GEOMETRICAL AND MECHANICAL DRAWING   **7040/1**

PAPER 1

OCTOBER/NOVEMBER SESSION 2001   2 hours 40 minutes

Additional materials:
    A2 Drawing paper (1 sheet)
    Standard drawing equipment

TIME   2 hours 40 minutes

INSTRUCTIONS TO CANDIDATES

Print your name, Centre number and candidate number at the bottom right-hand corner of your drawing paper.

Answer **five** questions.

Answer not more than **three** questions from any one section.

Unless otherwise stated, strictly geometrical methods must be used, solutions are to be drawn full size and no dimensions are required. All construction lines must be shown clearly, but lines which are parallel to, perpendicular to or inclined at angles of 30°, 45° or 60° to other lines may be drawn without showing construction lines.

Use both sides of the drawing paper for your answers.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

All dimensions are in millimetres unless otherwise stated.

This question paper consists of 7 printed pages and 1 blank page.

Section 1 Plane Geometry

Answer not more than **three** questions from this section.

1 Fig. 1 shows the view of a plate cam from a mechanism.

Construct full size the given view using only geometrical constructions and showing clearly methods of construction for all the centres of radii and the points of tangency.　　　　[20]
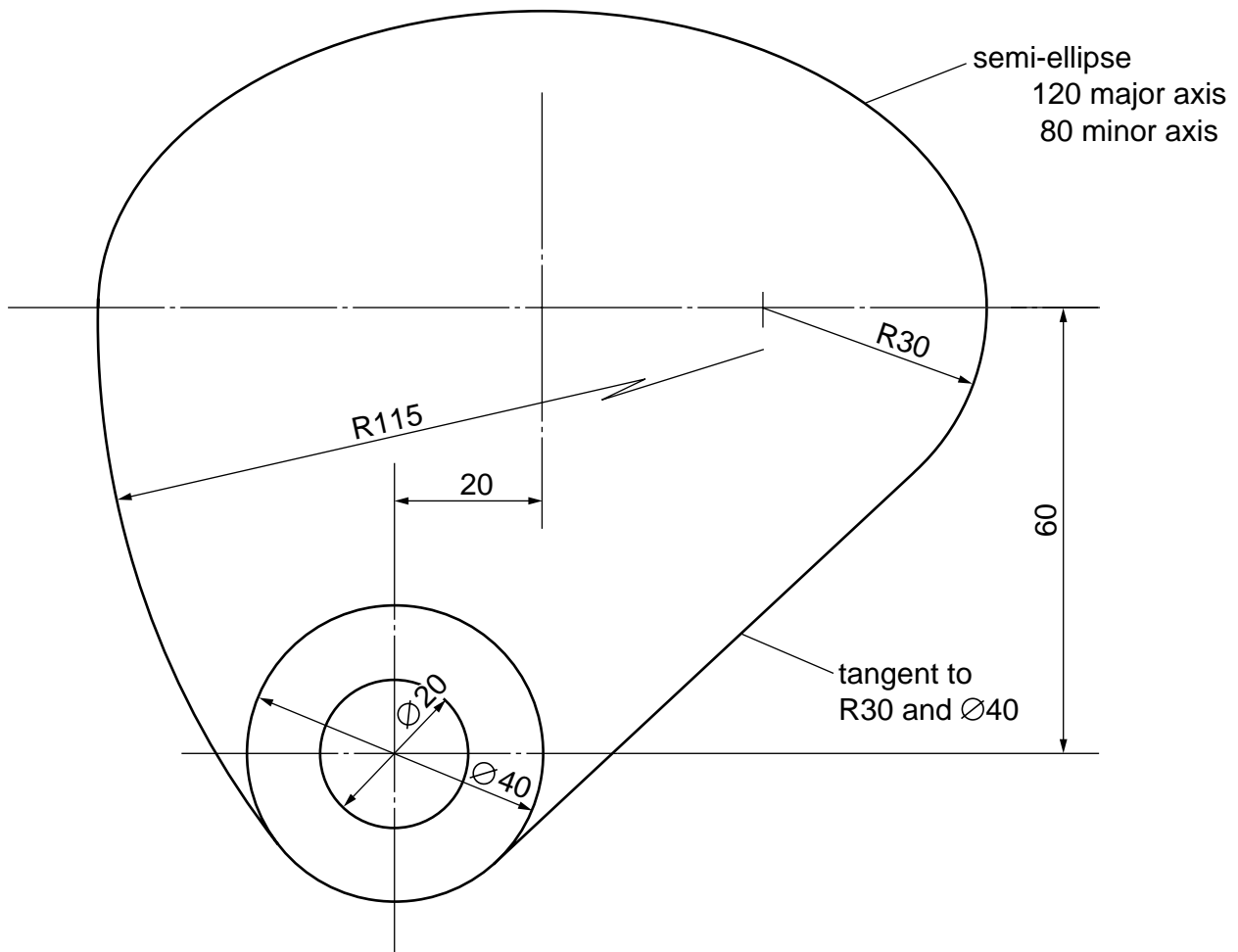

