



4.9 DRAWING AND DESIGN (449)

4.9.1 Drawing and Design Paper 1 (449/1)

SECTION A (40 marks)

Answer **all** the questions in this section on the answer sheets provided.

- 1 (a) State **two** requirements to be observed to avoid confusing the dimension lines with outlines in a drawing. (1 mark)
- (b) Give **two** reasons why care must be taken when storing drawing instruments. (2 marks)
- 2 (a) State what an industrial training centre in Kenya is. (1 mark)
- (b) State **two** factors to consider in order to produce quality drawing. (1 mark)
- 3 (a) State **four** ways through which design ideas are communicated. (2 marks)
- (b) Sketch the convention for each of the following: (2 marks)
- (i) circular tube;
 - (ii) planed timber;
 - (iii) switch;
 - (iv) knurling.
- 4 (a) Give the composition of each of the following alloys: (2 marks)
- (i) brass;
 - (ii) Stainless steel.
- (b) **Figure 1** shows a machine component. (2 marks)

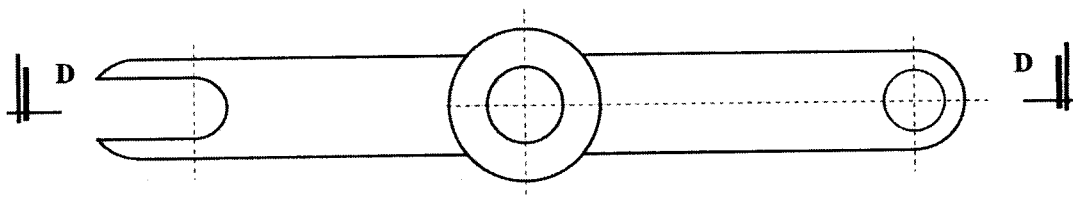


Figure 1

Draw the section D-D.

- 5 (a) (i) Explain each of the following scales in relation to the size of the drawing and the actual object.
- (I) 20:1
(II) 1:20
- (ii) Give a common example where each of the above scales would be used. (3 marks)
- (b) For the template shown in Figure 2.

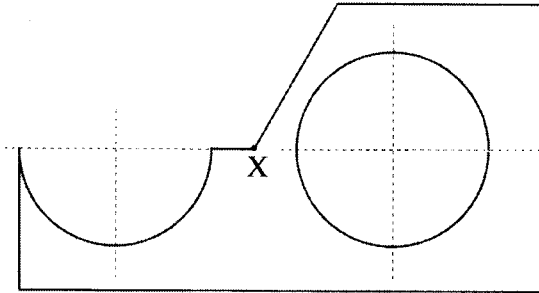
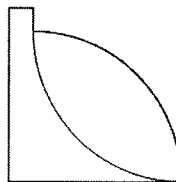


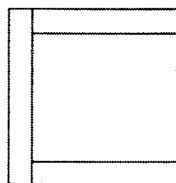
Figure 2

Measure and dimension the following:

- (i) the semi circle;
(ii) the angle at point X. (2 marks)
- 6 Use labelled sketches to differentiate between one-point and two-point perspective drawings. (2 marks)
- 7 Figure 3 shows two views of a block drawn in first angle projection.



Elevation



Plan

Figure 3

Sketch in good proportion, the oblique view of the block. (3 marks)

8 Construct a triangle whose perimeter is 240 mm and the sides are in the ratios 4.5:6.0:7.5 measure the smallest angle. (4 marks)

9 (a) **Figure 4** shows two views of a machined bracket drawn in first angle projection.

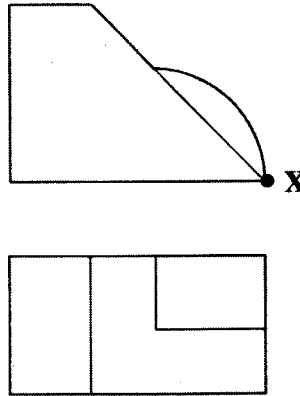


Figure 4

Sketch in good proportion, the isometric view of the block taking **X** as the lowest point. (3 marks)

(b) **Figure 5** shows a truncated triangular prism drawn in first angle projection.

