Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination, 2019

Design & Communication Graphics

Ordinary Level
Sections B and C *(180 marks)*

Thursday, 20 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** on drawing paper.
- All questions in Section B carry **45 marks** each.

SECTION C
- Five questions are presented.
- Answer **any two** (i.e. the options you have studied) on drawing paper.
- All questions in Section C carry **45 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.*

SECTION B - Core

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

B-1. The 3D graphic on the right shows a piece of equipment from a children's play area. It consists of a shaped main structure with a crawl tunnel passing through it.

Fig. B-1 below shows the elevation and incomplete plan of a model of the structure.

The outline profile of the tunnel is also shown on the left below.
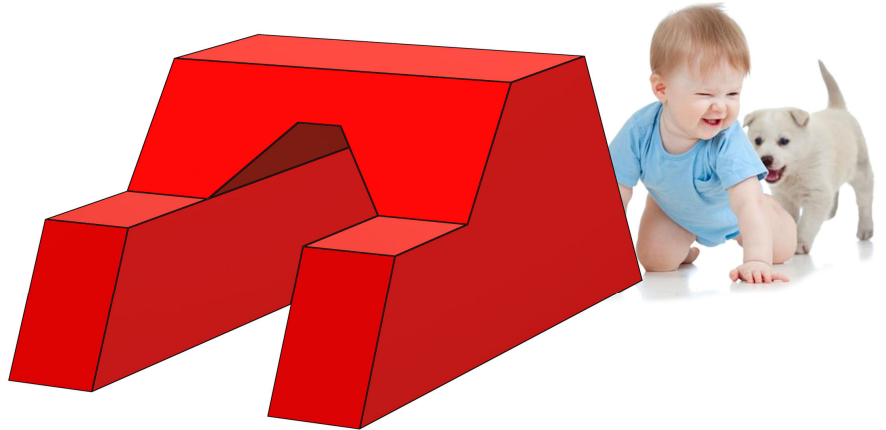
(a) Using the information provided in the 3D graphic and in Fig. B-1, draw the elevation and the incomplete plan of the structure as given.

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

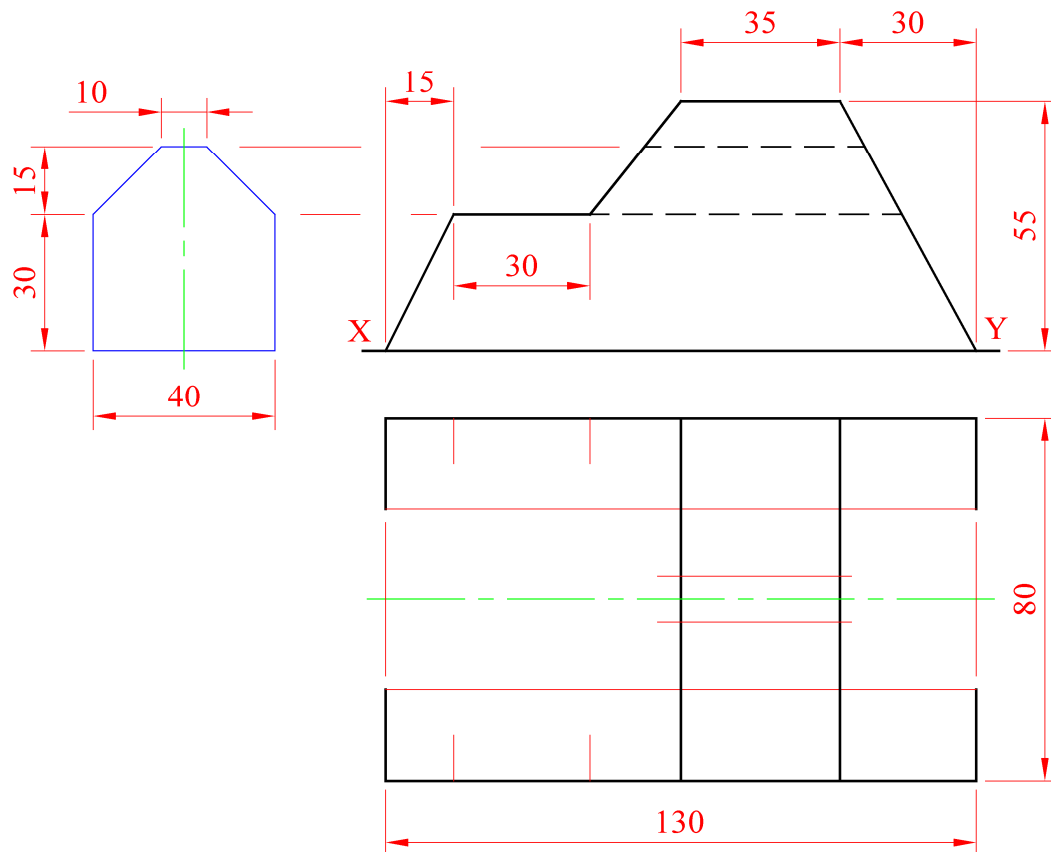**(c)** Draw an end view of the structure.