semi-ellipse
120 major axis
80 minor axis

R30

R115

20

60

tangent to
R30 and ⌀40

⌀20

⌀40

Fig. 1

2 (a) Construct a triangle ABC such that side AB = 80 mm, the angle ACB = $52\frac{1}{2}°$ and the ratio of the length of the sides AC : AB to be 2 : 3.　　　　[14]

(b) Construct a square equal in area to twice that of the drawn triangle ABC.　　　　[6]

3   Fig. 2 shows diagrammatically the outline of a mechanism. The crank OA rotates about a fixed centre O. The coupler BC is pin jointed to the crank at A. The link BD is pin jointed to the coupler at B and pivots about the fixed point D. The connecting rod CE is pin jointed to the coupler at C and to the piston E which is constrained to move in a straight vertical path.

   (a) Draw:

   (i)   the given view;   [6]

   (ii)   the locus of the pivot C for one complete revolution of the crank OA.   [11]

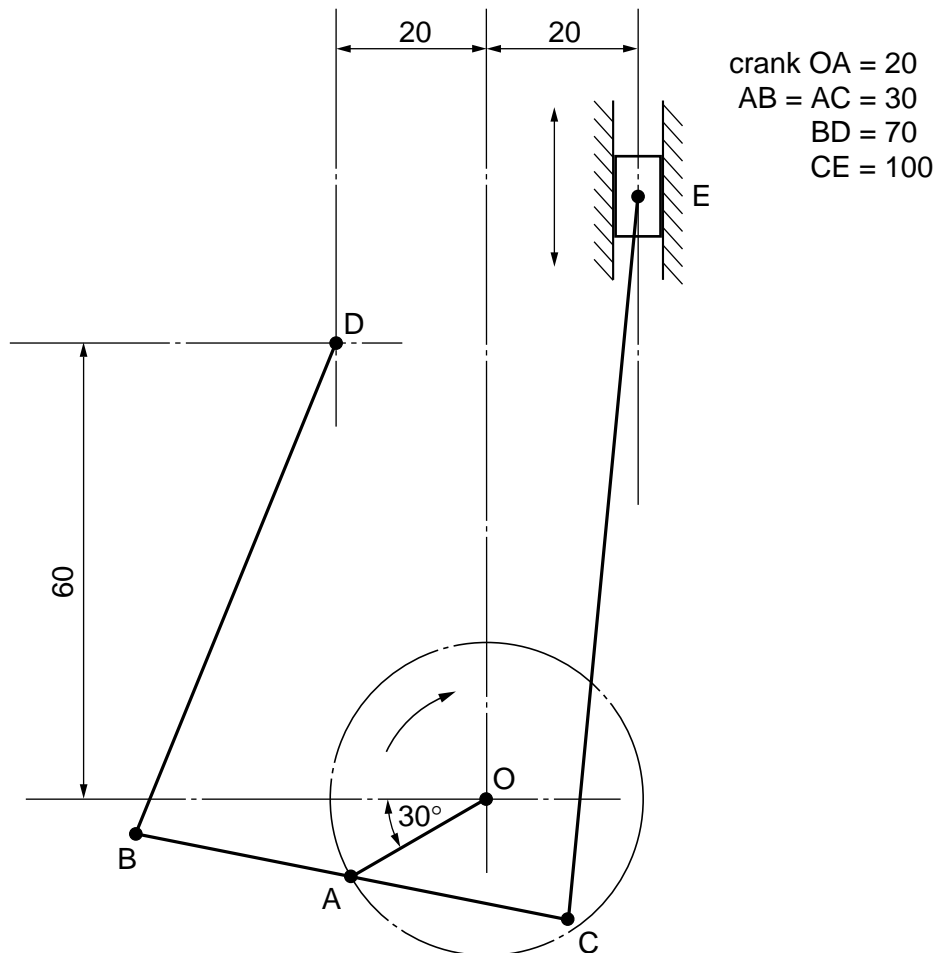   **(b)** Clearly show the extreme positions of the piston. Measure and state this distance.   [3]

crank OA = 20
AB = AC = 30
BD = 70
CE = 100

Fig. 2

[Turn over

Section 2 Solid Geometry

Answer not more than **three** questions from this section.

