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 8 printed pages.

Section 1 Plane Geometry

1 **(a)** **(i)** Construct a triangle ABC standing on a base BC of length 110 mm with side AB of length 55 mm and angle BAC 90 °. [3]

   (ii) Construct a square having an area equal to the triangle ABC and hence confirm its length of side is 51 mm. [8]

(b) Construct a regular pentagon whose **sides** are increased in the ratio of 3:4 to those of the square in part **(a)(ii)**. [9]

2 The schematic outline of a mechanism is shown in Fig. 1. The parabolic curve ABC and the semi-circle of radius 35 mm represent the centre-line of a grooved track. Point O on the rigid connecting rod NP slides around this groove whilst point N is constrained to slide in the vertical groove.

(a) Construct the centre-line of the parabolic and semi-circular grooved track. [8]

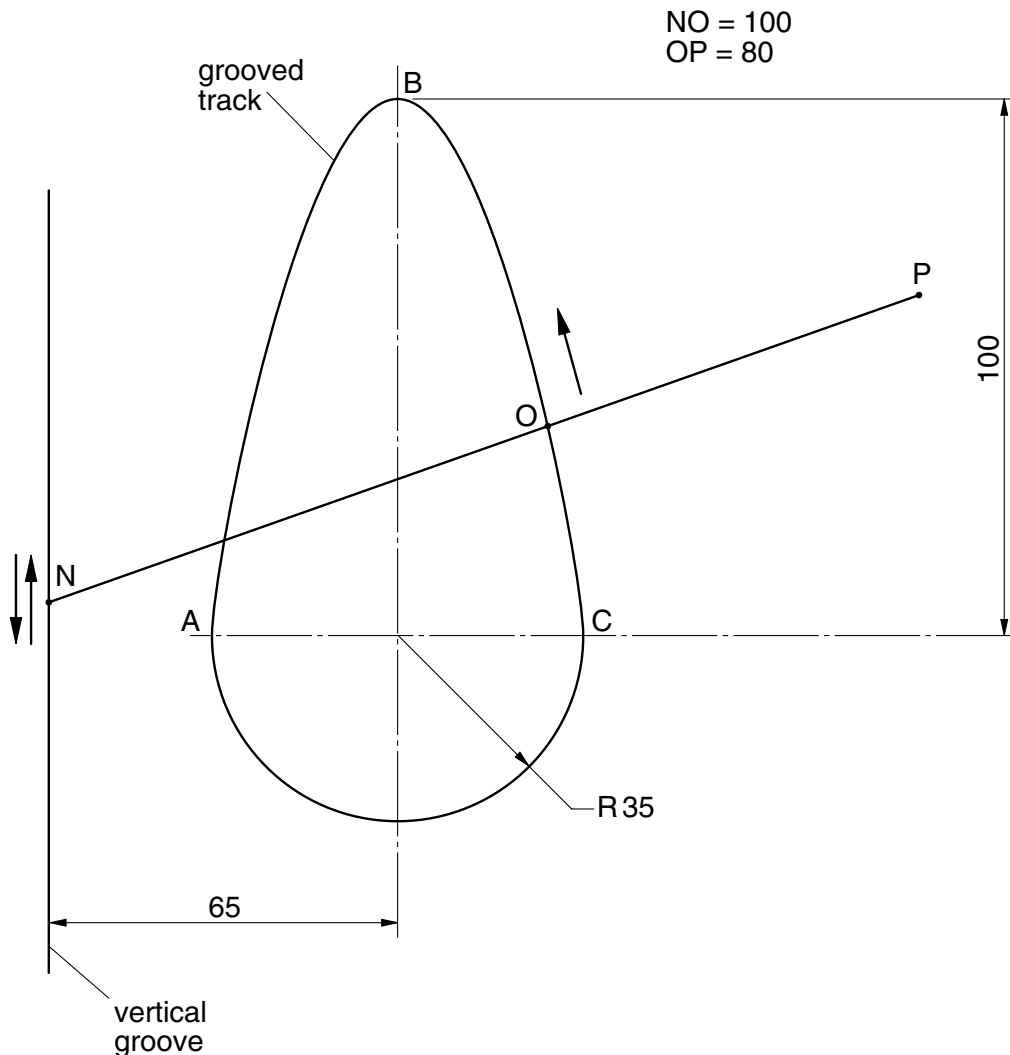**(b)** Plot the locus of P as O slides around the grooved track. [12]