Scale 1:1

Fig. B-1

B-2. The graphic on the right shows a candle holder and a candle.

Fig. B-2 below shows an incomplete isometric projection of a similar candle holder.

The elevation and plan of the holder 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 body of the candle holder.

(d) Draw the axonometric projection of the circular hole on the top surface of the candle holder.
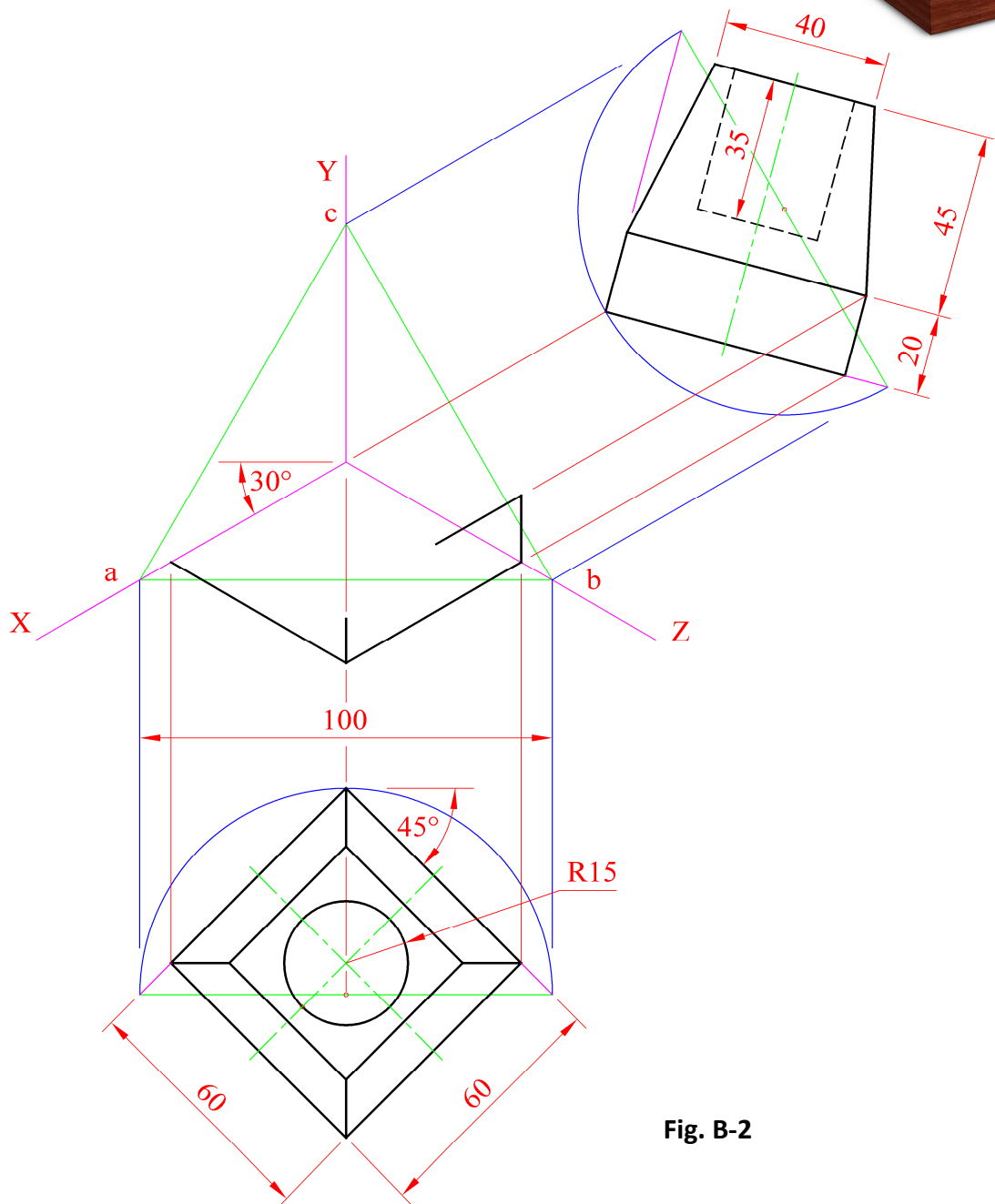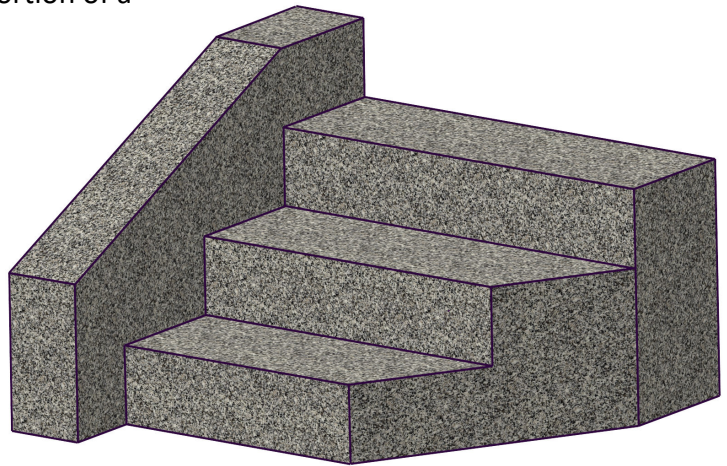
Scale 1:1