4   Fig. 3 shows the elevation of a hopper made from thin sheet metal.

The hopper is in the shape of a frustrum of a right circular cone, intersected by a circular pipe which passes completely through the cone.

The axes of the pipe and cone are at 90° to each other.

(a) Draw the given view. [3]

(b) Draw the development of the frustrum of the cone, showing the holes for the pipe. [17]

Ignore the thickness of the metal.
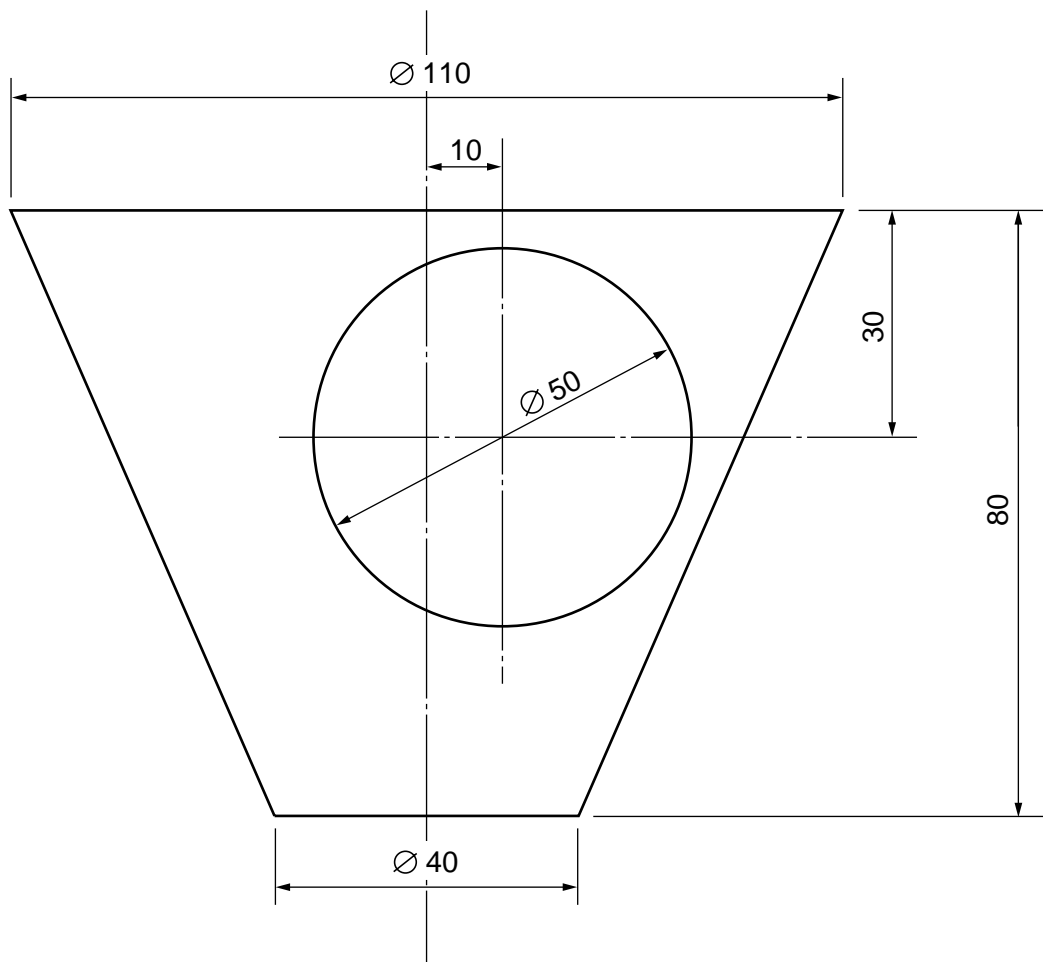
Fig. 3