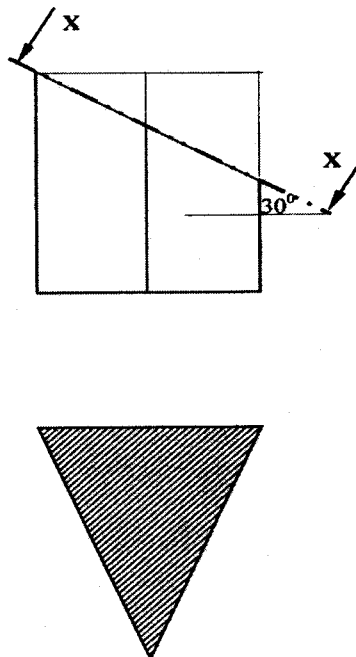


Figure 5

Draw the end elevation.

(4 marks)

- 10 Sketch in third angle projection the three orthographic views of the block shown in **Figure 6**.
(6 marks)

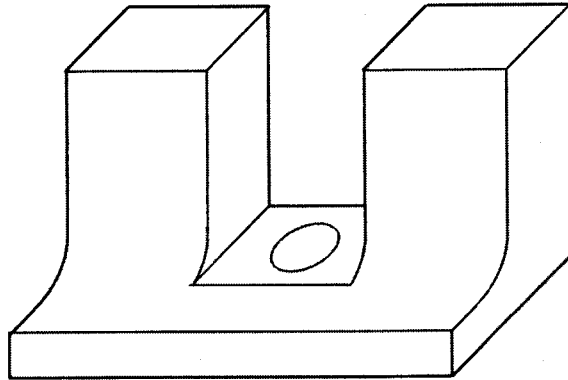


Figure 6

SECTION B (30 marks)

(COMPULSORY)

Candidates are advised to spend not more than one hour on this question.

- 11 **Figure 7** shows part of a coupling bracket drawn in first angle projection.

Assemble the parts and draw FULL SIZE, the following:

- (a) Sectional front elevation along the cutting plane A-A.
 - (b) End elevation in the direction of arrow B.
- Do not show the hidden details.

