COURSE CODE:	*AGE 224*
COURSE TITLE:	*Technical Drawing II*
NUMBER OF UNITS:	*2 Units*
COURSE DURATION:	*Two hours per week*

COURSE DETAILS:

Course Coordinator: **Dr. Olayanju T.M. Adeniyi,** B.Sc., M.Sc. Ph.D
Email: olayanjutma@unaab.edu.ng
Office Location: **Room G003, C VE Building, COLENG**
Other Lecturers: **None**

COURSE CONTENT:

Review of orthographic projection and isometric drawing. Conventions – enlarged part, common features, symmetry, repetitive information, etc. True lengths. Technical sketching. Conic sections. Interpretation of surfaces. Surface development – parallel and radial line only.

COURSE REQUIREMENTS:

This is a required course for all students in the Department of Food Science and Technology. In view of this, Students are expected to participate in all the course activities and have minimum of 75% attendance to be able to write the final examination.

READING LIST:

1. Technical drawing and Engineering Communication. David et al. 2008 Delmar Cengage Learning
2. AutoCAD 2000 for Beginners POOlad Consult Ltd Abeokuta

LECTURE NOTES

TECHNICAL DRAWING FOR FOOD SCIENTISTS AND TECHNOLOGISTS

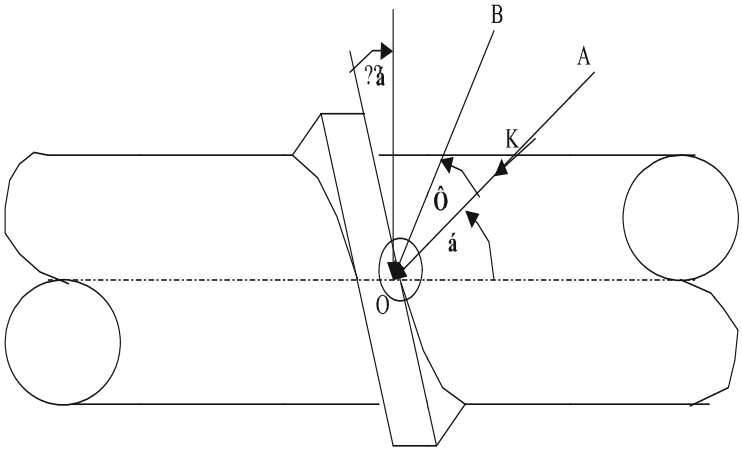


Figure 1:

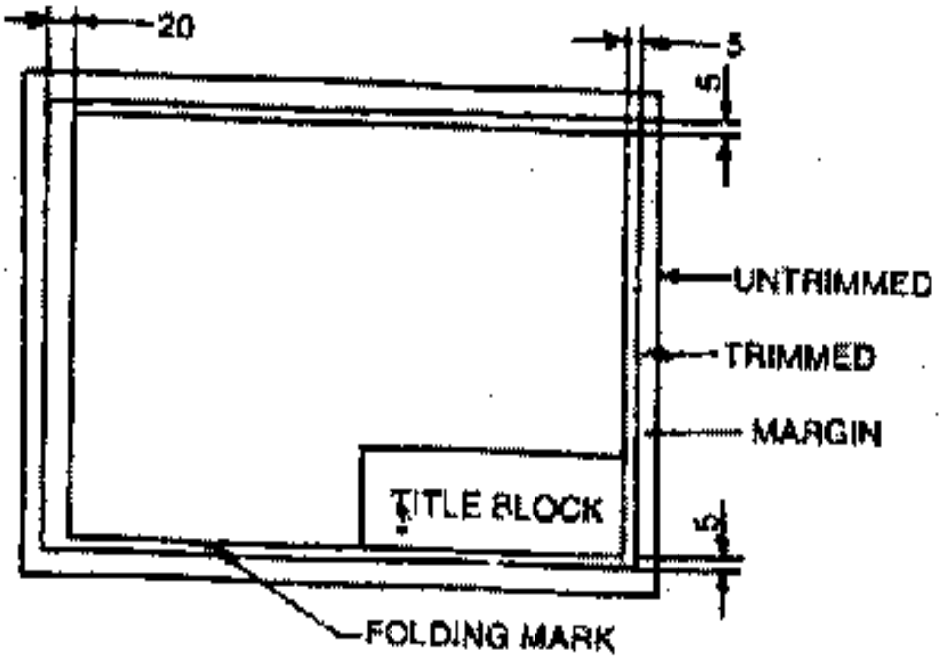
1.0 INTRODUCTION

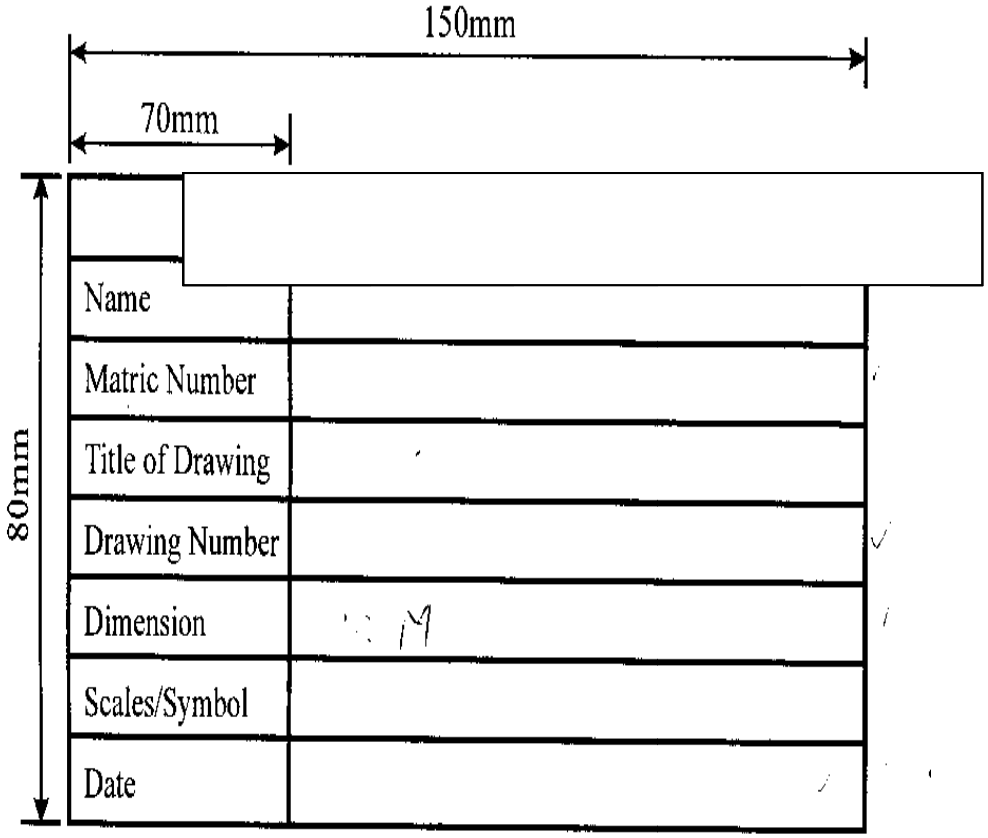
1.1 Drawing Instruments

A good and accurate drawing can only be made through constant practice with the aid of drawing instruments and materials listed below:-

- Drawing board
- Tee square
- Drawing pencils
- Set of drawing instruments
- Set squares 60^o - 30^o and 45^o
- Drawing paper clips or tape
- Protractor
- Scale rule
- French curves
- Drawing paper
- Eraser
- Compasses and Divider

1.2 Title Block





1.3 Dimensioning

DIMENSIONING TECHNIQUES/RULES.

(i) Dimensions should be placed outside the outline of the view whenever possible.

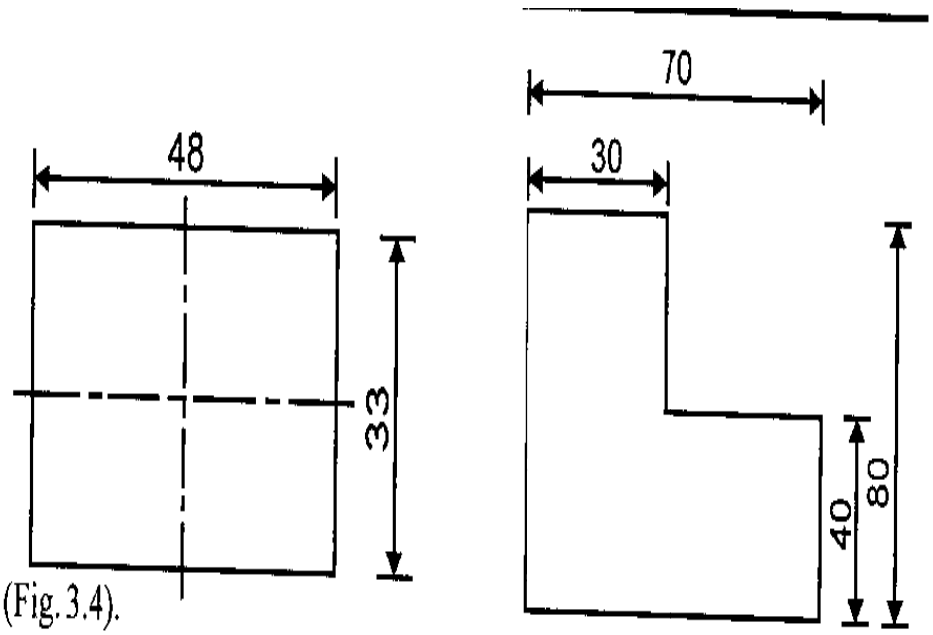
(ii) Always ensure there is a small gap between the outline and the start of the projection line.

(iii) Projection line should continue a short distance beyond the dimension line.

(iv) The dimension line arrow heads must just touch the projection line. Arrow heads are about 3mm long at each end.

(v) Dimensions must never be cramped.

(vi) Smallest dimension should be placed nearest the outline to avoid dimension and projection lines crossing (Fig. 3.4)



(Fig. 3.4).