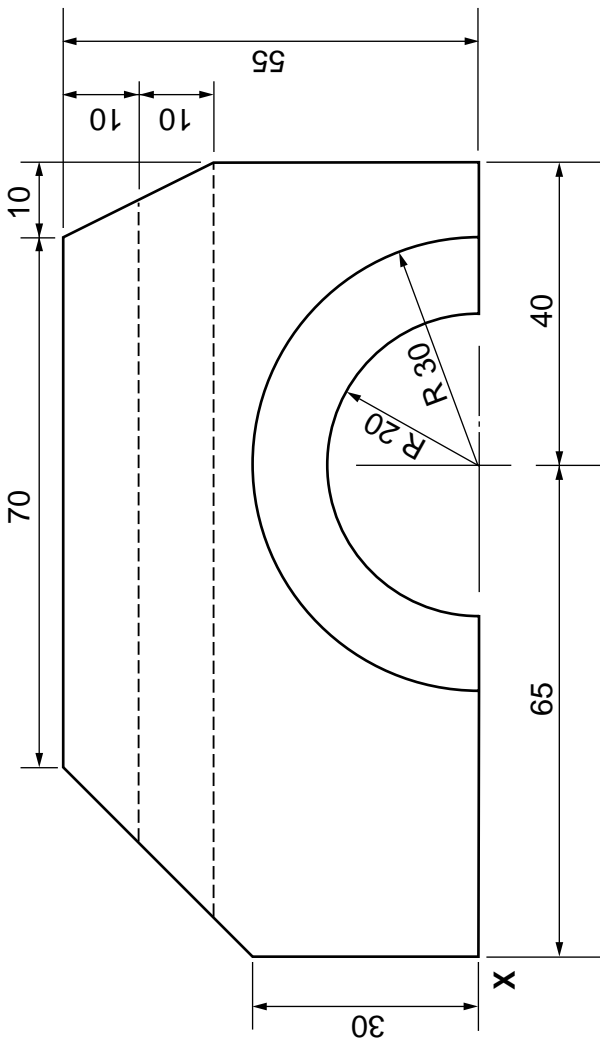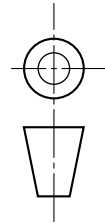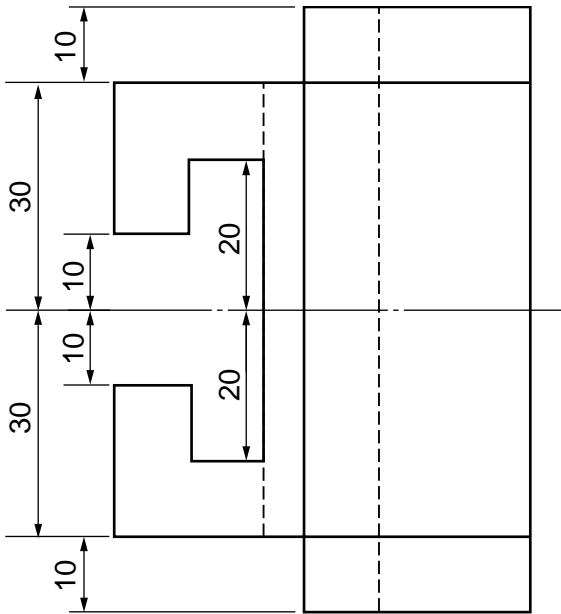**5** Fig. 4 shows three views of a slide bracket drawn in first angle projection.
Draw an isometric view of the bracket with **X** the lowest point in the view. [20]
Do not use an isometric scale or indicate any hidden details.

