2025. M81BC 2025L562A2EL

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination, 2025

Design & Communication Graphics

Higher Level
Section B and C (180 marks)

Thursday, 19 June
Morning, 9:30 - 12:30

This examination has three sections:	
Section A	Core - Short Questions
Section B	Core - Long Questions
Section C	Applied Graphics - Long Questions

Section B	• Three questions are presented. • Answer **any two** questions on drawing paper. • All questions in Section B carry **60 marks** each.

Section C	• Five questions are presented. • Answer **one** question (i.e. the option you have studied) on drawing paper. • All questions in 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 this section on drawing paper.

B-1. The image on the right shows the Gateshead Millennium Bridge in Newcastle, England. The bridge can rotate to allow ships pass under it.

Fig. B-1 shows the elevation, plan and end view of a similar bridge in the closed position. The dotted line in end view shows the outline of the bridge when rotated to the open position.

The curve **ABC** is a parabola in elevation with vertex at **B**.

(a) Draw the given elevation.

(b) Project the given plan and end view of the bridge in the closed position.

(c) The bridge is rotated 25° about **AC**, as indicated in the end view, to allow ships to pass.

(i) Draw the given end view of the rotated bridge.

(ii) Project the elevation of the rotated bridge.

Scale 1:200

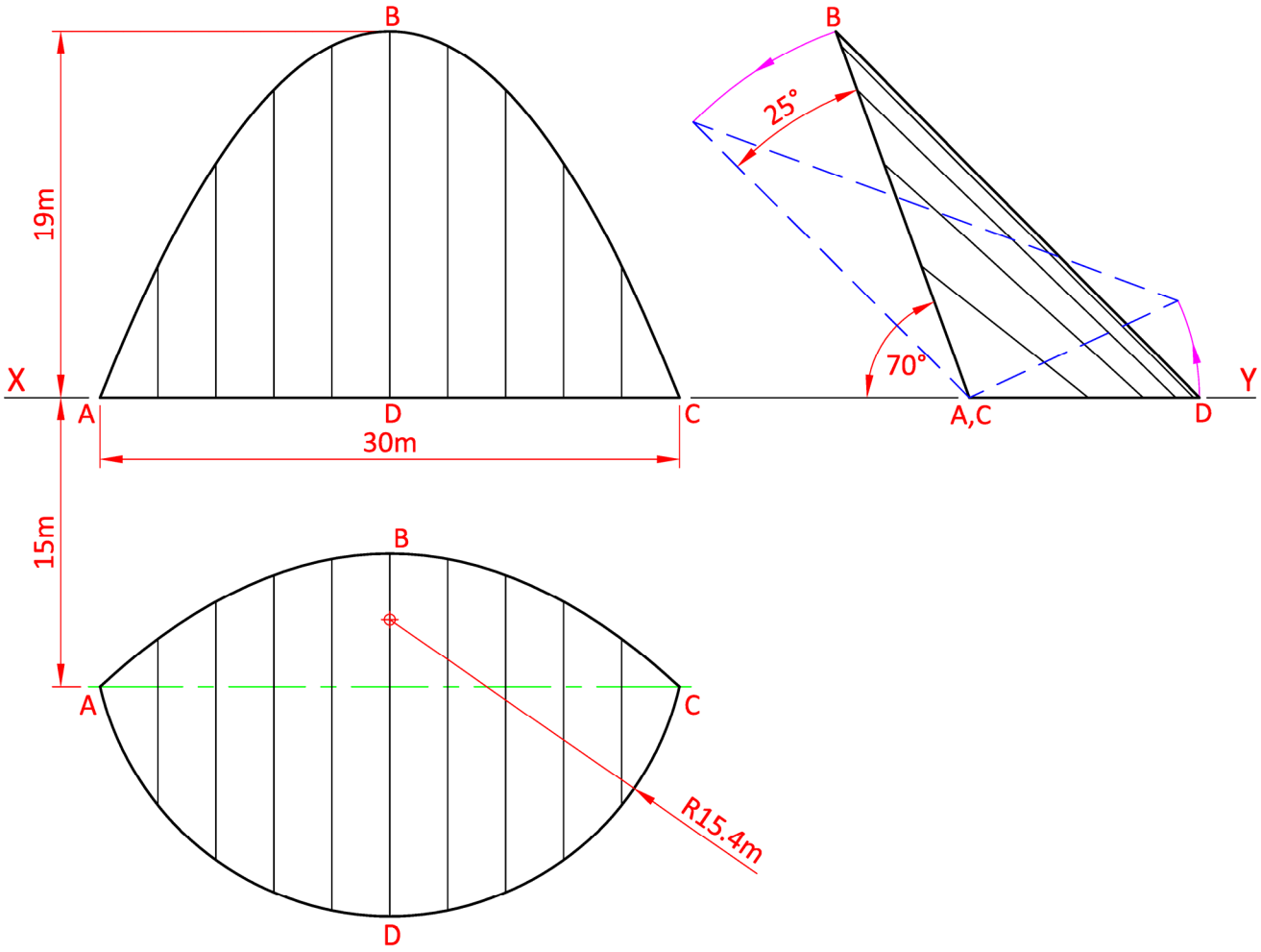


Fig. B-1

B-2. The image on the right shows an indoor adventure centre in Abu Dhabi. The building includes a series of intersecting planar triangular surfaces.

Fig. B-2 shows the plan and elevation of three intersecting planar surfaces.

The horizontal and vertical coordinates for points **A**, **B**, **C**, **D**, and **E** are given.

Scale 1:1

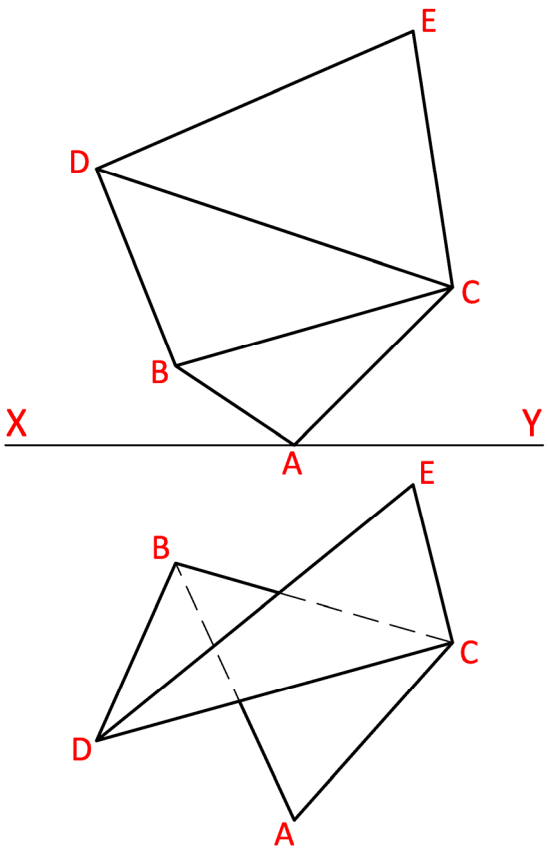


Fig. B-2

A:	160	---	0	---	95
B:	130	---	20	---	30
C:	200	---	40	---	50
D:	110	---	70	---	75
E:	190	---	105	---	10

(a) Draw the given elevation and plan of the intersecting planes **ABC**, **BCD**, and **CDE**.

(b) Determine the dihedral angle between planes **ABC** and **BCD**.

(c) Determine the true shape of surface **CDE**.

(d) Determine the horizontal and vertical traces of the plane **ABC**.

B-3. The image on the right shows a laundry kiosk.

Fig. B-3 shows the plan and elevation of a similar kiosk. A pictorial view of the kiosk is also shown. Surface **B** is a solar panel and is inclined at 15° to the horizontal plane.

(a) Draw the given plan.