Fig. B-2

B-3. The graphic on the right shows steps and portion of a wall.

Fig. B-3 below shows an isometric view of a similar structure.

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

(b) Project a plan from the elevation.

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

Scale 1:1

Fig. B-3
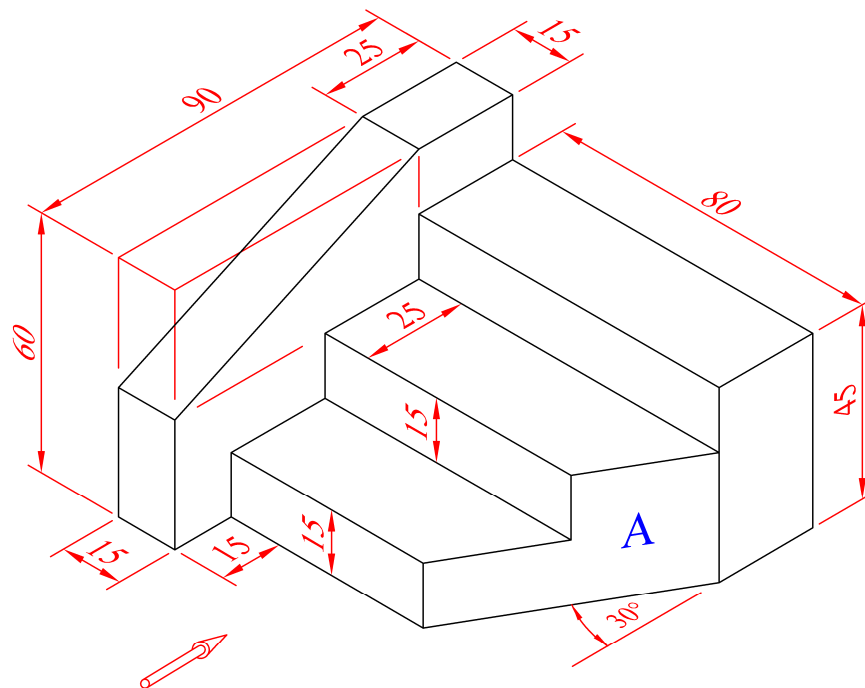
SECTION C - Applied Graphics
Answer **any two** questions (i.e. the options you have studied)
from this section on drawing paper.

Geologic Geometry

C-1. The image on the right shows an aerial view of an open mine. A portion of a similar mine area is represented on the accompanying map, located on the back page of Section A. The map shows ground contours at five metre vertical intervals.

  (a) On the map supplied, draw a vertical section (profile) on the line **AB**.

