Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination, 2016

Design & Communication Graphics
Ordinary Level
Sections B and C (180 marks)

Wednesday, 22 June
Afternoon, 2:00 - 5:00

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.*
- *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 shows a USB memory key.

Fig. B-1 below shows an incomplete isometric projection of a similar USB key. The plan and elevation of the USB key 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 plan and elevation positioned as shown.

(c) Draw the axonometric projection of the rectangular parts of the USB key.

(d) Complete the axonometric projection of the USB key by drawing the semi-circular end.

Scale 1:1

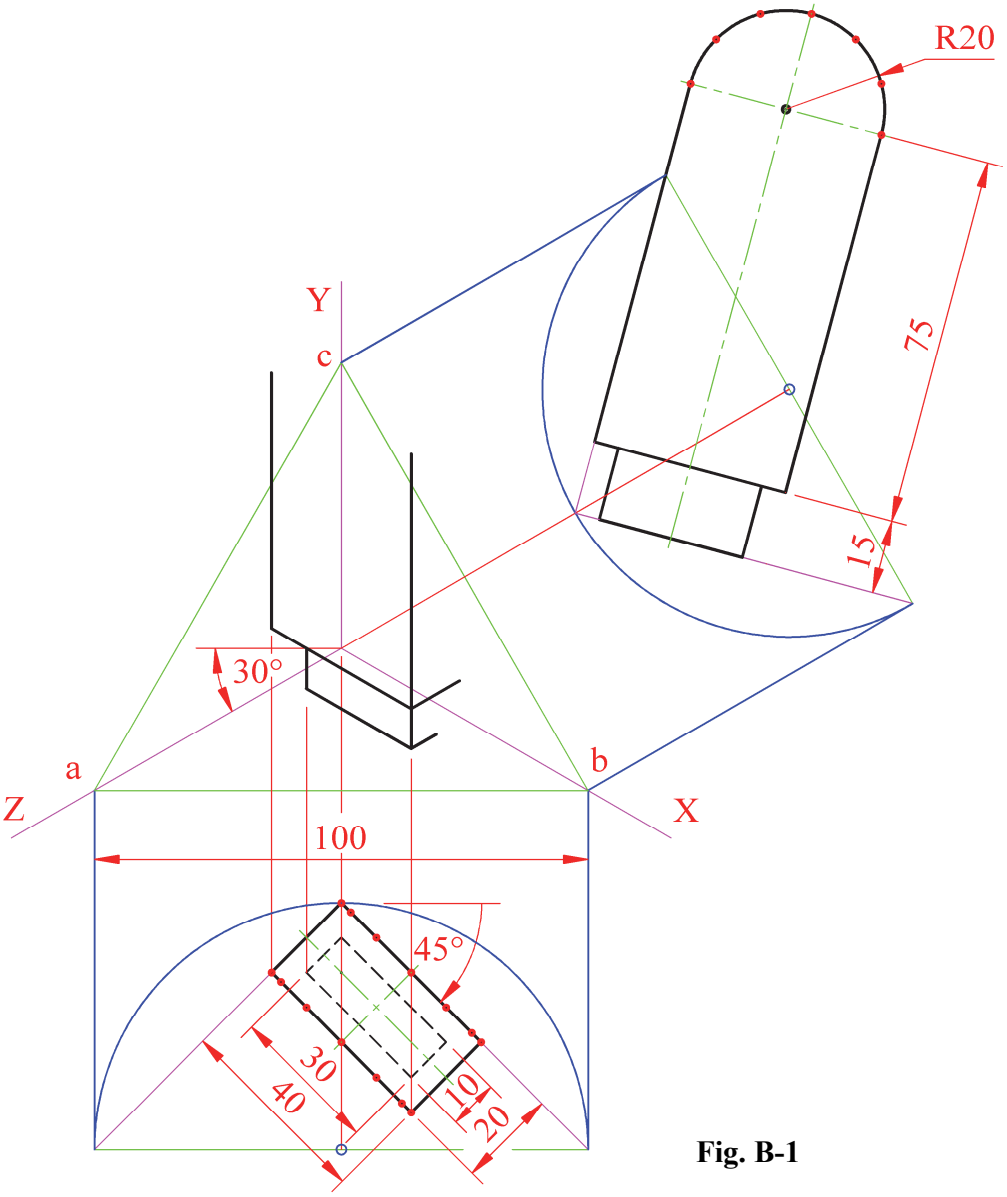


Fig. B-1

B-2. The 3D graphic on the right shows a cooker hood made from copper.

Fig. B-2 below shows an isometric view of the hood.

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

(b) Draw a plan projected from the elevation.

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

Scale 1:1

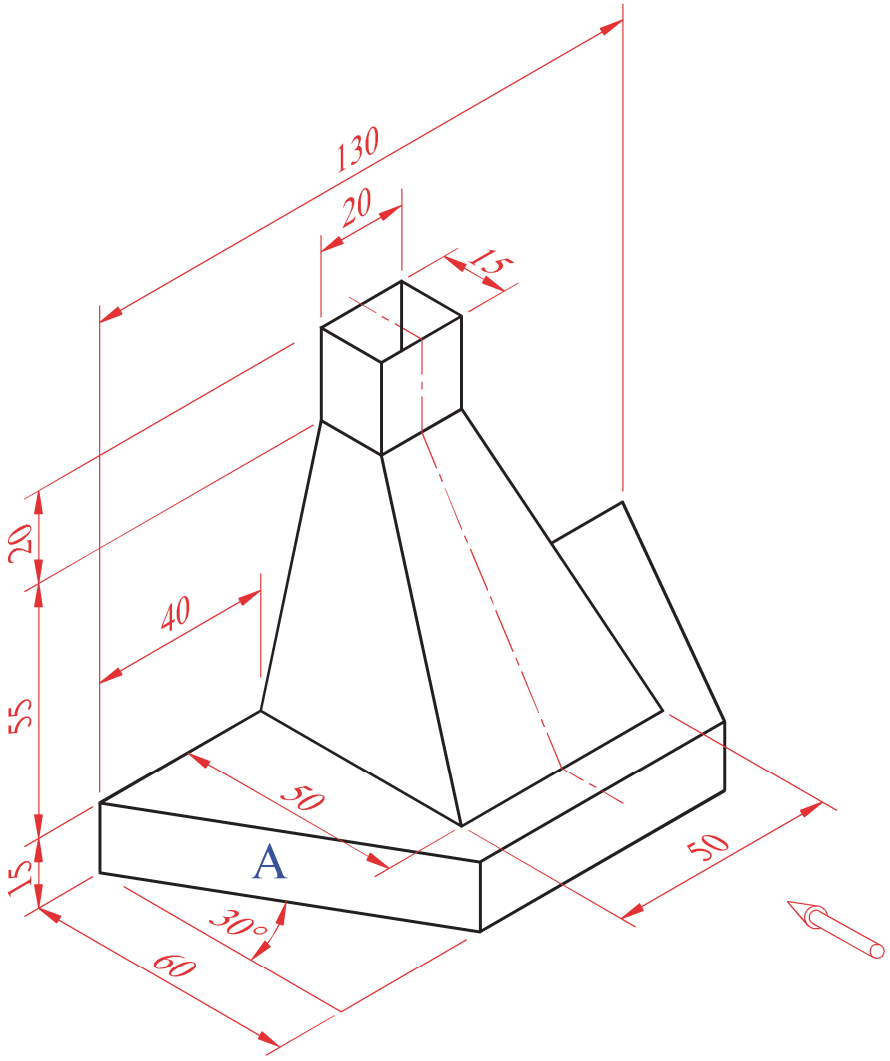


Fig. B-2

B-3. The 3D graphic on the right shows a fence from the *Dublin Horse Show*.

