



Leaving Certificate Examination, 2023

Design & Communication Graphics

Higher Level

Section B and C (180 marks)

Thursday, 22 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** 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 A 3D graphic of a desk lamp is shown on the right. The lamp consists of a truncated pentagonal prism and a truncated equilateral triangular prism, which intersect each other as shown.

Fig. B-1 shows the incomplete projections of a similar lamp.

- (a) Draw the given plan and elevation.
- (b) Complete the projections of the desk lamp showing all lines of interpenetration.

Include all hidden detail.

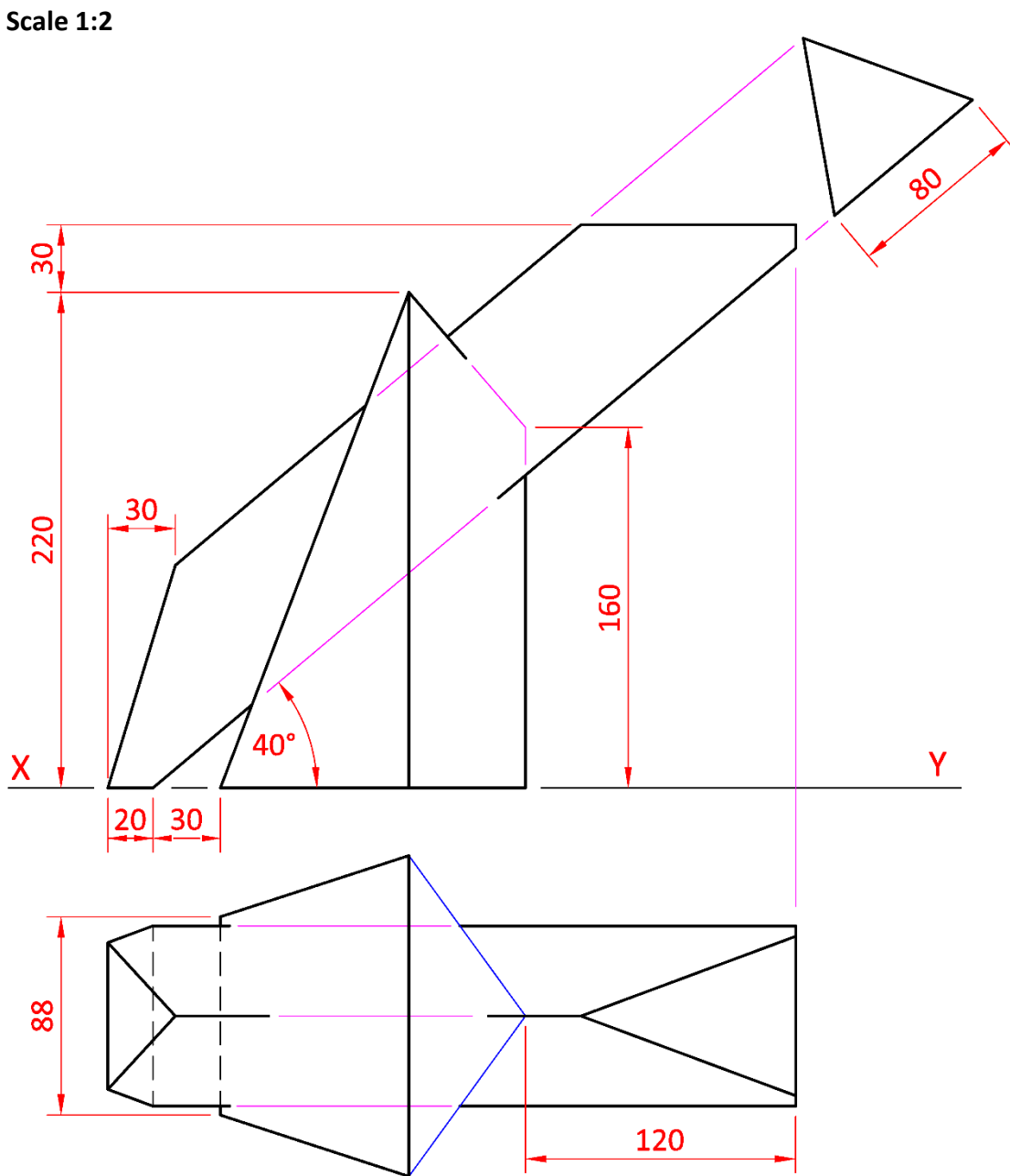
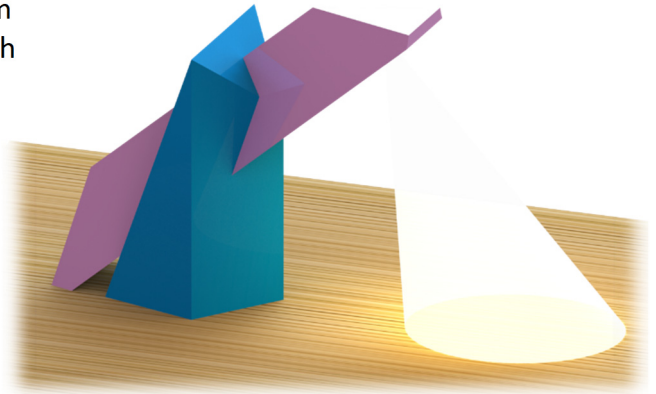