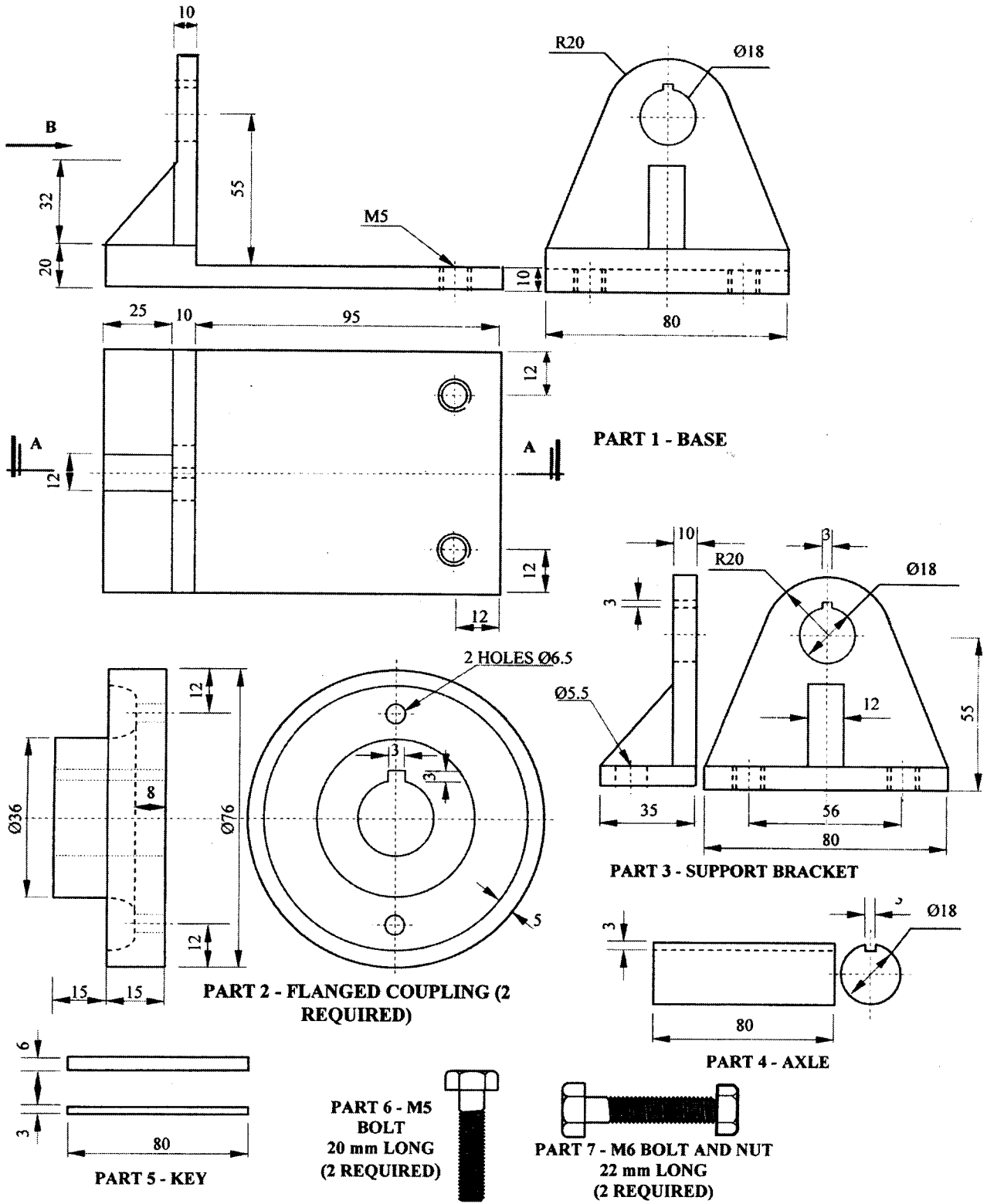
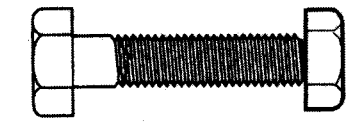
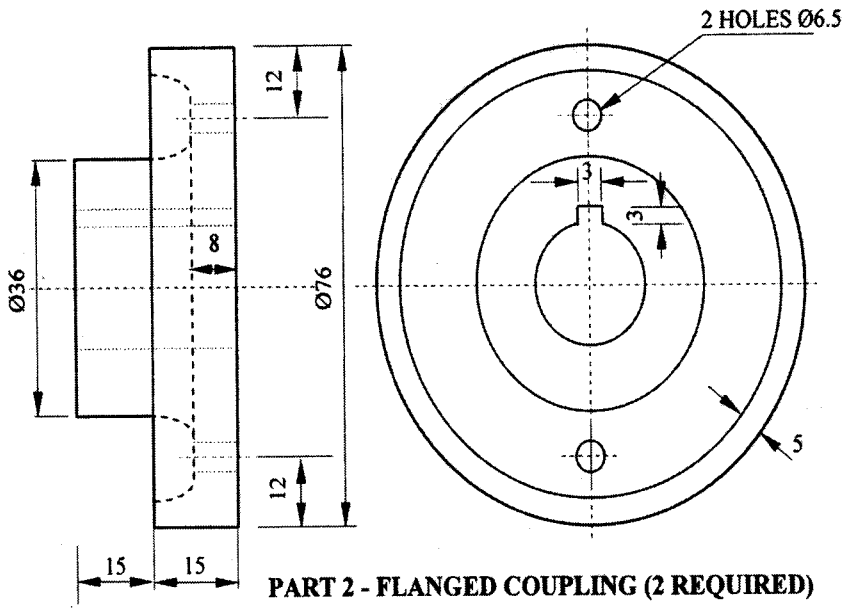