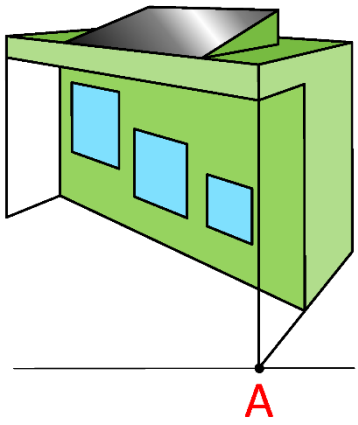
(b) Make a perspective drawing of the kiosk given the following:

- the spectator point **S**, is 130 mm from point **A**
- the picture plane is touching point **A**
- the horizon line is 105 mm above the ground line.

*Use an auxiliary vanishing point to determine the surface **B** in the perspective drawing.*

(c) On your perspective drawing, determine and indicate the height of point **C** above the horizontal plane.

Scale 1:1



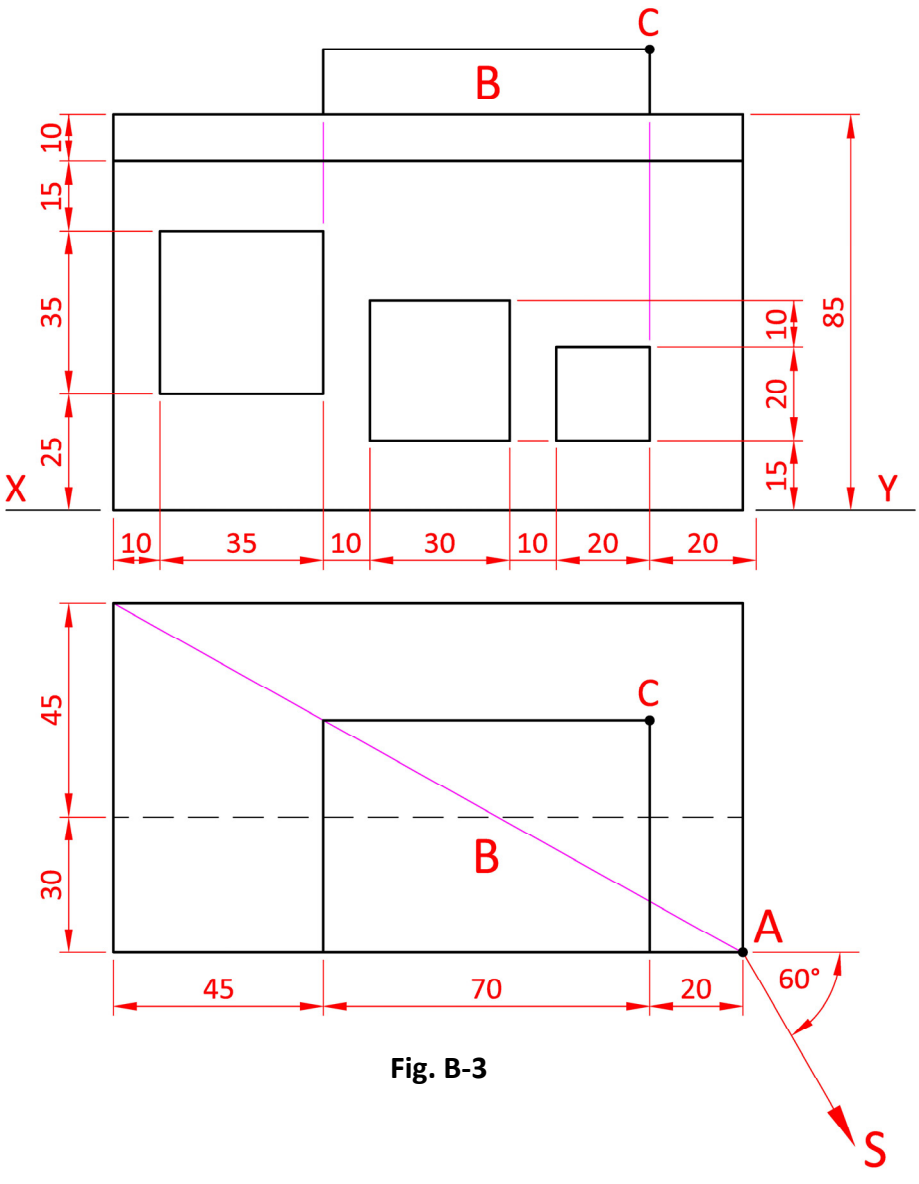


Fig. B-3

Section C - Applied Graphics

Answer **one** question (i.e. the option 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 on the N22 Macroom bypass in Co. Cork.