NO = 100
OP = 80

Fig. 1

3 Fig. 2 shows the outline of an ornamental bracket made from 6 mm thick strip material. The inner surface of the curved brace AB is a quarter of an ellipse with surface C parallel to it.

(a) Draw full size the outline of the bracket, clearly showing the construction for the elliptical curve AB and parallel curve C. [15]

(b) After determining its centre, insert a circular ring, also made from 6 mm material, so that its outer surface touches the inner surfaces of the bracket and the curved surface C. [5]
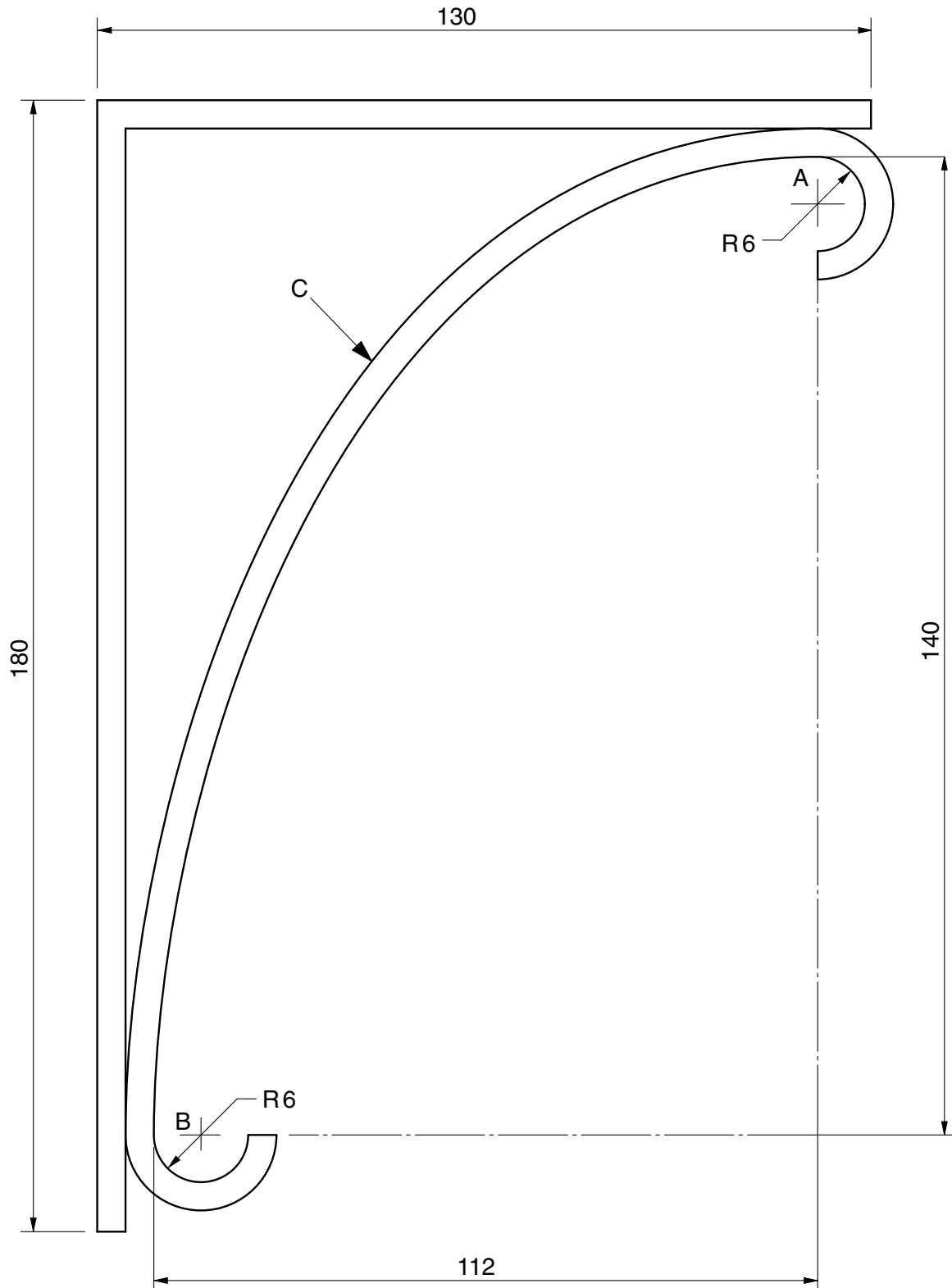