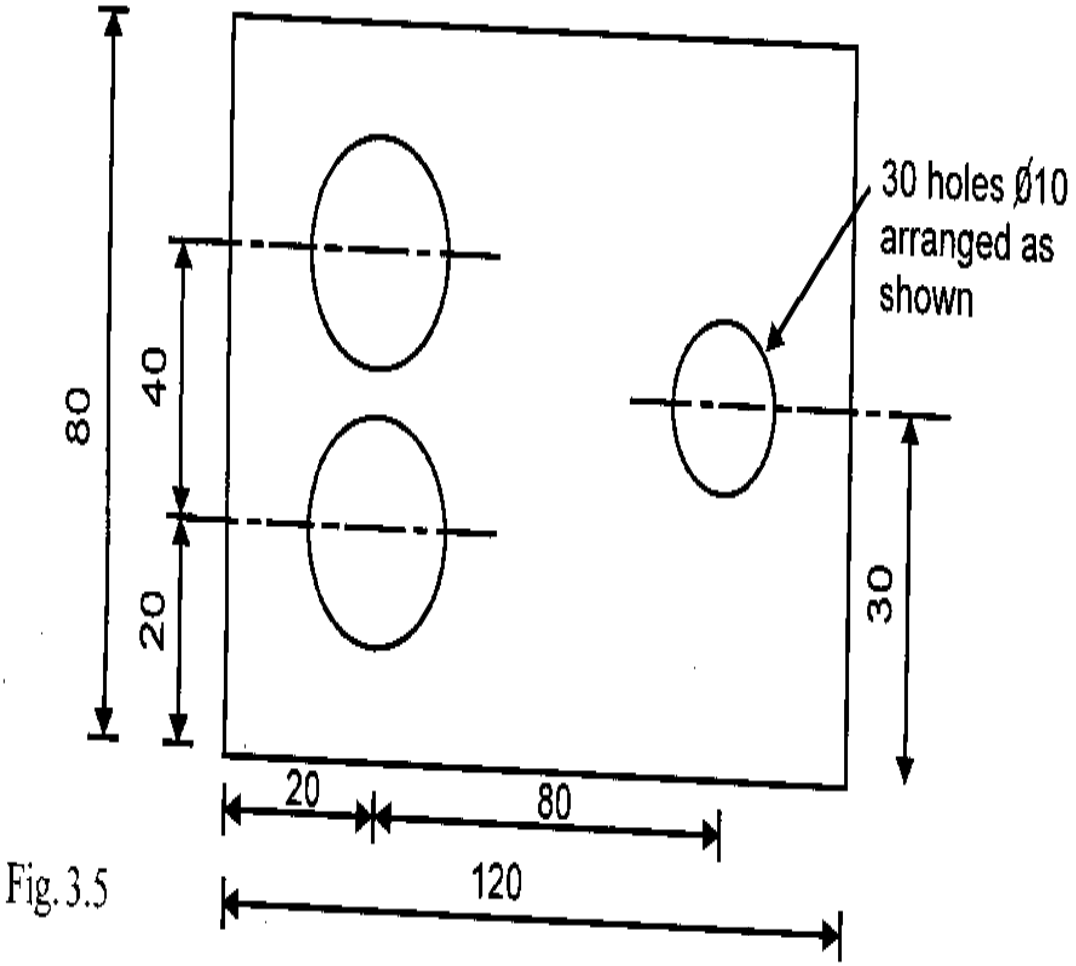


Fig. 3.5

1.4 Lines

CONVENTIONS FOR VARIOUS LINES (ACCORDING TO B.I.S. S.P; 46-1988)

LINE	DESCRIPTION	GENERAL APPLICATIONS
A	CONTINUOUS THICK	A1 VISIBLE OUTLINE A2 VISIBLE EDGES
B	CONTINUOUS THIN STRAIGHT OR CURVED	B1 IMAGINARY LINES OF INTERSECTION B2 DIMENSION LINES B3 PROJECTION LINES B4 LEADER LINES B5 HATCHING B6 OUTLINES OF REVOLVED SECTIONS IN PLACE B7 SHORT CENTRE LINE
C	CONTINUOUS THIN FREEHAND	C1 LIMITS OF PARTIAL OR INTERRUPTED VIEWS AND SECTIONS, IF THE LIMIT IS NOT A CHAIN THIN
D	CONTINUOUS THIN (STRAIGHT WITH ZIGZAGS	D1 LINE
E	DASHED THICK	E1 HIDDEN OUTLINES E2 HIDDEN EDGES
F	DASHED THIN	F1 HIDDEN OUTLINES F2 HIDDEN EDGES
G	CHAIN THIN	G1 CENTRE LINES G2 LINES OF SYMMETRY G3 TRAJECTORIES
H	CHAIN THIN, THICK AT ENDS AND CHANGES OF DIRECTION	H1 CUTTING PLANES
J	CHAIN THICK	J1 INDICATION OF LINES OR SURFACES TO WHICH A SPECIAL REQUIREMENT APPLIES
K	CHAIN THIN DOUBLE-DASHED	K1 OUTLINES OR ADJACENT PARTS K2 ALTERNATIVE AND EXTREME POSITIONS OF MOVABLE PARTS K3 CENTROIDAL LINES K4 INITIAL OUTLINES PRIOR TO FORMING K5 PARTS SITUATED IN FRONT OF THE CUTTING PLANE

1.5 Simple Geometry

To construct an Angle of 60^0

Procedure

1. Draw a line AB.
2. Indicate point C anywhere on AB
3. With centre C and any convenient radius draw an arc to cut AB at D
4. with centre D and the same radius draw an arc to cut the previous (at E.
5. Draw a line from C through E (line CF). FCB is the required (angle.

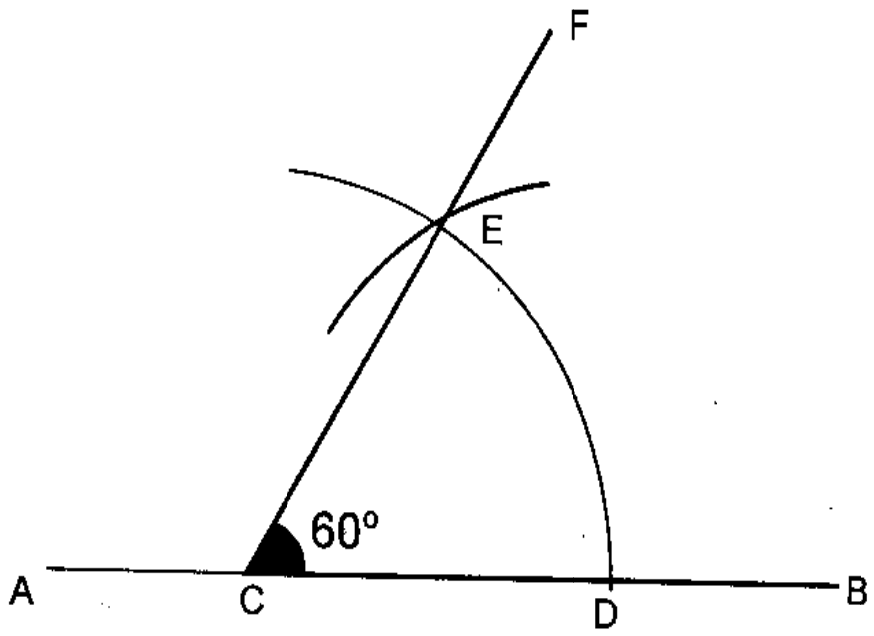


Fig 4.1

To construct an Angle of 30^0 (See Fig 4.2)

Procedure

i. Construct an angle of 60^0, as in Fig 4.1
ii. Bisect the 60^0 angle.
iii. Angle ABC is the required 30^0 angle.

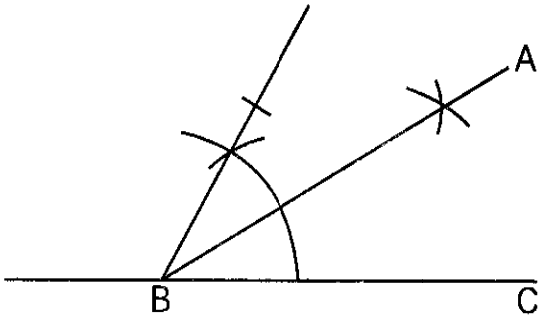


Fig. 4.2

To construct an Angle of 15^0 (See Fig 4.3)

Procedure

i. Construct an angle of 30^0, as above
ii. Bisect the 30^0 angle.
iii. Angle 1,2,3 is the required 15^0 angle.

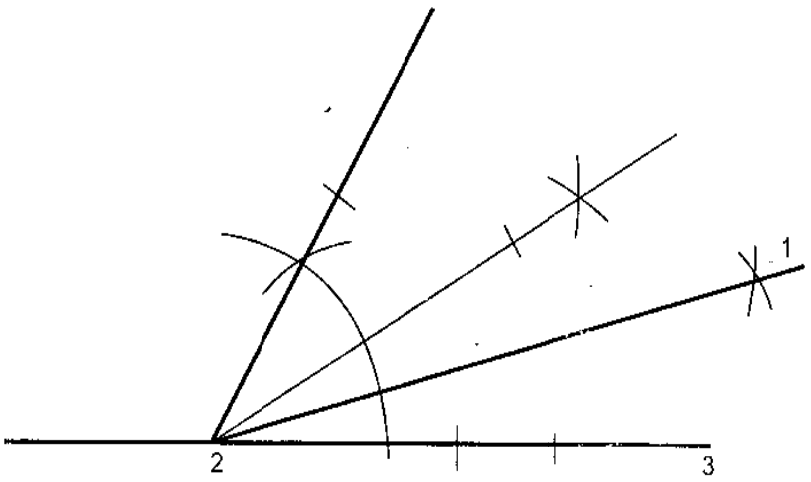


Fig. 4.3

To construct an Angle of 45^0

Procedure

1. Construct a right angle BAC
2. Bisect the the right angle to obtain a 45 angle.

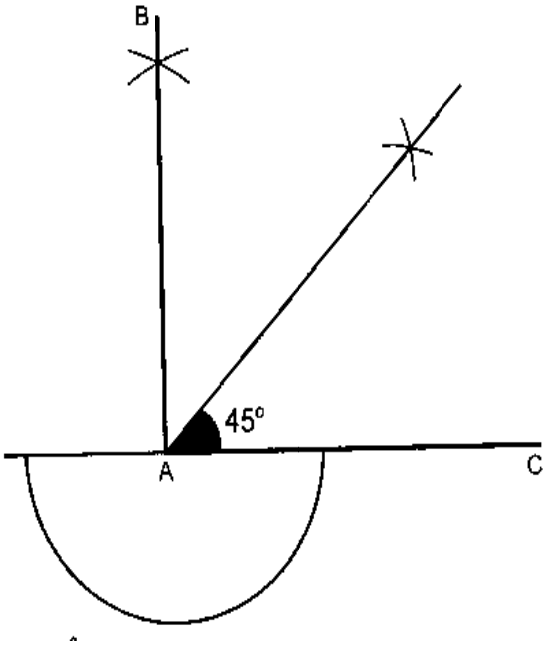


Fig. 4.4

Construction of angle 90^0 using compasses

(Fig. 4.5)