ABC is the centreline of the roadway.

The roadway has the following specifications:

- the portion from **A** to **B** is level at an altitude of 75 m
- the portion from **B** to **C** is falling uniformly at a rate of 1 in 15
- side slopes of 1 in 1 for the cuttings and 1 in 1.5 for the embankments.

Complete the earthworks necessary to accommodate the roadway on the southern side.

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

(b) On a separate diagram on the map, the elevation and plan of two skew boreholes from points **R** and **S** are shown. The borehole at **R** reveals the top and bottom surfaces of a stratum of ore at $\mathbf{R_h}$ and $\mathbf{R_f}$, respectively. The borehole at **S** reveals the top and bottom surfaces of the stratum at $\mathbf{S_h}$ and $\mathbf{S_f}$, respectively.

Determine the strike, dip and thickness of the stratum.

Scale 1:1000

C-2. The images on the right show the rugby player Dan Carter and a kicking tee. The kicking tee is based on a truncated hyperboloid of revolution.

Fig. C-2 below shows the elevation, plan, and end view of a similar kicking tee in the form of a hyperboloid of revolution.

(a) Draw the given plan and elevation of the kicking tee.

(b) Project the given end view.

(c) Determine the position of the directrix and the focal point for one branch of the double hyperbola in elevation.

Scale 1:1

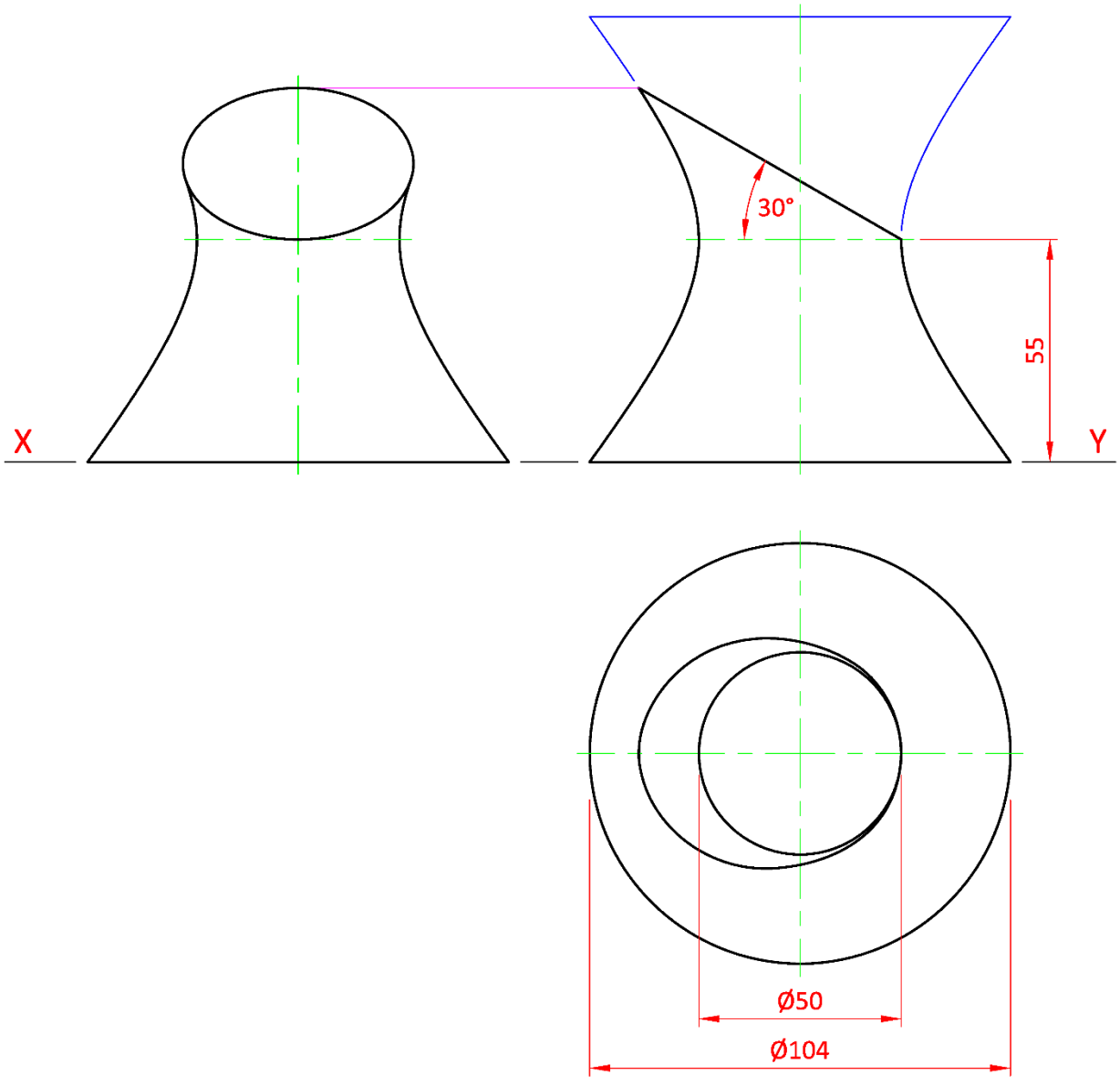


Fig. C-2

C-3. The image on the right shows a mocha coffee jug.

Fig. C-3 below shows the elevation and plan of a similar mocha jug. The jug is based on two regular octagonal-based pyramids and a truncated cone. A pictorial view is also shown.

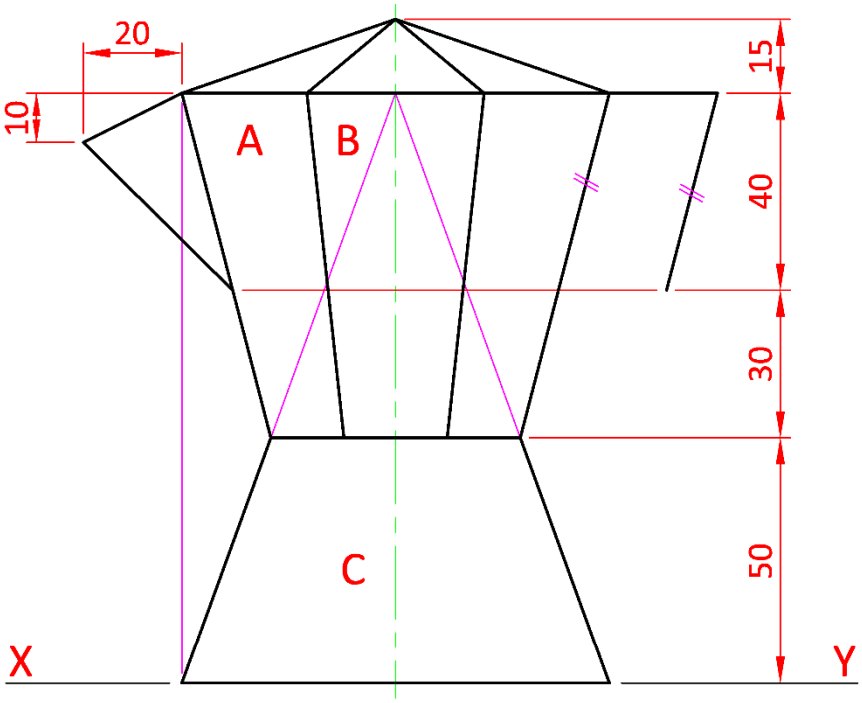
(a) Draw the given plan and elevation.

(b) Determine the dihedral angle between surfaces **A** and **B**.

(c) Draw a one-piece surface development of the conical surface **C**.