Fig. B-3 below shows the plan and incomplete elevation of a similar fence and two rectangular piers.

(a) Draw the given plan and elevation and complete the projections, showing all lines of interpenetration between the fence and the piers.

(b) Draw an end view of the structure.

Scale 1:1

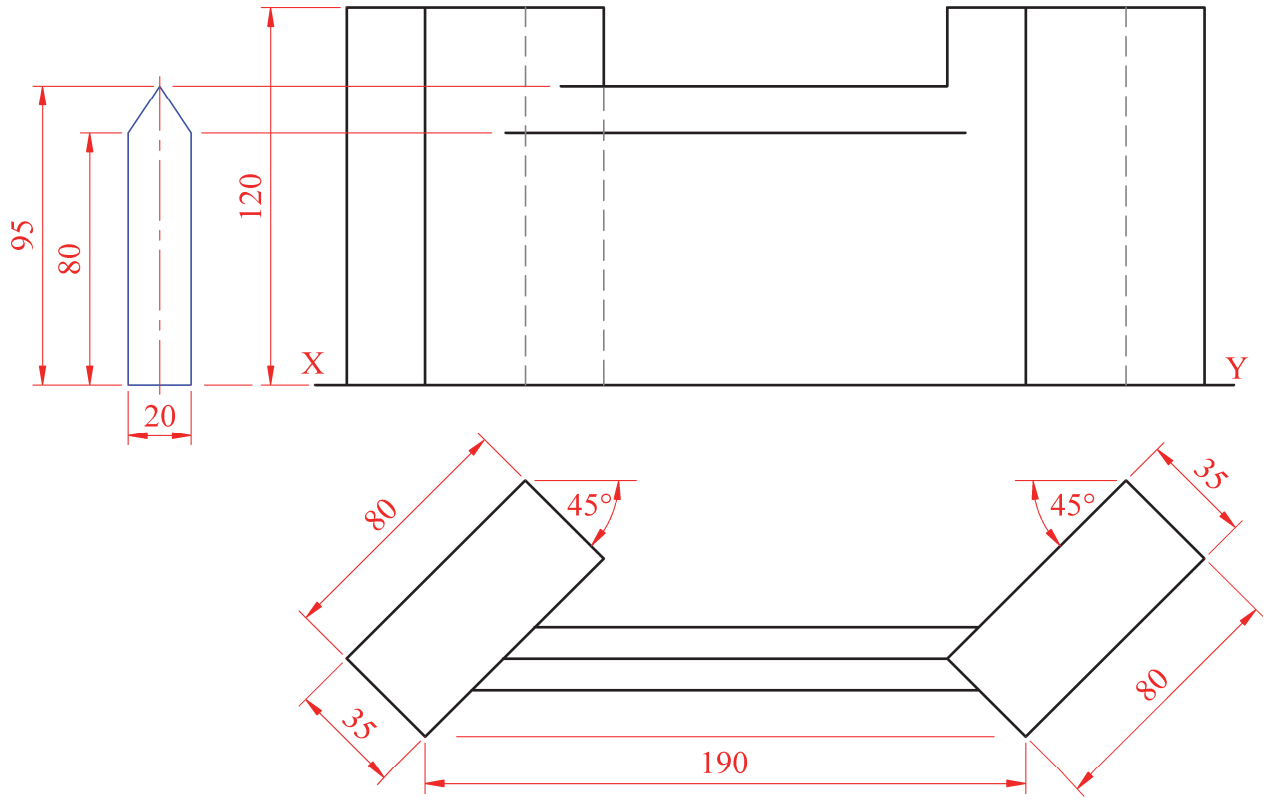


Fig. B-3

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 accompanying map, located on the back page of Section A, shows ground contours at 5 metre vertical intervals.

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

(b) **CD** is the centreline of a proposed roadway which is level at an altitude of 35m.
Using side slopes of 1:1 for both the embankments and 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 graphic on the right shows deck chairs in the form of hyperbolic paraboloids.