Fig. B-1

B-2 The image on the right shows the *Glasshouse hotel* in Co. Sligo. The hotel includes a series of planar glass surfaces.

Fig. B-2 shows the plan and elevation of two intersecting planar surfaces **ABCD** and **BCEF**.



- (a) Draw the given plan and elevation of the intersecting planes **ABCD** and **BCEF**.
- (b) Determine the dihedral angle between the planes **ABCD** and **BCEF**.
- (c) **P** is a point on the edge **BC** which is located at a true distance of 55 mm from point **B**.
 - (i) Draw the plan and elevation of the line **DP**.
 - (ii) Determine and indicate the true length of **DP**.
- (d) Determine the true angle between the edges **AB** and **BF**.

Scale 1:1

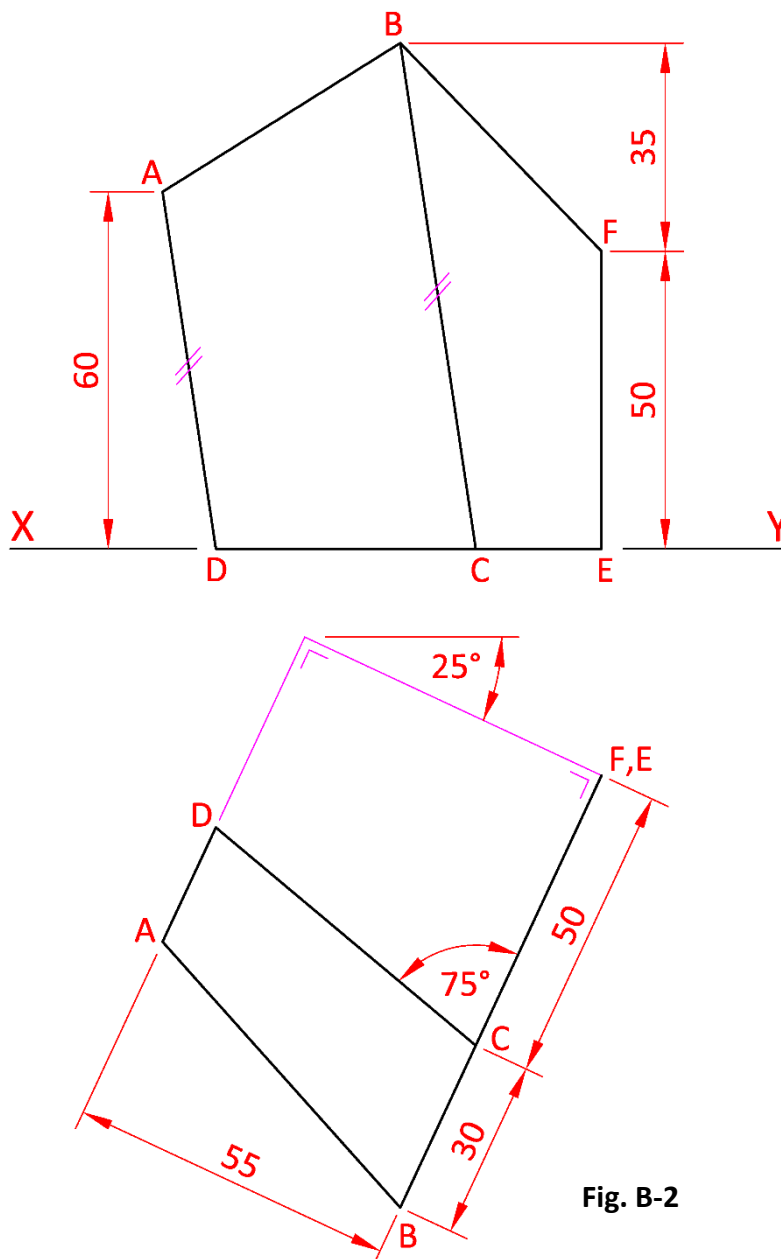


Fig. B-2

B-3 The image on the right shows an *Applegreen* outdoor dining pod.

Fig. B-3 shows an incomplete dimetric projection, using the axonometric axes method, of a similar dining pod. The elevation and plan are shown in their required positions.

A pictorial view of the pod is also shown.

- (a) Draw the axonometric axes **X**, **Y**, and **Z** and the isosceles triangle **abc**.
- (b) Draw the elevation and plan, orientated as shown.
- (c) Complete the dimetric projection of the pod.



