



Coimisiún na Scrúduithe Stáit

State Examinations Commission

Leaving Certificate Examination, 2023

Design & Communication Graphics

Higher Level

Section A (60 marks)

Centre No.

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** questions on the A3 sheet overleaf.
- 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.*
- *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.*

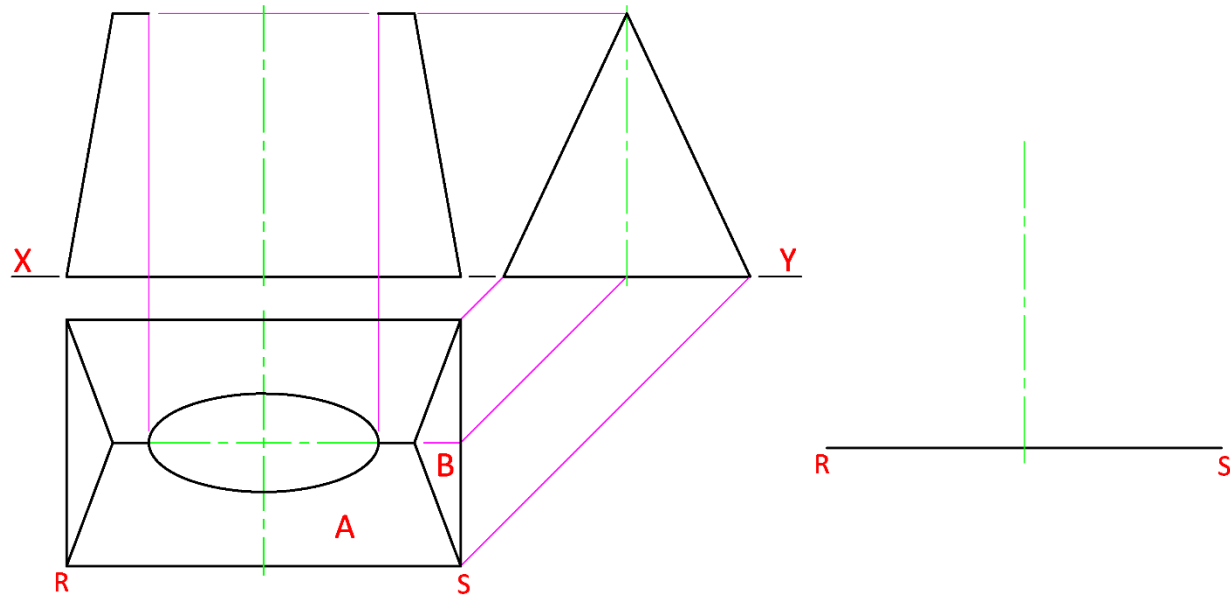
Examination Number

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

A-1. The image on the right shows a tissue box. The opening at the top of the box is elliptical in plan.

The drawing below shows the plan, incomplete elevation and end view of a similar tissue box. The position of a surface development of surface **A** is also shown.

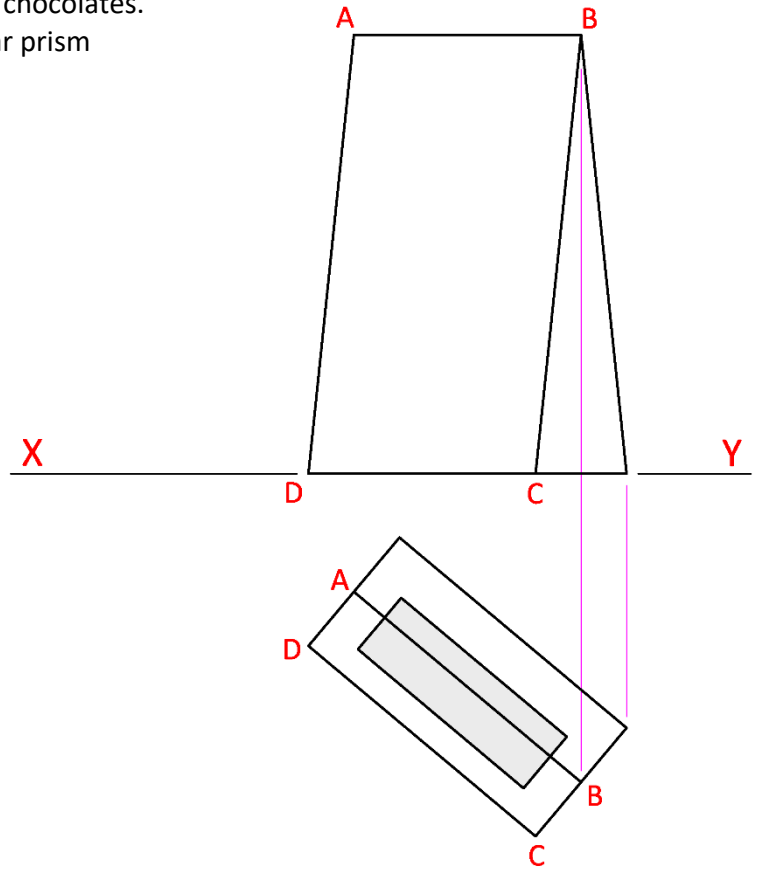
- (a) Complete the elevation.
(b) Complete a one-piece surface development of surfaces **A** and **B**.



A-3. The image below shows the packaging for *Skelligs* chocolates. The shape of the packaging is based on a triangular prism with a rectangular label at the top.

