



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.



- Draw the given equilateral triangle **abc** and the axonometric axes **X**, **Y**, and **Z**.
- Draw the elevation and plan, positioned as shown.
- Draw the axonometric projection of the rectangular outline of the charging station.
- Draw the axonometric projection of the central cut-out including the semi-circle.

Scale 1:1

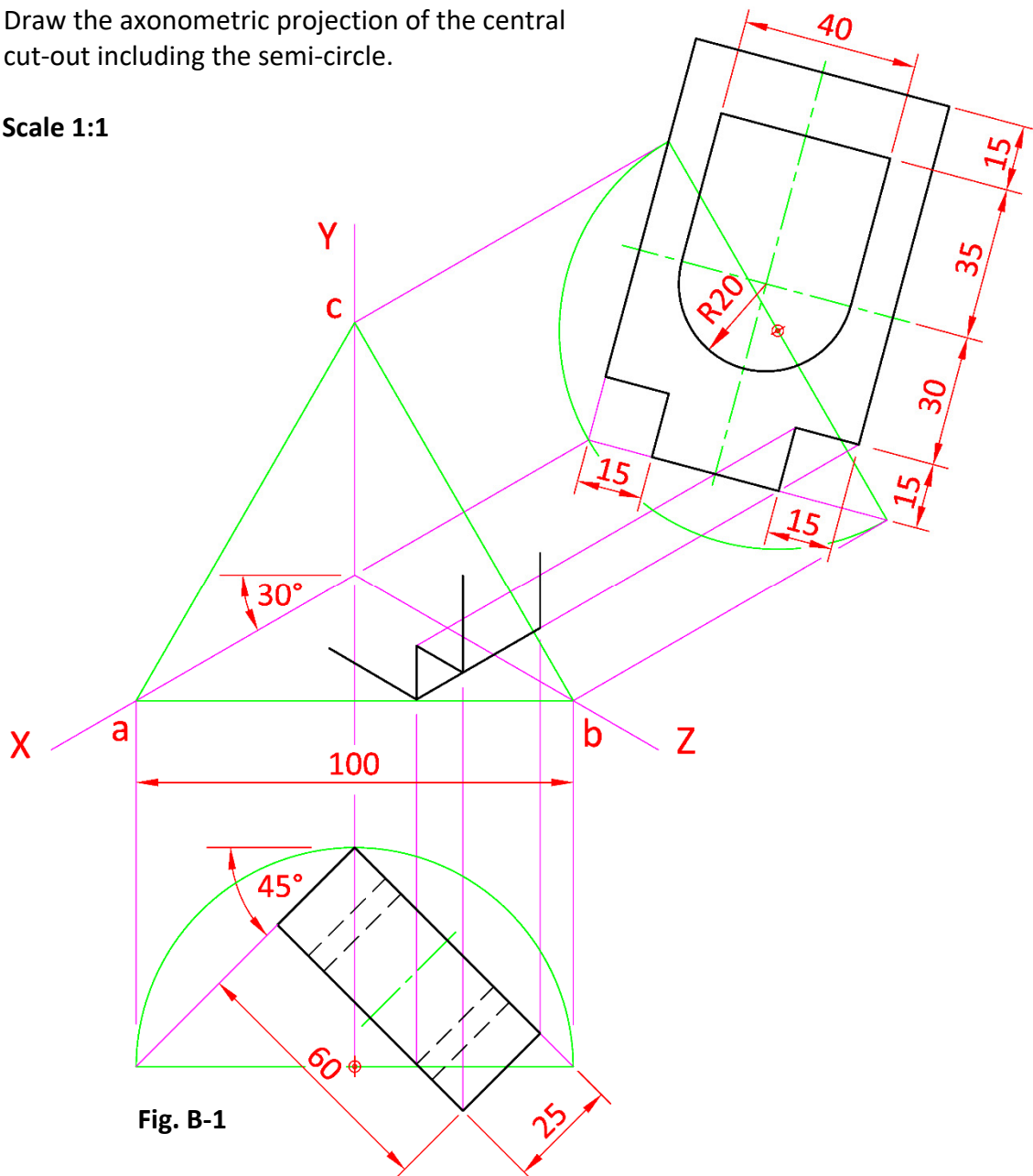


Fig. B-1

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

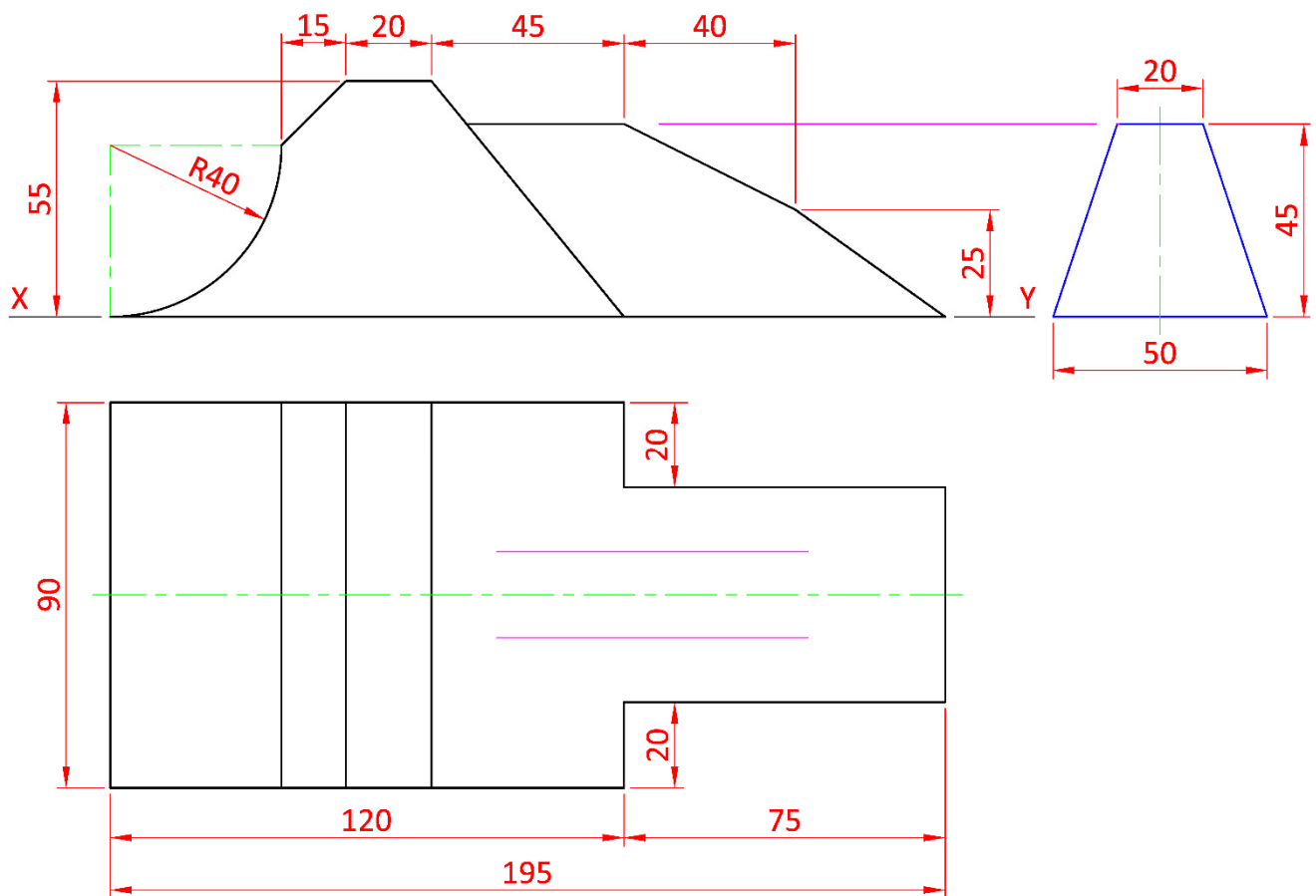
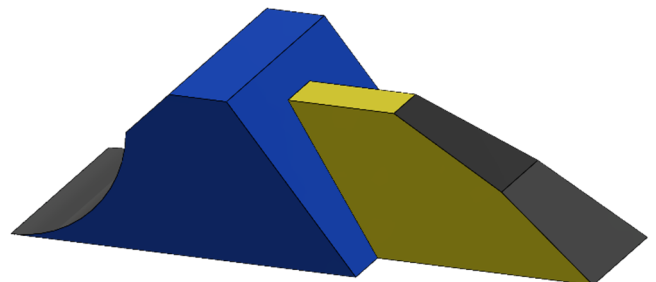