Scale 1:1

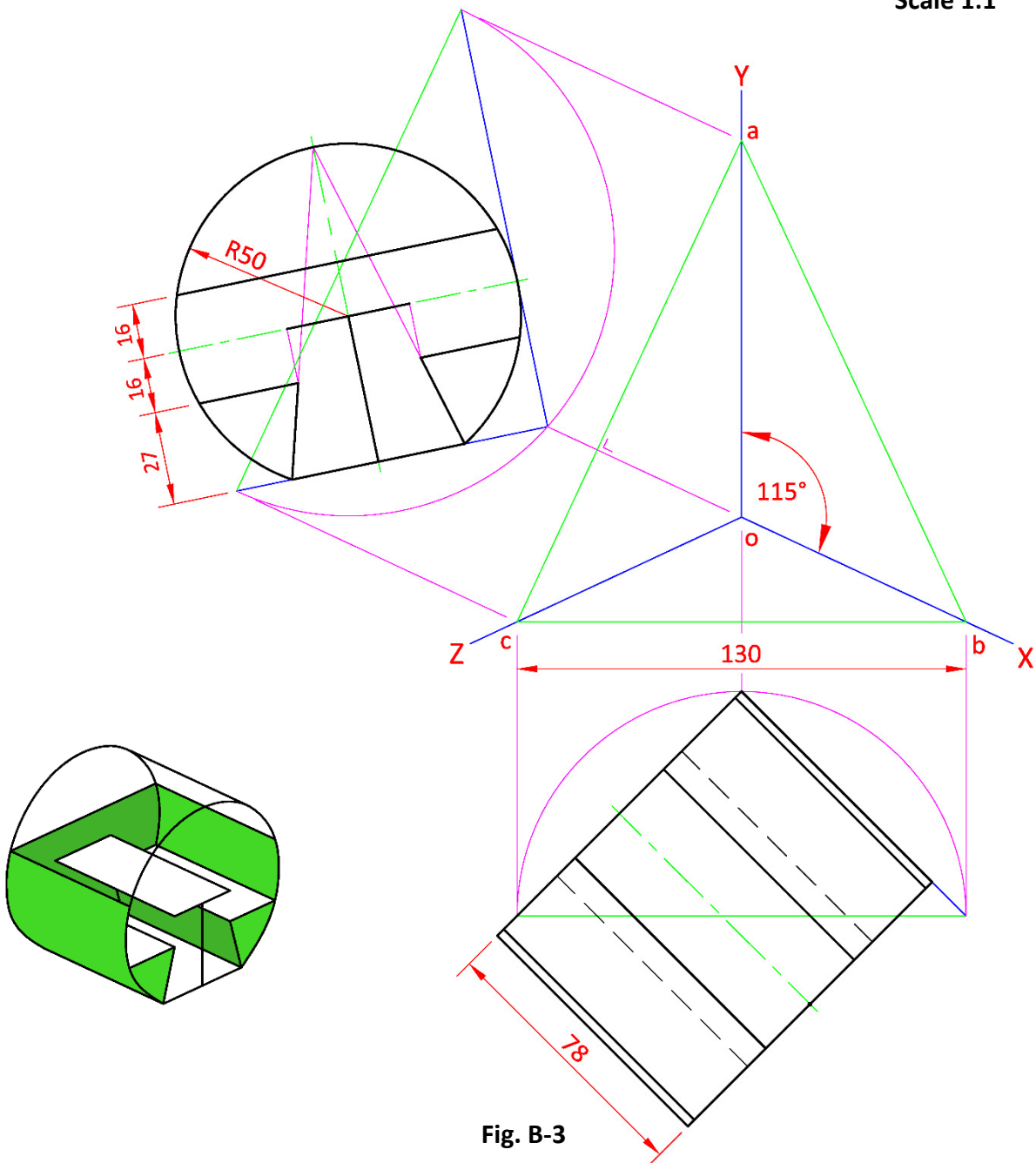


Fig. B-3

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 a park pathway.

ABCD is the centreline of the pathway and **O** is the centre of the circular curve which forms part of the pathway edge.

The pathway has the following specifications:

- the portion from **A** to **C** is level at an altitude of 50 m
- the portion from **C** to **D** is rising uniformly to a level of 55 m at **D**.

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 pathway on the northern side.

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

- (b)** On a separate diagram on the map, the elevation and plan of three support poles **P**, **Q**, and **R** are shown. The plan of a triangular canopy attached to these poles is also shown.
- Draw the elevation of the canopy.
 - Determine the strike and dip of the canopy.



Scale 1:1000

Structural Forms

C-2. The image on the right shows a glamping tent. The projections of a similar glamping tent are shown in Fig. C-2 below.

The curved surface is produced by translating the generating parabola **ABC**, in a vertical position, along the parabolic curve **EBD**, which is shown in elevation.



B is the vertex of both the parabola **ABC** and the parabola **EBD**, as shown.

- Draw the given elevation of the parabolic curve **EBD**.
- Draw the end view of the generating parabola **ABC**.
- Project the plan and complete the elevation of the tent.
- Determine the true shape of the curve **EC**.