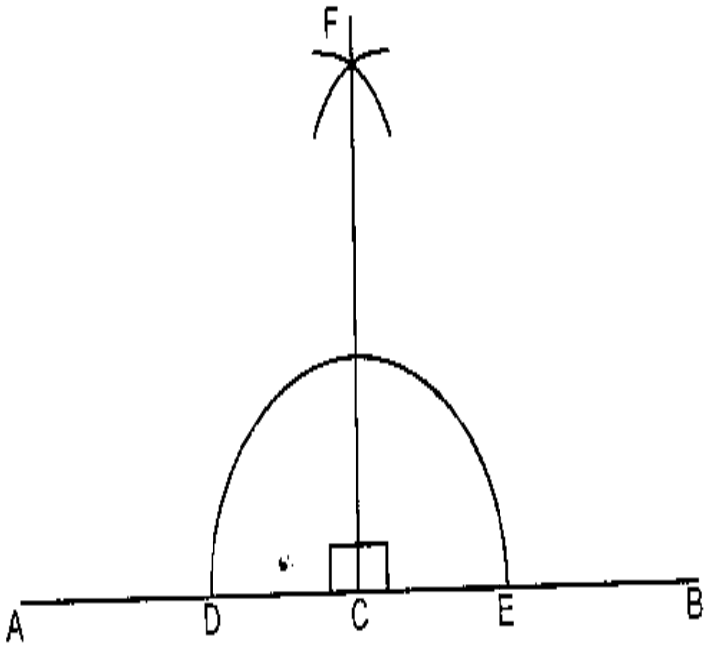
Given:

(i) Let line AB be a given line with point C at which the right angle 90^0 is to be drawn.

(ii) With centre C and any convenient radius, draw the semi-circle touching the line AB at D and E.

(iii) With centres D and E and radius DE draw two arcs which intersect at F. Join F to C.

(iv) Angles FCA and FCB are each 90^0



(Fig. 4.5)

2.0 ORTHOGRAPHIC PROJECTION

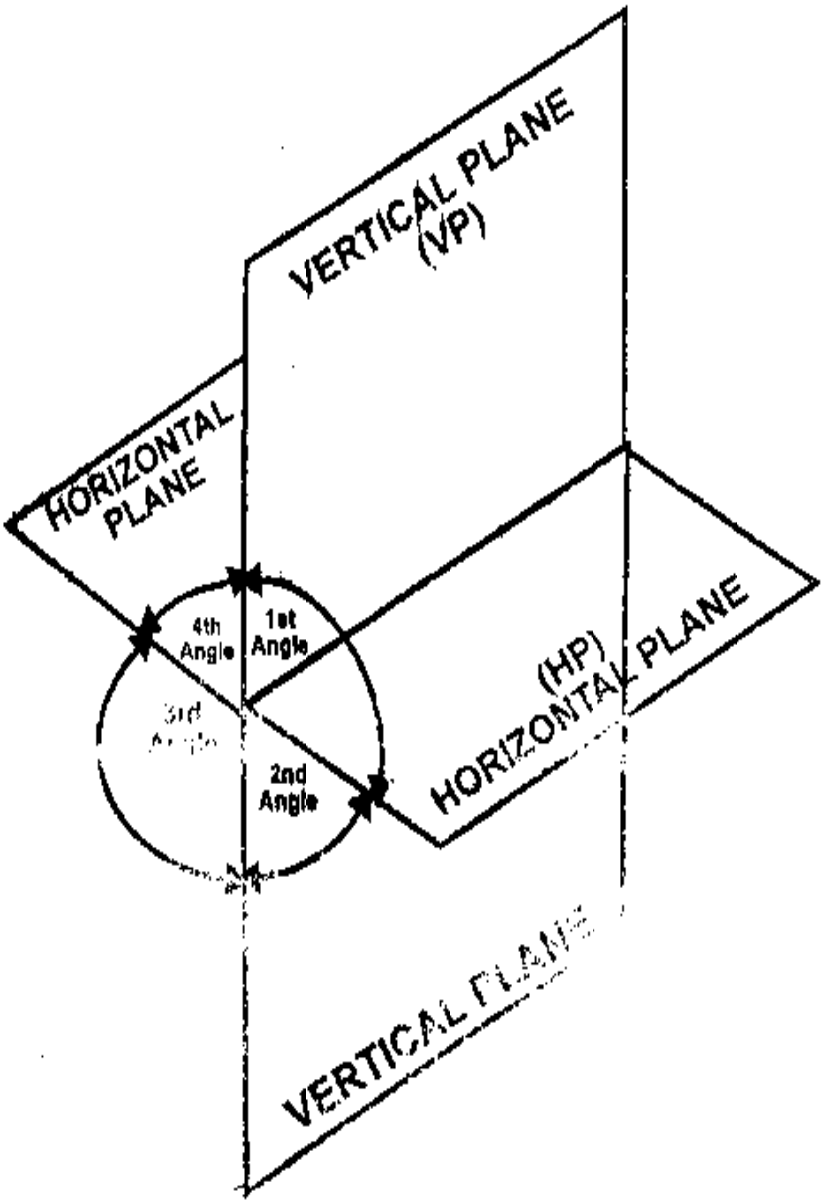

VERTICAL PLANE
(VP)
HORIZONTAL
PLANE
4th
Angle
1st
Angle
3rd
Angle
2nd
Angle
(HP)
HORIZONTAL PLANE
VERTICAL PLANE

Fig. 10.14

FIRST AND THIRD ANGLE PROJECTIONS

In first angle projection the object is placed in the first quadrant. The view obtained reveal that the elevation is above the plan upon resolving the horizontal plane about the line XY, which intersects the vertical and Horizontal planes, until both planes coincide (fig. 10.14). In the third angle projection, where the object it placed in the third quadrant, the plan is above the elevation.

We thus, see that when the same object is placed in the first and third quadrants the views obtained on projection are exactly the same, however, the relative position of the plan and elevation are different.

The views obtained and their relative positions when the same object is placed in both the first and fourth angles are the same, that is, they overlap. In the same vein, views obtained in the third and second angle overlap. It can therefore be seen why we speak of only first and third angle projections.

END VIEWS

In most cases the elevation and plan view do not fully describe the shape of an object. It therefore becomes, in such cases, mandatory that another view of the object be drawn for a good grasp of the complete shape of the object. This view, often referred to as end view or end elevation can be obtained by the introduction of another plane of projection called an auxiliary Vertical plane (AVP), oriented perpendicularly to both the Vertical plane and horizontal plane.

The end view is either to the left or right of the elevation depending on the position of the Auxiliary vertical plane.

PROJECTION SYMBOLS

It is necessary to indicate on the drawing which system of projection has been used. This is done by a symbol consisting of an elevation and an end view of a frustrum of a cone.

The first and third angle symbols are shown in Fig 10.16

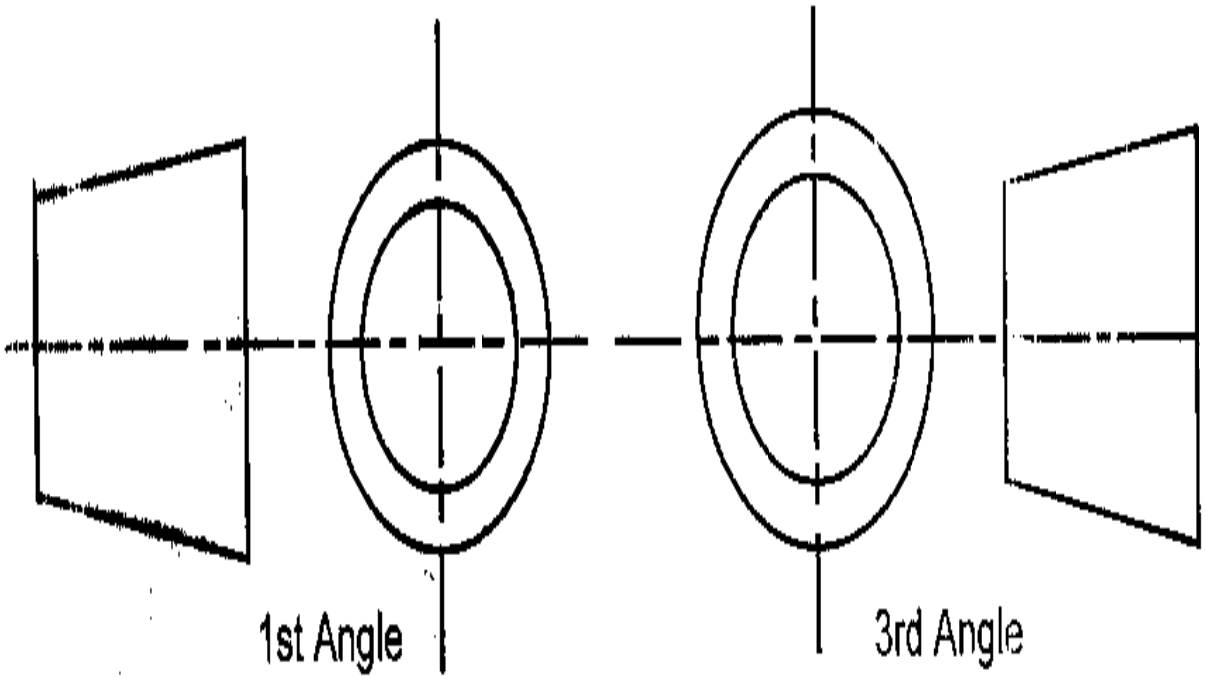


Fig. 10.16

POINTS TO NOTE IN ORTHOGRAPHIC PROJECTION

i. Enough space should be left between the views on a drawing to accommodate dimension and notes without crowding.

ii. The spacing should be planned before beginning.

iii. Hidden detail should only be used where it is essential for a complete description of the object but it should not be used for dimensioning.

iv. Avoid completing the view separately since it wastes time. Measurements can often be made on two or more views simultaneously or projected from one to another as soon as they are made therefore build all the views together.