Fig. B-2

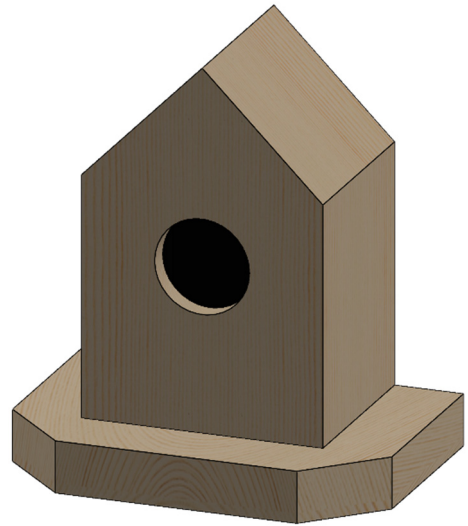


B-3. The 3D graphic on the right shows a birdhouse.

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

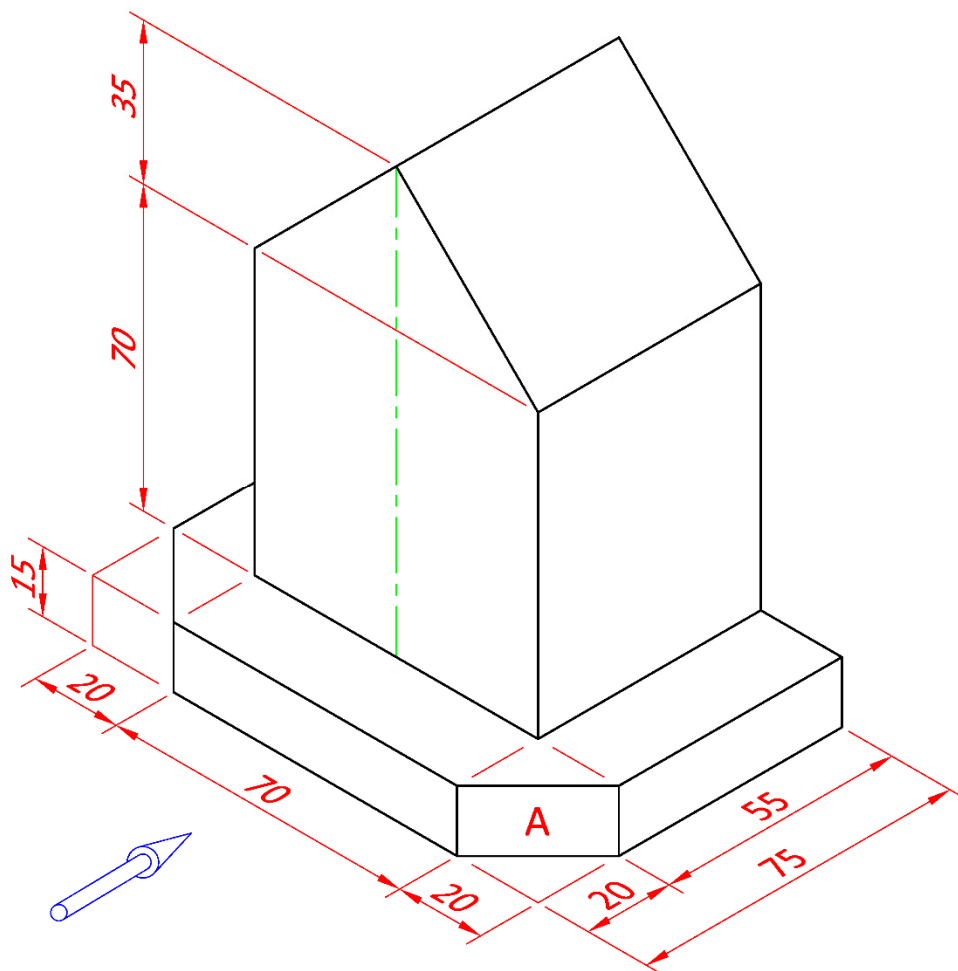


Fig. B-3

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