130

A

R6

C

180

140

R6

B

112

Fig. 2

7040/1 M/J/02

[Turn over

Section 2 Solid Geometry

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

4   Fig. 3 shows details of a roller and retaining bracket.

Draw full size:

(a) the given views;   [4]

(b) the auxiliary plan view on X_i Y_i viewed in the direction of arrow S. Hidden detail is not
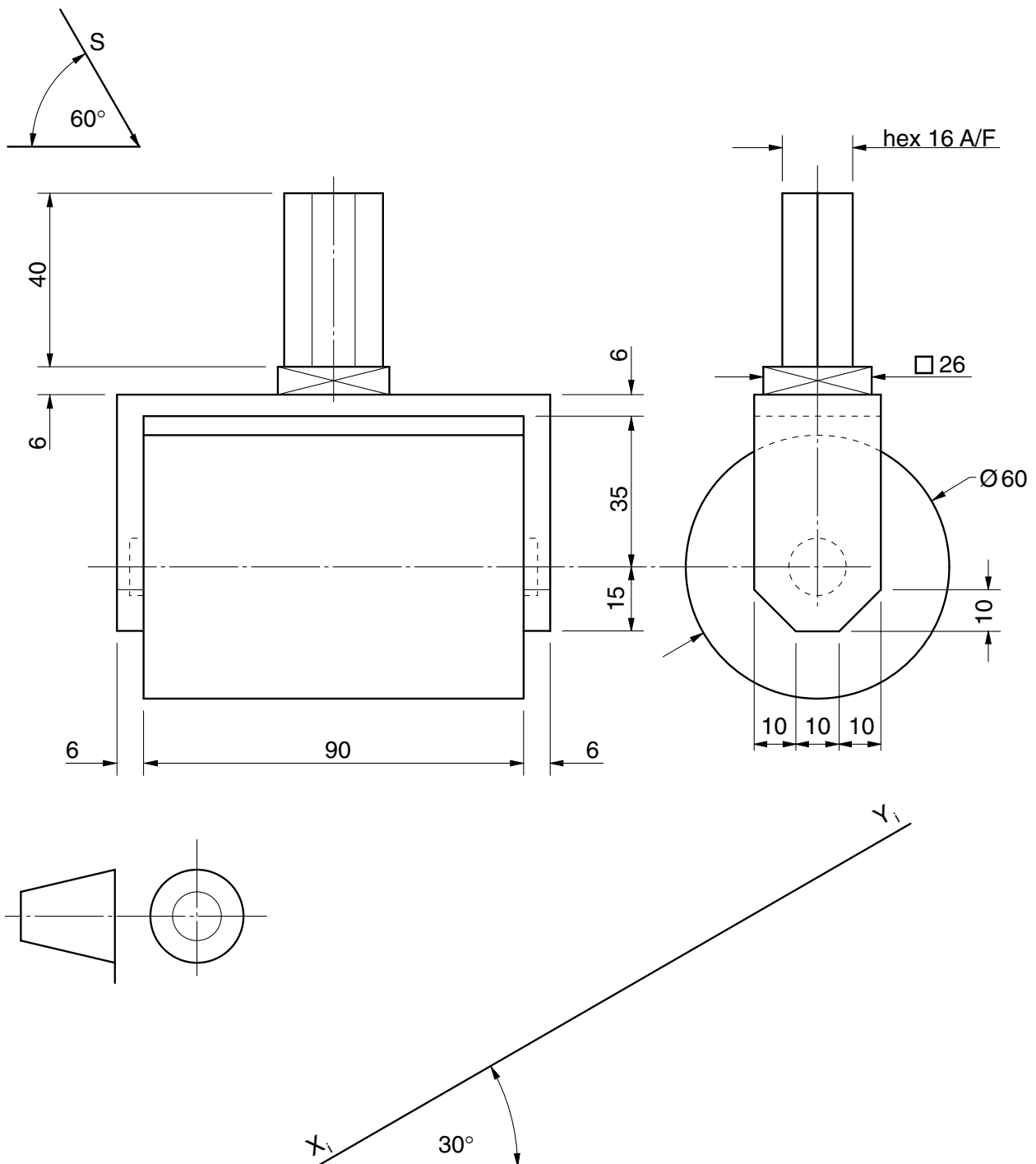required.   [16]

