the questions on this A3 sheet.

**A-1.** The 3D graphic below shows a modern sculpture in the grounds of Trinity College, Dublin. It consists of a series of spheres which are in contact as shown. The entire structure rests on a square base.

The drawing on the right shows the incomplete projections of the three lower spheres, centrally positioned on the square base.

- (a) Draw the plan of sphere **A**.
- (b) Draw the elevation of the sphere **B** when it has been moved into position **C**, as indicated by the arrow, so that it is in contact with sphere **A** at the point **P**.
- (c) Draw the plan of sphere **B** in its new position and complete the drawing of the structure.

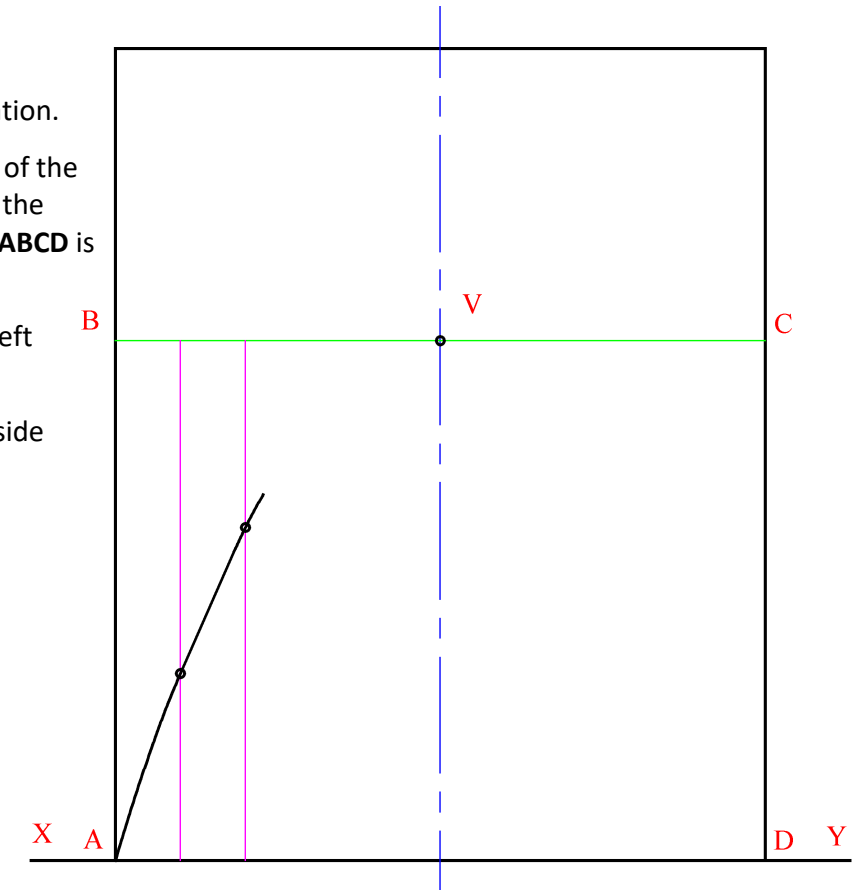


**A-3.** The images below show a cutter which is part of a paper punch.

The cutter appears as a parabola in elevation.

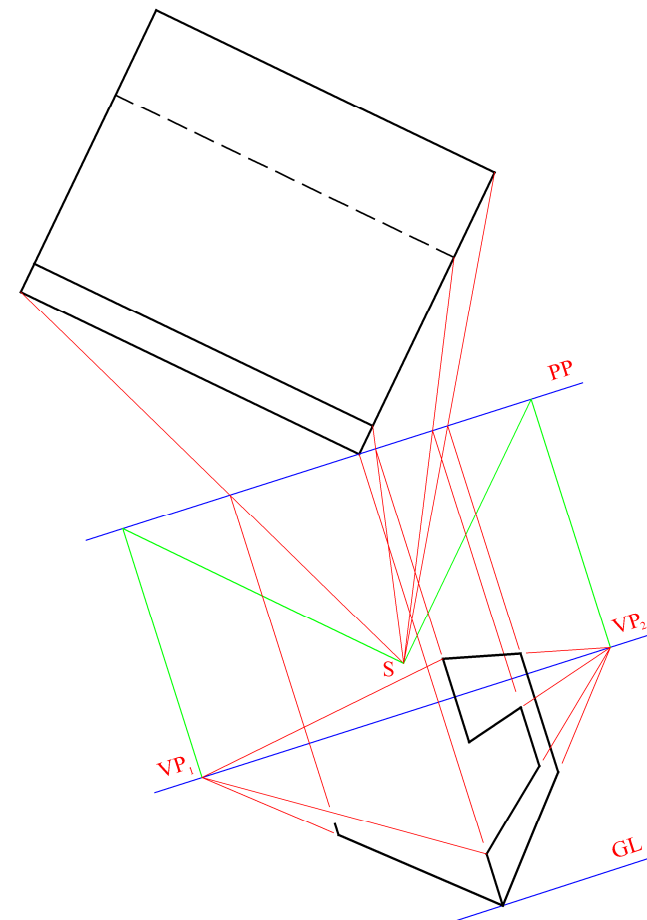
The drawing shows the outline elevation of the cutter. A portion of the left hand side of the parabola, which is inscribed in rectangle **ABCD** is shown. **V** is the vertex of the parabola.

