



2021. M80A

2021L562G1EL

Coimisiún na Scrúduithe Stáit

State Examinations Commission

Leaving Certificate Examination, 2021

Design & Communication Graphics

Ordinary Level

Section A (60 marks)

Centre No.

Thursday, 24 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

and
SECTION C

- Eight questions are presented.
- Answer **any two** on drawing paper.
- All questions in Section B and Section C carry **60 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

The 2021 examination papers were adjusted to compensate for disruptions to learning due to COVID-19. This examination paper does not necessarily reflect the same structure and format as the examination papers of past or subsequent years.

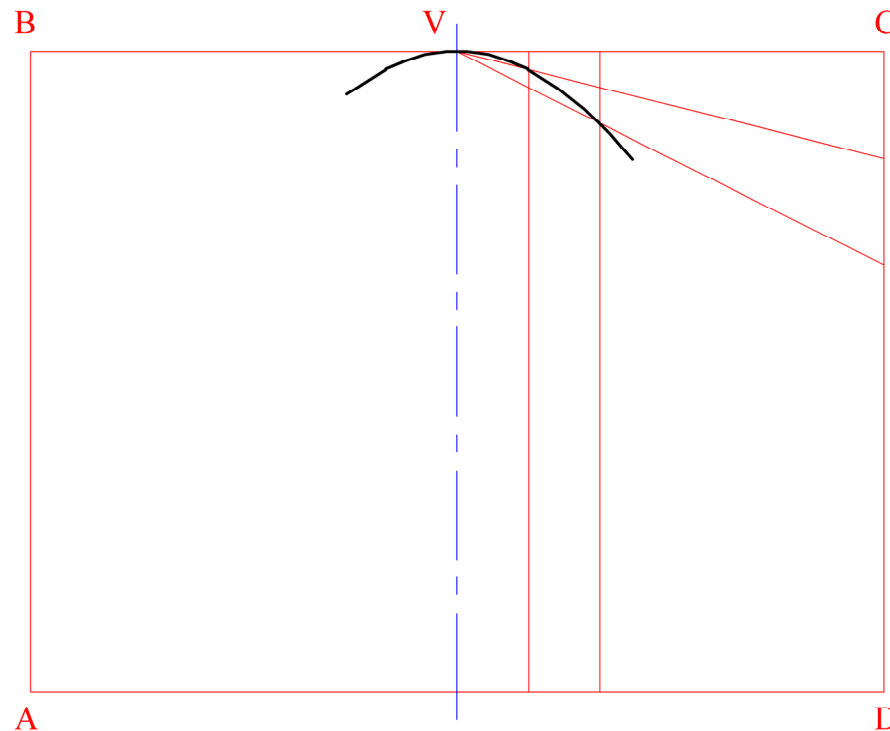
SECTION A - Core - Answer any three of the questions on this A3 sheet.

A-1. The image below shows a bee hive hut which is situated on the side of the M1 motorway near Drogheda, Co. Louth. The outline of the structure is a parabola.

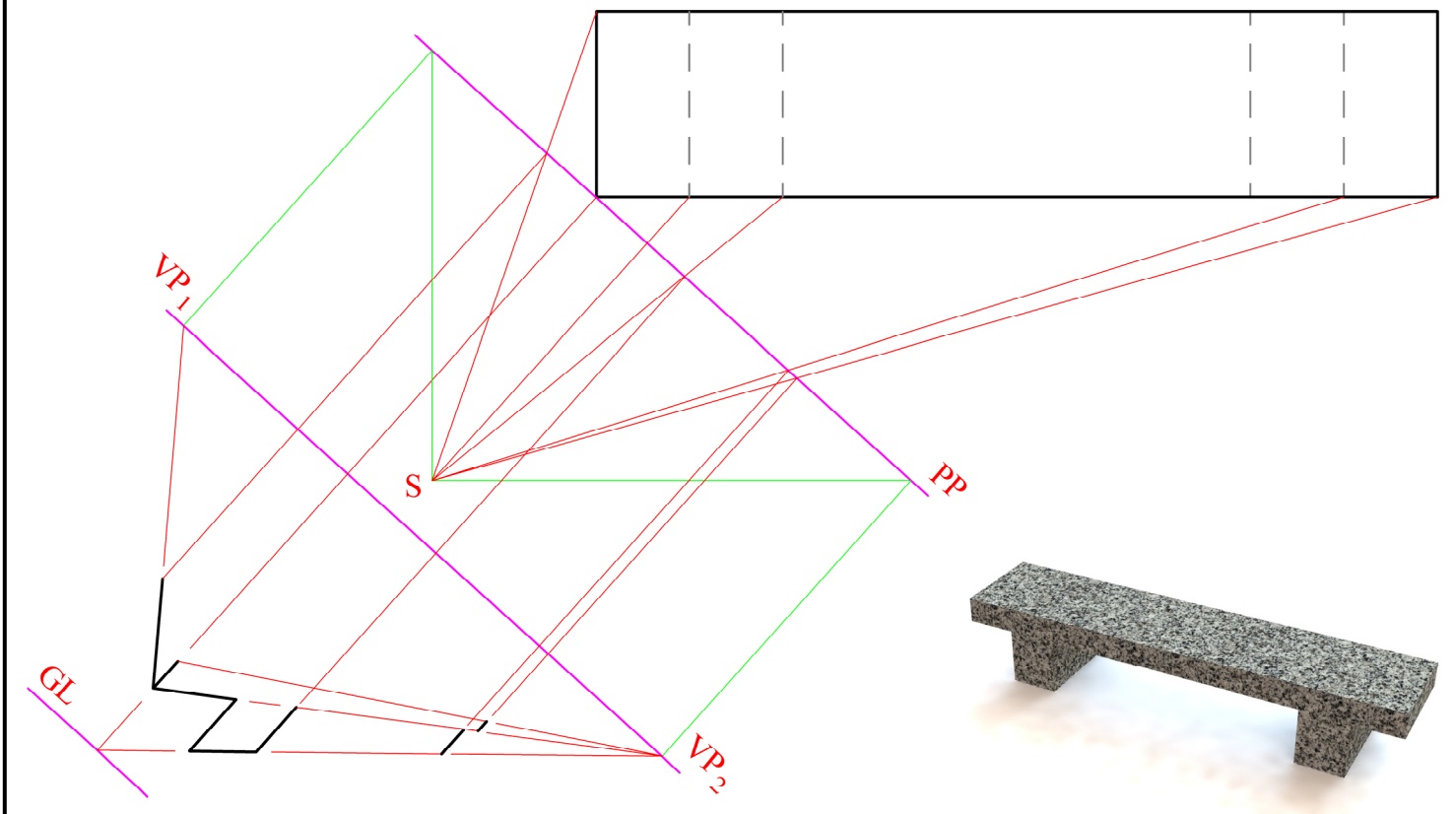
The drawing on the right shows a portion of a similar parabola, which is inscribed in rectangle **ABCD**.