Scale 1:200

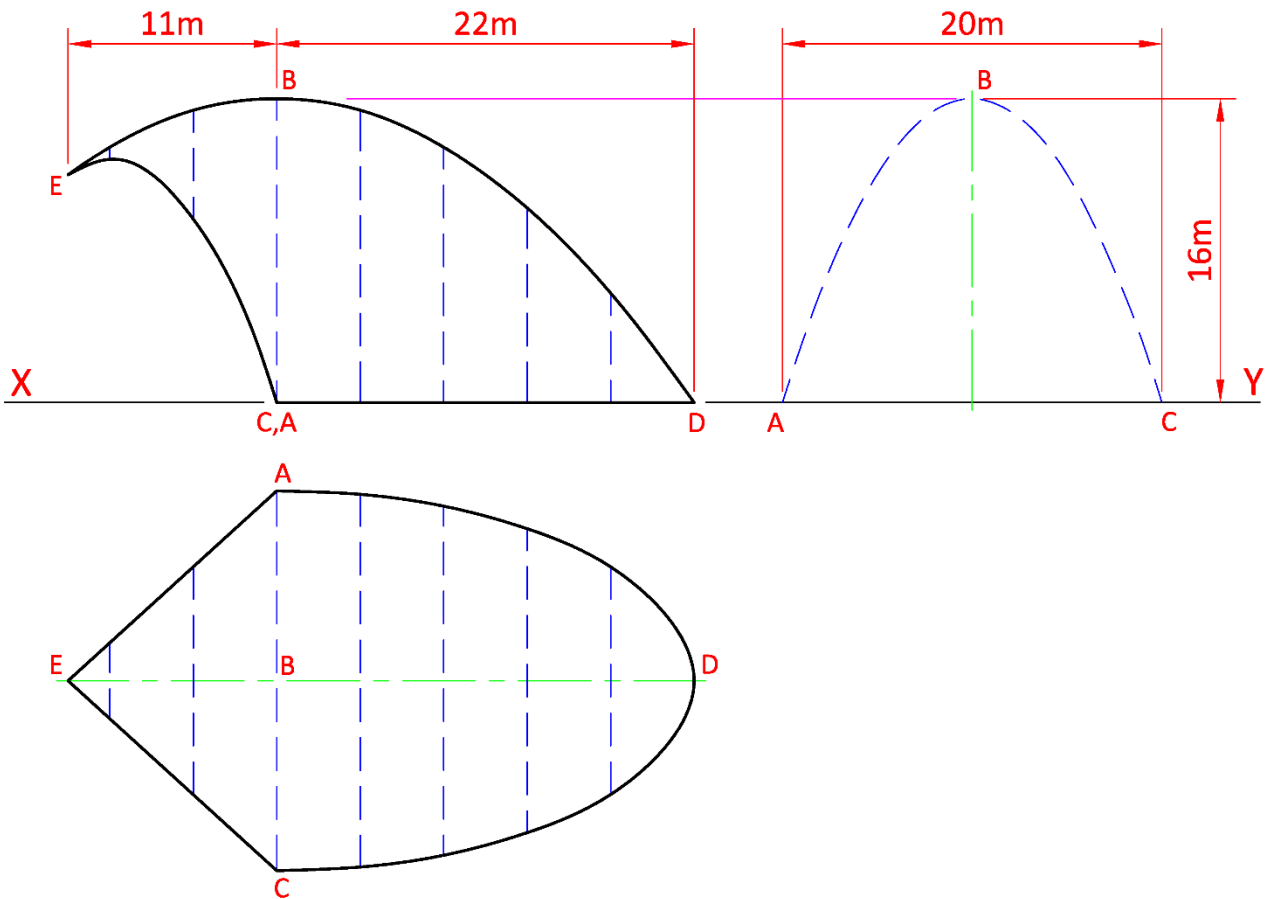


Fig. C-2

Surface Geometry

C-3. The image on the right shows a dipping cone.

Fig. C-3 shows the plan and elevation of a similar dipping cone. A pictorial view is also given.

- Draw the given elevation of the dipping cone.
- Project the plan.
- Draw the surface development of the conical surface **A**.
- Draw the elevation of one of the focal spheres for the 30° truncated top edge.