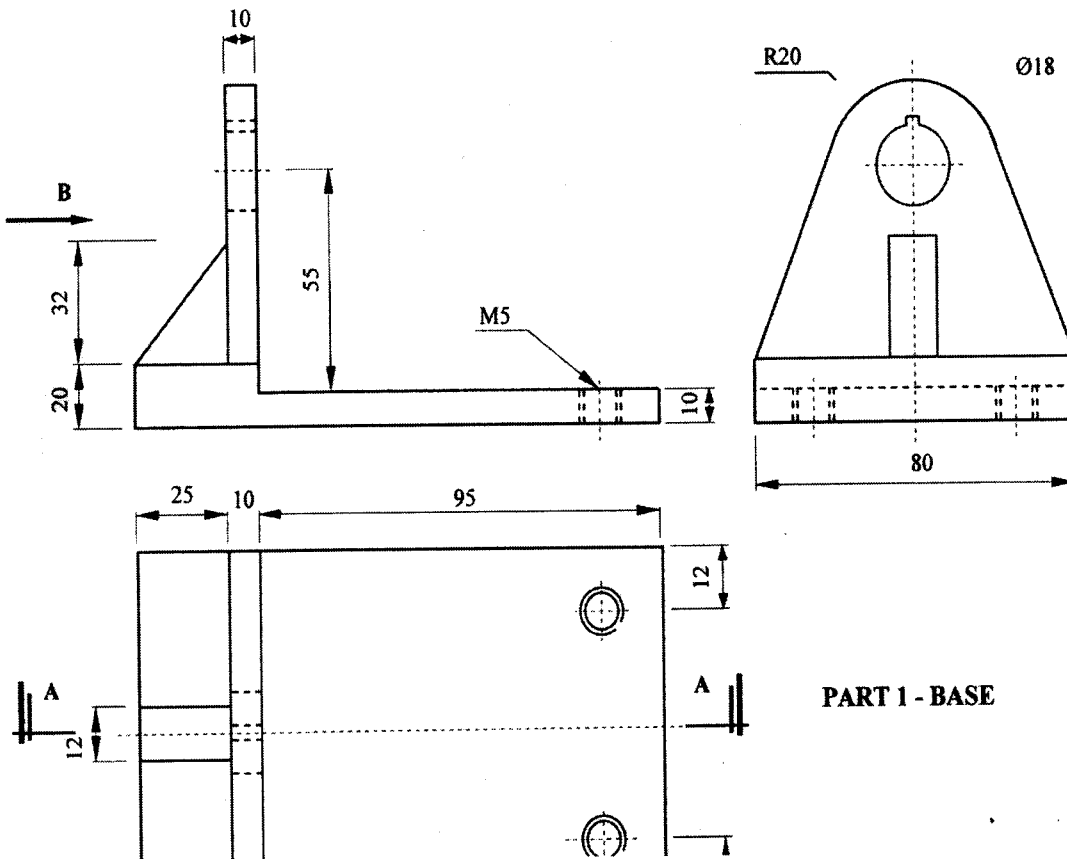
FIGURE 7



PART 7 - M6 BOLT AND NUT
22 mm LONG
(2 REQUIRED)



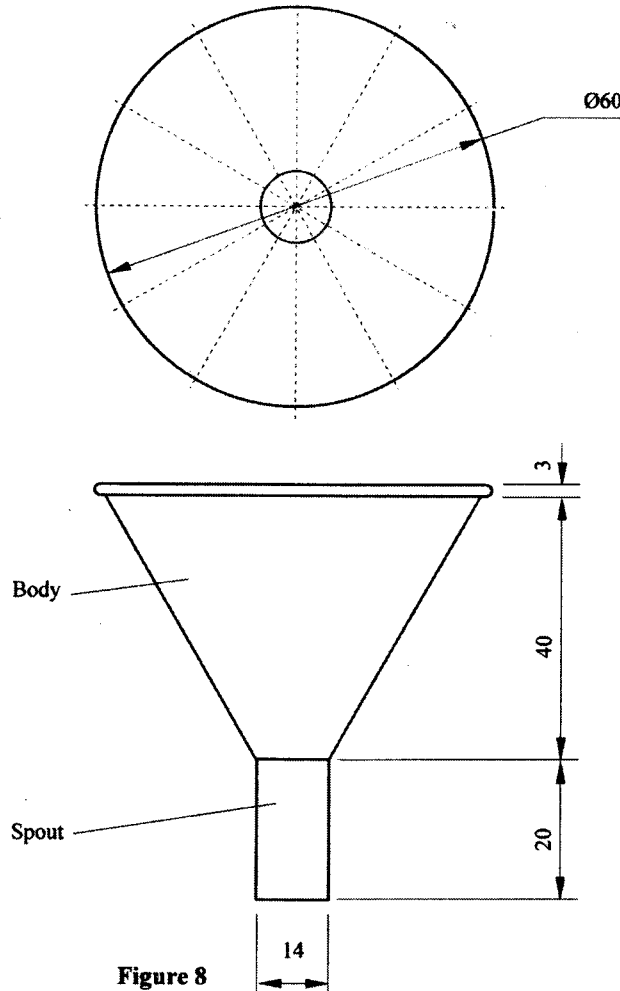
PART 6 - M5 BOLT
20 mm LONG
(2 REQUIRED)



SECTION C (30 marks)

Answer any two questions from this section.