  (b) Points **C**, **D** and **E** are outcrop points on the surface of a stratum of ore.
  Draw the plan and elevation of the triangle **CDE**.

  (c) Determine the strike and dip of the stratum.

Scale 1:1000

Structural Forms

C-2. The image on the right shows a wooden watch face. The top surface of the watch face is a hyperbolic paraboloid. The watch face is a square in plan.

   (a) Draw the given plan and elevation of the hyperbolic paraboloid surface of the watch.

   (b) Project an end view of this hyperbolic paraboloid surface.
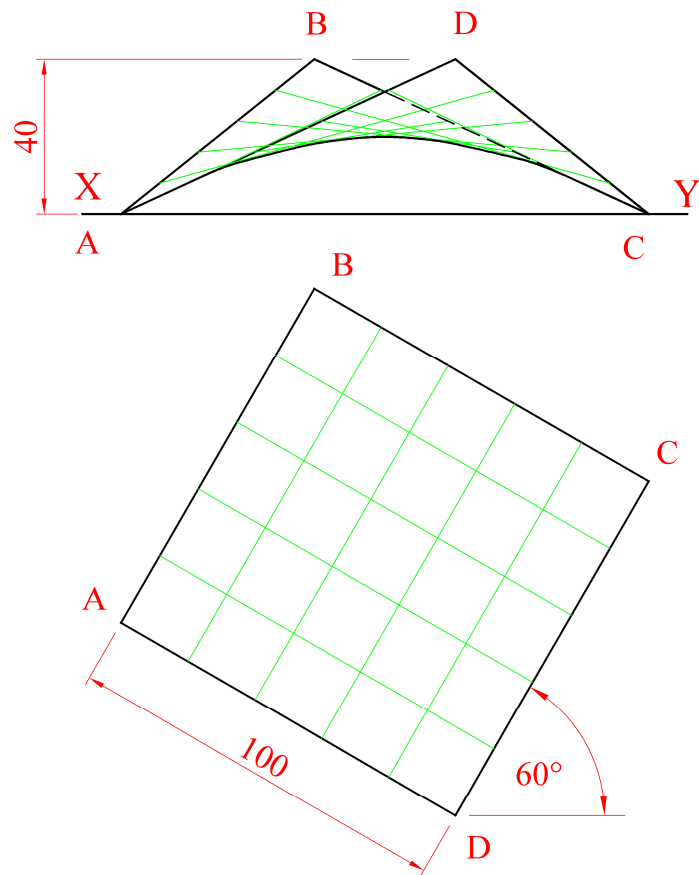
Scale 1:1

Fig. C-2

Surface Geometry

C-3. The graphic on the right shows a measuring tape and a storage box for the tape.

The projections of the storage box are shown in Fig. C-3 below.

(a) Draw the given views of the storage box, showing clearly how you located the centre of the 40mm arc.

(b) Project an end view of the storage box.

(c) Draw a one-piece surface development of the storage box.

Scale 1:1

Fig. C-3

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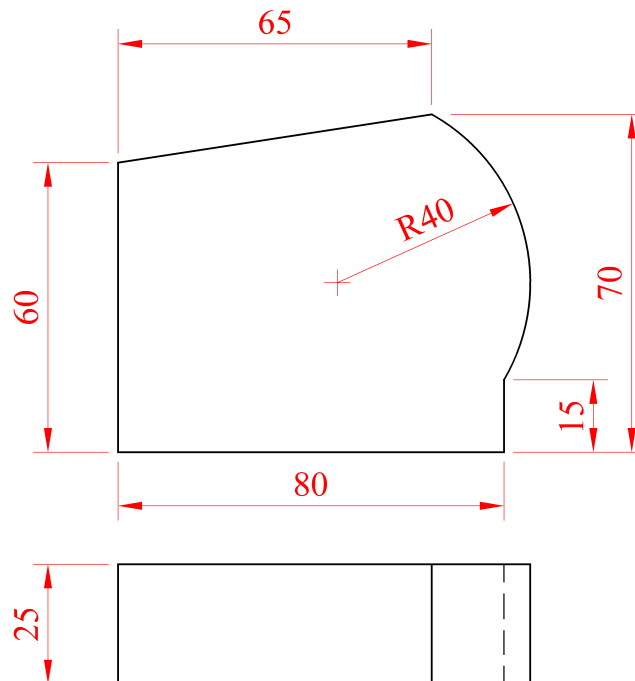*Design & Comm. Graphics, Section C – Ordinary Level*

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Dynamic Mechanisms

C-4. Cams, cranks and pistons are parts of the engine of a motorbike.