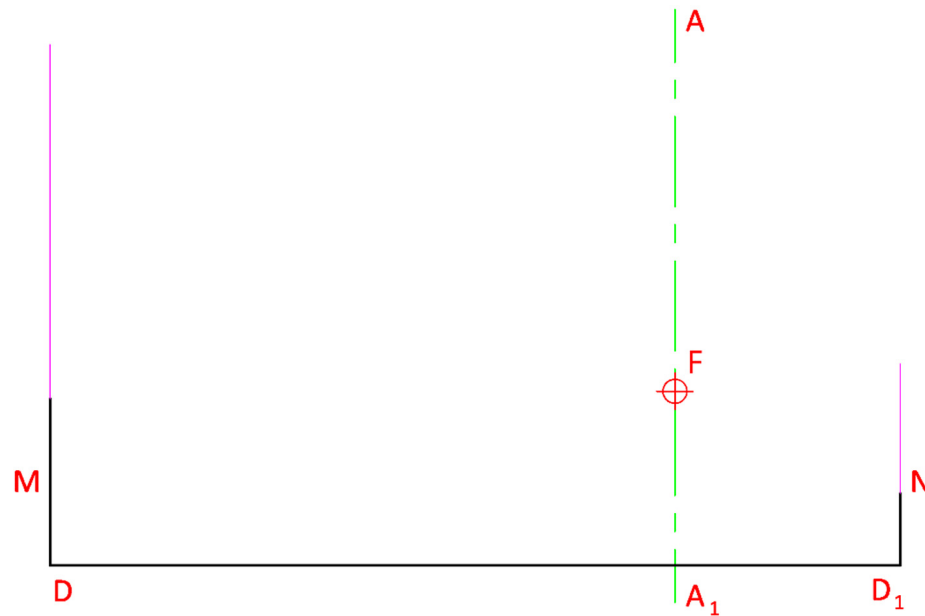
The drawing on the right shows the plan and incomplete elevation of a similar package.

- (a) Determine the horizontal and vertical traces of the oblique plane that contains the surface **ABCD**.
(b) Complete the elevation of the label (shaded area in plan) including all hidden detail.



A-2. The image below shows the ski jump from the 2022 Winter Olympics in Beijing China. The ski jump slope is in the shape of a hyperbola. The drawing shows the axis **AA₁**, directrix **DD₁**, focus **F**, and incomplete edges **M** and **N** of a similar ski jump. The hyperbola has an eccentricity of 3:2.

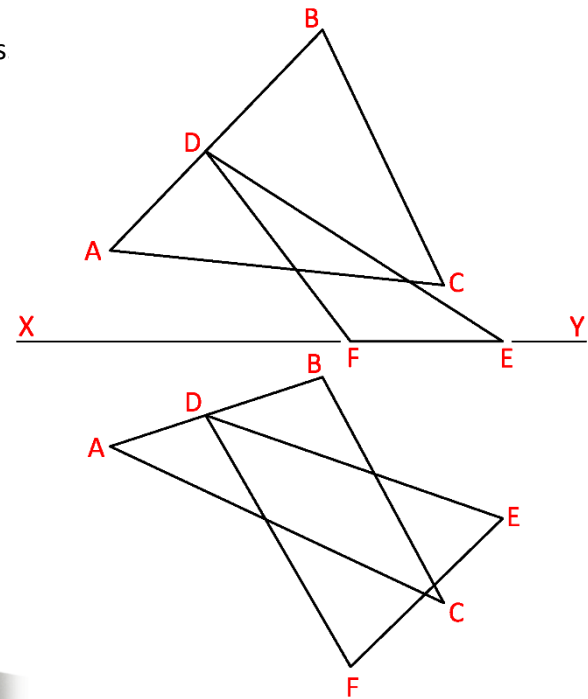
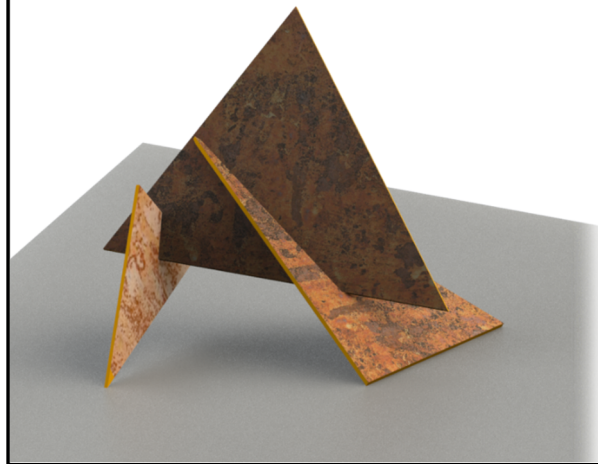
- (a) Locate the line of eccentricity and vertex of the hyperbola.
(b) Draw the portion of the hyperbola between edges **M** and **N** and complete the ski jump.



A-4. The image below shows a sculpture based on intersecting triangular planes.