V is the vertex of the curve.

- (a) Locate the remaining points on the right hand side of the parabola.
- (b) Locate the points on the left hand side of the parabola.
- (c) Complete the parabola in the rectangle **ABCD**.



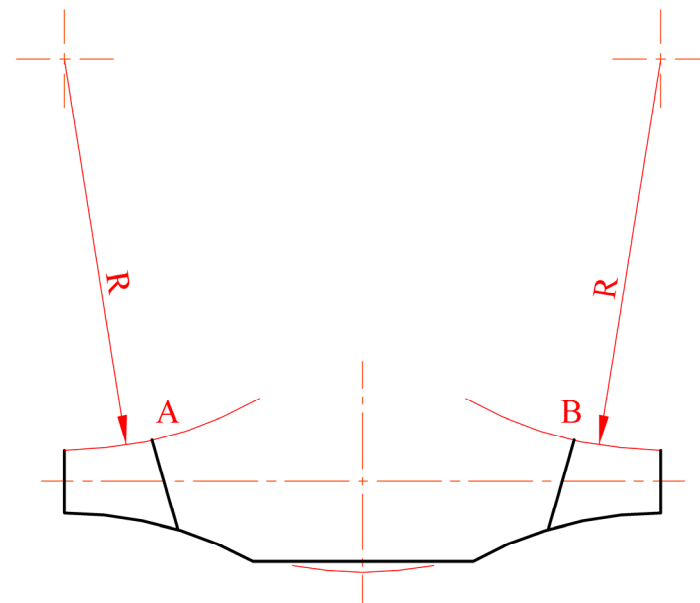
A-3. The image below shows a garden bench. The drawing shows the plan and a partially completed perspective view of a similar bench. Complete the perspective drawing.



A-2. The image below shows a bridge in Fitzgerald Park, Cork. The symmetrically designed structure includes tangential arcs **A**, **B**, and **C** which have the same radius.

The drawing on the right shows a partially completed view of the structure.

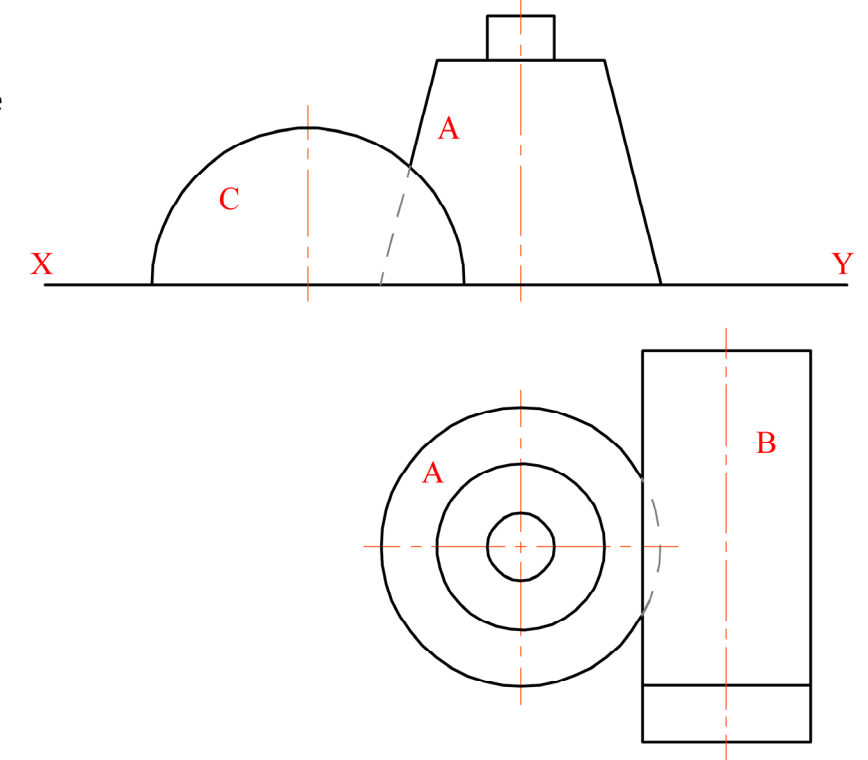
- (a) Complete the upper section of the bridge by drawing arc **C** tangential to the given arcs **A** and **B**. Show clearly how the centre point for arc **C** is located.
- (b) Show all points of contact.