- (a) Locate the remaining points on the left hand side of the parabola.
- (b) Locate the points on the right hand side of the parabola.
- (c) Draw the complete parabola.



**A-2.** The image below shows a coffee machine. The drawing on the right shows the plan and the partially completed perspective view of the main body of a similar coffee machine.

Complete the perspective drawing.

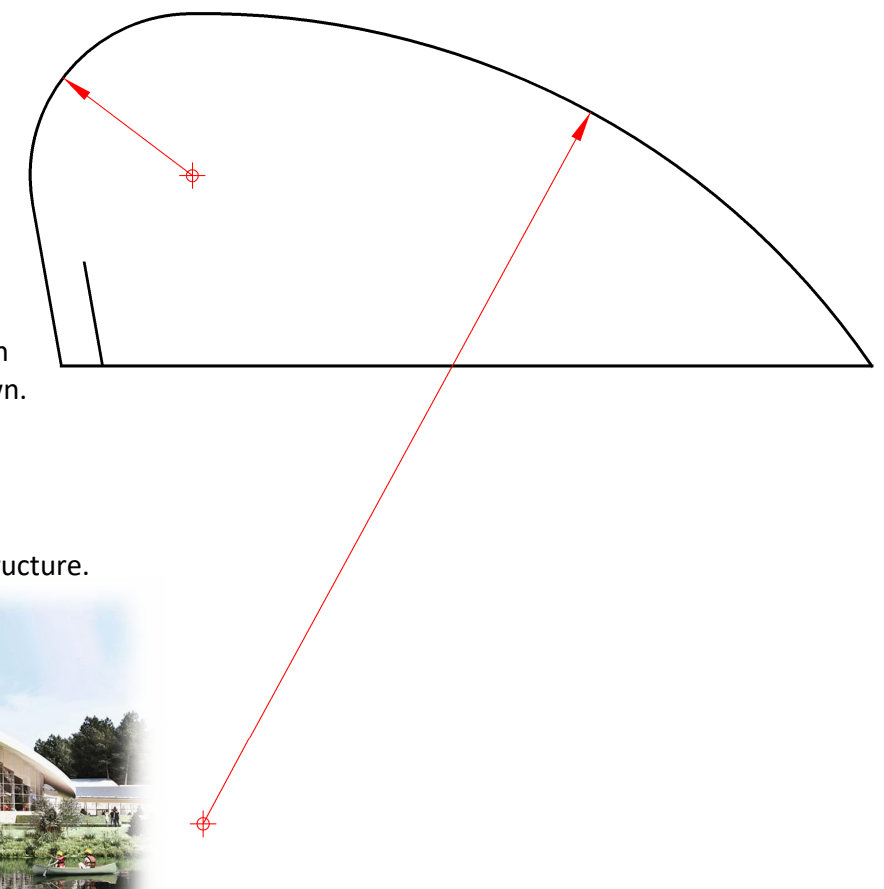


**A-4.** The image below shows an artist's impression of a structure in the 'Centre Parcs' holiday resort, currently under construction in county Longford.

The drawing on the right shows the outline of a similar structure.