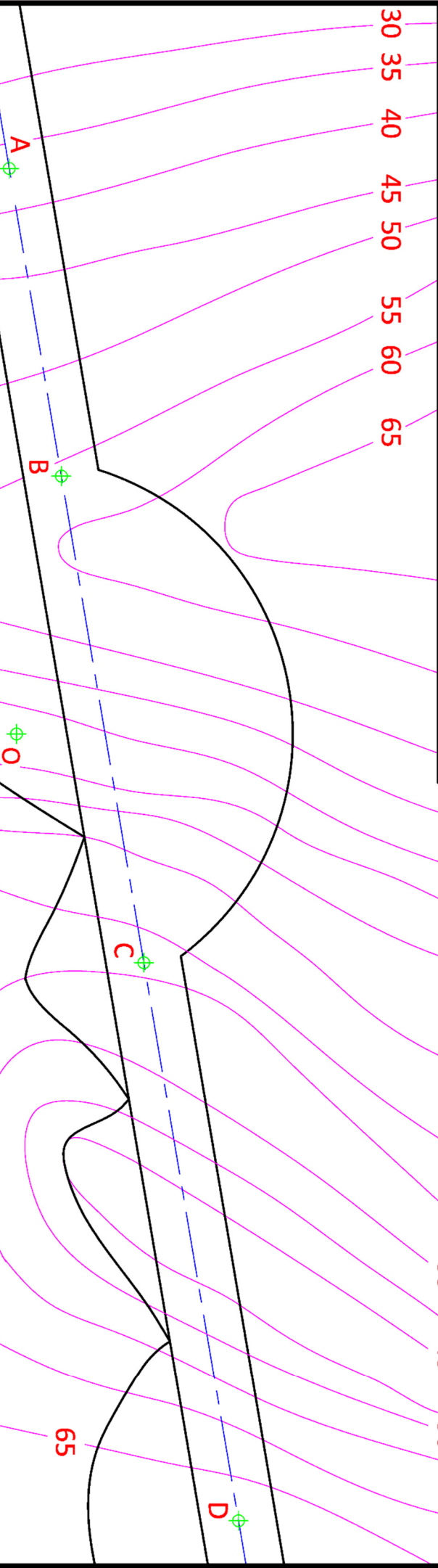
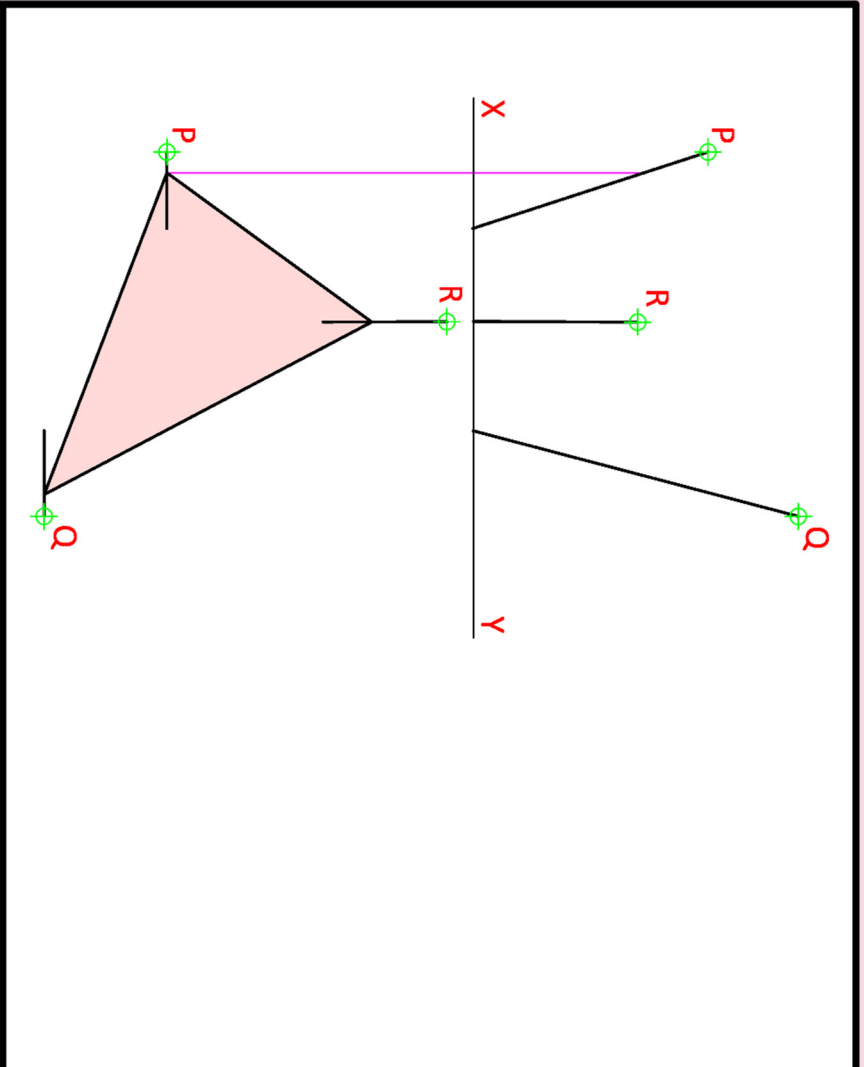
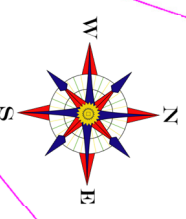
The drawing on the right shows the incomplete plan and elevation of two of these intersecting planes.

- (a) Draw the plan and elevation of the line of intersection between the two planes.
(b) Determine the true shape of the plane **DEF**.



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, 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.

Do not hand this up.

**This document will not be returned to the
State Examinations Commission.**

SECTION B - Core

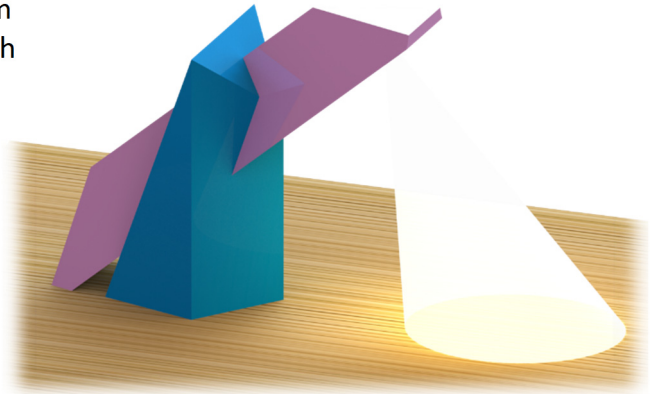
Answer **any two** questions from this section on drawing paper.

