2022. M80BC 2022L562G2EL

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination, 2022

Design & Communication Graphics

Ordinary Level
Sections B and C (120 marks)

Thursday, 23 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 image on the right shows a Tesla charging station. Fig B-1 below shows an incomplete isometric projection of a similar charging station.

The elevation and plan of the station 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 charging station.

(d) Draw the axonometric projection of the central cut-out including the semi-circle.

Scale 1:1

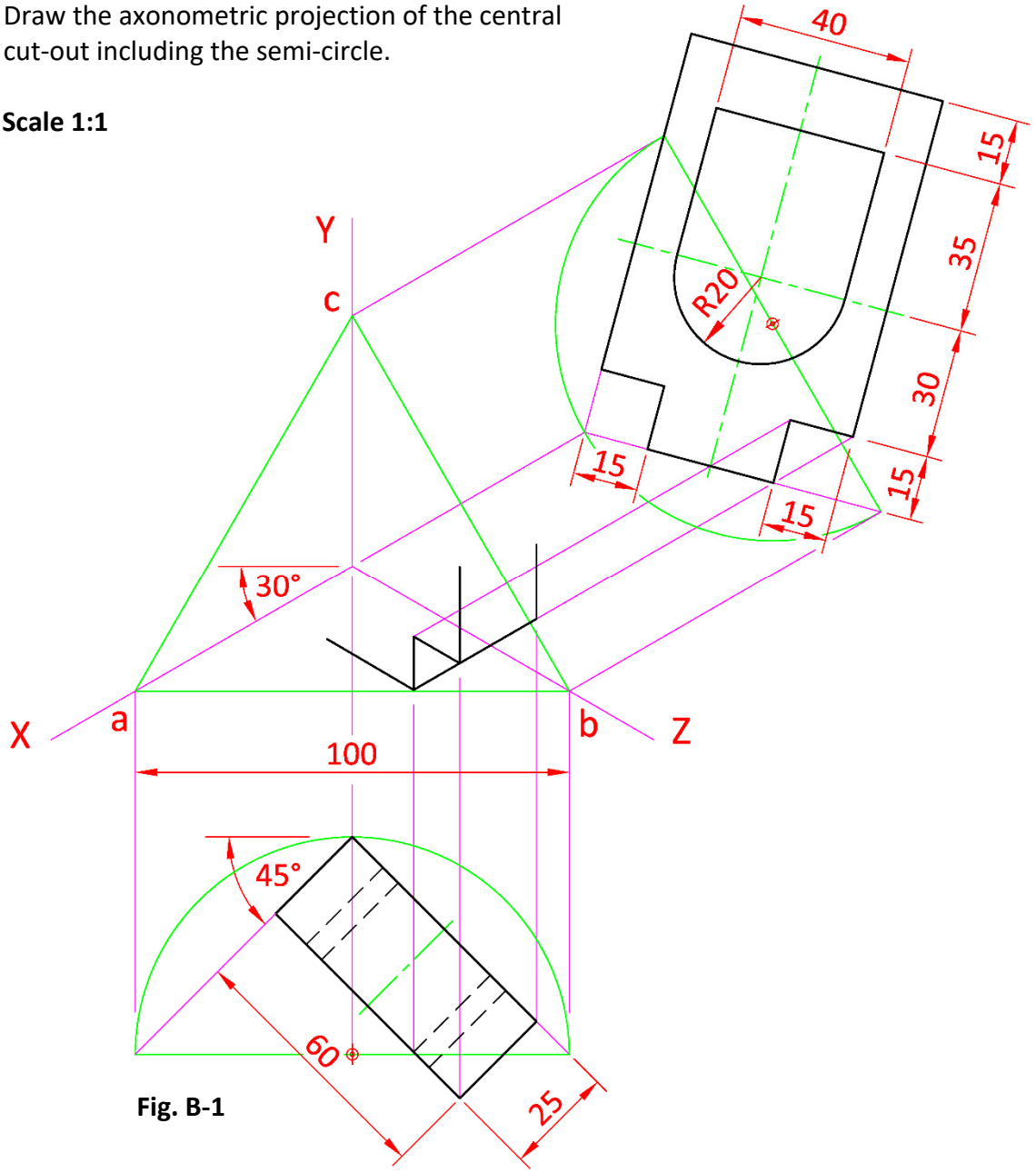


Fig. B-1

B-2. The image on the right shows a BMX freestyler at the 2020 Olympic Games. The BMX course consisted of a number of ramp structures.