A-4. The 3D graphic below shows a selection of personal care products in geometrical form. The objects rest on a dressing table and are in contact as shown.

The arrangement consists of a truncated cone **A**, a cylinder **B** and a hemisphere **C**. The drawing on the right shows the partially completed elevation and plan of the objects.

- (a) Draw the elevation of the cylinder **B**.
- (b) Draw the plan of the hemisphere **C**.



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)

20

20

25

A

30

35

40

45

50

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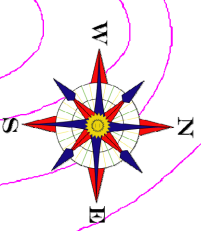
30

B

C

D

E





Coimisiún na Scrúduithe Stáit

State Examinations Commission

Leaving Certificate Examination, 2021

Design & Communication Graphics

Ordinary Level

Sections B and C (120 marks)

Thursday, 24 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

and

SECTION C

- Eight questions are presented.
- Answer **any two** on drawing paper.
- All questions in Section B and Section C carry **60 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.*

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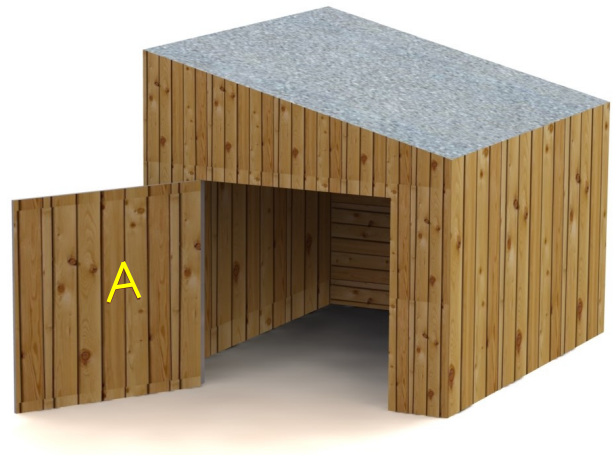
SECTION B - Core

Answer **any two** questions from the eight questions presented in **Section B** and **Section C** on drawing paper.

B-1. The 3D graphic on the right shows a dog kennel with the door in the open position.

Fig. B-1 below shows an isometric view of a similar kennel.

- (a) Draw the elevation of the kennel looking in the direction of the arrow and project the plan.
- (b) Draw the plan and elevation of the door in the open position as shown.
- (c) Draw the auxiliary elevation of the *kennel*, projected from the plan, which will include the true shape of face **A** of the door.