- 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.



Scale 1:2

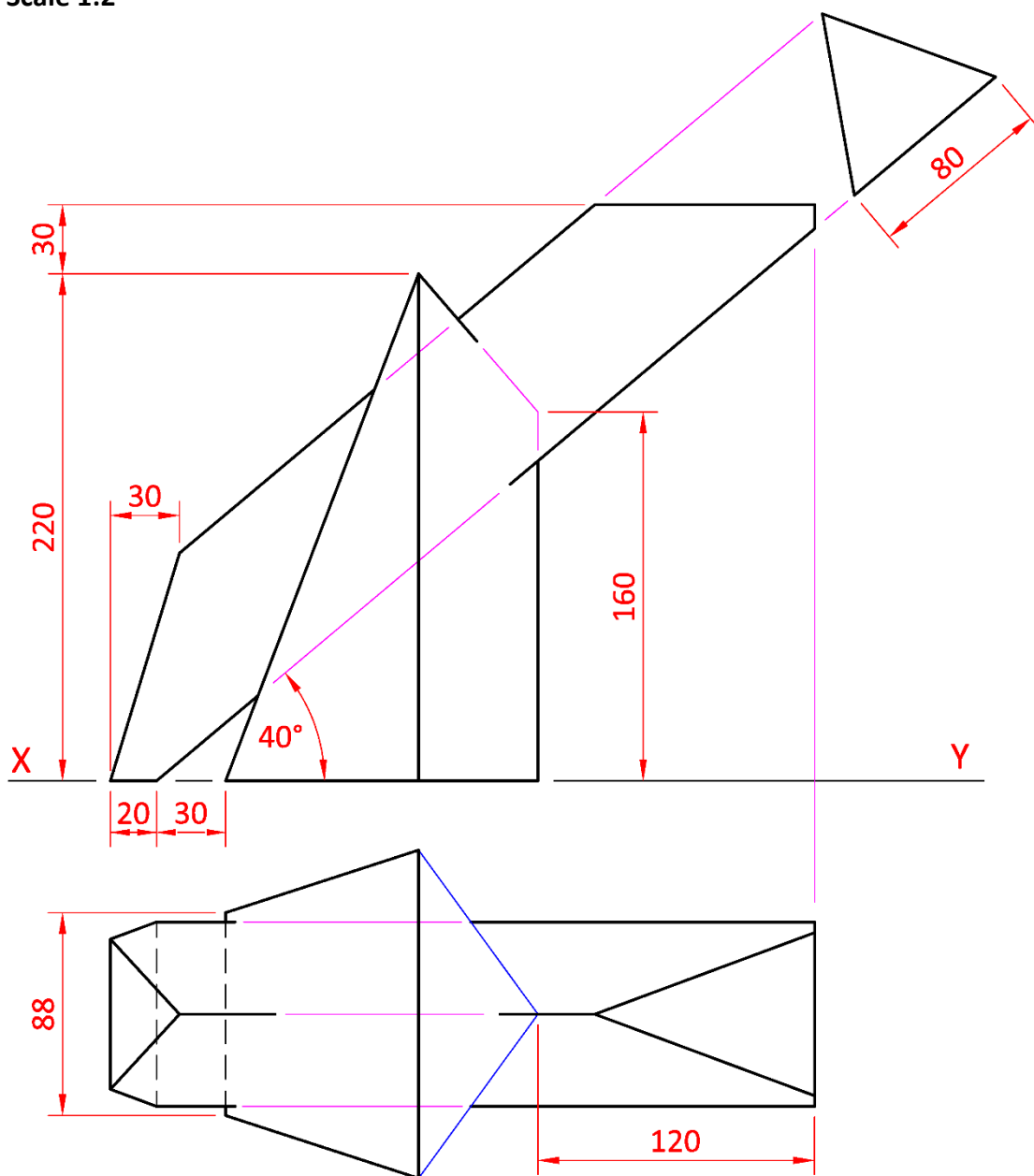


Fig. B-1

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

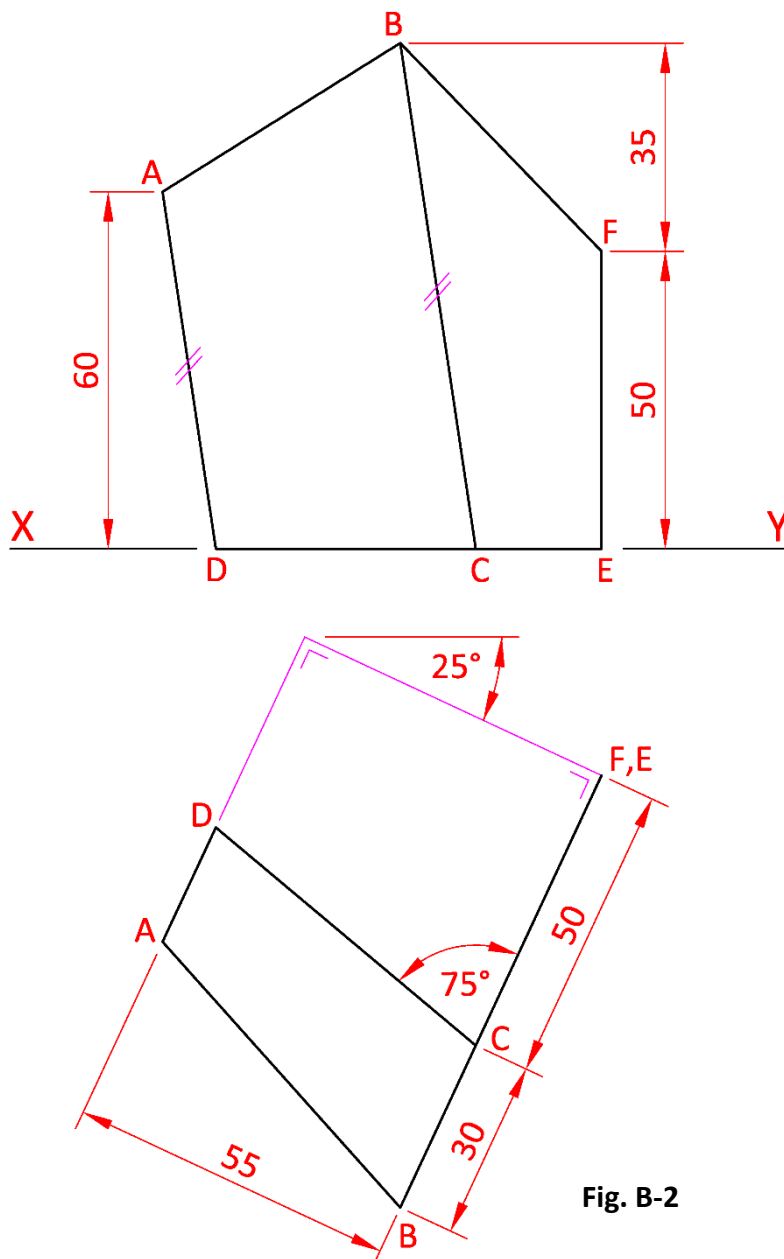


Fig. B-2

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.