Fig. B-2 below shows the elevation and incomplete plan of a similar BMX ramp structure. The outline profile of a second ramp is also shown on the right below.

A 3D graphic is also given.

(a) Draw the given elevation and incomplete plan of the structure.

(b) Complete the plan showing all lines of interpenetration.

(c) Draw an end view of the structure.

Scale 1:1

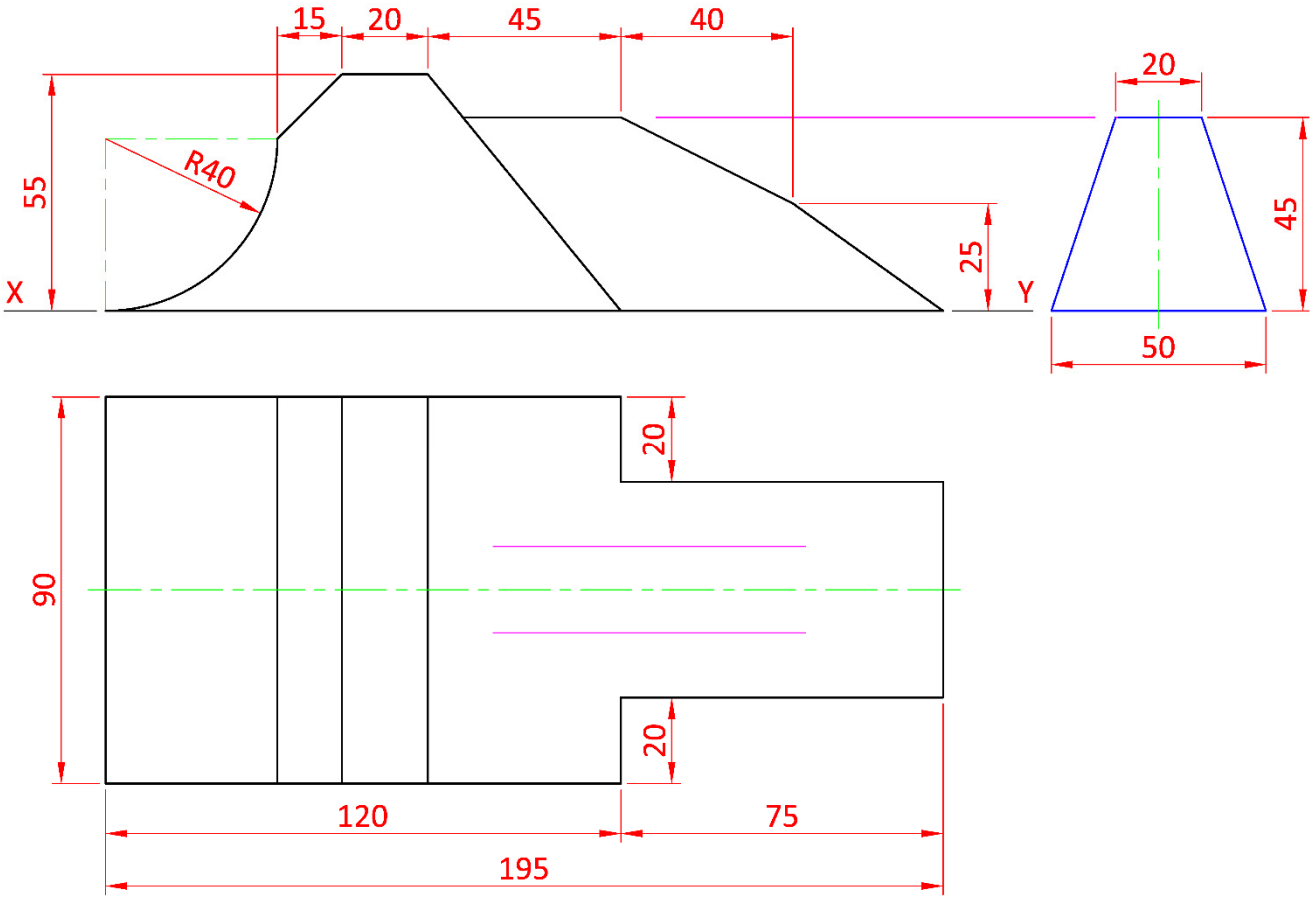
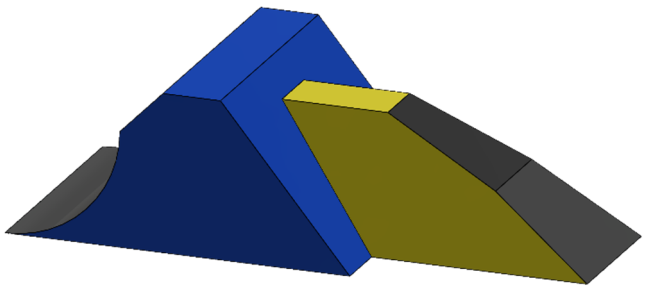