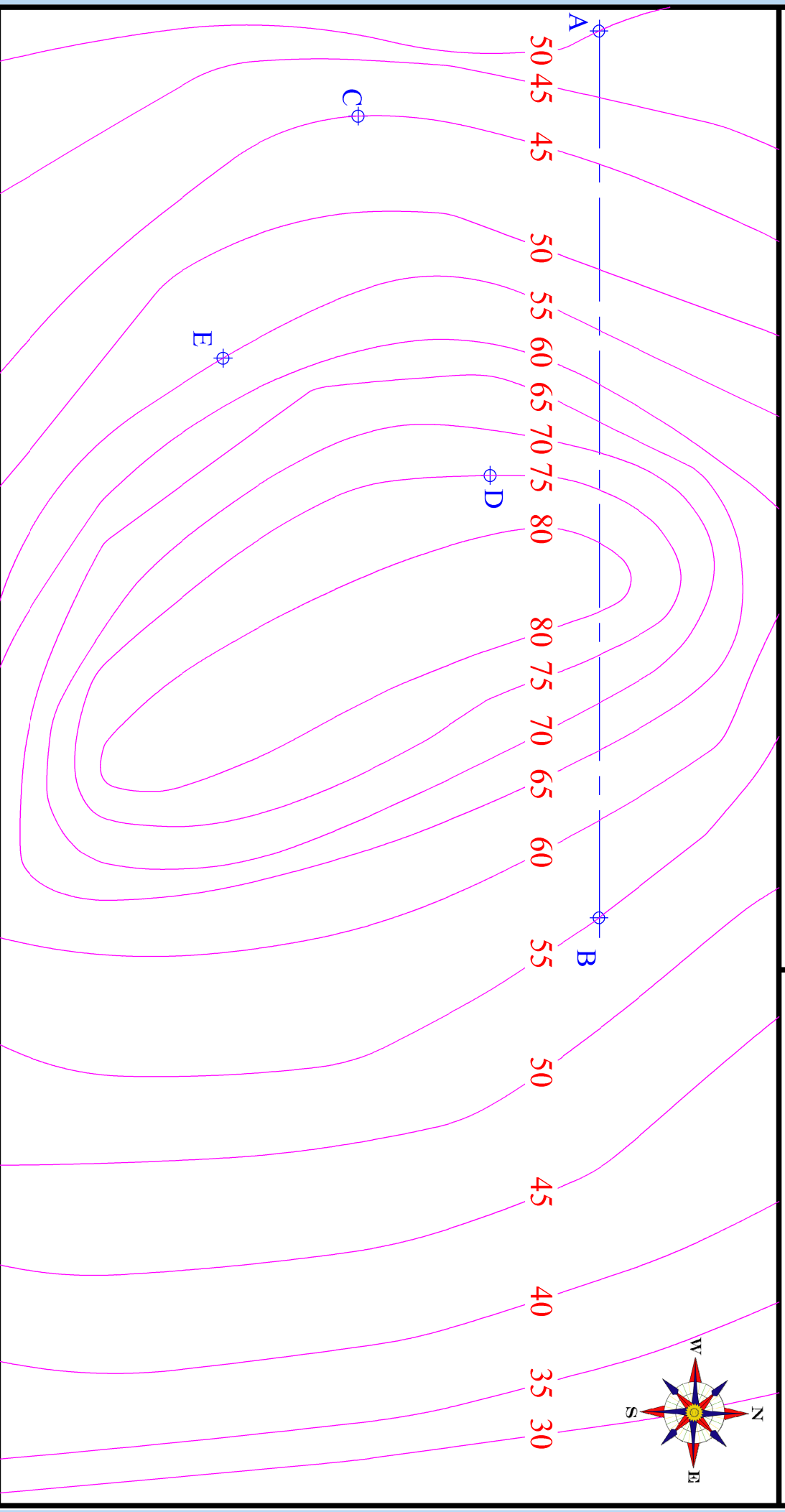
The design of the structure is based on lines and tangential arcs. The structure has a uniform thickness. A small portion of the inner parallel surface is also shown.

- (a) Complete the drawing of the **inner surface** of the structure.
- (b) Show the exact points of contact between all arcs and lines in the structure.



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)





# Coimisiún na Scrúduithe Stáit

## State Examinations Commission

***Leaving Certificate Examination, 2019***

***Design & Communication Graphics***

***Ordinary Level***

***Sections B and C (180 marks)***

**Thursday, 20 June**

**Morning, 9:30 - 12:30**

**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.*
- *The graphics presented are not necessarily drawn to scale and must not be used for scaling purposes.*
- *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 Examination number in the box provided on section A and on all other sheets used.*

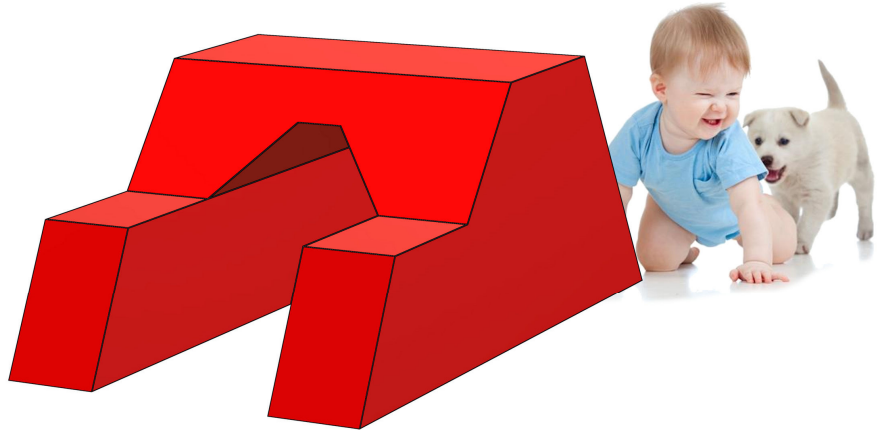
## SECTION B - Core

Answer **any two** questions from this section on drawing paper.

- B-1.** The 3D graphic on the right shows a piece of equipment from a children's play area. It consists of a shaped main structure with a crawl tunnel passing through it.

Fig. B-1 below shows the elevation and incomplete plan of a model of the structure.

The outline profile of the tunnel is also shown on the left below.