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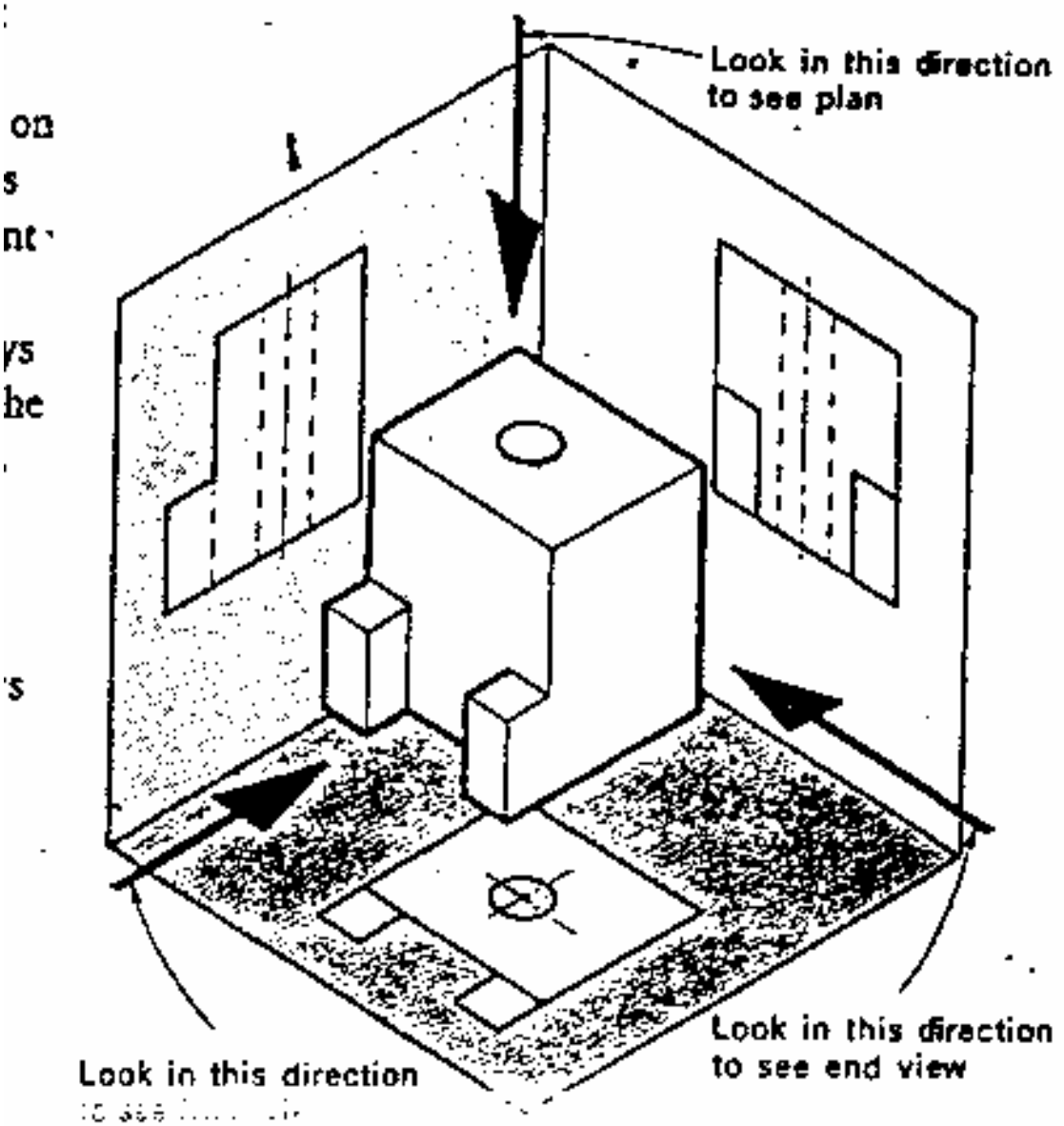

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Choice of viewing position

The two working drawings on this page and on page 47 opposite show different views of the same component. The drawing on page 47 shows an end view on the *right* of the front view. That on this page shows an end view on the *left* of the front view. Both are quite correct.

Rules for First Angle projection

Note: The following details shown in the two working drawings should be noted —

1 In First Angle projection, the PLAN is *below* the FRONT VIEW.

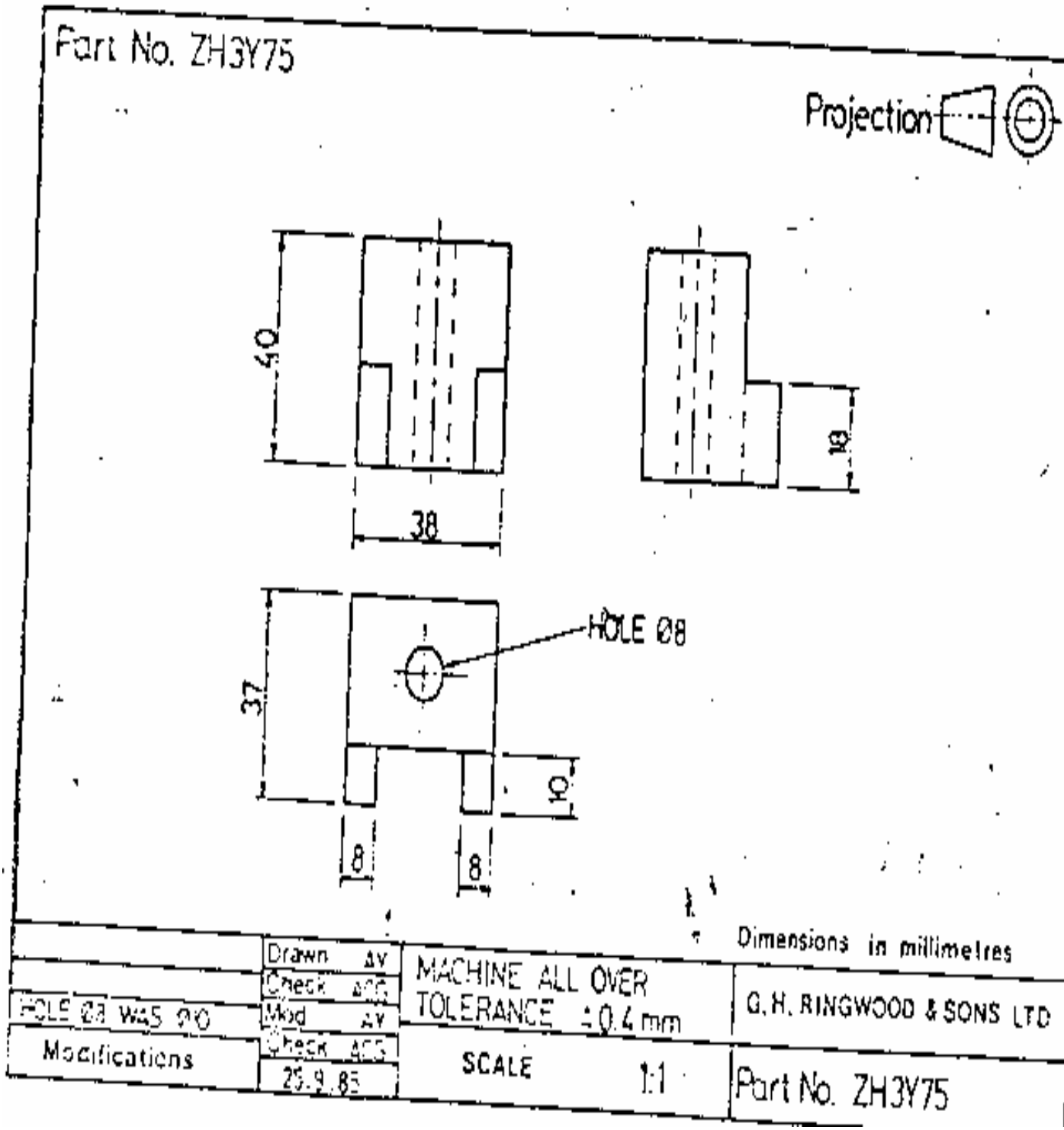
2 In First Angle projection the END VIEW on the *right* of the FRONT VIEW is the view as

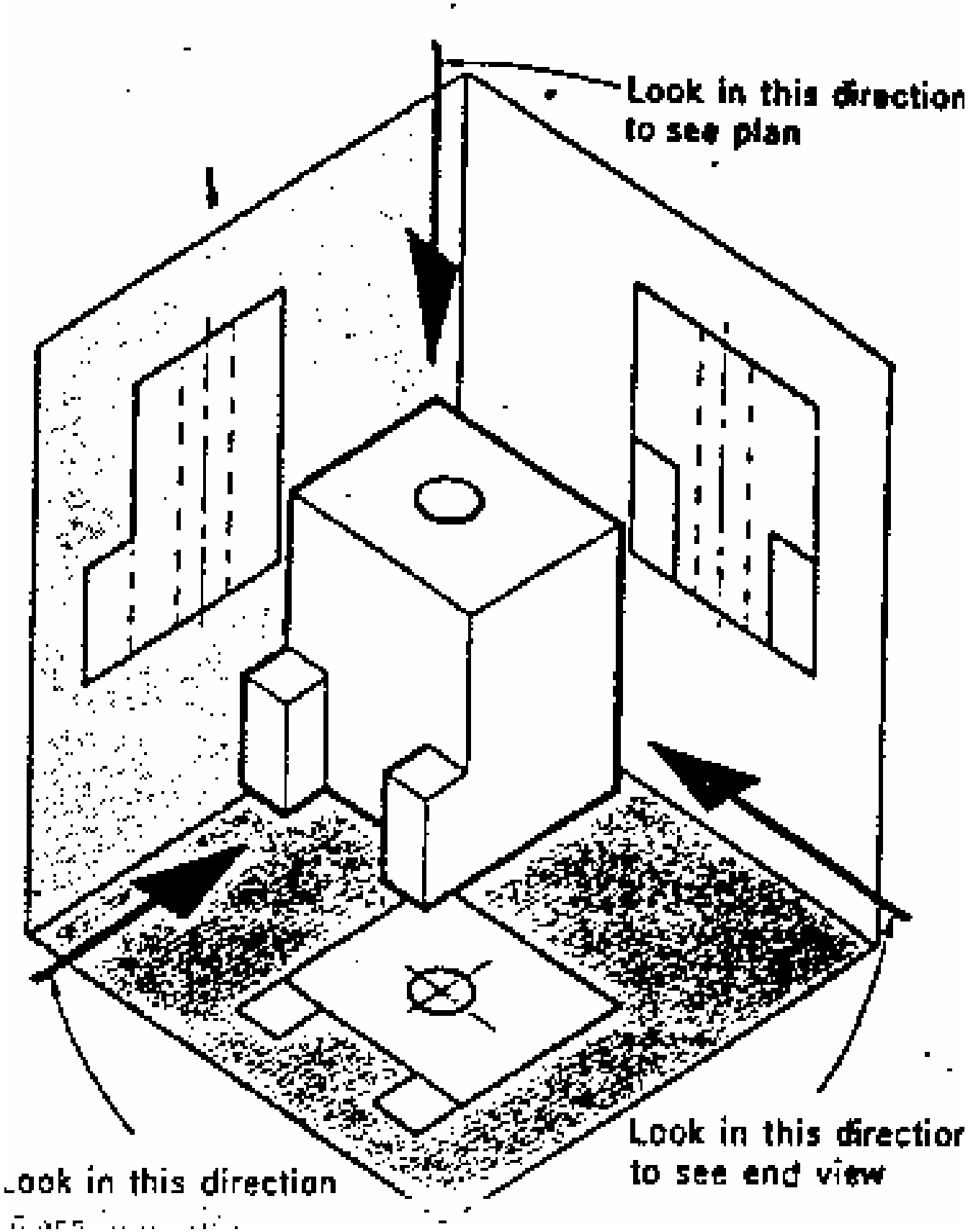
seen when looking at the *left* of the front view.