[Turn over
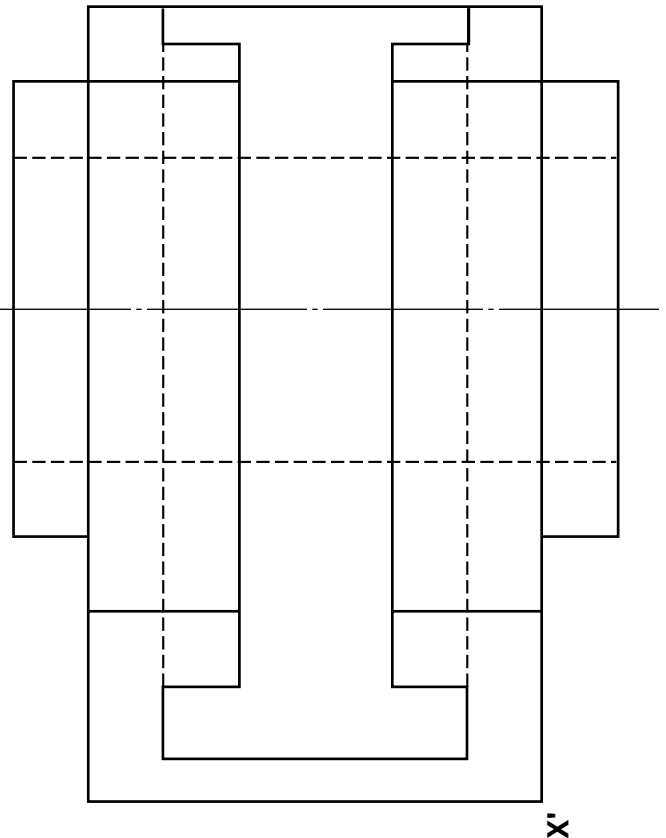
6 Fig. 5 shows details of a machined casting.
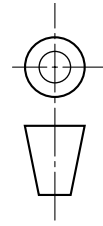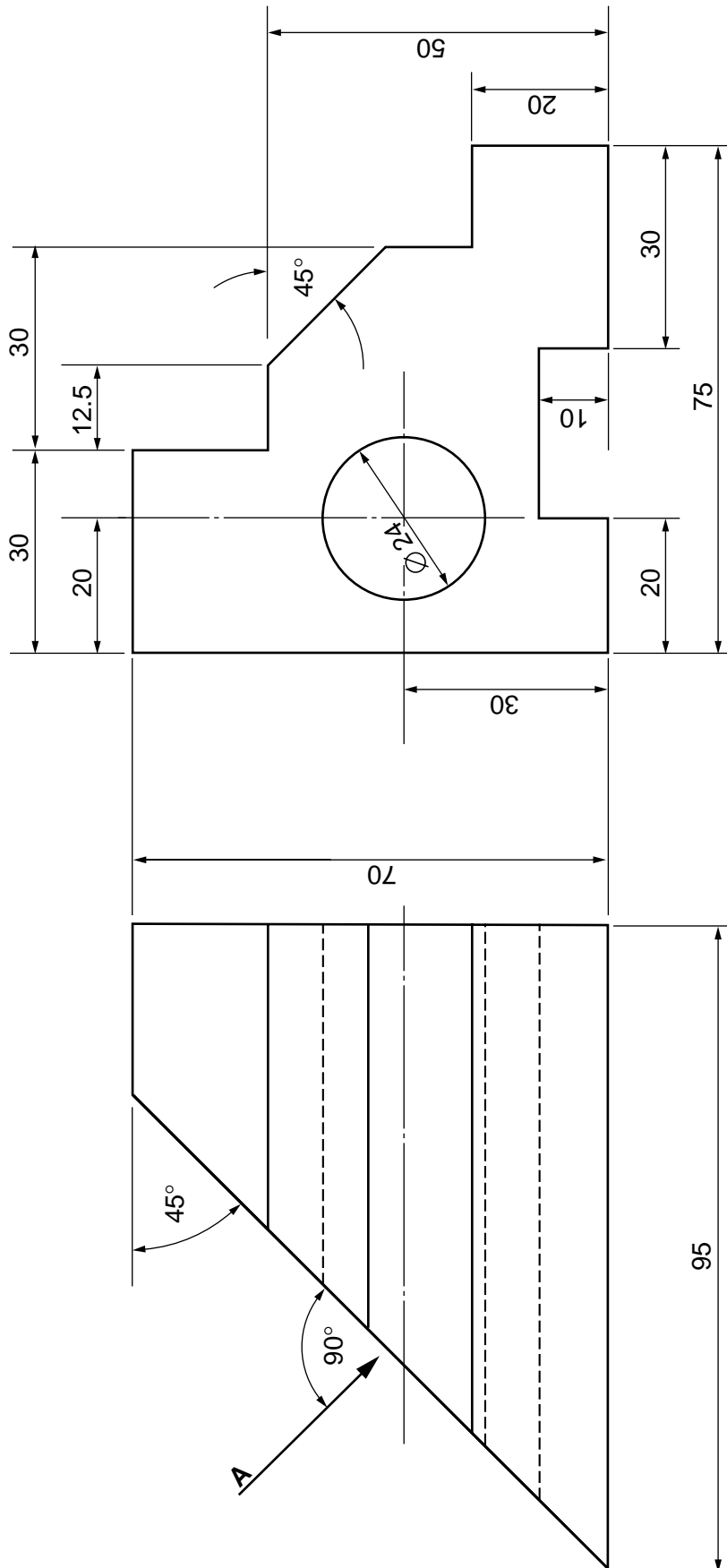
    (a) Draw the given views. [6]

    (b) Draw the auxiliary plan as seen in the direction of the arrow **A**. [14]

        Include all hidden detail.