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



Scale 1:1

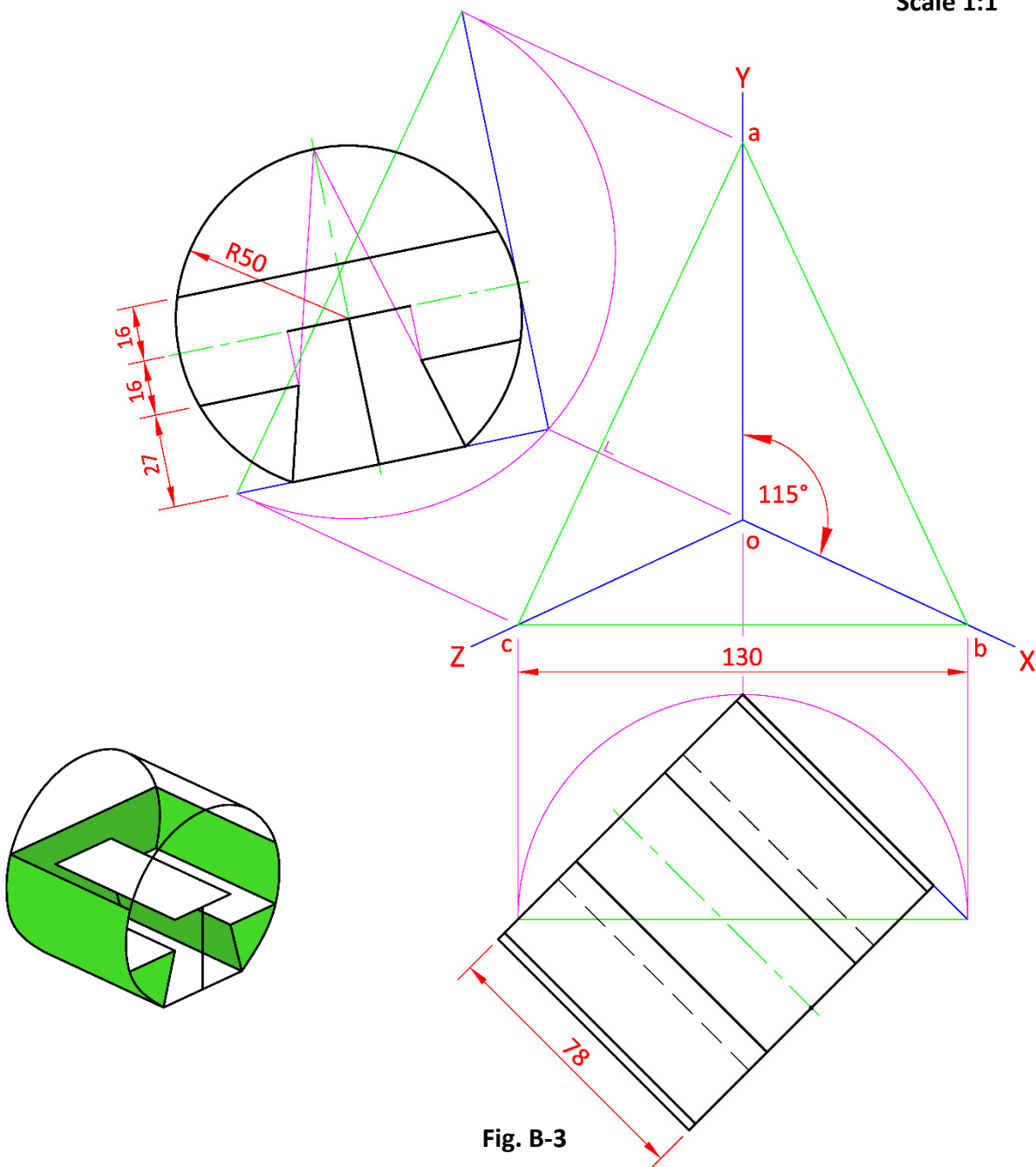


Fig. B-3