Fig. B-2



B-3. The 3D graphic on the right shows a birdhouse.

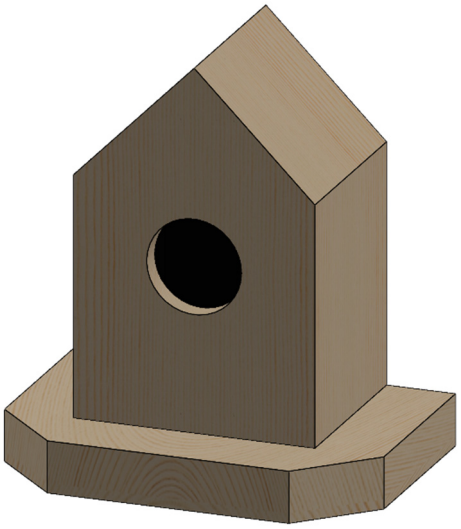


Fig. B-3 below shows an isometric view of the birdhouse.

Note: *The hole is not required to be drawn.*

(a) Draw the elevation of the birdhouse looking in the direction of the arrow.

(b) Project a plan from the elevation.

(c) Draw the auxiliary elevation of the ***birdhouse***, projected from the plan, which will include the true shape of surface **A**.

Scale 1:1

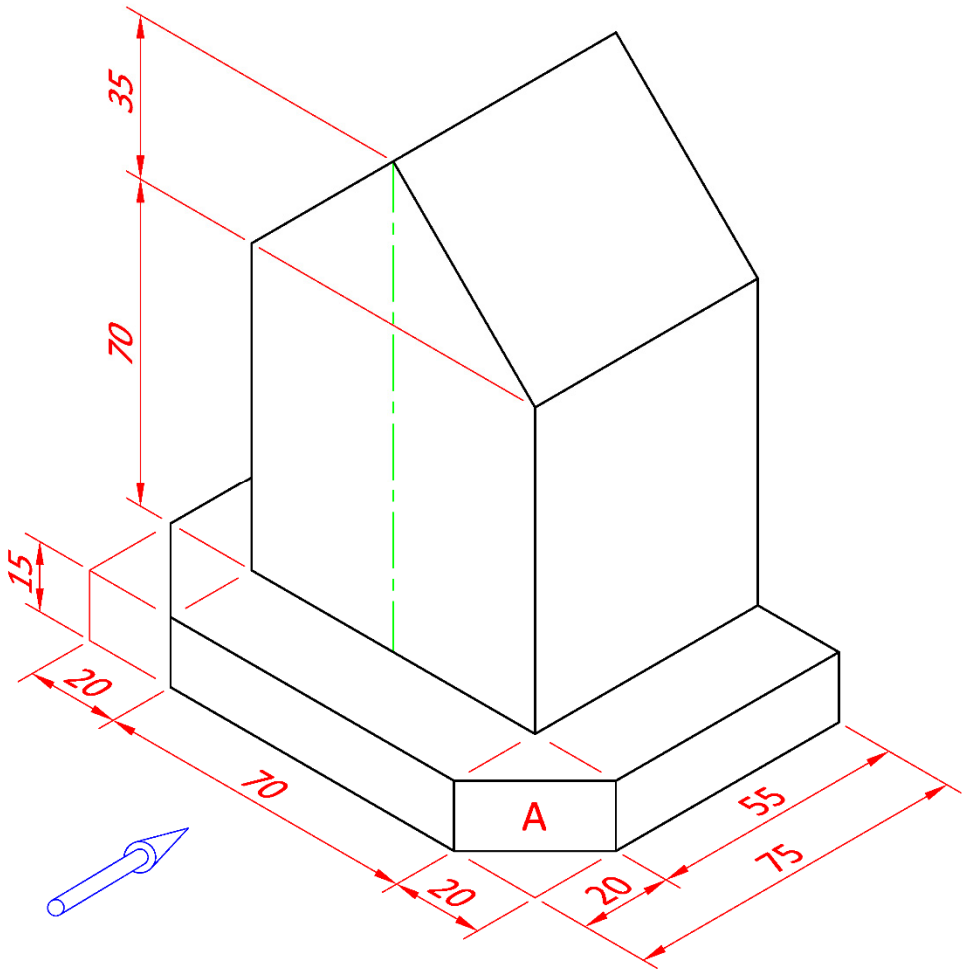


Fig. B-3

SECTION C - Applied Graphics

Answer **any two** questions 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) The image on the right shows a section of the M8 motorway which links Dublin to Cork.

CD is the centreline of the roadway which is level at an altitude of 50m.

Using side slopes of 1:1 for the embankments and 1:2 for the cuttings, complete the earthworks on the northern side, which are necessary to accommodate the roadway.

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

Scale 1:1000

C-2. The image on the right shows a beach art structure at a holiday destination. The top of the structure consists of a hyperbolic paraboloid.
The structure appears as a square in plan.

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

(a) Draw the plan and elevation of the given structure.

(b) Project an end view of the structure.