Scale 1:1

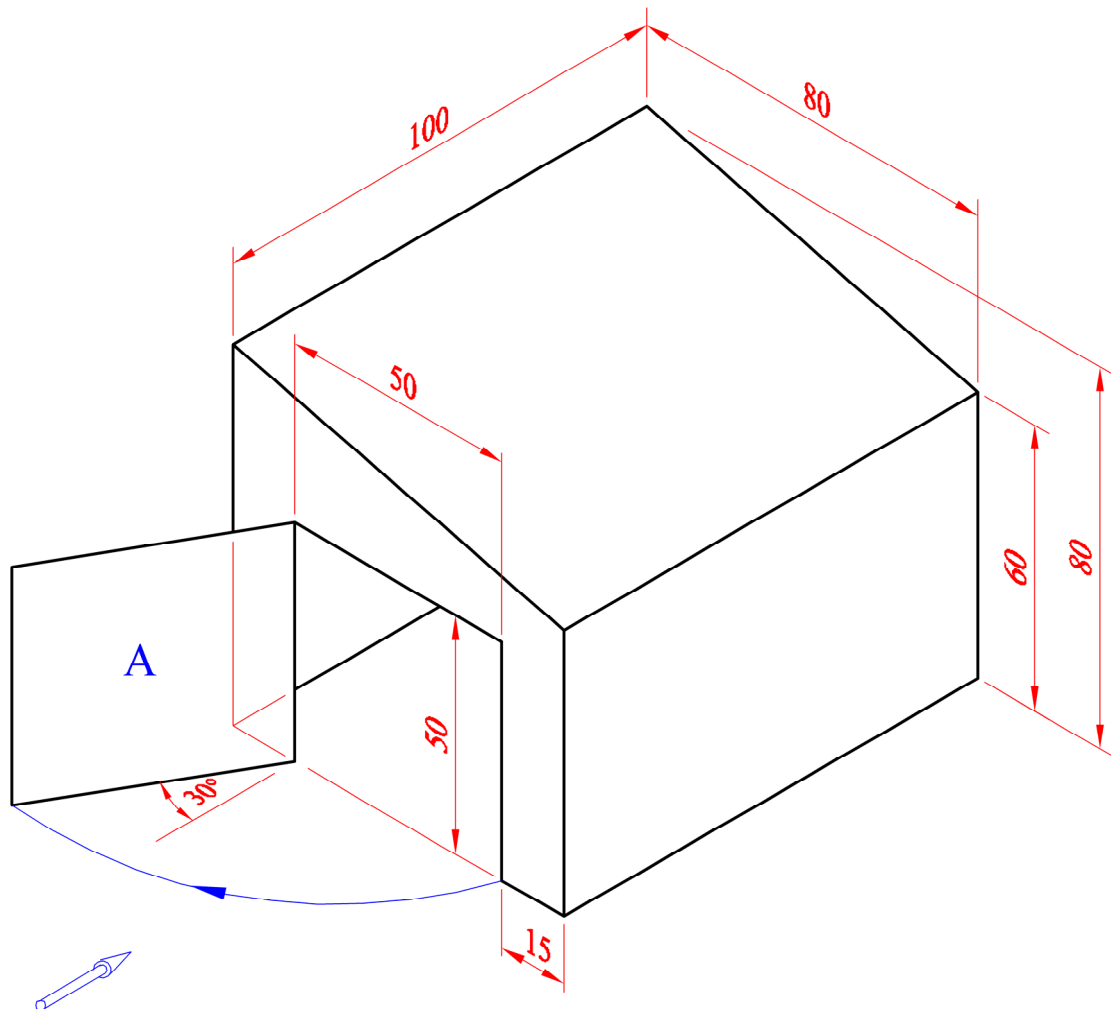


Fig. B-1

B-2. The image on the right shows a lifebuoy and its box.

Fig. B-2 below shows the axonometric axes and an incomplete isometric projection of a similar box.
A 3D graphic is also given.

The elevation and plan of the box 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 rectangular outline of the lifebuoy box.
- (d) Complete the axonometric projection of the lifebuoy box including the semi-circular top.



Scale 1:1

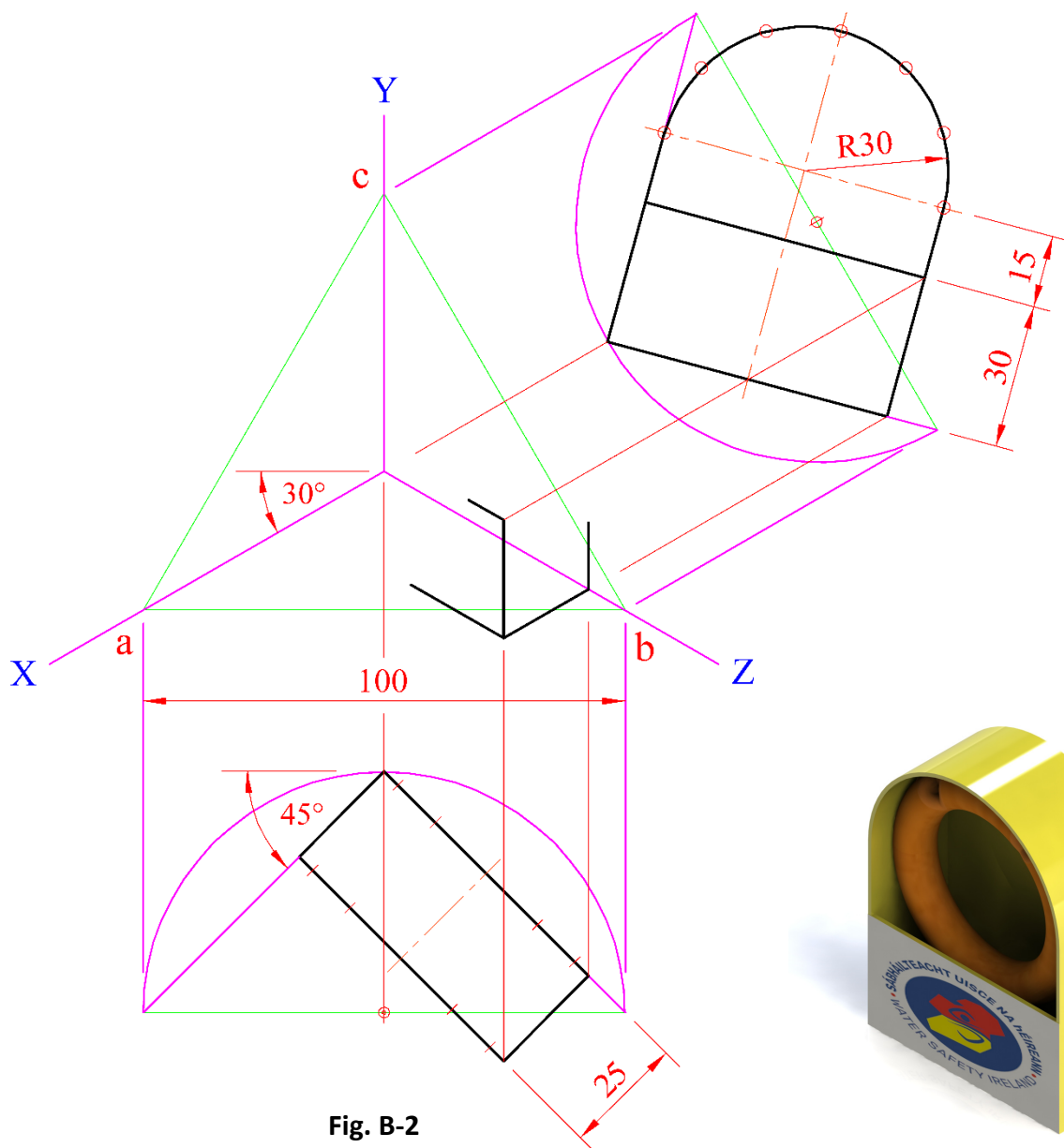
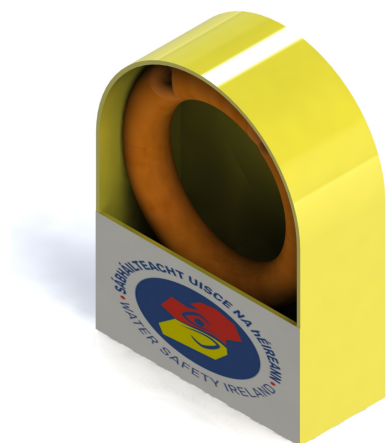