Structural Forms

- 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

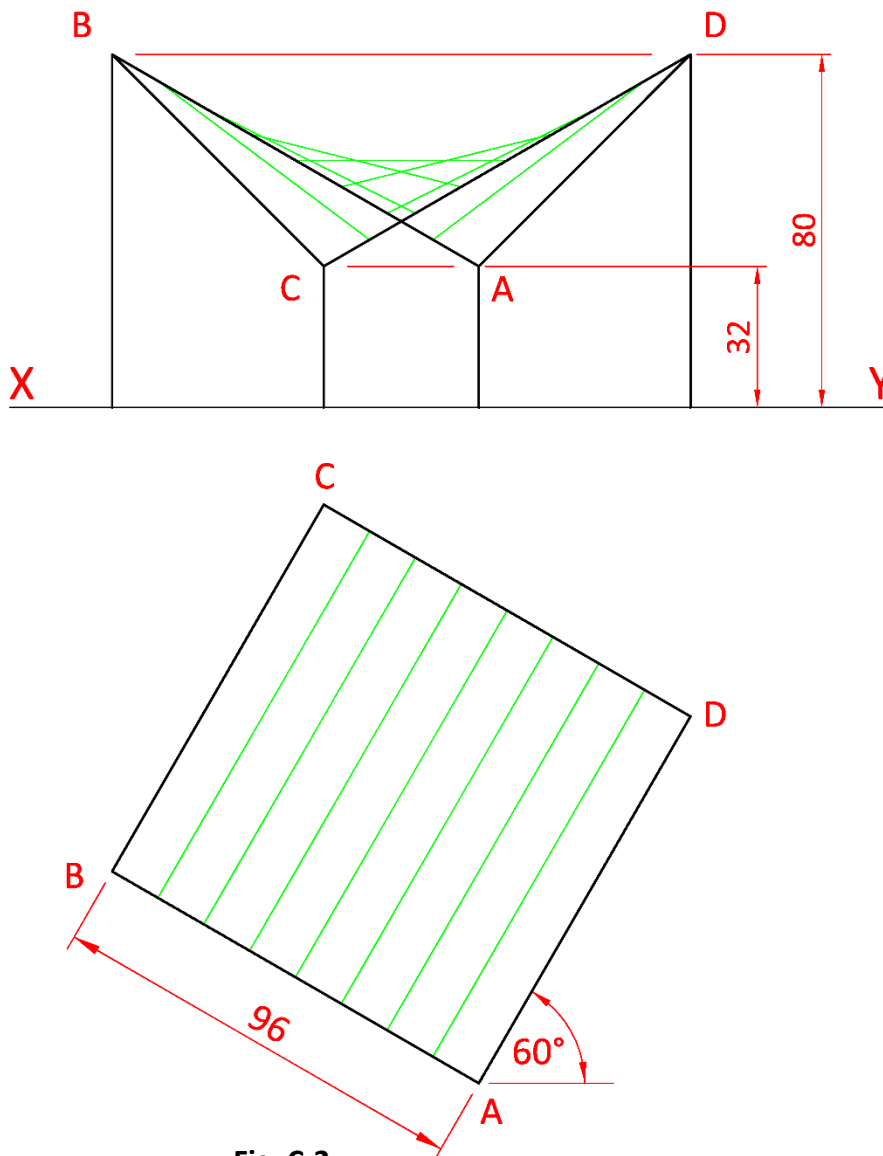


Fig. C-2

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

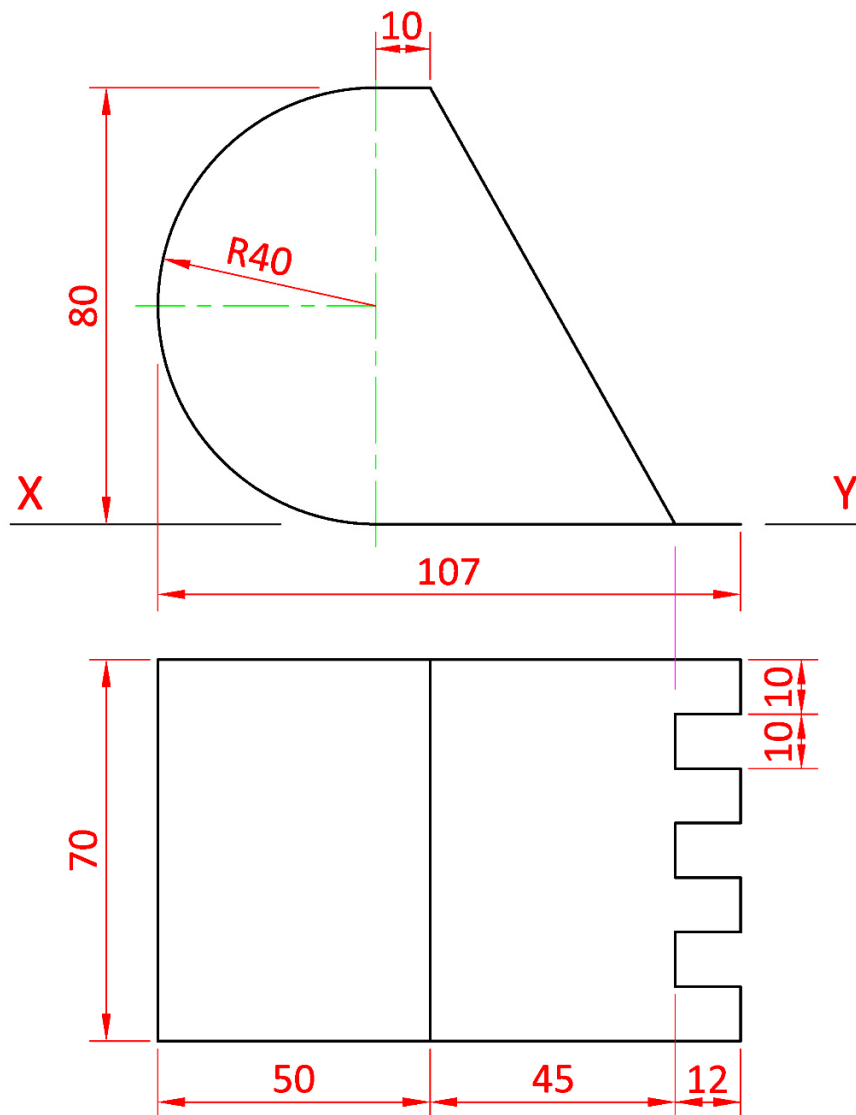