Scale 1:1

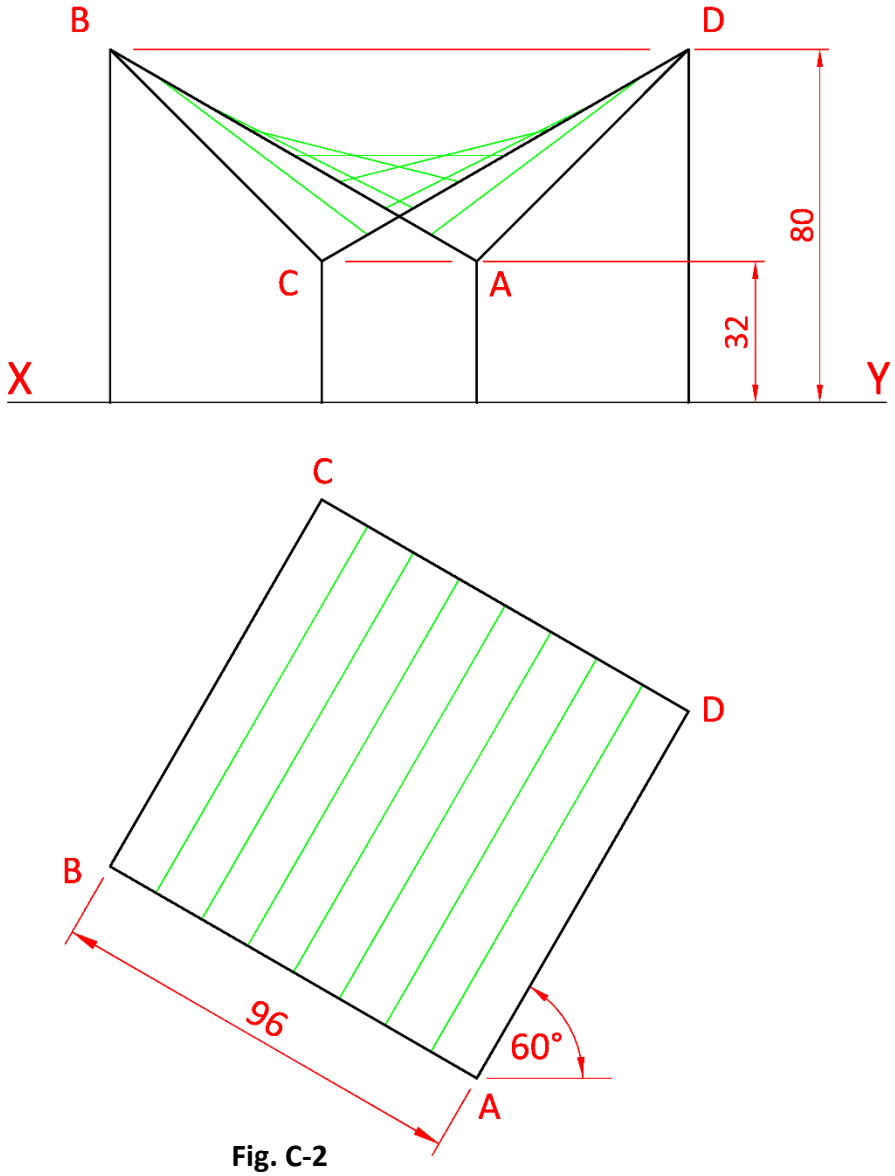


Fig. C-2

Surface Geometry

C-3. The image on the right shows a digger bucket.

The projections of a similar digger bucket are shown in Fig. C-3 below. All teeth are equal in width.