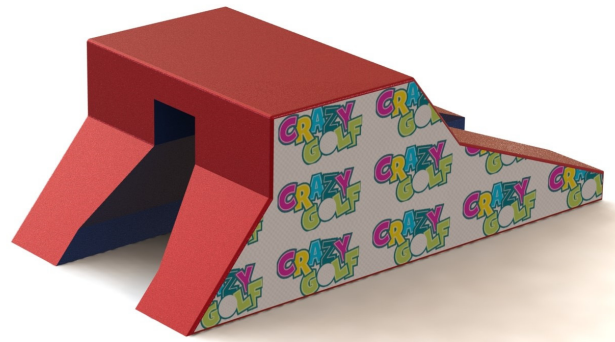
Fig. B-2



B-3. The 3D graphic on the right shows a model of a structure from a crazy-golf park. The design is based on the shape of a car body, through which a tunnel has been created.

Fig. B-3 below shows the elevation and incomplete plan of the structure.

The outline profile of the tunnel is also shown.



- (a) Draw the given elevation and incomplete plan of the structure.
- (b) Complete the plan, showing all lines of interpenetration between the tunnel and **both** ends of the structure.
- (c) Draw an end view of the structure.

Show all hidden detail.

Scale 1:1

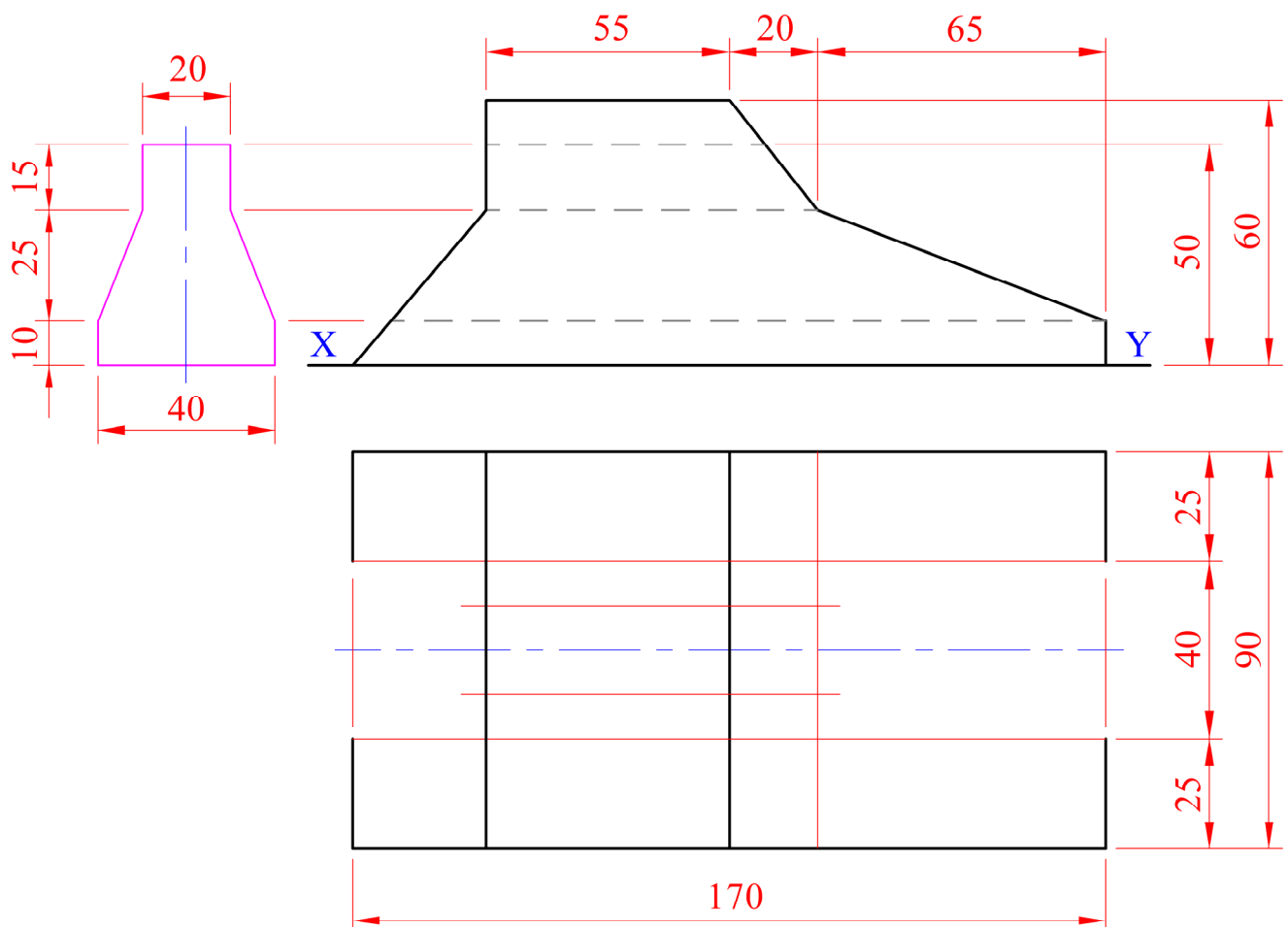


Fig. B-3

SECTION C - Applied Graphics