Fig. C-2 shows the plan and elevation of a typical hyperbolic paraboloid surface **ABCD**.

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

(b) Project an end view of the hyperbolic paraboloid surface.

Scale 1:1

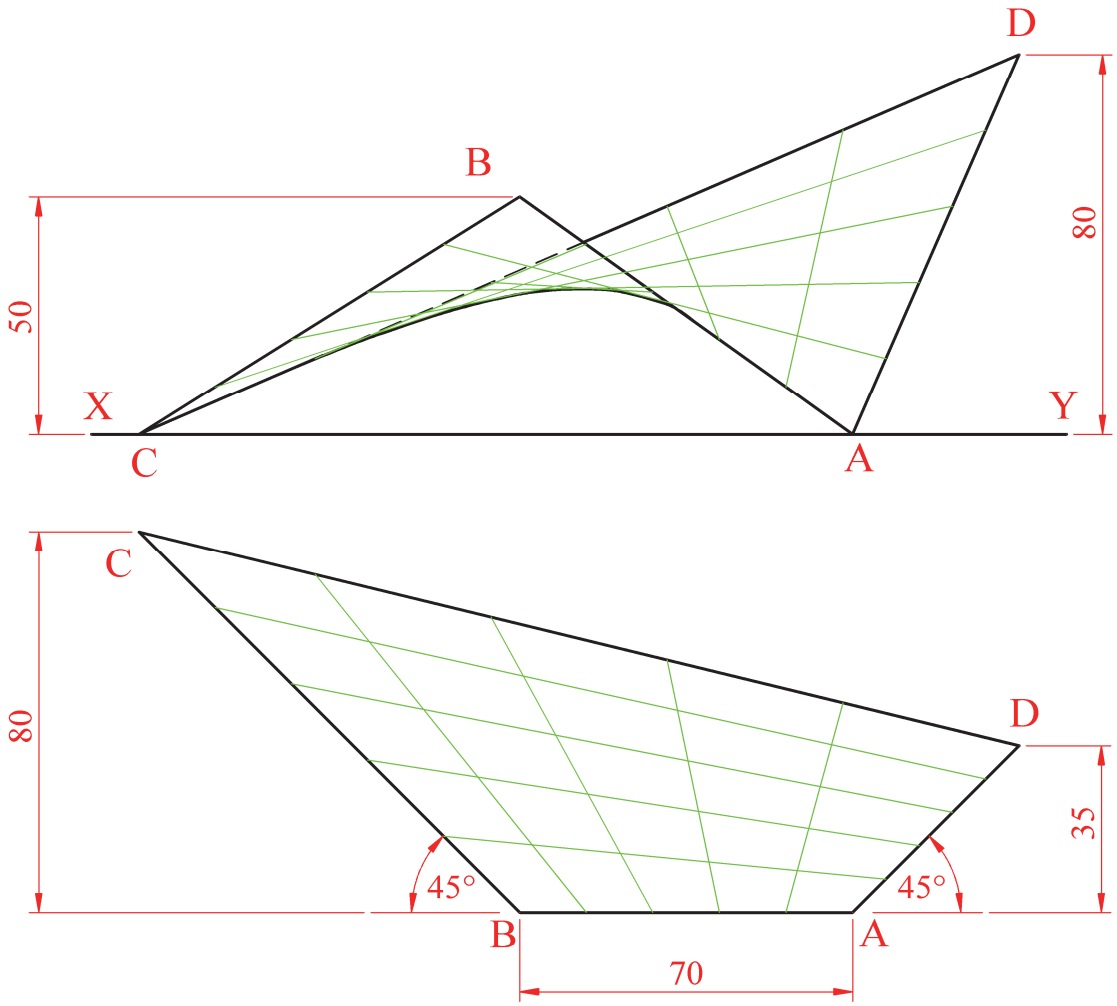


Fig. C-2

Surface Geometry

C-3. The 3D graphic on the right shows an electric guitar and a guitar case.