7 Fig. 6 shows the plan and incomplete elevational views of two intersecting square prisms whose axes are perpendicular to each other.

(a) Draw the given plan. [3]

(b) Complete the end elevation. [5]

(c) Complete the front elevation. [12]
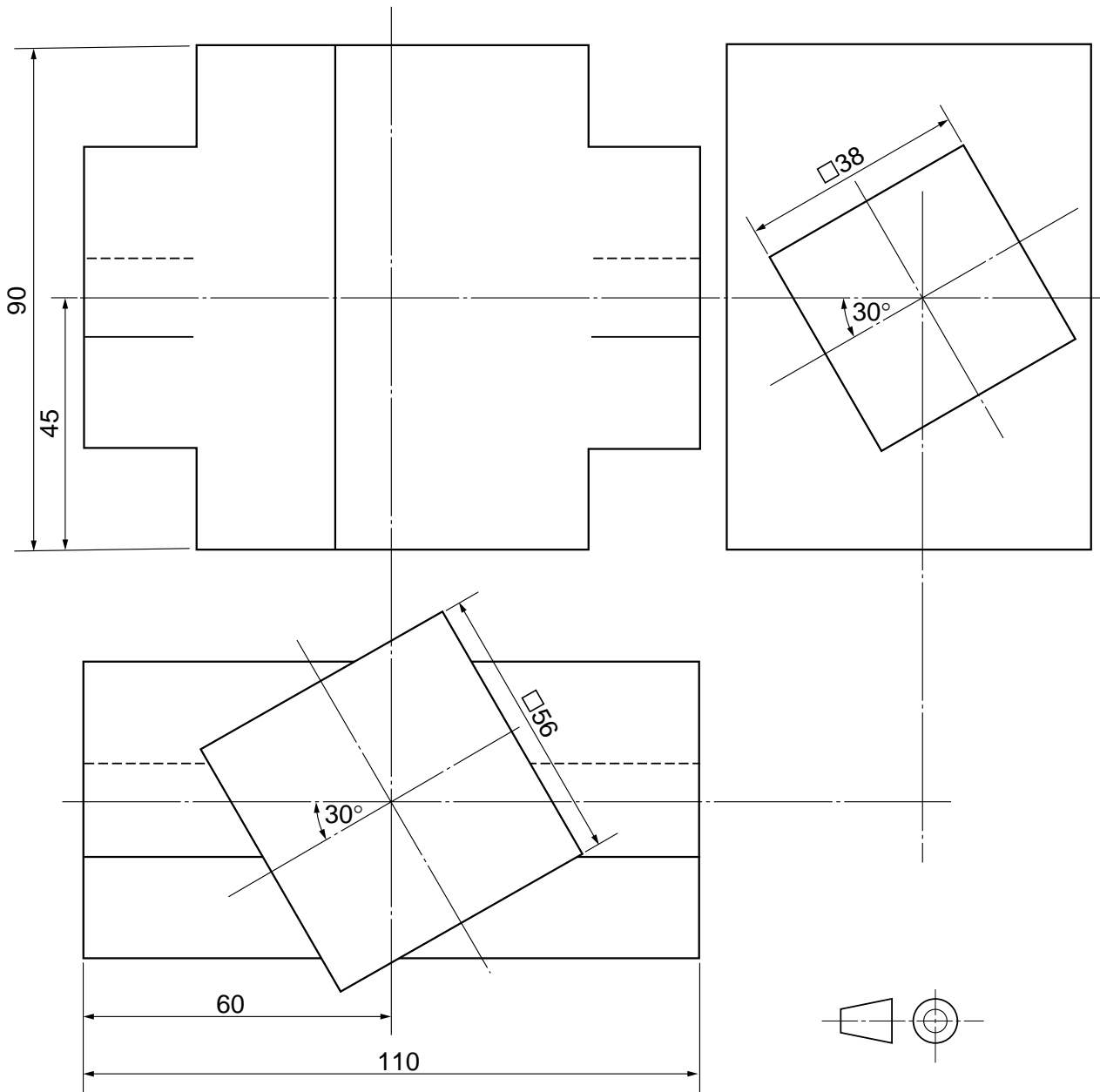
Include all hidden detail.

Fig. 6

8 Draw two full turns of a single start right hand square thread, having an outside diameter of 74 mm and a pitch of 24 mm. [20]

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