(a) Draw the given plan and elevation of the digger bucket.

(b) Project an end view of the bucket.

(c) Draw a one-piece surface development of the digger bucket.

Scale 1:1

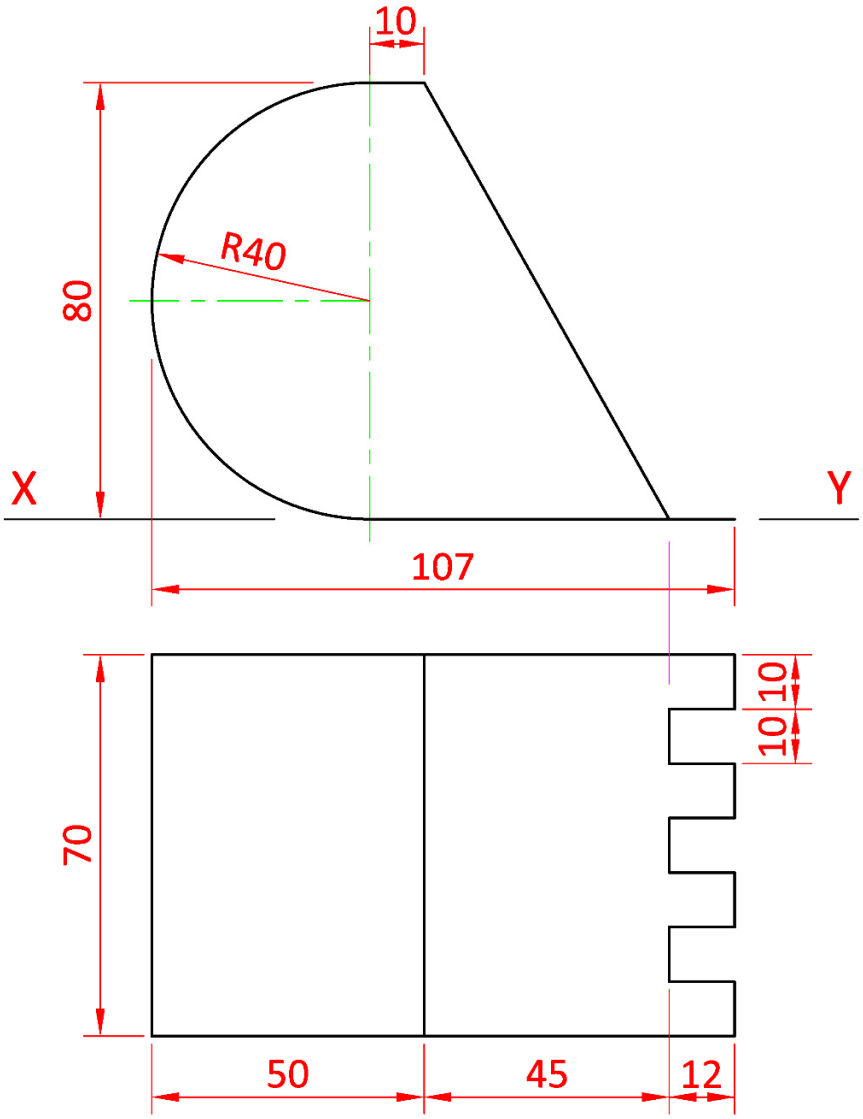
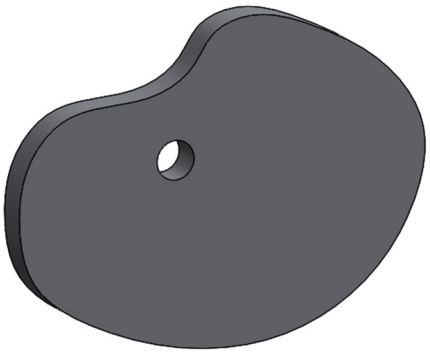