- Using the information provided in the 3D graphic and in Fig. B-1, draw the elevation and the incomplete plan of the structure as given.
- Complete the plan showing all lines of interpenetration.
- Draw an end view of the structure.

Scale 1:1

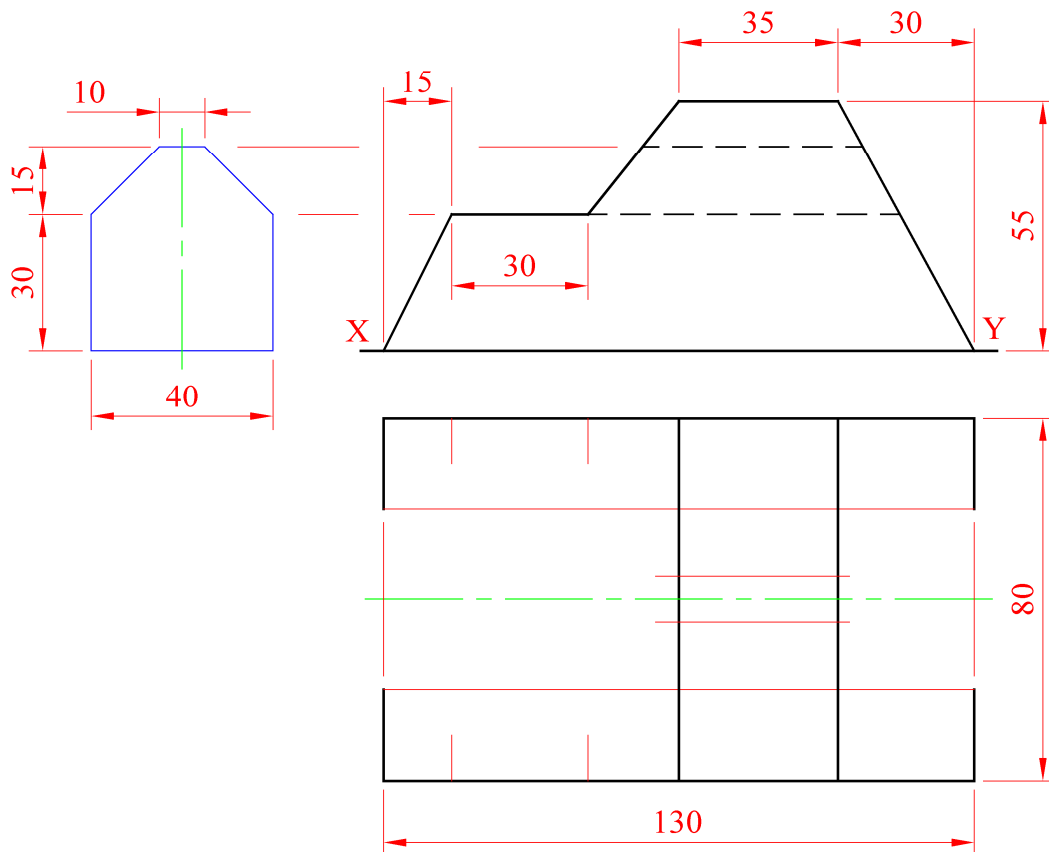


Fig. B-1

**B-2.** The graphic on the right shows a candle holder and a candle.

Fig. B-2 below shows an incomplete isometric projection of a similar candle holder.

The elevation and plan of the holder are also shown in their required positions.

- (a) Draw the given equilateral triangle **abc** and the axonometric axes **X**, **Y** and **Z**.
- (b) Draw the elevation and plan, positioned as shown.
- (c) Draw the axonometric projection of the body of the candle holder.
- (d) Draw the axonometric projection of the circular hole on the top surface of the candle holder.