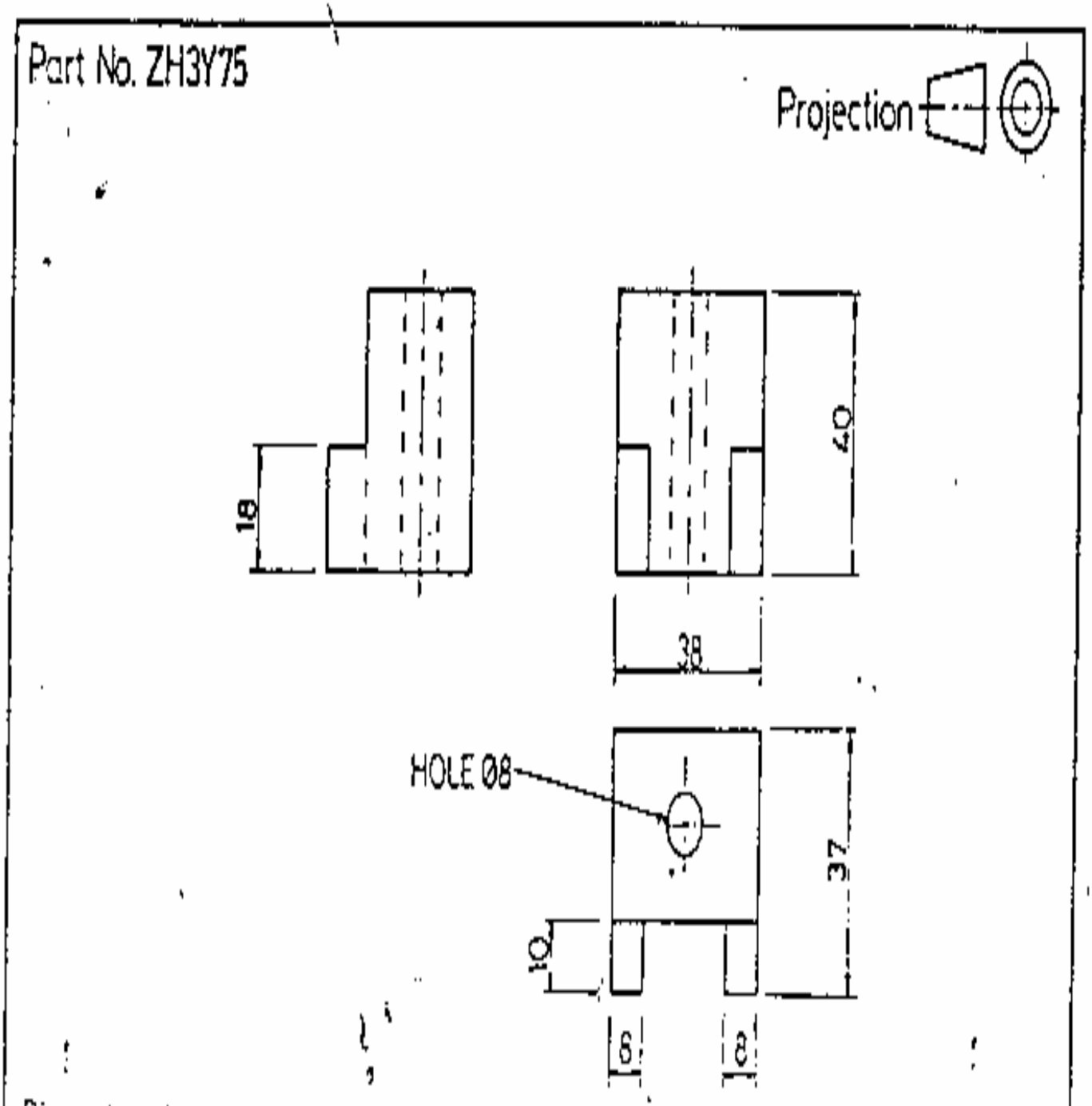
In First Angle projection the END VIEW on the *left* of the FRONT VIEW is the view as seen when looking at the *right* on the front view.

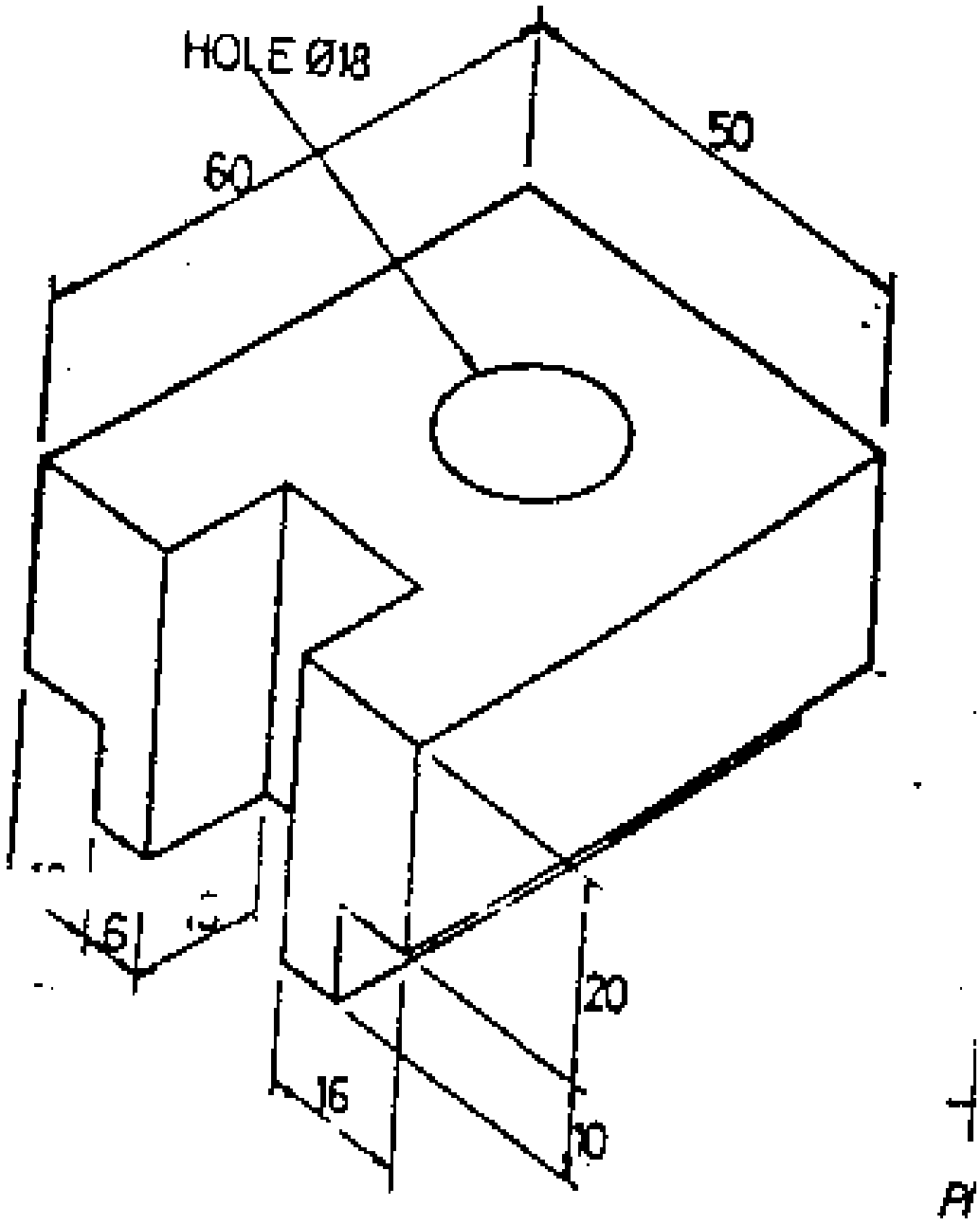
In First Angle projection the PLAN always faces *outwards* from the FRONT VIEW. The lines of the front of the plan face towards the sheet margins.

In First Angle projection END VIEWS always face *outwards* from the FRONT VIEW. The lines of the fronts of end views face towards the sheet margins.