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

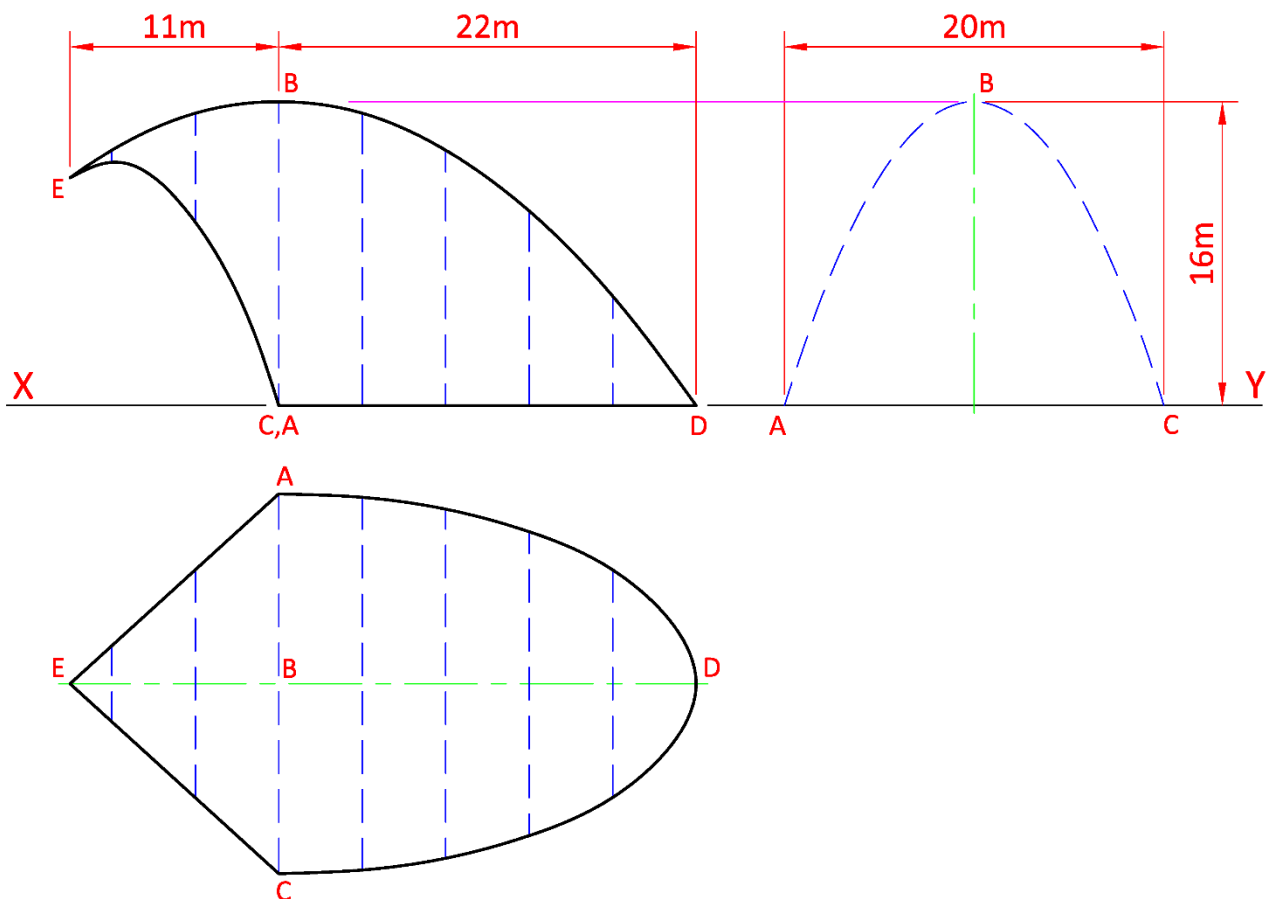


Fig. C-2

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.