Scale 1:1

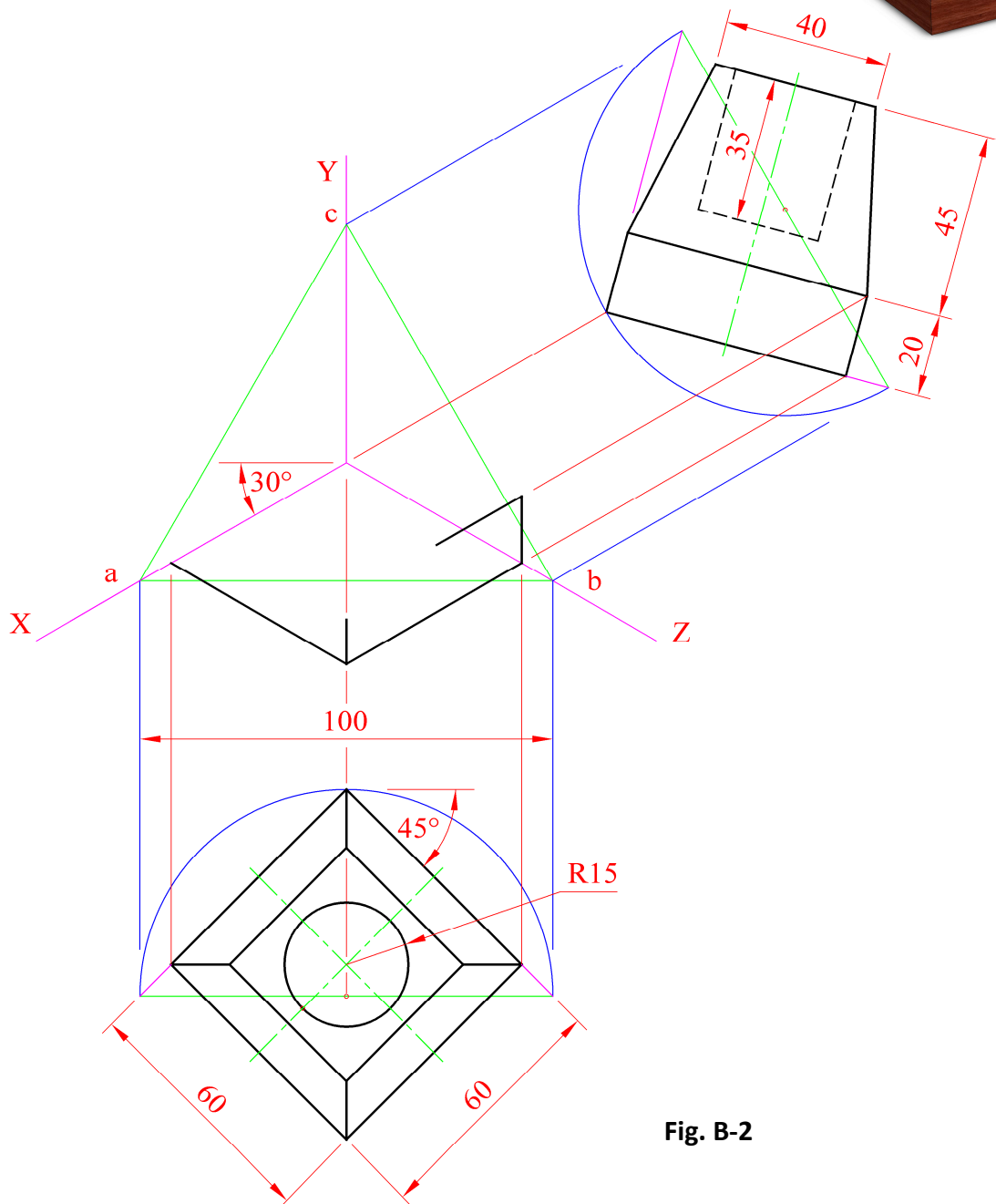


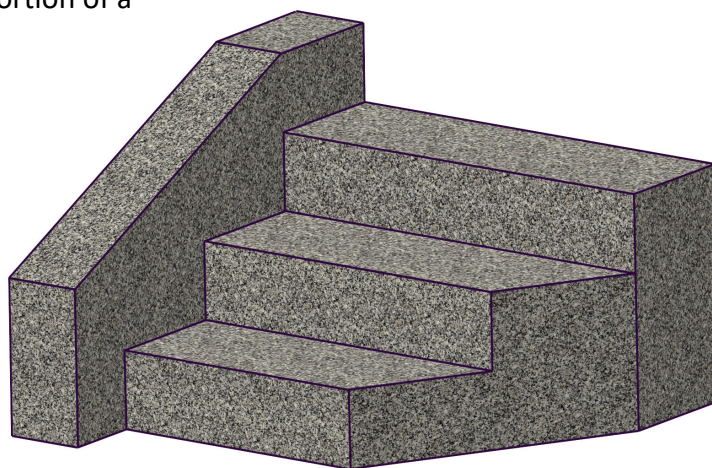
Fig. B-2



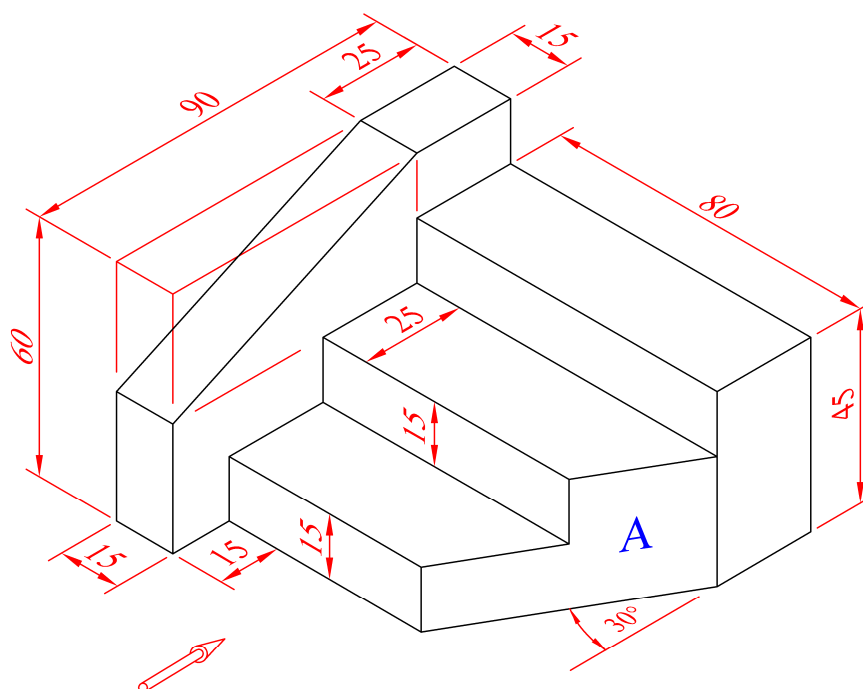
**B-3.** The graphic on the right shows steps and portion of a wall.