The plan and elevation of the guitar case are shown in Fig. C-3.

(a) Draw the given views.

(b) Project an end view of the case.

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

Scale 1:1

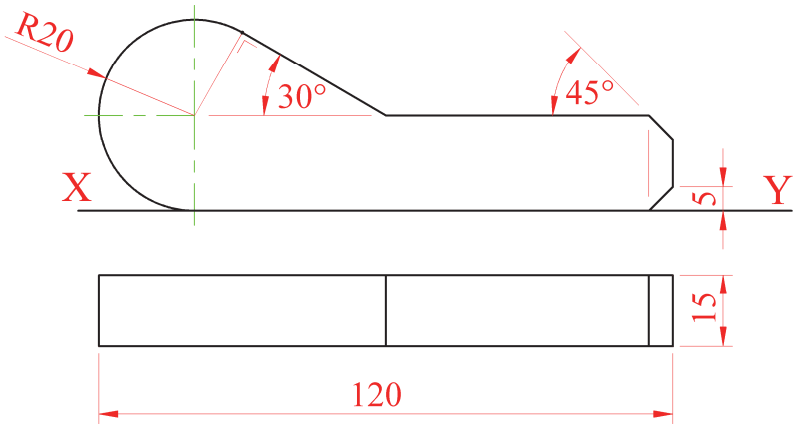


Fig. C-3

Dynamic Mechanisms

C-4. (a) The images on the right show an enlarged view of the piston and crank mechanism from the engine of a *jet ski*.

Fig. C-4 below shows a line diagram for this engine mechanism.

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

As the crank **OA** rotates in a clockwise direction, for one revolution, point **C** moves along the horizontal axis.

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

Scale 1:1

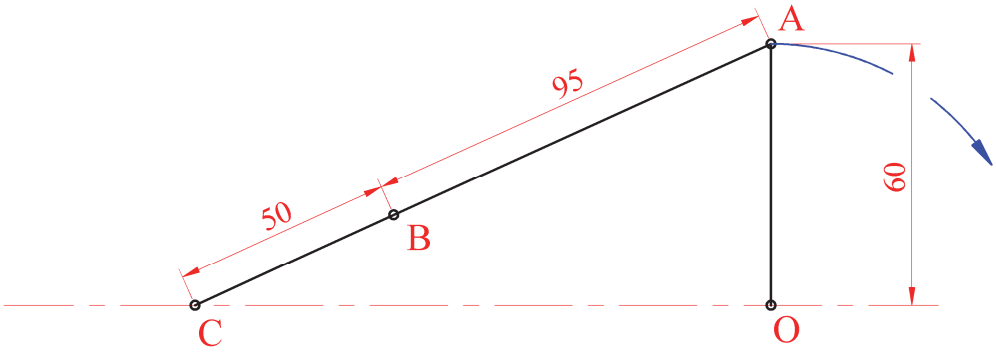


Fig. C-4

(b) The image on the right shows an enlarged view of the camshaft from such a jet ski engine. The cam imparts the following motion to a follower:

- 0° to 90° Dwell
- 90° to 180° Rise 50mm with uniform velocity
- 180° to 360° Fall 50mm with uniform acceleration and retardation.

Draw the displacement diagram for the cam, using a distance of 15mm for each 30° interval.