Fig. 3

5 Fig. 4 shows the outline of a circular clear glass bowl. The bowl is to be mounted on a turntable and two lines engraved on its outer surface using a scriber which is constrained to move vertically from D to D_i as the bowl makes one full revolution and then to repeat the sequence again from E to E_i.

Given that the vertical displacement of the scriber down the outside of the bowl for each line is proportional to its rotational travel around the bowl:

(a) draw full size the given elevation and a plan view of the glass bowl ignoring the thickness; [2]

(b) complete the two views clearly showing the construction for both curves; [16]

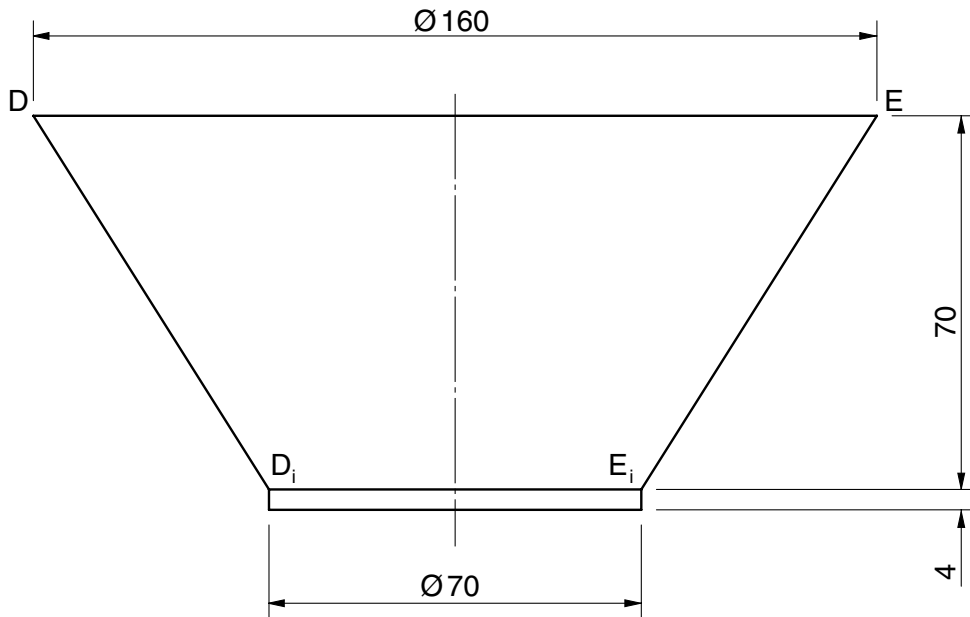**(c)** name the curves which you have constructed in the **plan** view. [2]

Ø 160

D   E

D_i E_i

Ø 70

70

4

Fig. 4

[Turn over

6 Fig. 5 shows the plan view and part elevation of two intersecting pipes.

(a) Draw full size the two given views and include the curve of intersection of the outer surfaces of the two cylindrical pipes. Include hidden detail. [13]