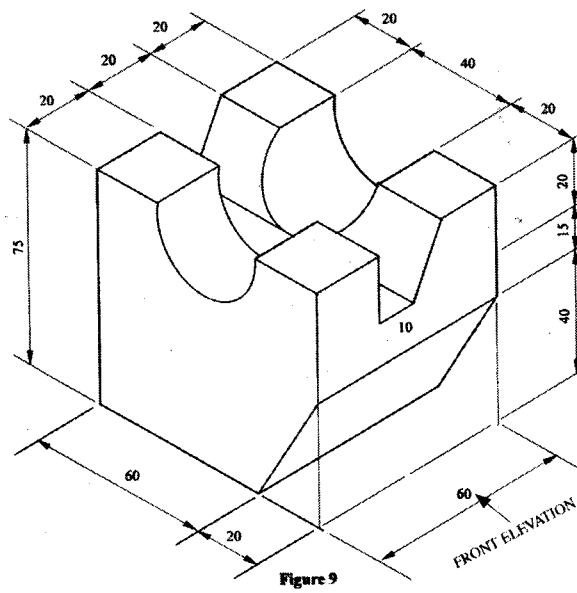
- 12 **Figure 8** shows two views of a funnel drawn in third angle projection. The body of the funnel is conical with a wired edge and a cylindrical spout.



Draw the development of:

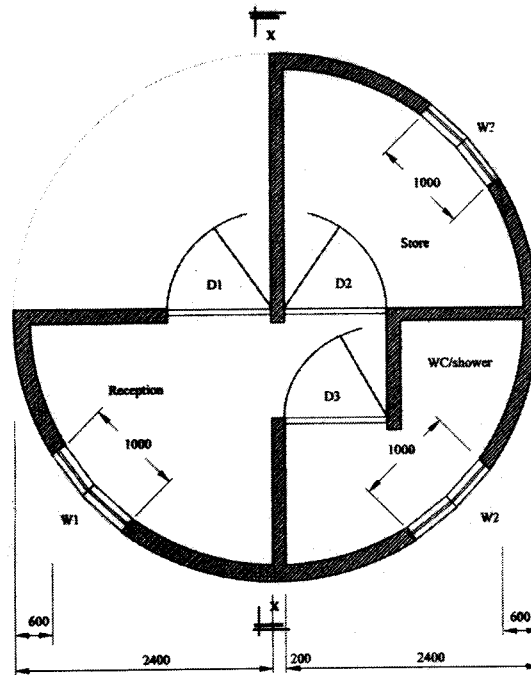
- (a) the body with a 3 mm wire edge;
- (b) the spout (allow 5 mm seam and ignore the thickness of the material). (15 marks)

13 Figure 9 shows a pictorial view of a machined block.



Draw FULL SIZE in third angle projection, the three orthographic views of the block. (15 marks)

14 Figure 10 shows a plan of a guard house.



Draw section X-X to a scale of 1:50.

(15 marks)

Specifications

Foundation: Concrete strip 600 x 200
Walling: 200 mm blockwork
Flooring: Ring beam 300 x 200
Flooring: Concrete on hardcore
Screed on 100 mm concrete
Roof: Pitch 30° covered with concrete tiles on 50 x 25 battens on 100 x 50 rafters.
Doors: D1 steel casement 2000 x 900
D2 and D3 framed timber 2000 x 900
Windows: W1 steel casement 1600 x 1000
W2, W3 and W4 1000 x 500

4.9.2 Drawing and Design Paper 2 (449/2)

DESIGN PROBLEM (40 marks)

Gardeners usually encounter a lot of problems when trying to reach branches of tall trees to prune them. They also risk falling-off from the unstable ladders when pruning trees. Design a leaning type ladder to facilitate the pruning of tall trees considering the following.

1. The ladder should have provision for using it on tree trunks with both regular and irregular surfaces.
2. It should be possible to conveniently serve the gardener when pruning trees of different heights.
3. It should have steps that are comfortable to the user.
4. It should have provision for a firm grip on the ground.
5. It should also have provision for packing to enhance ease of transportation.

REQUIREMENTS

- (a) Make hand sketches of two possible designs. (6 marks)
- (b) Select **one** of the designs in (a) above and make a refined pictorial drawing of the design and label the main parts. (11 marks)
- (c) Make exploded pictorial sketches to show the mechanisms for each considerations in 1, 2, 3, 4 and 5 above. (15 marks)
- (d) Name **two** different materials used in making the ladder and state **one** reason for each of the chosen materials. (4 marks)
- (e) Give **two** methods used in joining the parts and state where each is applied. (4 marks)