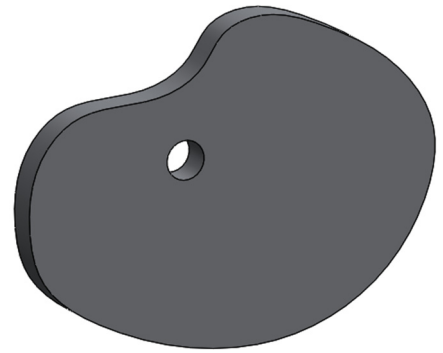


Fig. C-3

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

(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 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

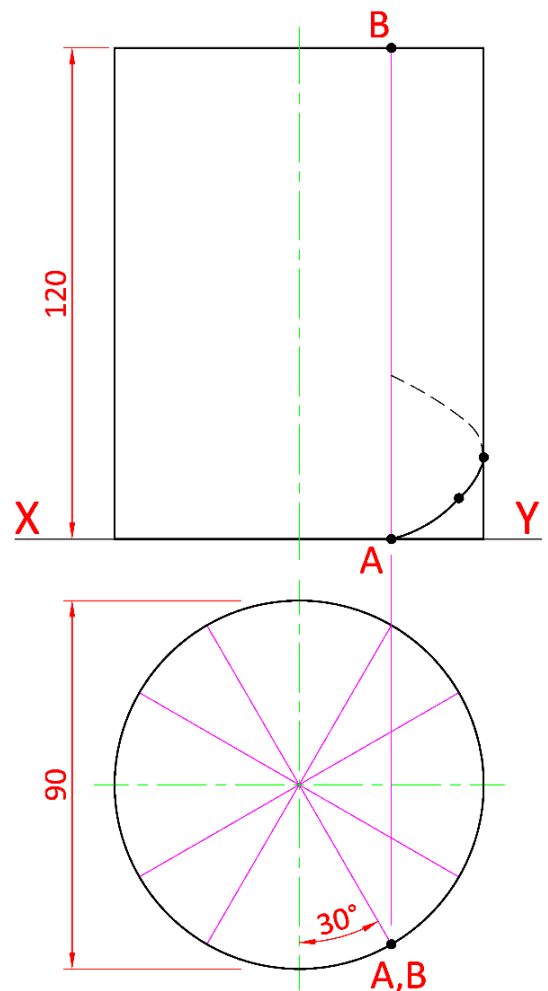


Fig. C-4(b)