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

Scale 1:1

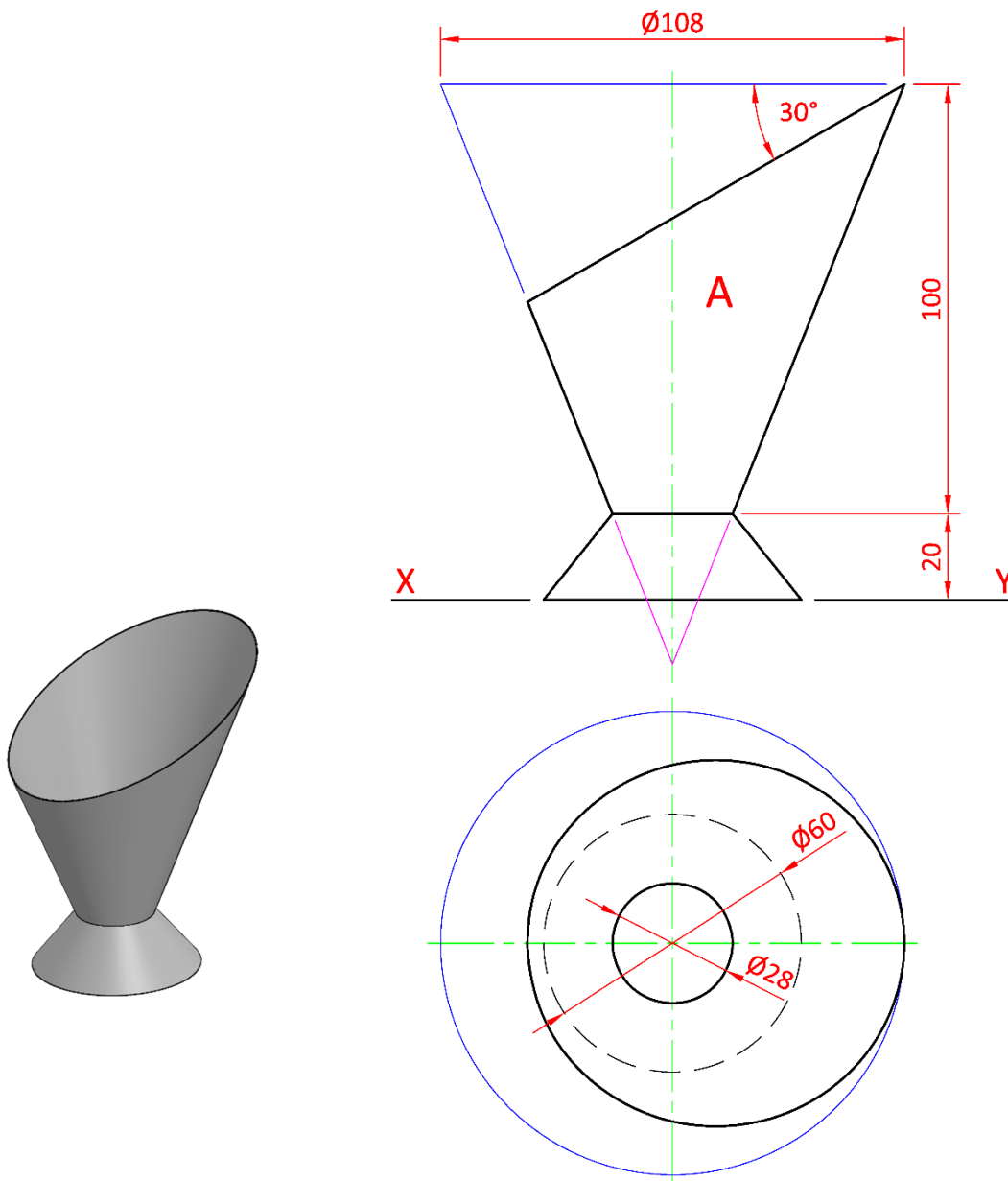


Fig. C-3

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.

- Draw the given diagram.
- Plot the locus of point **C** for the combined movement.

Scale 1:1

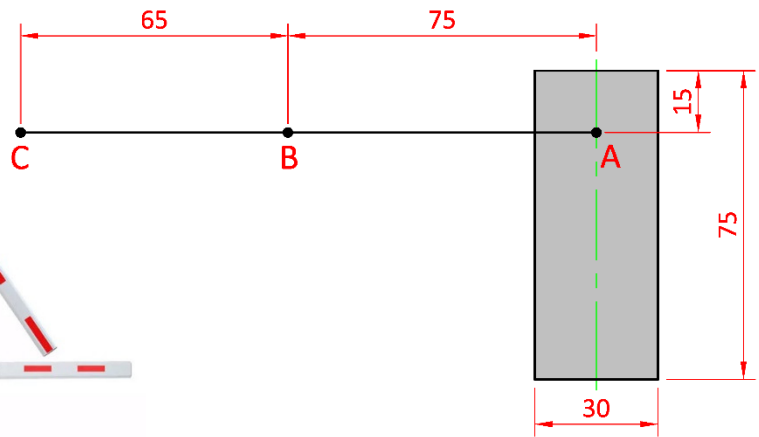


Fig. C-4(a)

- (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**.

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

Scale 1:1

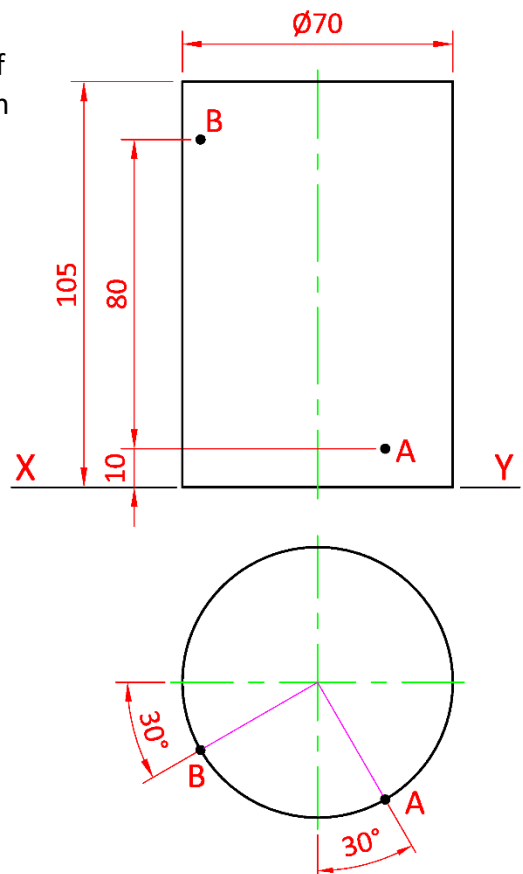


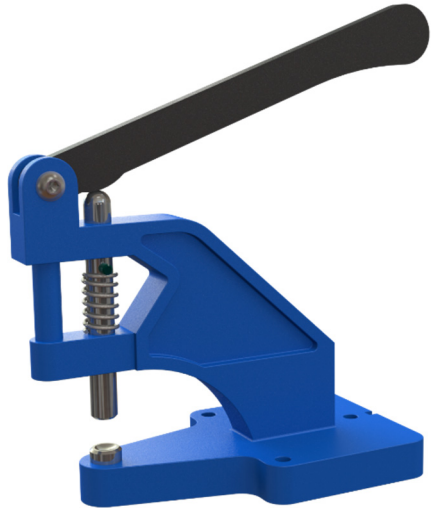
Fig. C-4(b)