(b) Assuming the thickness of the pipe walls to be minimal, construct the section VV. Hidden detail of the inclined pipe to be omitted. [7]
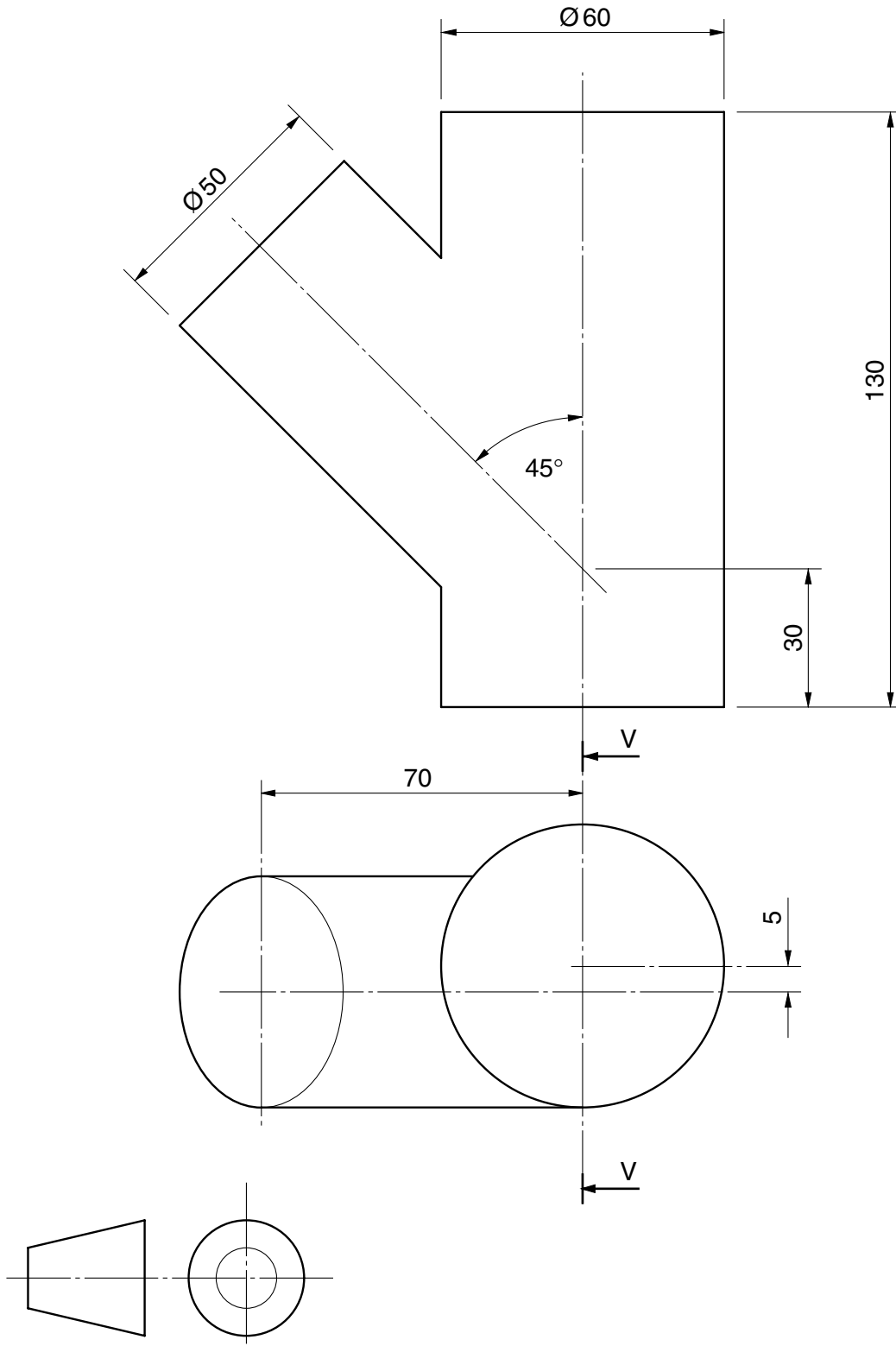