Fig. C-3

Dynamic Mechanisms

C-4. **(a)** A cam mechanism is a profiled shape (similar to the one shown on the right) mounted on a shaft that is used to convert rotary motion into linear motion.



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

- 0^o to 90^o Rise 70mm with uniform velocity
- 90^o to 120^o Dwell
- 120^o to 180^o Fall 20mm with uniform velocity
- 180^o to 360^o Fall 50mm with simple harmonic motion.

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

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

(b) The graphic below shows an earring which is based on the profile of a cylindrical helix.

Fig. C-4(b) on the right shows the projections of a cylinder and a portion of such a helix.

(i) Draw the given plan and elevation of the cylinder.

(ii) Complete the projections of a regular helix which moves in an anticlockwise direction about the cylinder, from point **A** on the base to point **B** at the top, in one revolution.

Scale 1:1

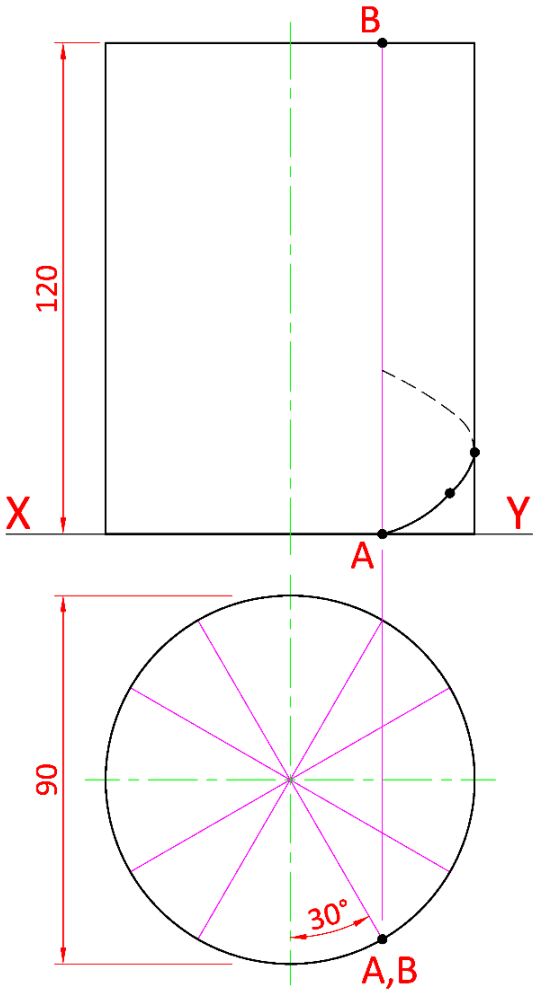
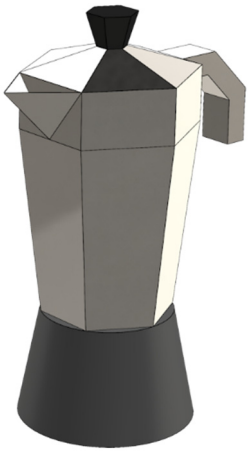


Fig. C-4(b)