Answer **any two** questions from the eight questions presented in **Section B** and **Section C** on drawing paper.

Geologic Geometry

C-1. The accompanying map, located on the back page of Section A, 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 climbing frame from a children's playground. It contains a series of hyperbolic paraboloid surfaces.

Fig. C-2 below shows the projections of a similar hyperbolic paraboloid surface.



(a) Draw the elevation and plan of the given hyperbolic paraboloid surface.

(b) Project an end view of the surface.

Scale 1:1

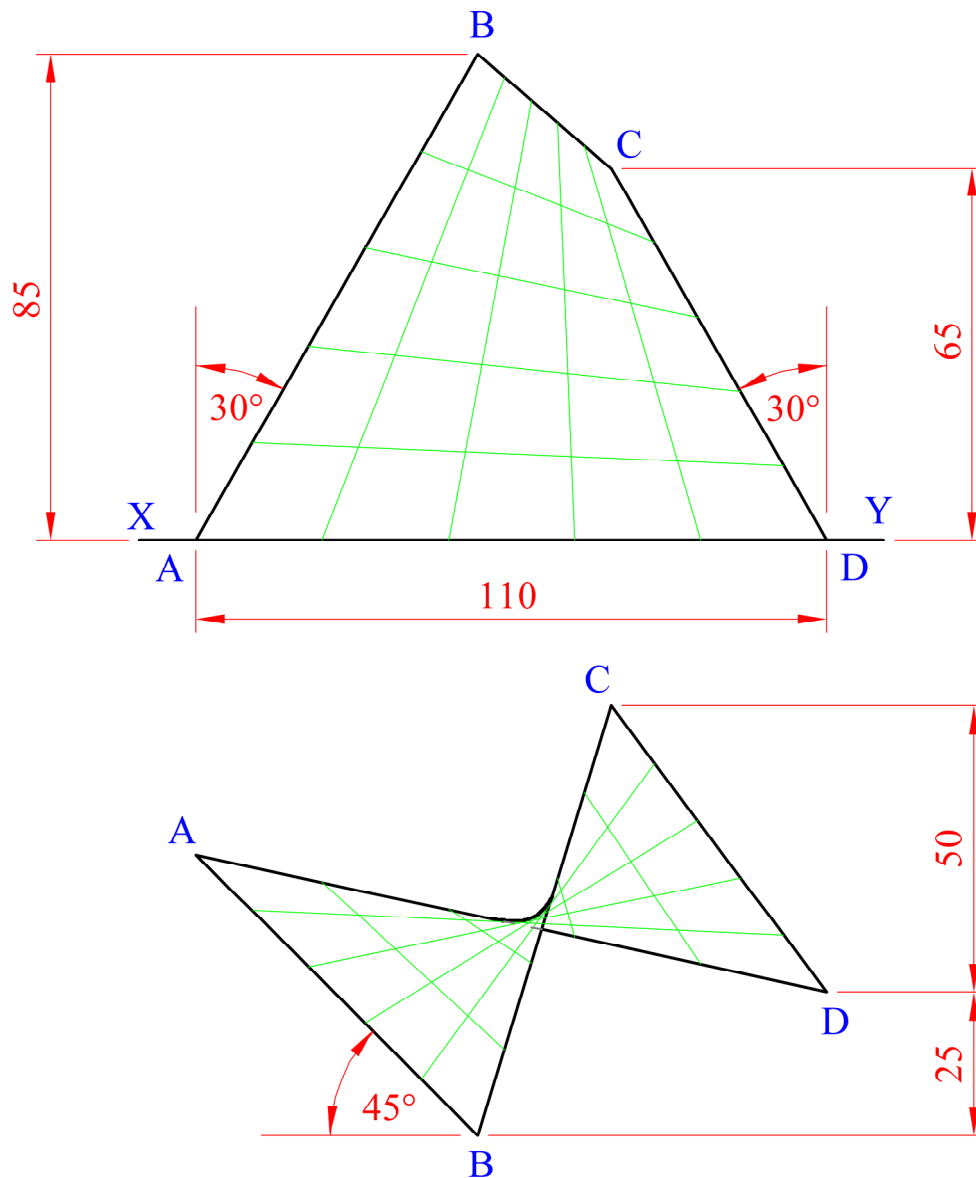


Fig. C-2

Surface Geometry

C-3. The image on the right shows a 'Magnum' ice cream and a wrapper.