Fig. 5

7 Fig. 6 shows two views of an oblique triangular pyramid standing with its base on the horizontal plane.

    (a) Draw full size the given views.   [2]

    (b) Determine the true lengths of all edges.   [9]

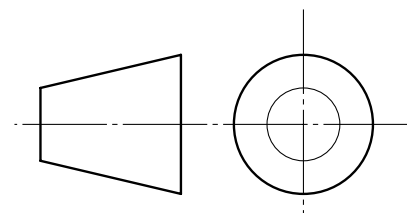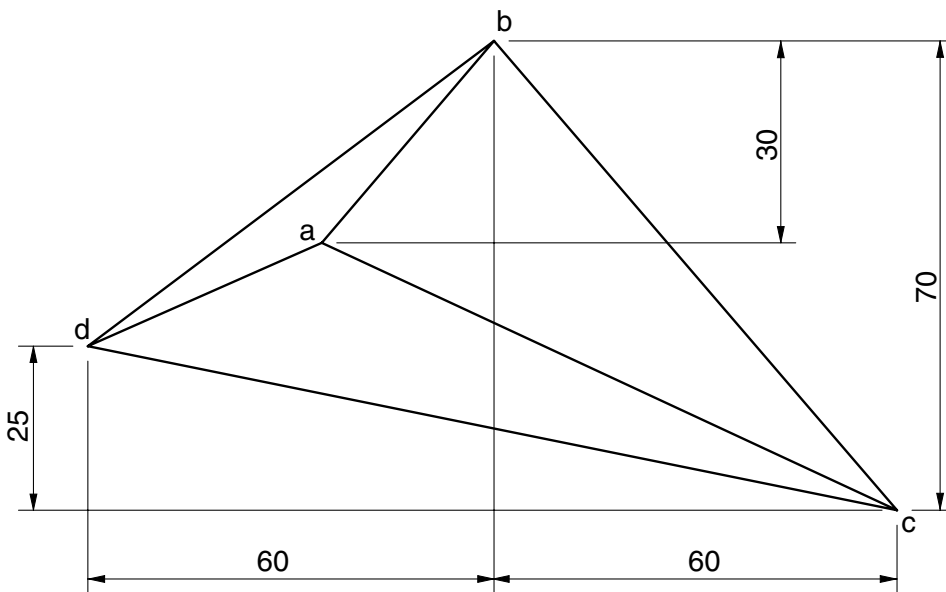   **(c)** Construct a development of the three sides and the base.   [9]

Fig. 6

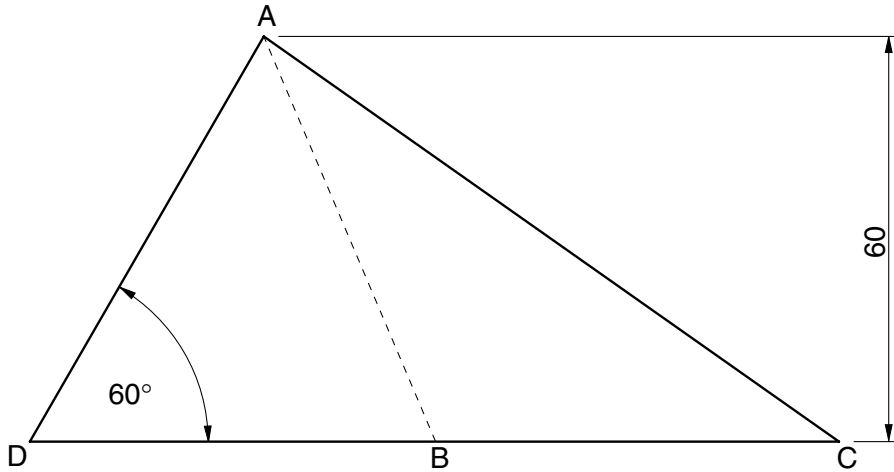**8** Details of a machined block are shown in Fig. 7.