Assemblies



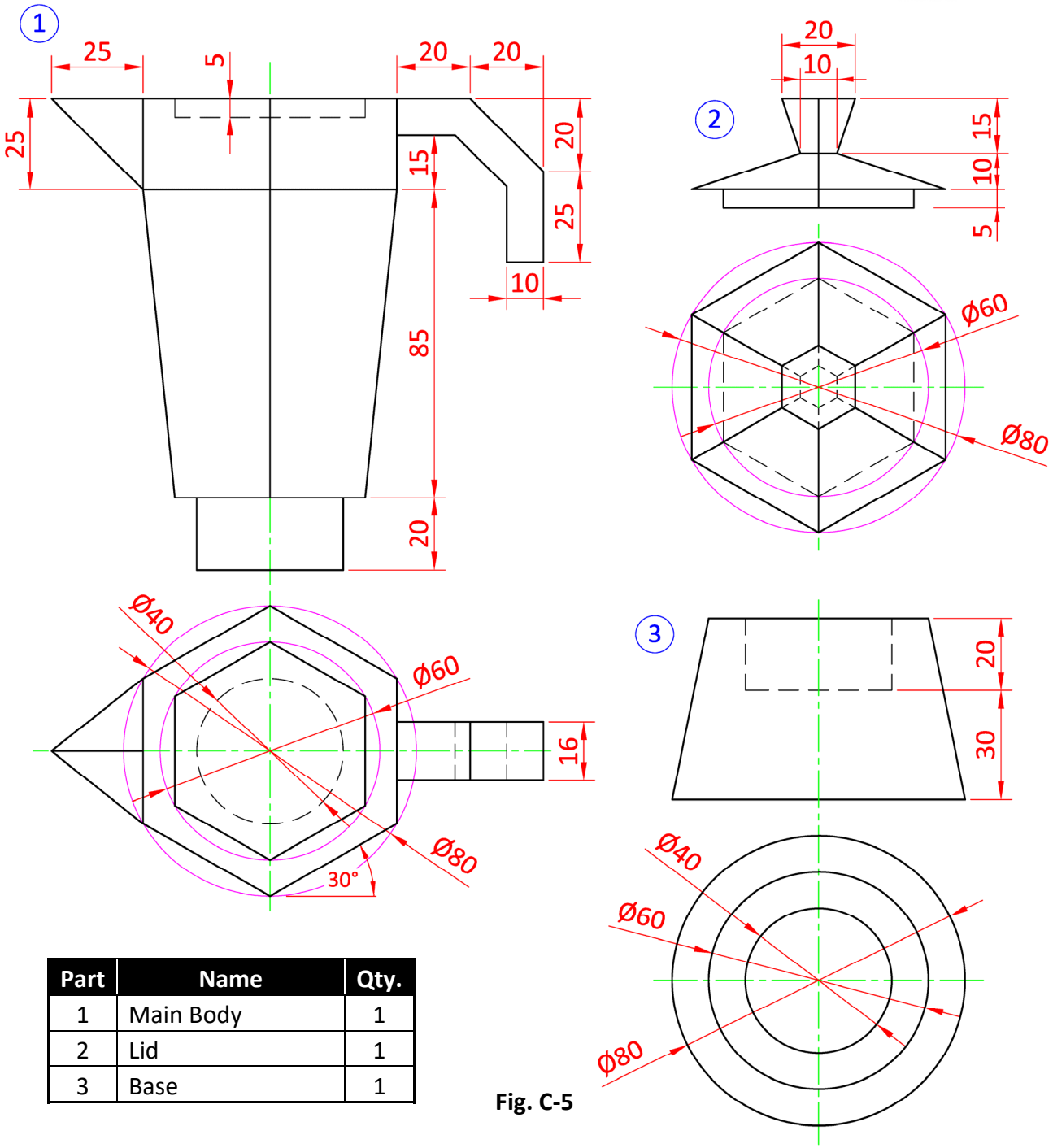
C-5. Stove-top coffee pots are a very popular method of brewing coffee at home. Details of a stove-top coffee pot are given in Fig. C-5 below.

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

Draw the ***elevation*** of the assembled coffee pot.

Note: Any *omitted dimensions may be estimated. Unnecessary dimensions and hidden detail have been omitted for clarity*.

Scale 1:1



Part	Name	Qty.
1	Main Body	1
2	Lid	1
3	Base	1

Fig. C-5

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