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

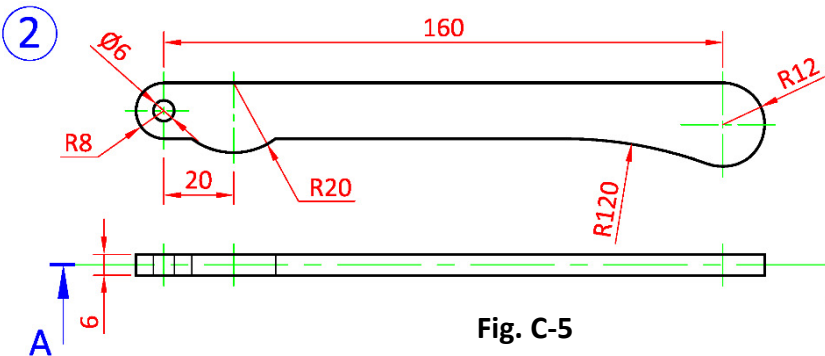
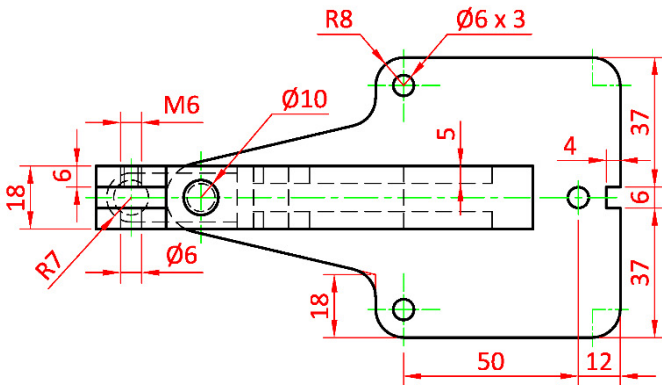
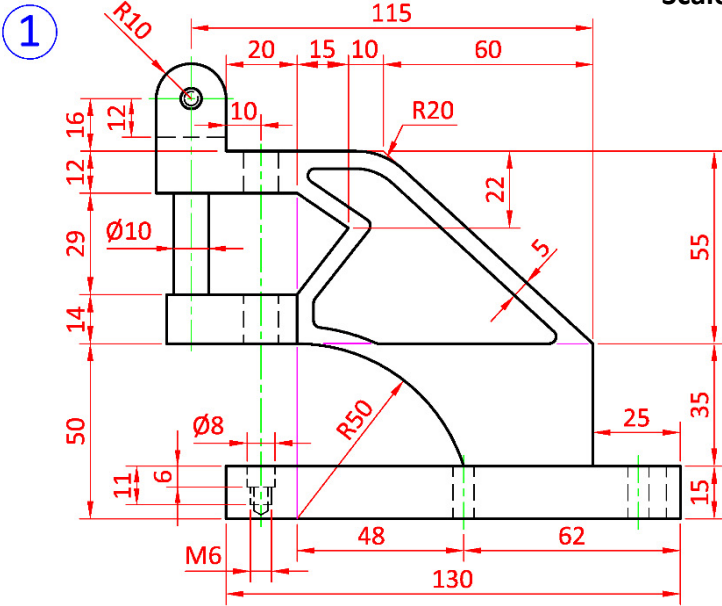
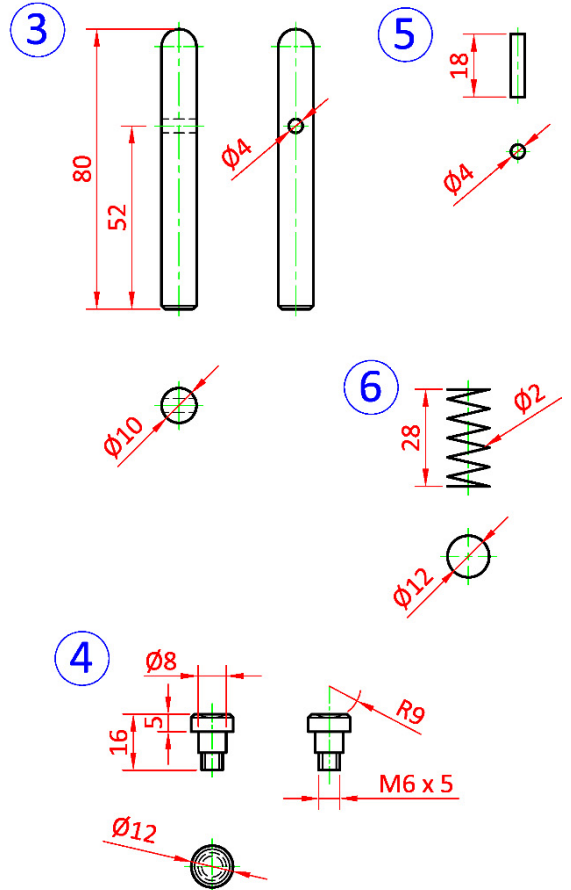


Fig. C-5



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

There is no examination material on this page

There is no examination material on this page

There is no examination material on this page

Do not hand this up.

This document will not be returned to the
State Examinations Commission.