Part No. ZH3Y75
Projection
40
38
19
HOLE Ø8
37
Ø
8
8
Dimensions in millimetres
Drawn AV
Check ACS
Mod AV
Check ACS
25.9.85
MACHINE ALL OVER TOLERANCE ±0.4 mm
SCALE 1:1
G.H. RINGWOOD & SONS LTD
Part No. ZH3Y75
HOLE Ø8 WAS Ø10
Modifications


Look in this direction
to see plan
Look in this direction
to see end view
Look in this direction


Part No. ZH3Y75
Projection
18
40
38
HOLE Ø8
37
10
8
8
Dimensions in millimetres
Drawn AY
Check ACG
Mod AY
Check ACG
25.9.85
MACHINE ALL OVER
TOLERANCE ±0.4 mm
G. H. RINGWOOD & SONS LTD
HOLE Ø8 WAS Ø10
Modifications
SCALE 1:1
Part No. ZH3Y75


HOLE Ø18
60
50
16
20
16
10

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ter setting up the sheet of drawing paper on a
wing board:

Draw parallel lines with the aid of a tee square and vertical lines with the aid of a set square to produce the outlines of a front view, an end view and a plan. The three rectangles required are: front view — 60 mm by 30 mm; end view — 50 mm by 30 mm; plan — 60 mm by 50 mm. Draw these outlines with a sharpened pencil in very thin, fine lines which can be easily removed with a rubber eraser.

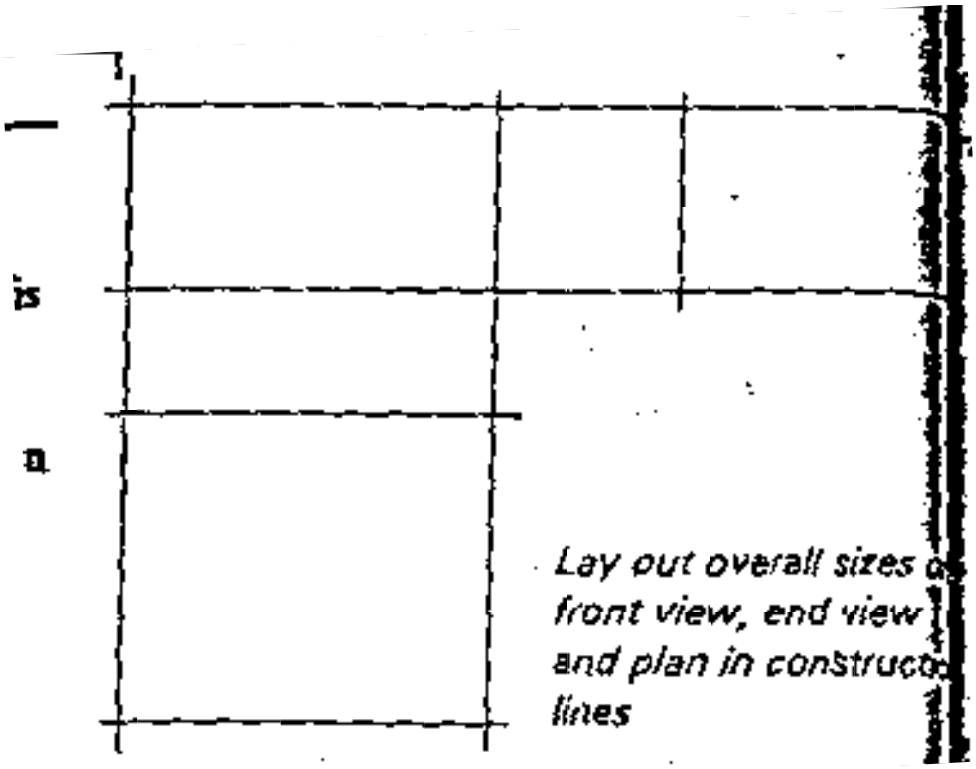
Measure the distance between the front view and the plan. Mark this distance off from the left hand of the end view outline to give AB. Draw a vertical through AB with the aid of a set square. A compass centred at B and set to AB should produce the arc AC with C in line with the upper edge of the plan outline.

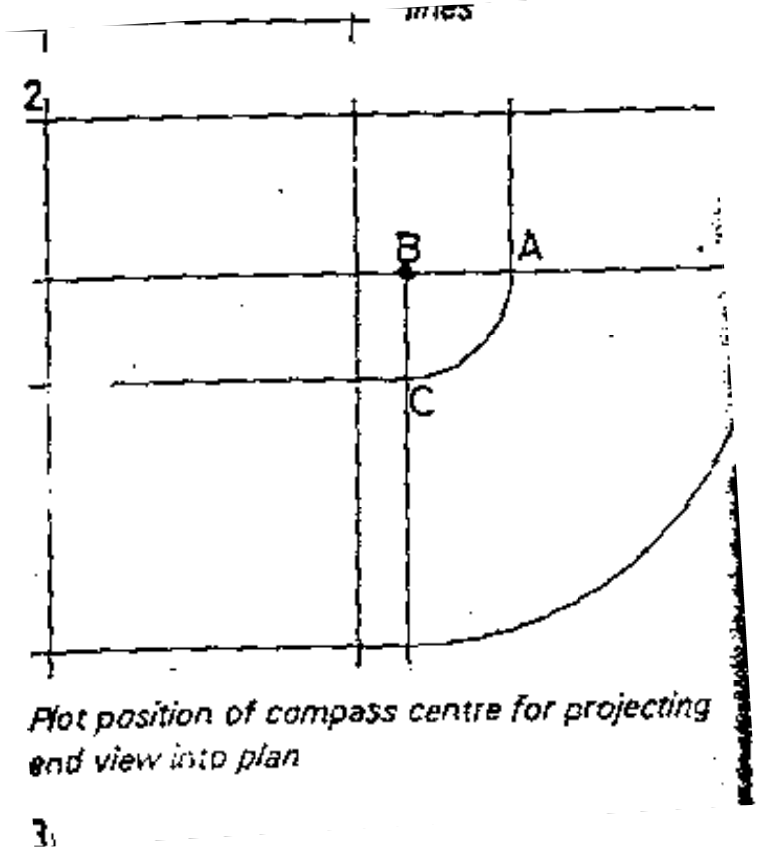
Fill in details within the end view outline

3 Fill in details within the end view outline with fine construction lines. With compass centred at B swing these lines through to meet the vertical line through B to give points 1, 2, 3, 4 and 5.

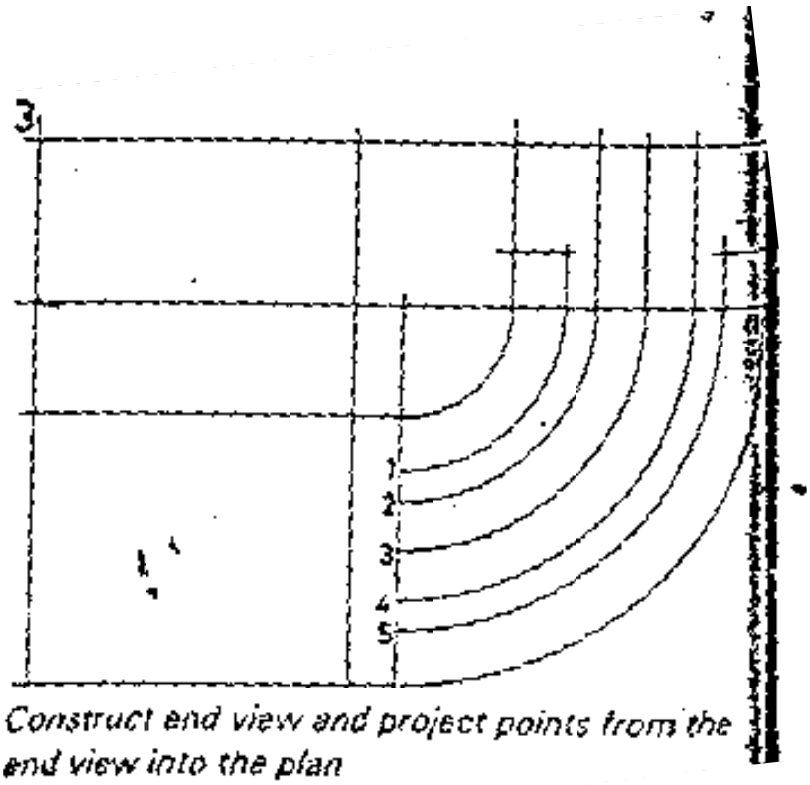
4 Project lines 1, 2, 3, 4 and 5 across the plan outline with the aid of a tee square. Complete filling in details of the plan to obtain the hole, its centre lines and the length of the slot.

Fill in details in the front view outline by projecting from the end view and the plan. Line-in all required details in the three views with a sharp pencil. Outline lines should be thick black lines. Centre and hidden detail lines should be thin black lines. Erase unwanted construction lines. Add the symbol of projection.