(a) The graphic shows an enlarged view of a cam from a motorbike engine.

A cam, similar to the one shown, imparts the following motion to an inline knife-edge follower:

- 0°   to   30°   Dwell
- 30°   to   120°   Rise 70mm with uniform velocity
- 120°   to   180°   Fall 14mm with uniform velocity
- 180°   to   360°   Fall 56mm with simple harmonic motion.

Draw the displacement diagram for the cam.

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

(In the displacement diagram, use a distance of 15mm to represent each 30° interval.)
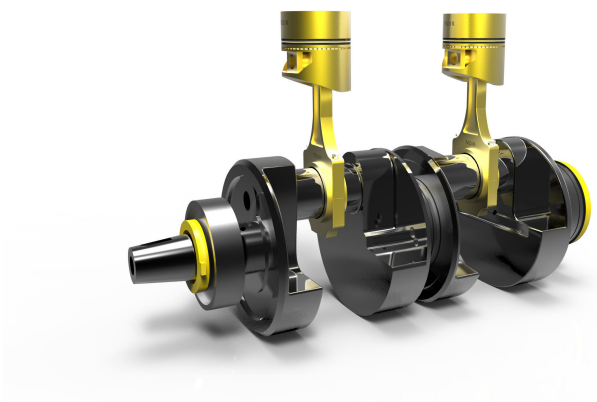
(b) The graphic below shows an enlarged view of the piston and crank mechanism from the motorbike engine.

Fig. C-4(b) shows a line diagram for this mechanism.

Crank **OA** and the rod **AC** are pin jointed at **A**.
Point **B** is located on the rigid rod **AC** as shown.

Crank **OA** rotates in a clockwise direction, about point **O**, for one revolution. Point **C** moves on the vertical axis as shown.

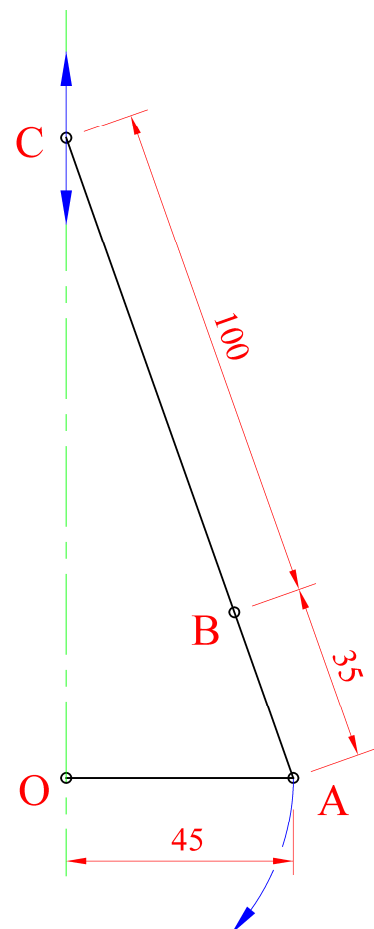Plot the locus of point **B** for this movement.

Scale 1:1

C

100

B

35

O   A

45

Fig. C-4(b)

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Assemblies

C-5. Mug trees are a very convenient method of storing a number of mugs neatly.

Details of a mug tree are given in Fig. C-5 below.

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

Draw the **sectional elevation A-A** of the assembled mug tree.