Scale 1:1

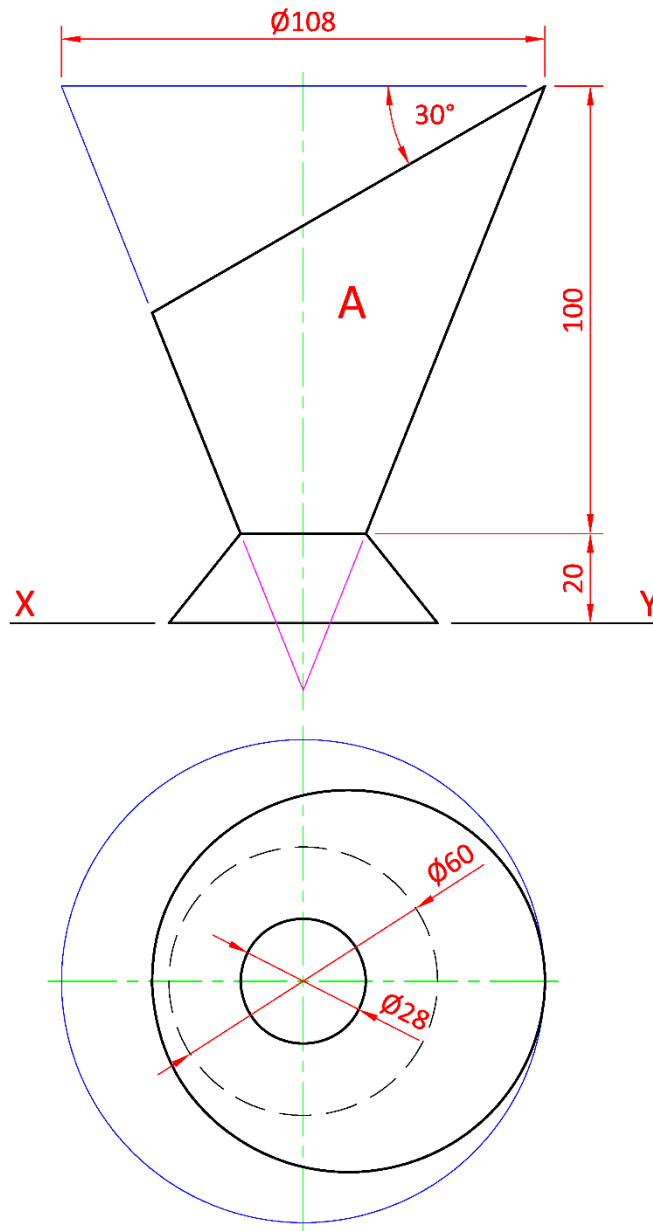
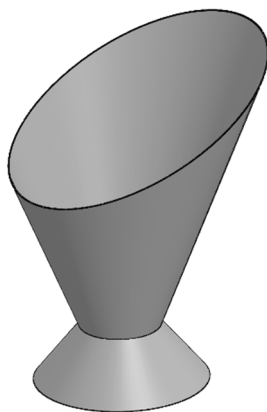


Fig. C-3

Dynamic Mechanisms

C-4. (a) The image below shows a folding access barrier. A line diagram representing the barrier is shown in Fig. C-4(a) on the right below.

Arm **AB** rotates in a clockwise direction, at a constant speed, through 90° about **A**. During this movement the arm **BC** rotates anticlockwise about point **B** at a constant speed. Arm **AB** and arm **BC** finish in a vertical position at the end of the movement.

- (i) Draw the given diagram.
- (ii) Plot the locus of point **C** for the combined movement.

Scale 1:1

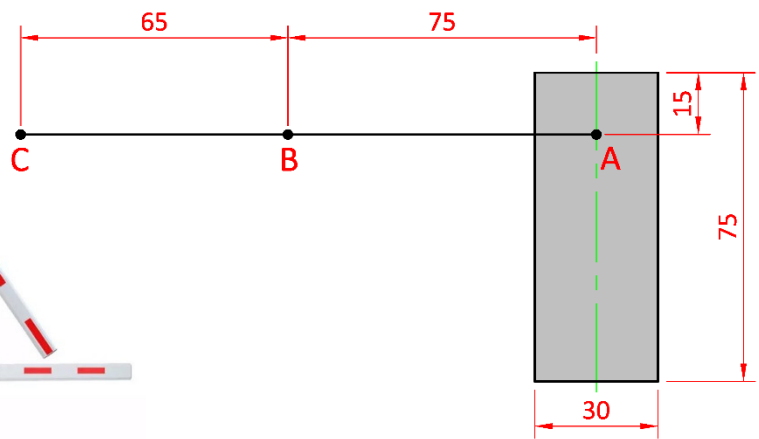


Fig. C-4(a)

(b) The graphic below shows an energy storage tower in Heidelberg, Germany. The tower has a walkway based on a cylindrical helix around the outer surface.

Fig. C-4(b) on the right shows the projections of a similar tower with a helical walkway. A portion of a regular helix moves in an anticlockwise direction from point **A** to point **B**.