(d) Draw a one-piece surface development of the top lid of the jug.

Scale 1:1



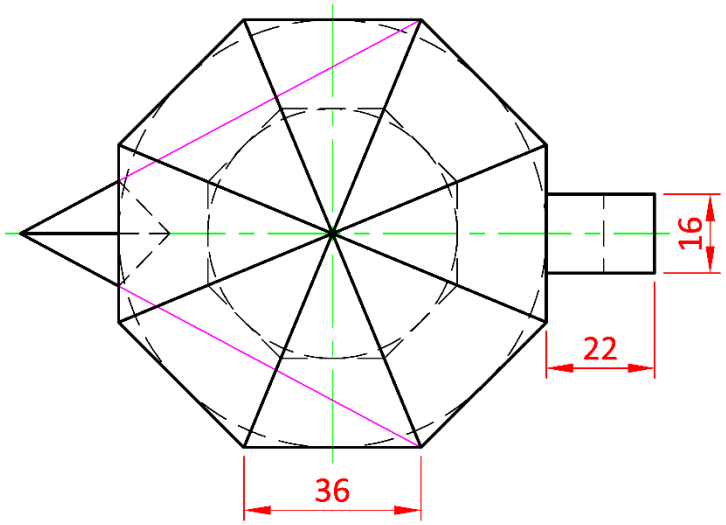


Fig. C-3

C-4. **(a)** The image on the right shows a pull-along frog toy.

Scale 1:1

The frog toy has a cam and follower mechanism which causes the mouth to open and close as the toy moves.

Draw the displacement diagram and profile of the radial plate cam which imparts the following motion to an inline knife edge follower.

- 0° to 120° rise of 36 mm with uniform acceleration and retardation
- 120° to 180° rise 24 mm with uniform velocity
- 180° to 360° fall 60 mm with simple harmonic motion.

The nearest approach of the follower to the cam centre is 40 mm.
The camshaft diameter is 20 mm. The cam rotates in an anticlockwise direction.

Use a distance of 12 mm for each 30° interval on your displacement diagram.

(b) The image on the right shows an elliptical cross trainer exercise machine.
A line diagram representing the exercise machine is shown in Fig. C-4 below.

Arm **ED** rotates in an anticlockwise direction about **E**. Points **E** and **B** are fixed. Points **C** and **D** are pin joints. Arm **AC** is constrained to rotate about point **B**. Point **P** is located at the midpoint of **CD**.

(i) Draw the given diagram.

(ii) Plot the locus of point **P** for a full revolution of the arm **ED**.