Draw, full size, an isometric projection of the machined block with corner C in the forefront of your view.

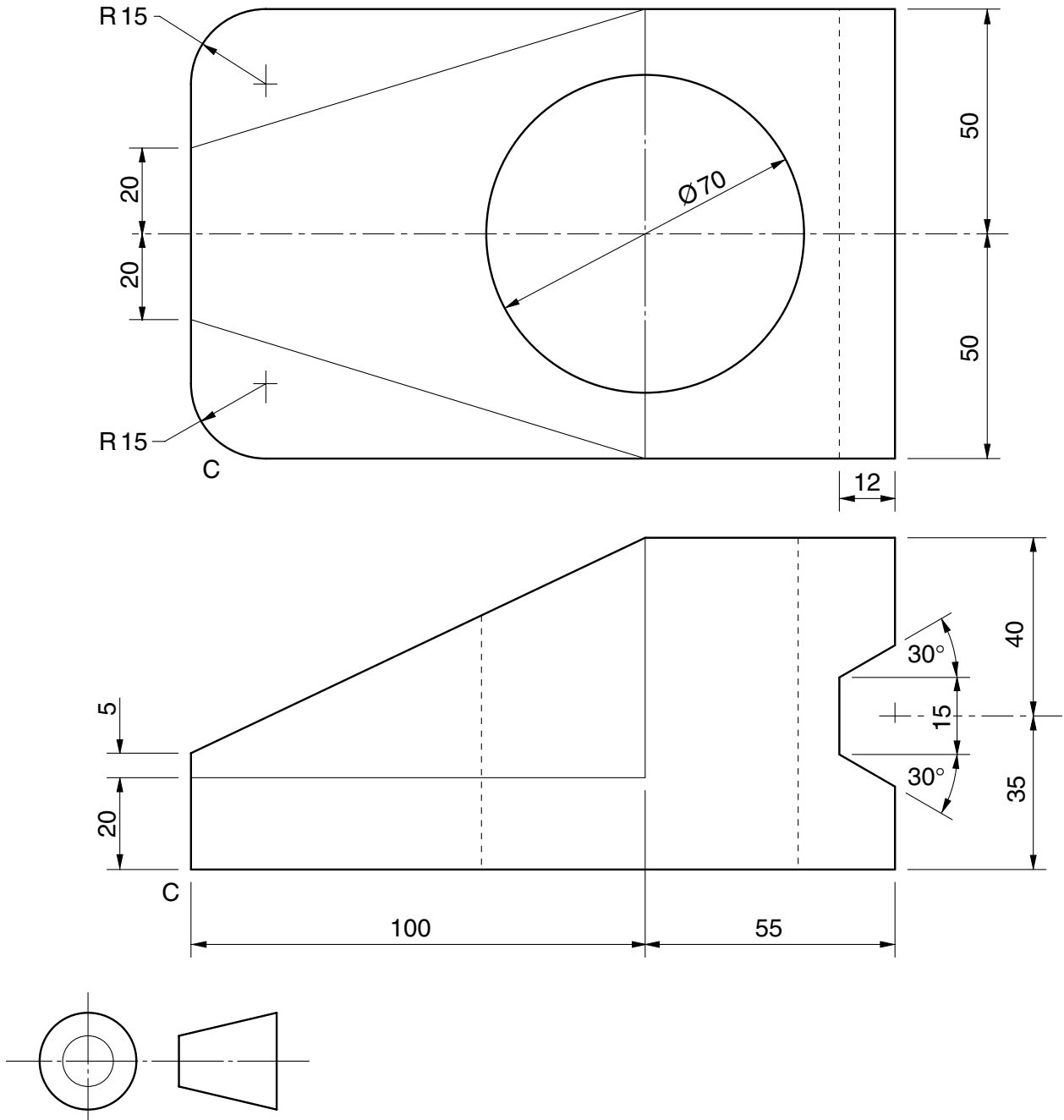Omit hidden details and do not use an isometric scale. [20]

Fig. 7