Fig. B-3 below shows an isometric view of a similar structure.

- (a) Draw the elevation of the complete structure looking in the direction of the arrow.
- (b) Project a plan from the elevation.
- (c) Draw the auxiliary elevation of the **structure**, projected from the plan, which will include the true shape of surface **A**.



**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.** The image on the right shows an aerial view of an open mine. A portion of a similar mine area is represented on the accompanying map, located on the back page of Section A. The map shows ground contours at five metre vertical intervals.



- (a)** On the map supplied, draw a vertical section (profile) on the line **AB**.
- (b)** Points **C**, **D** and **E** are outcrop points on the surface of a stratum of ore. Draw the plan and elevation of the triangle **CDE**.
- (c)** Determine the strike and dip of the stratum.

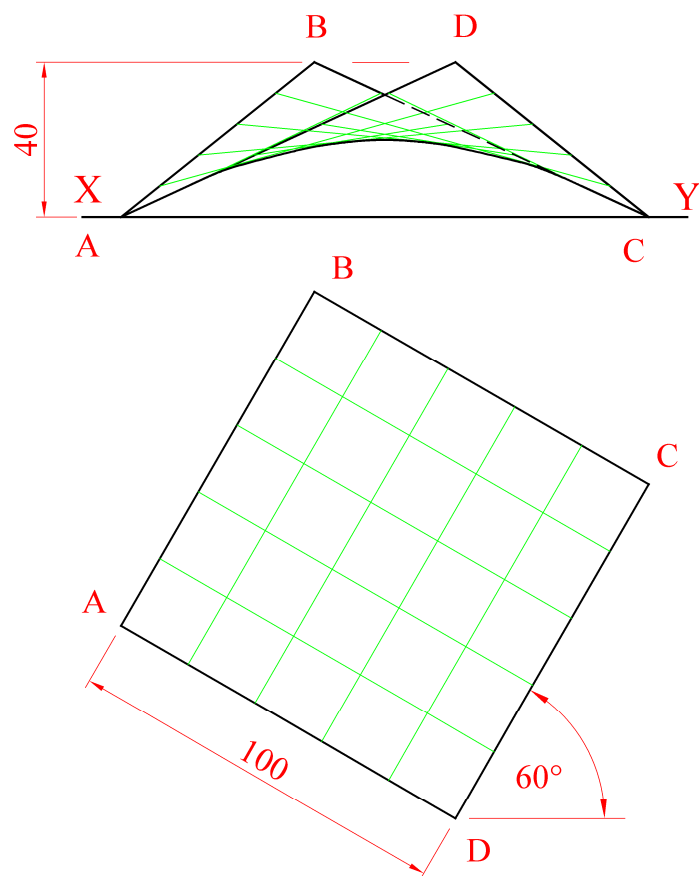
**Scale 1:1000**



# Structural Forms

**C-2.** The image on the right shows a wooden watch face. The top surface of the watch face is a hyperbolic paraboloid. The watch face is a square in plan.

- (a) Draw the given plan and elevation of the hyperbolic paraboloid surface of the watch.
- (b) Project an end view of this hyperbolic paraboloid surface.



Scale 1:1

**Fig. C-2**

## Surface Geometry

**C-3.** The graphic on the right shows a measuring tape and a storage box for the tape.

The projections of the storage box are shown in Fig. C-3 below.

- (a) Draw the given views of the storage box, showing clearly how you located the centre of the 40mm arc.
- (b) Project an end view of the storage box.
- (c) Draw a one-piece surface development of the storage box.