Scale 1:1

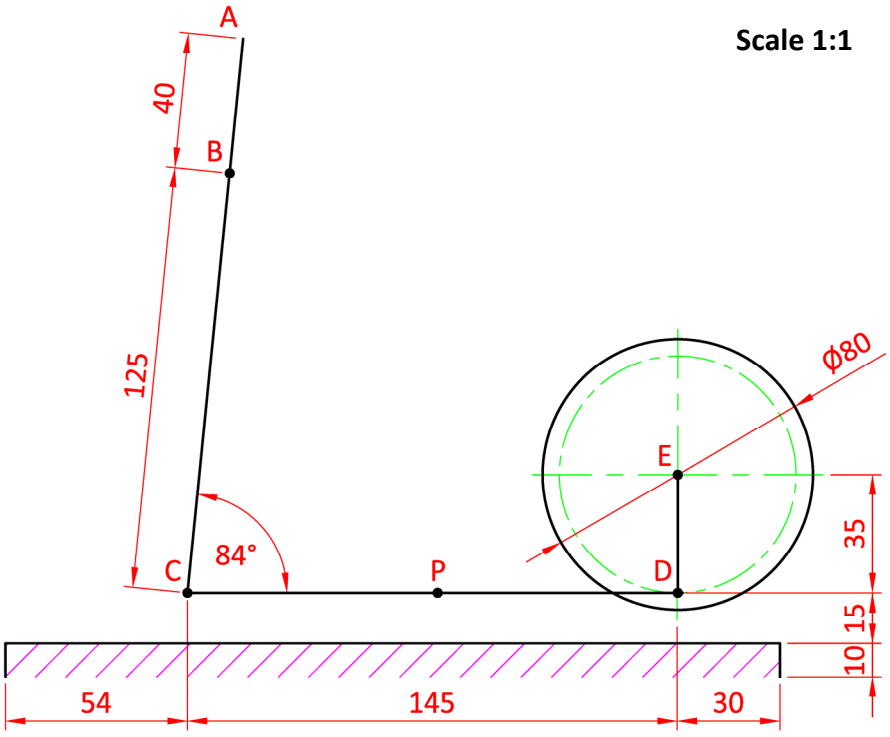


Fig. C-4

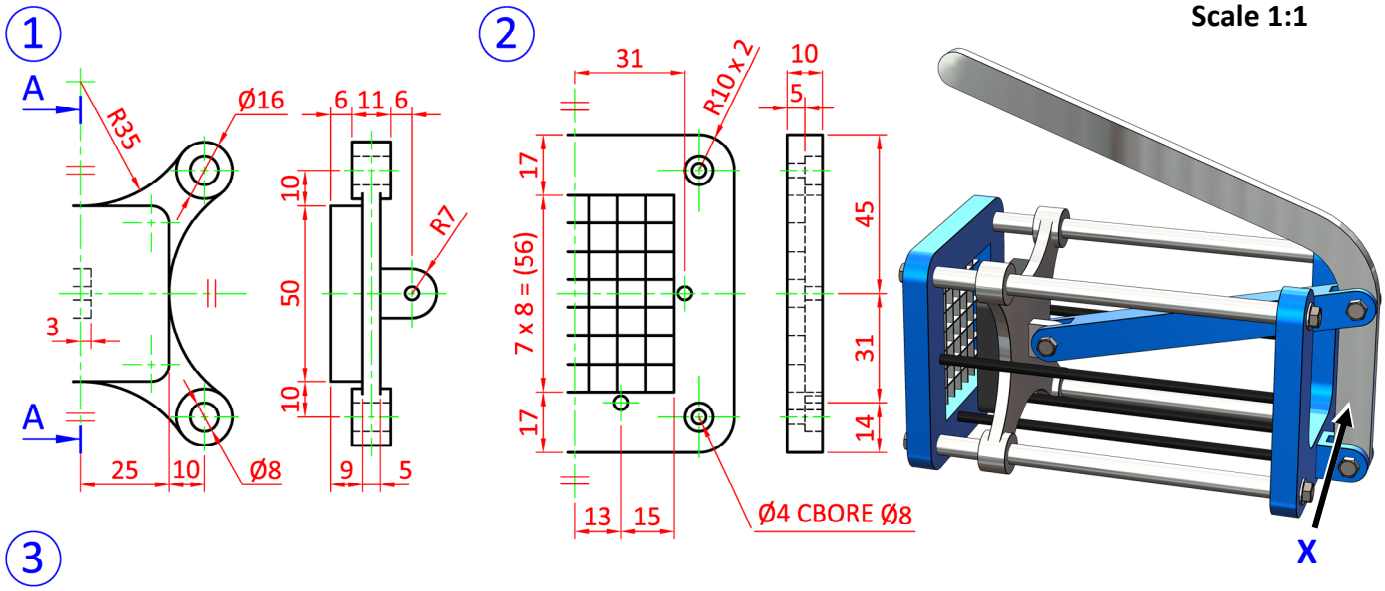
Assemblies

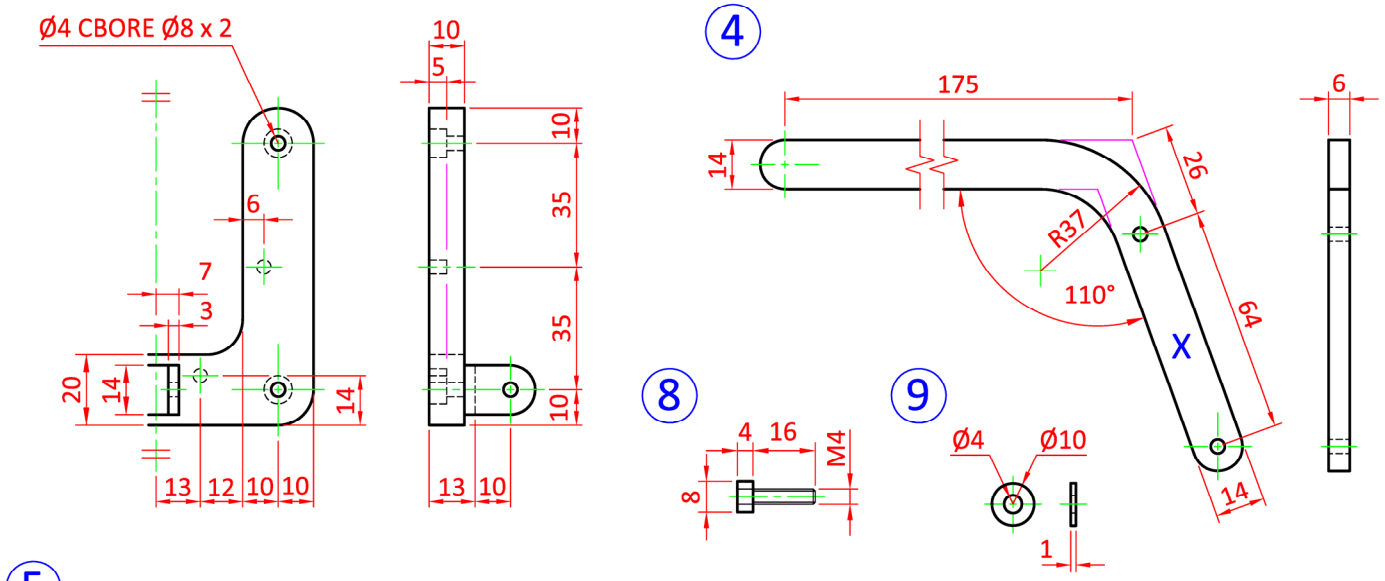
C-5. The 3D graphic on the right shows a potato chip maker. The details of the potato chip maker are given in Fig. C-5 below. The parts list is also given in a table.

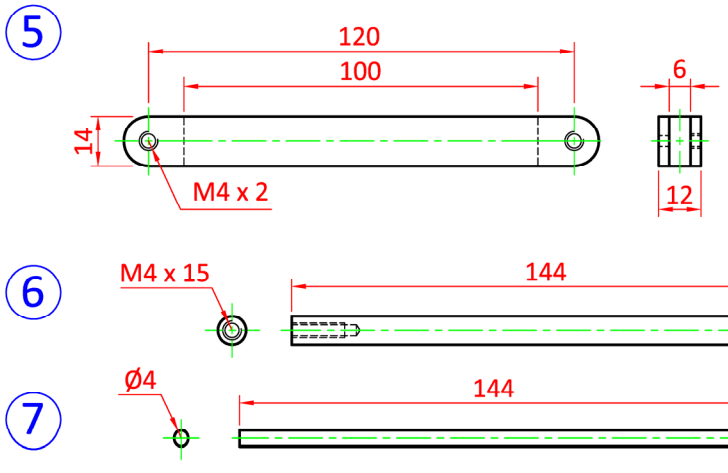
Draw a sectional elevation on **A-A**, showing the parts fully assembled with the portion of the handle labelled **X** in a vertical position.

***Note**: Any undimensioned holes are Ø4 mm. Any omitted dimensions may be estimated.*

Scale 1:1







Part	Name	Qty.
1	Sliding Plunger	1
2	End Cutter	1
3	End Cap	1
4	Handle	1
5	Link Arm	1
6	Plunger Guide Bar	4
7	Potato Guide Bar	4
8	M4 × 16 Set Screw	11
9	Washer	8

Fig. C-5

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Leaving Certificate - Higher Level

Design & Communication Graphics, Section B & C

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