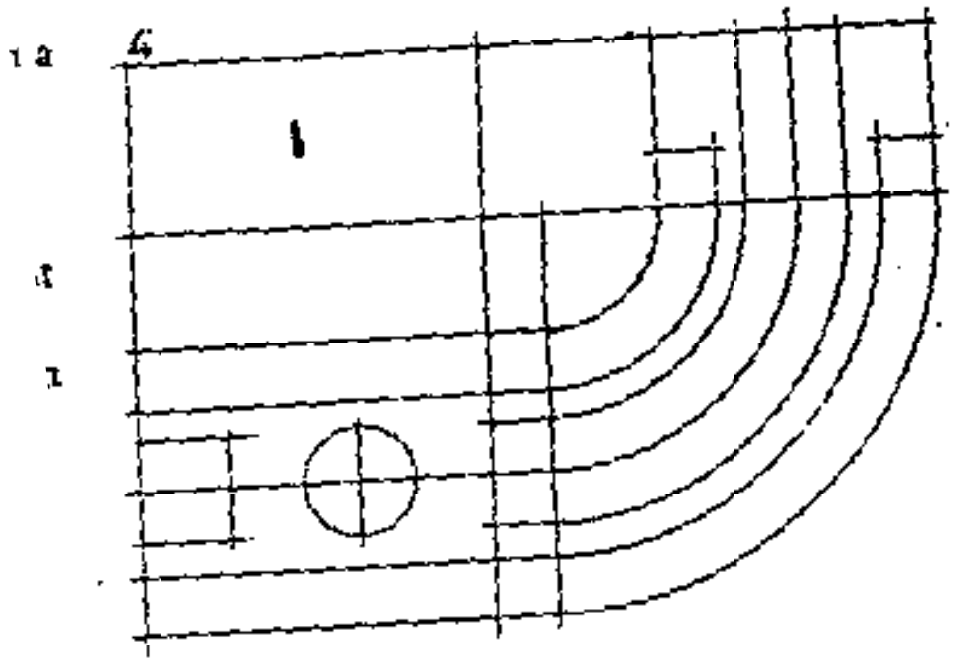




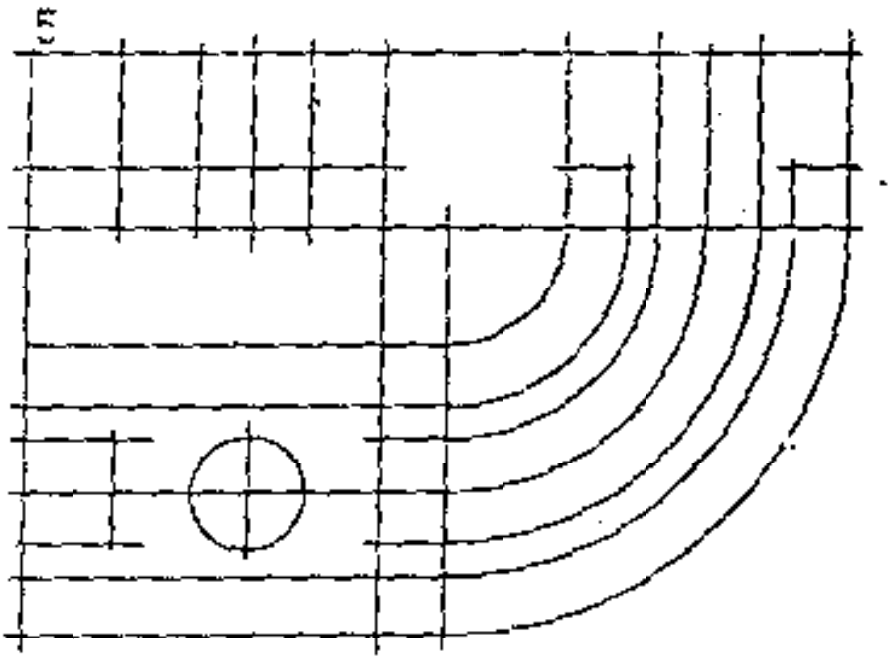
Plot position of compass centre for projecting end view into plan



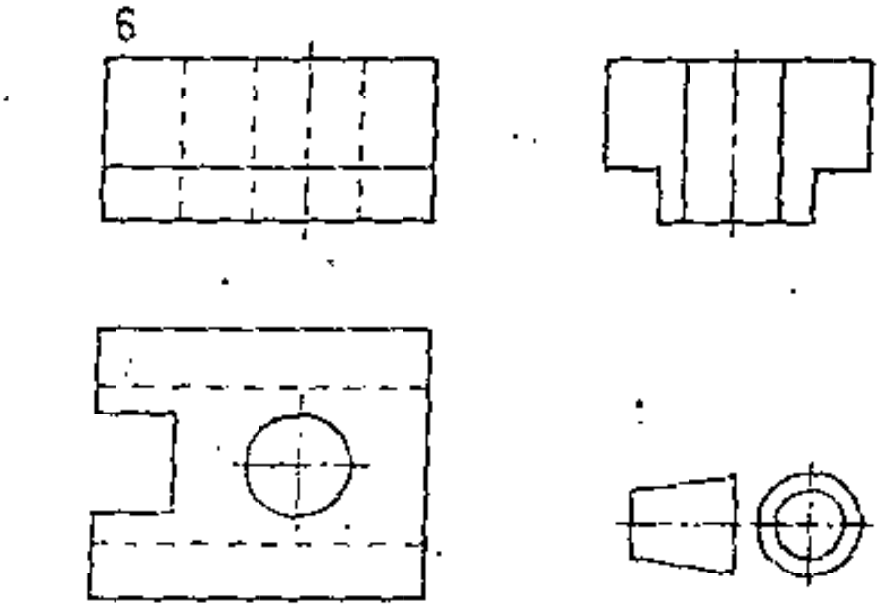
Construct end view and project points from the end view into the plan



Construct plan



Project detail from end view and plan into the front view



Line-in, add symbol of projection

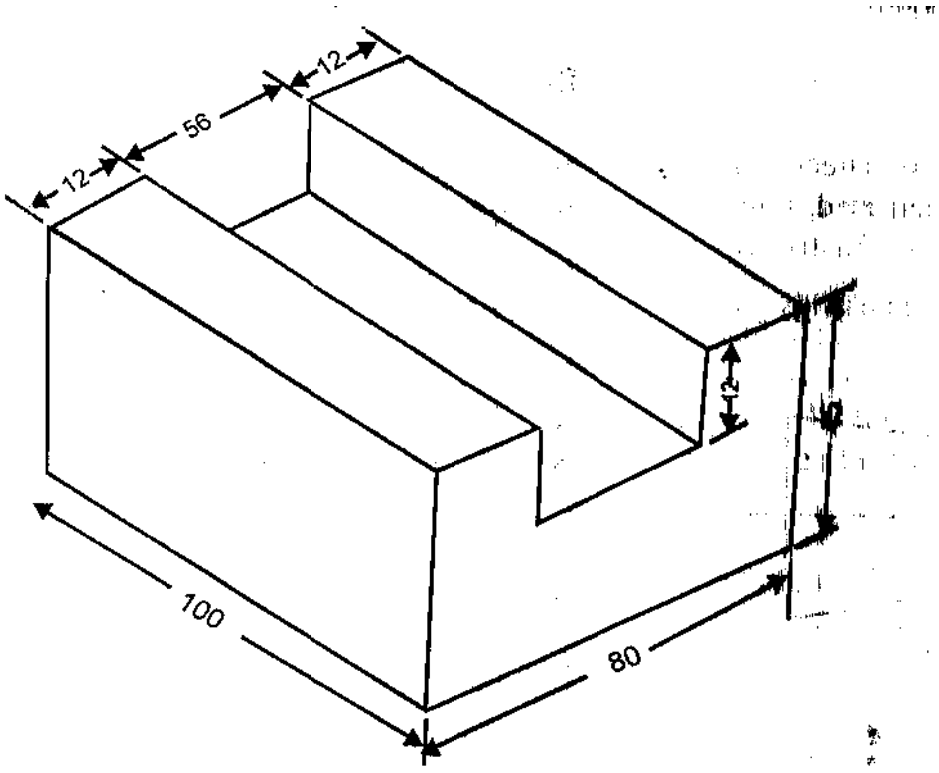


Fig 10.17

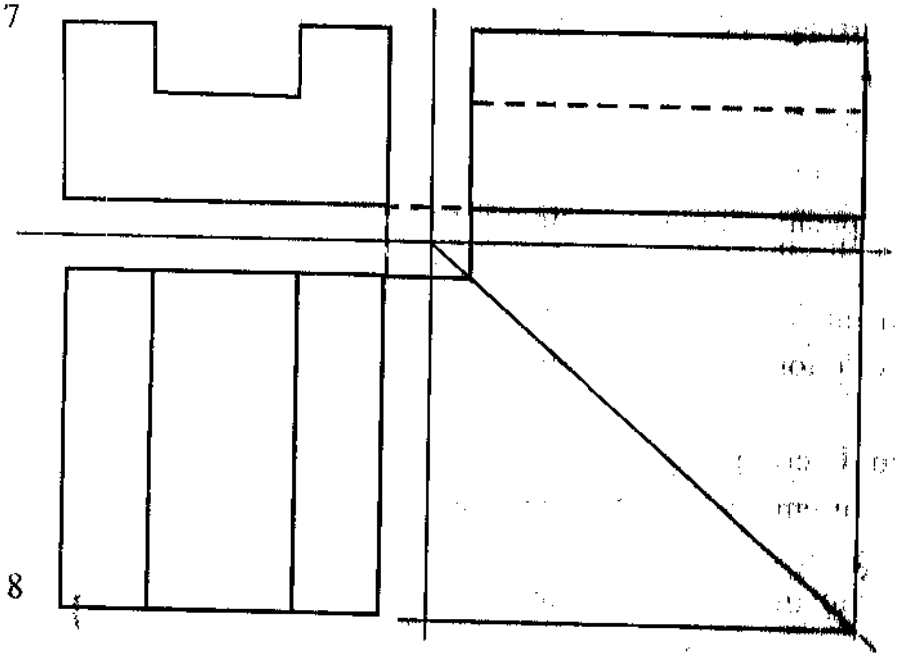
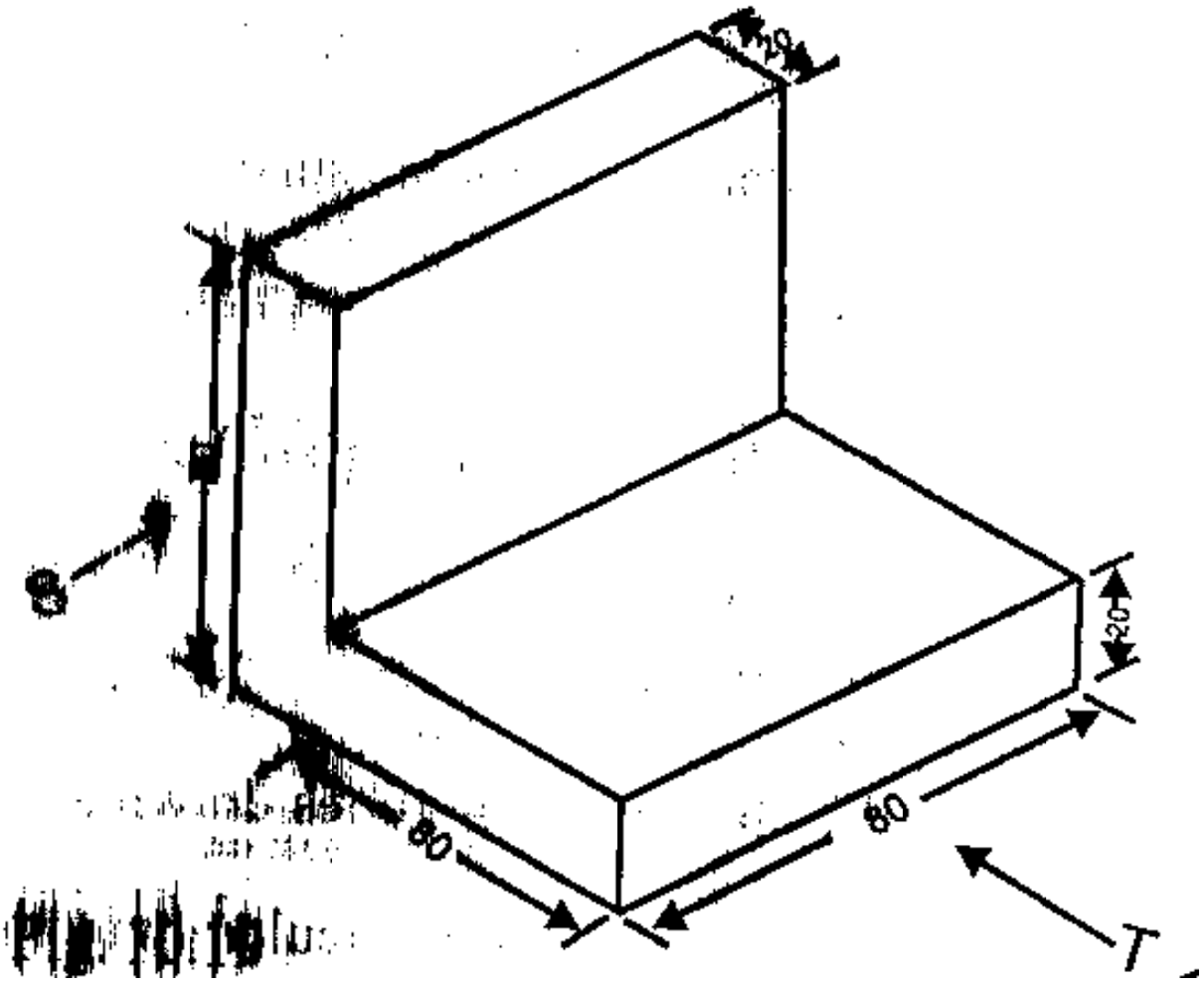