- (i) Draw the given plan and elevation of the tower.
- (ii) Determine the projections of the helical walkway between **A** and **B** in elevation.
- (iii) Determine the position where the helical walkway will reach the top of the tower when extended.

Scale 1:1

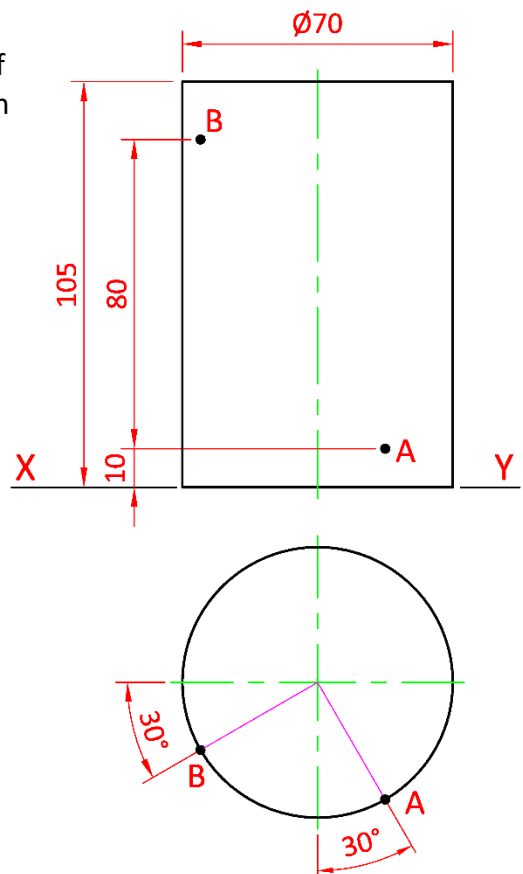


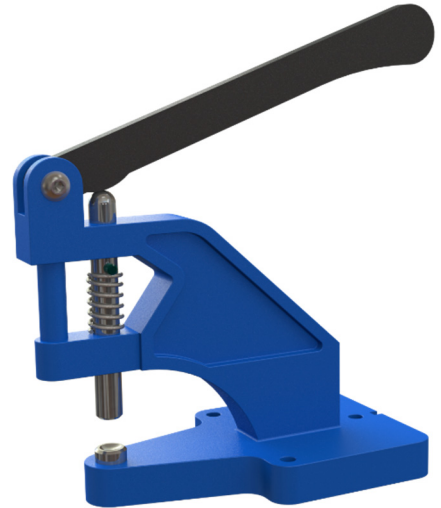
Fig. C-4(b)

Assemblies

C-5. The 3D graphic on the right shows a rivet punch.
The details of the punch 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 handle inclined at an angle of 20° to the horizontal plane.
Clearly show all points of contact.

(Note: Unless otherwise stated, fillets are 2 mm and chamfers are 1×1 mm. Any omitted dimensions may be estimated.)