Scale 1:1

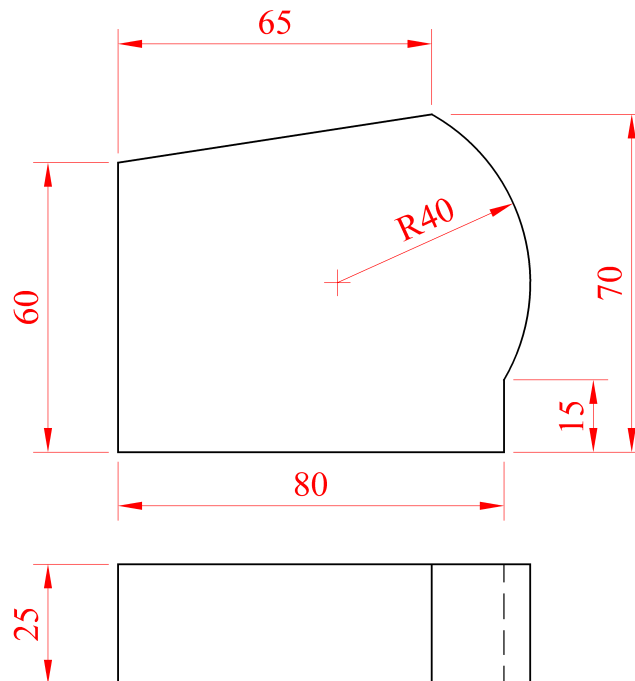


Fig. C-3

# Dynamic Mechanisms

**C-4.** Cams, cranks and pistons are parts of the engine of a motorbike.

- (a) The graphic shows an enlarged view of a cam from a motorbike engine.

A cam, similar to the one shown, imparts the following motion to an inline knife-edge follower:

- $0^\circ$  to  $30^\circ$  Dwell
- $30^\circ$  to  $120^\circ$  Rise 70mm with uniform velocity
- $120^\circ$  to  $180^\circ$  Fall 14mm with uniform velocity
- $180^\circ$  to  $360^\circ$  Fall 56mm with simple harmonic motion.

Draw the displacement diagram for the cam.

**Note:** It is not necessary to draw the cam profile.

(In the displacement diagram, use a distance of 15mm to represent each  $30^\circ$  interval.)



- (b) The graphic below shows an enlarged view of the piston and crank mechanism from the motorbike engine.

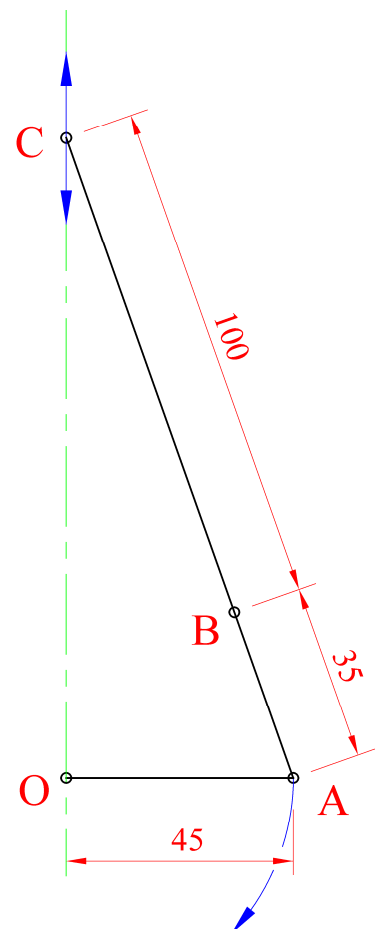
Fig. C-4(b) shows a line diagram for this mechanism.

Crank **OA** and the rod **AC** are pin jointed at **A**.  
Point **B** is located on the rigid rod **AC** as shown.

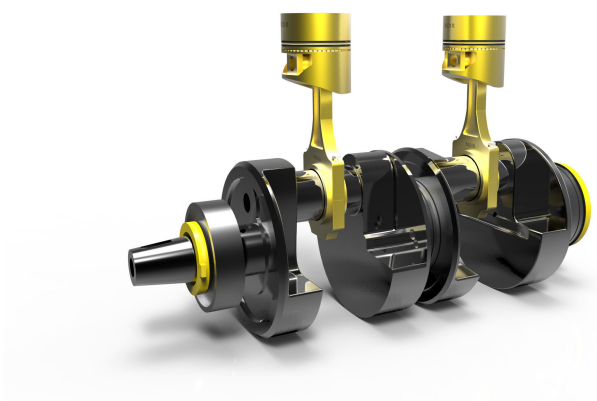
Crank **OA** rotates in a clockwise direction, about point **O**, for one revolution. Point **C** moves on the vertical axis as shown.

Plot the locus of point **B** for this movement.

Scale 1:1



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



# Assemblies

**C-5.** Mug trees are a very convenient method of storing a number of mugs neatly.

Details of a mug tree are given in Fig. C-5 below.

A parts list and a 3D graphic of the parts are also shown.

Draw the **sectional elevation A-A** of the assembled mug tree.

(Any omitted dimensions may be estimated.)