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

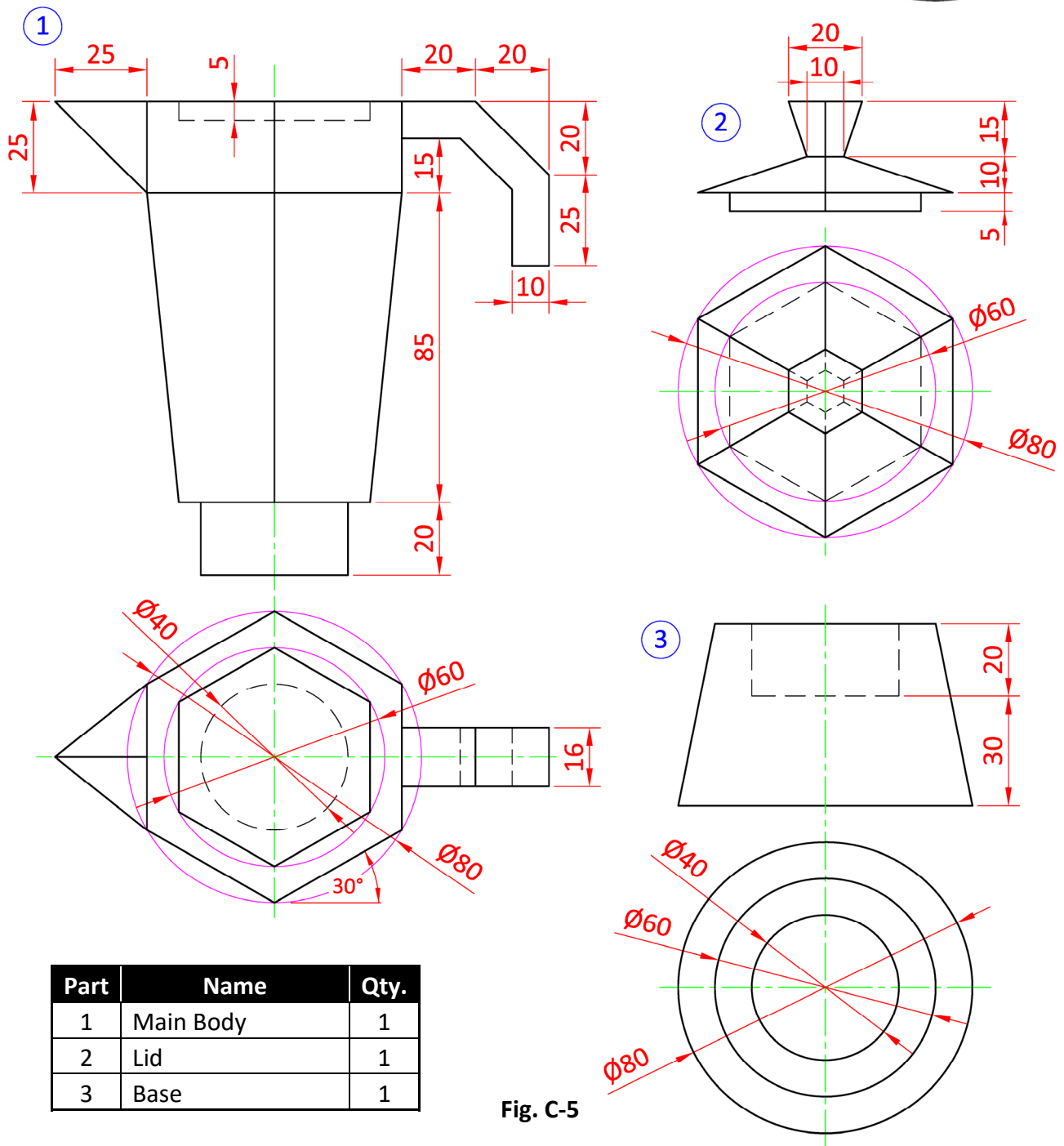
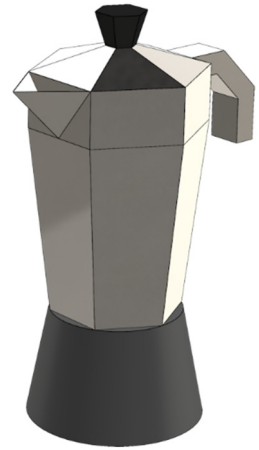


Fig. C-5

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