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

Scale 1:1

Assemblies

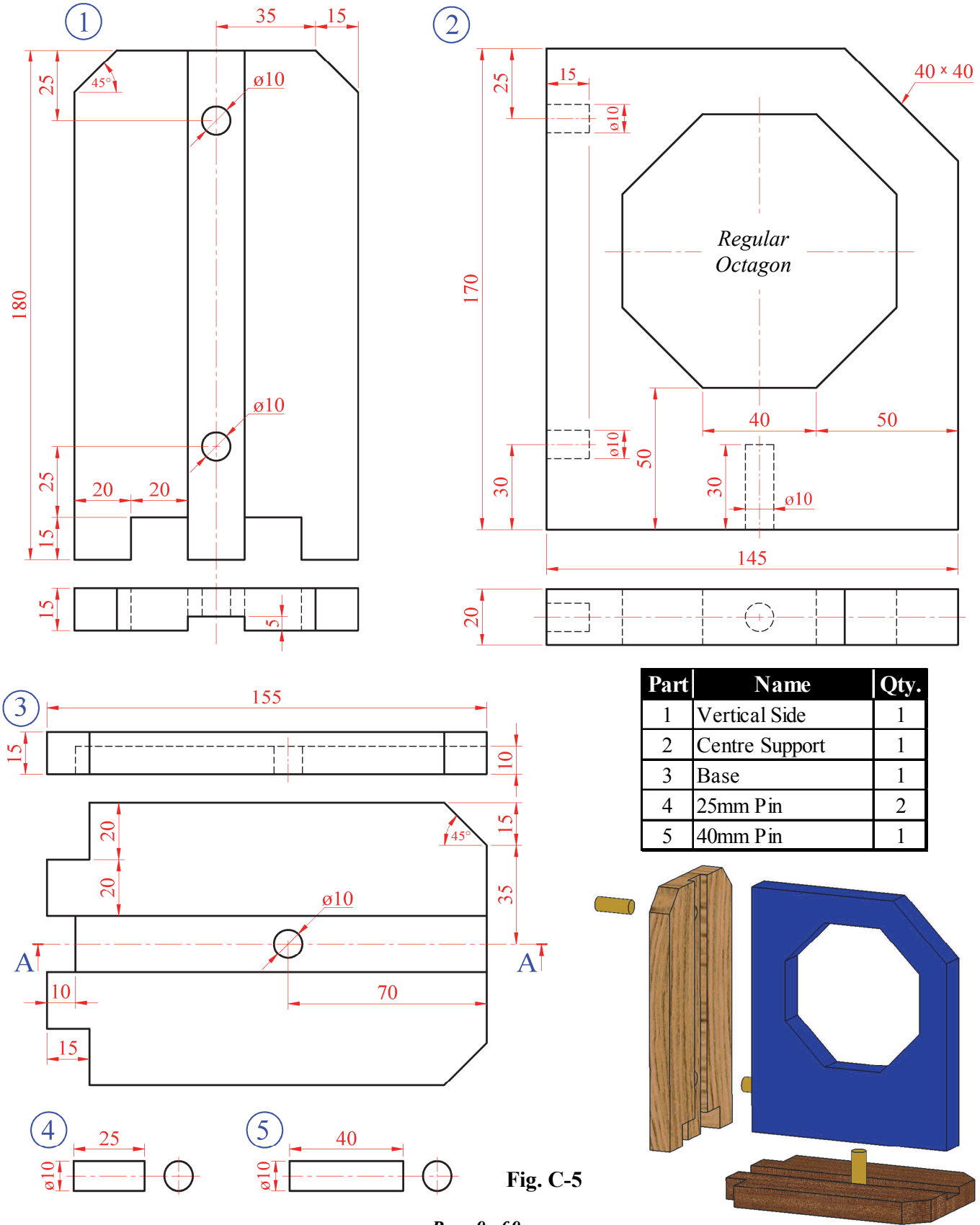
C-5. The 3D graphic on the right shows books on a shelf which rest against a *Bookend*. Details of the Bookend are given in Fig. C-5 below.

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

Draw the ***sectional elevation*** A-A of the assembled Bookend.

(Any omitted dimensions may be estimated.)

Scale 1:1



Part	Name	Qty.
1	Vertical Side	1
2	Centre Support	1
3	Base	1
4	25mm Pin	2
5	40mm Pin	1

Fig. C-5

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