The projections of a similar wrapper are shown in Fig. C-3 below.

- Draw the given elevation and plan of the wrapper. Show clearly how the points of contact are located in the elevation.
- Project an end view of the wrapper.
- Draw a one-piece surface development of the wrapper.

Scale 1:1

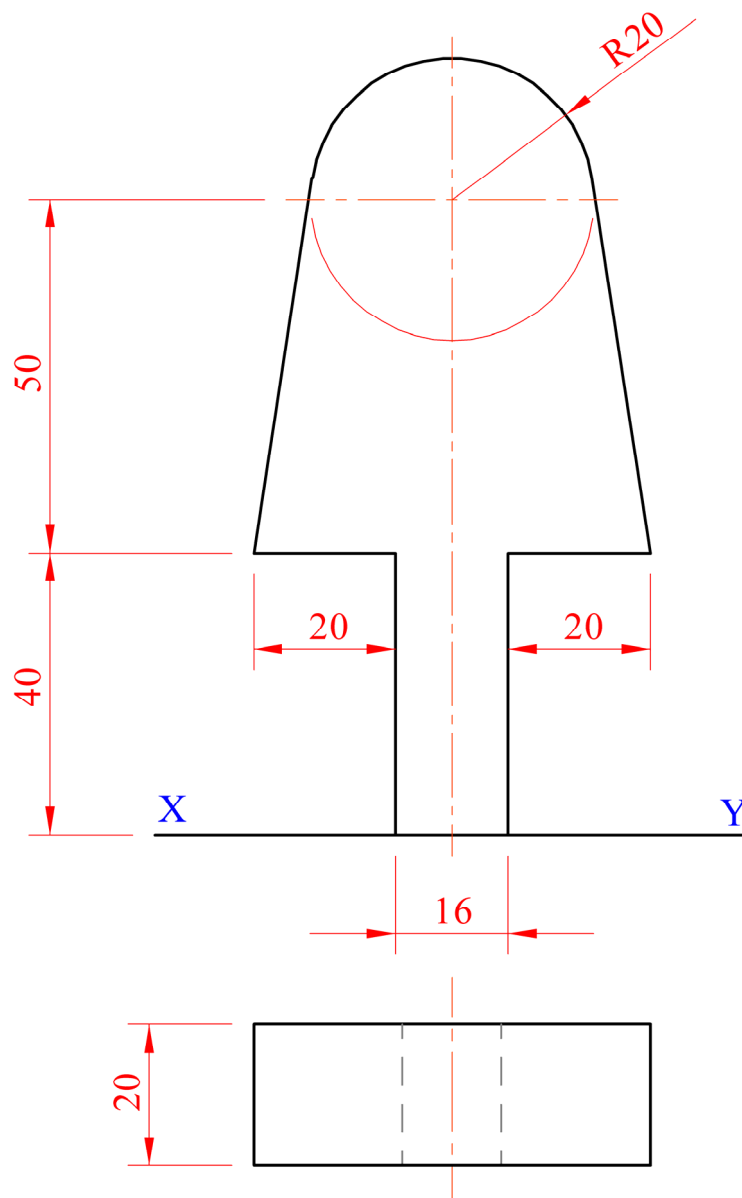


Fig. C-3

Dynamic Mechanisms

C-4. A cam, as shown, is often used as part of a sewing machine.

- (a) Draw the displacement diagram for a cam which imparts the following motion to an inline knife edge follower:



- 0° to 90° Rise 60mm with uniform velocity
- 90° to 180° Dwell
- 180° to 360° Fall 60mm with uniform acceleration and retardation.

(In the displacement diagram, use a distance of 15mm to represent each 30° interval.)

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

- (b) The image below shows an enlarged view of the sewing machine mechanism.