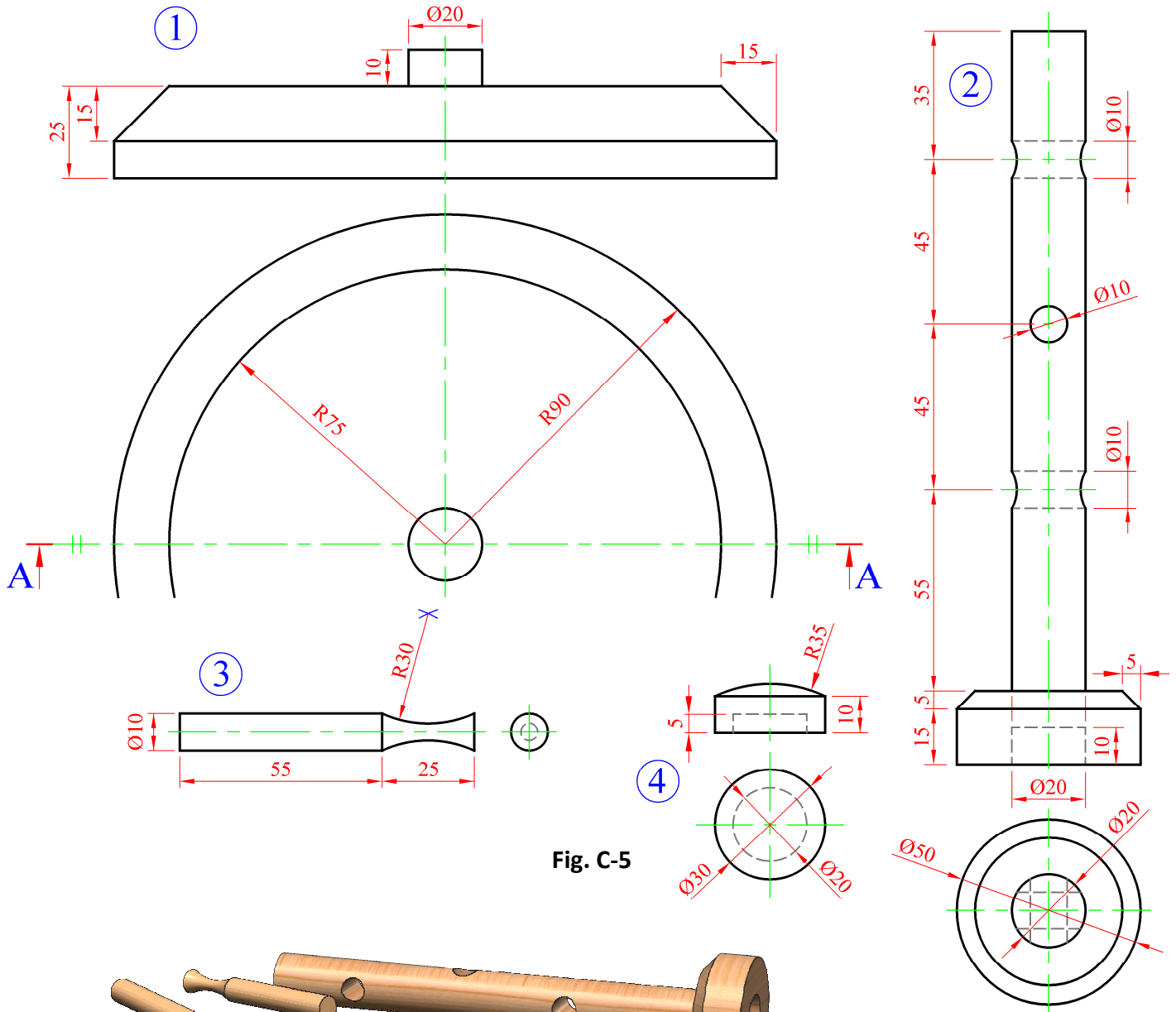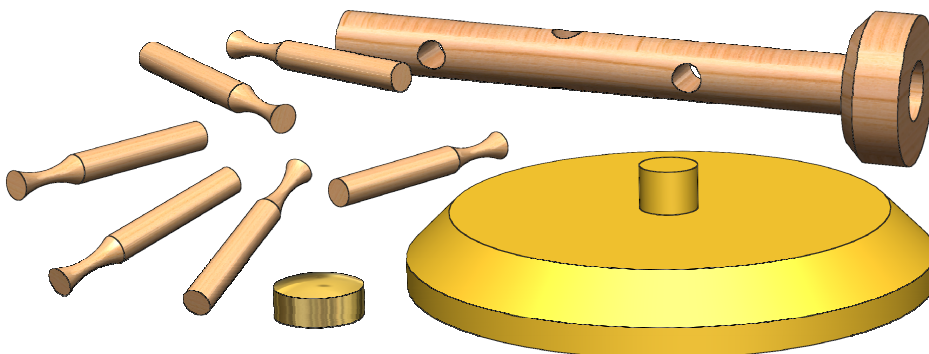*(Any omitted dimensions may be estimated.)*

Scale 1:1

Fig. C-5

Part	Name	Qty.
1	Base	1
2	Upright	1
3	Branch	6
4	Cap	1

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