Scale 1:1

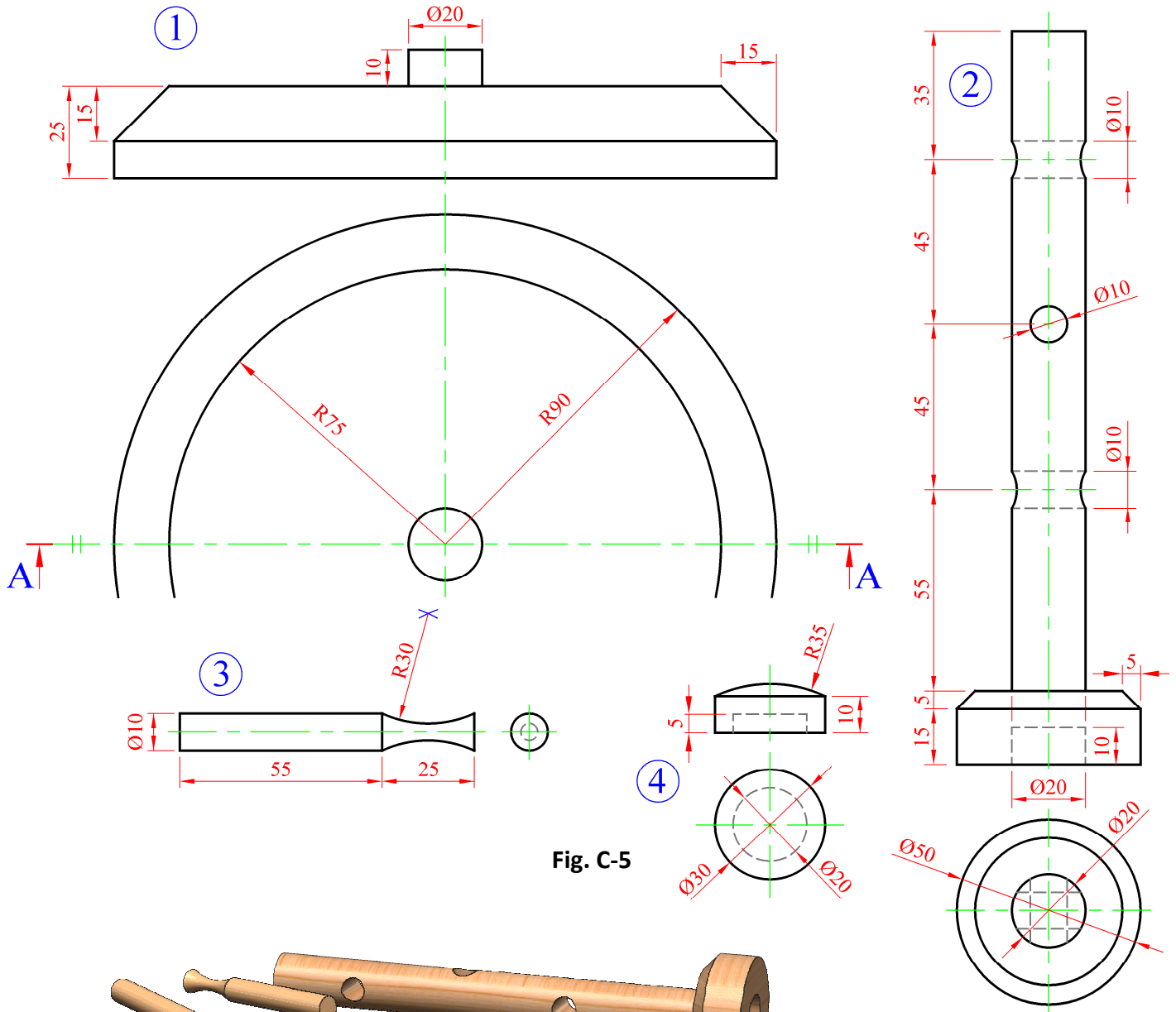
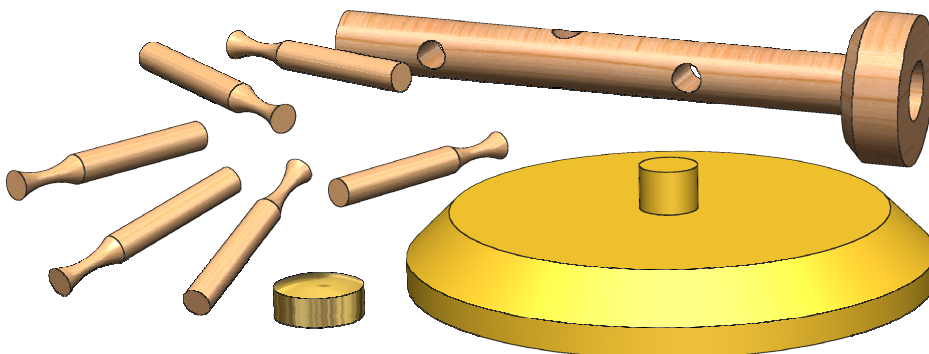


Fig. C-5



Part	Name	Qty.
1	Base	1
2	Upright	1
3	Branch	6
4	Cap	1

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