Scale 1:1

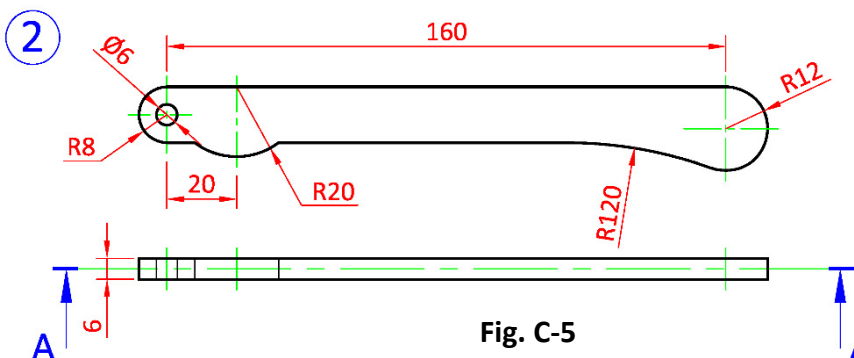
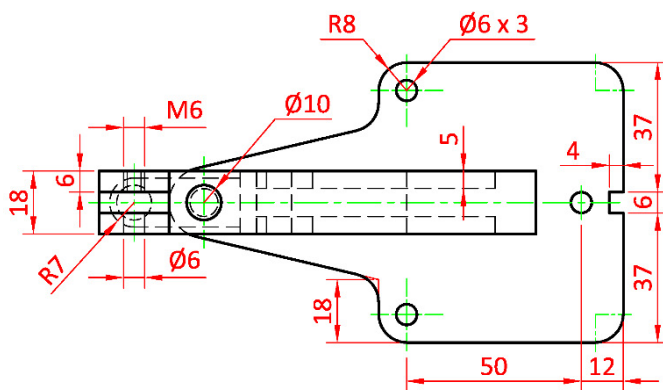
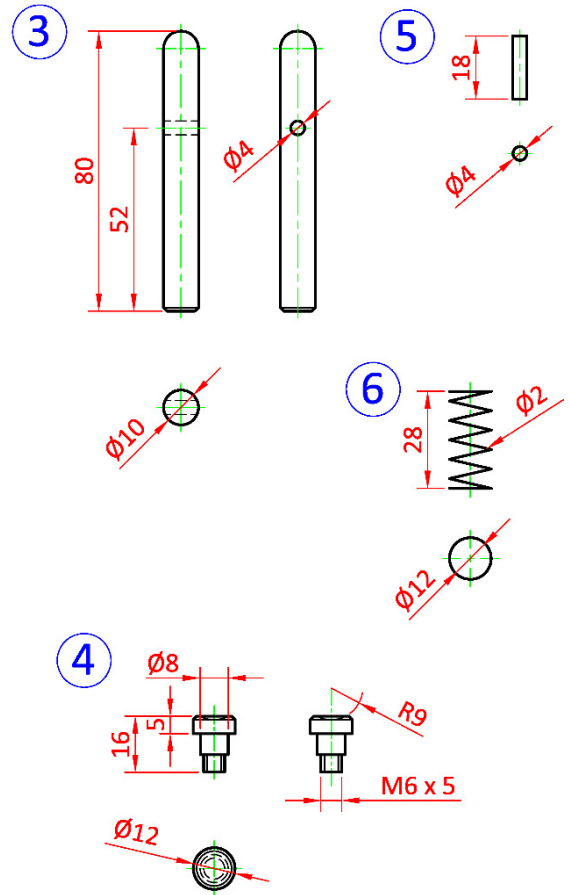
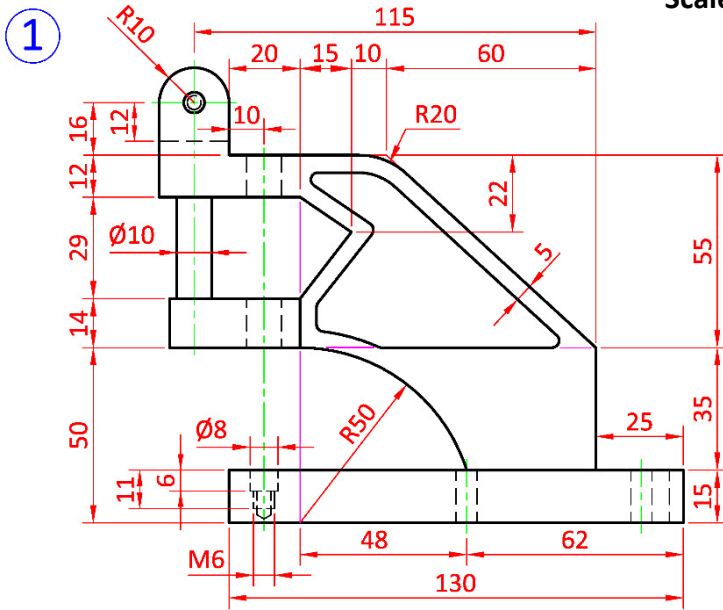


Fig. C-5

Part	Name	Qty.
1	Main Body	1
2	Handle	1
3	Punch	1
4	Lower Support	1
5	Pin	1
6	Spring	1
7	M6 × 20 Set Screw (Not Shown)	1

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