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

Crank **OA** and 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

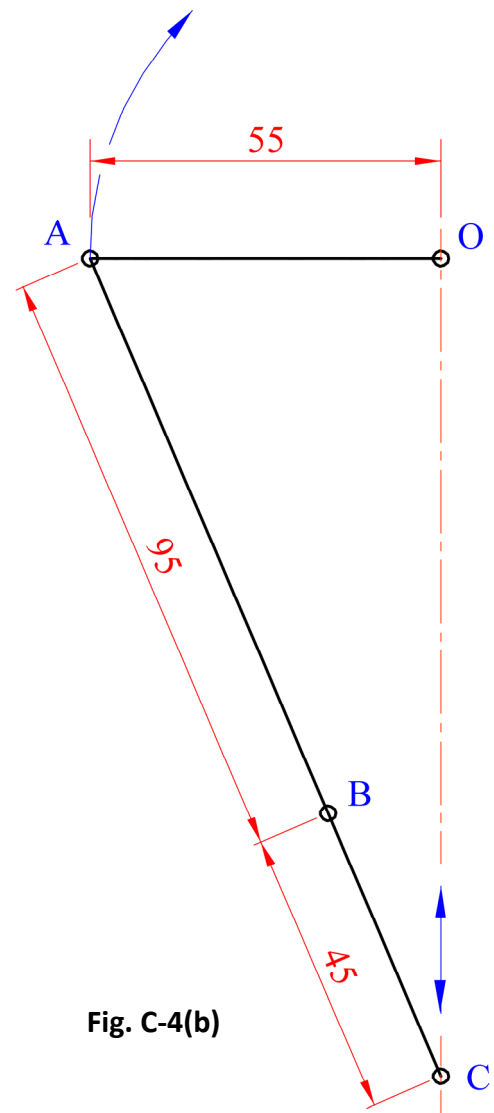


Fig. C-4(b)

Assemblies

C-5. Paint rollers similar to the one shown are used in home decoration. Details of the paint roller are given in Fig. C-5 below.

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

Draw the **sectional elevation A-A** of the assembled paint roller.

(Any omitted dimensions may be estimated.)

Scale 1:1

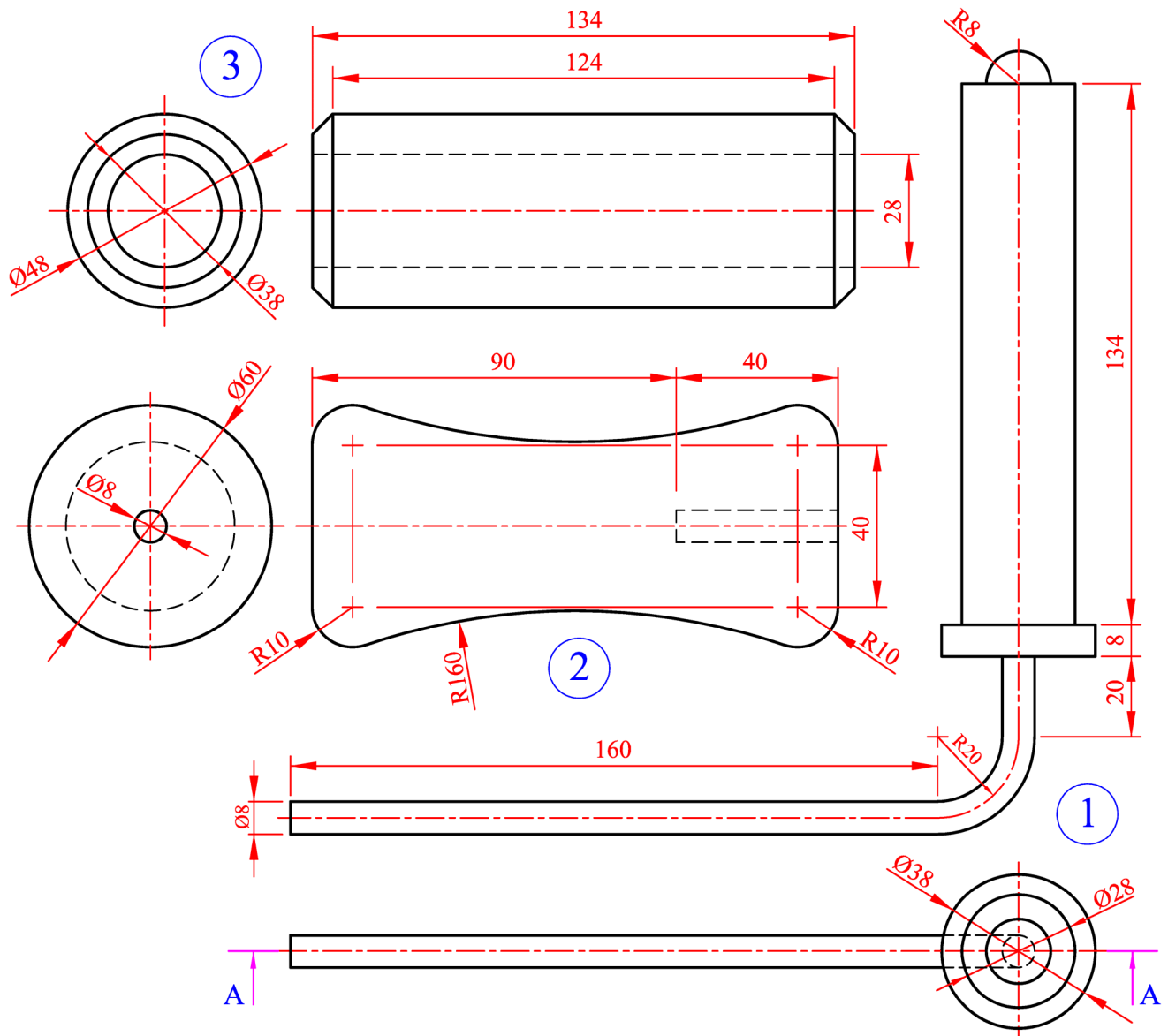


Fig. C-5

Part	Name	Qty.
1	Main Body	1
2	Handle	1
3	Roller	1

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