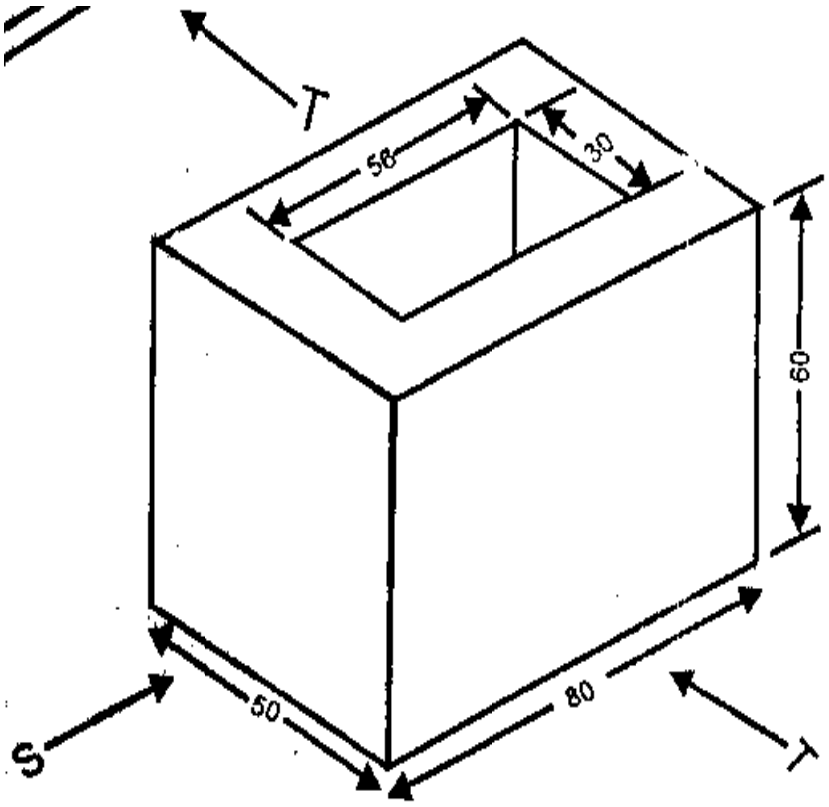
Fig. 10.18

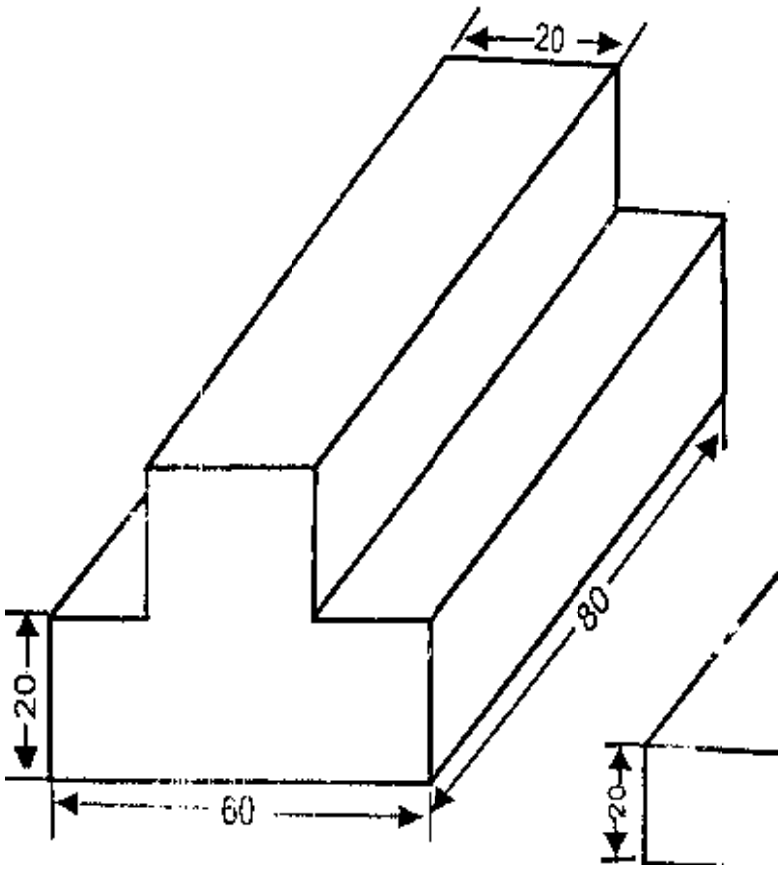
Sketch the following views of the given objects:

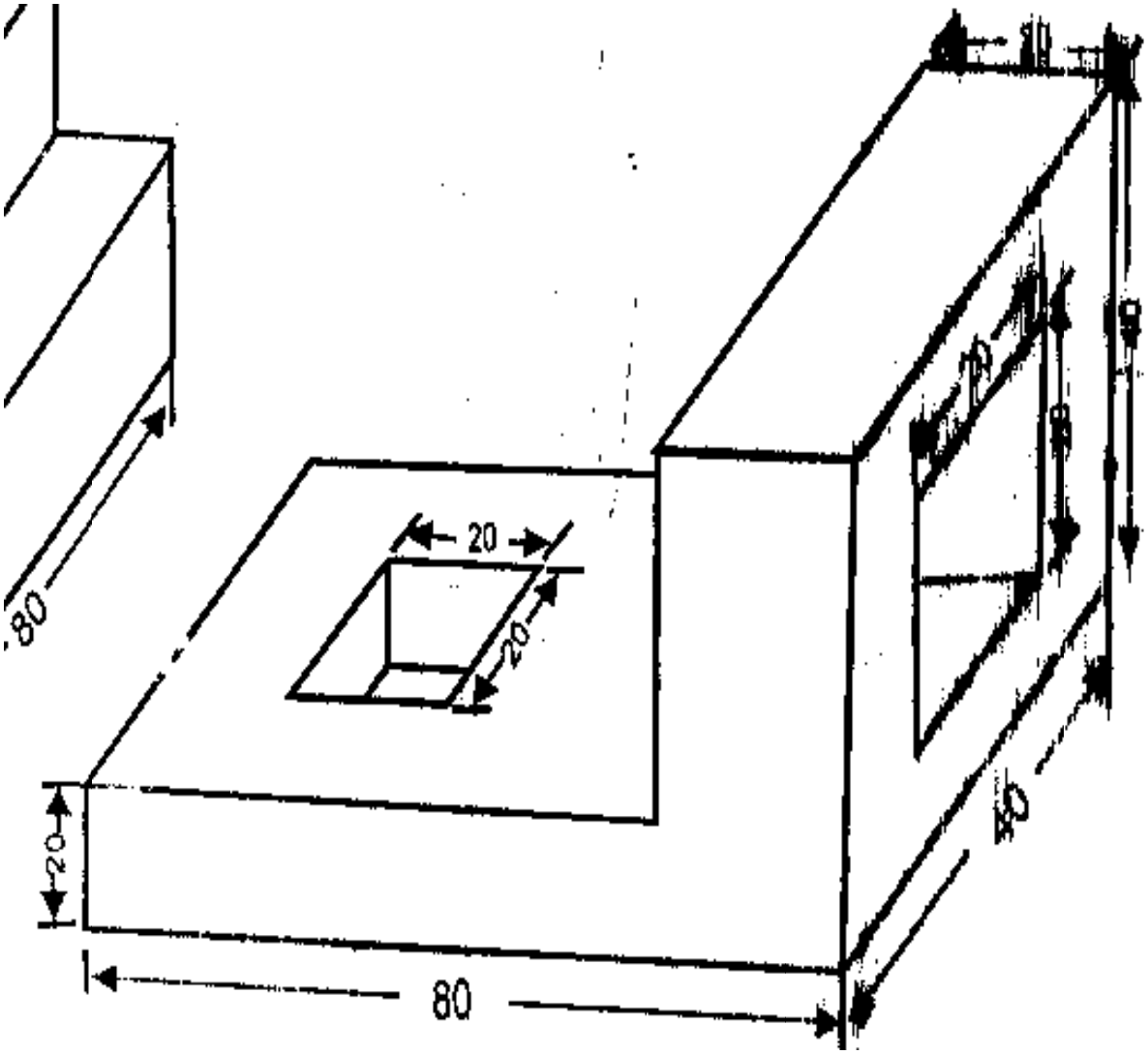
a. Elevation in direction of arrow T.
b. End view in direction of arrow S.
c. Plan view projected from view (a).

(Use first and third angle projection for objects, shown on Fig. 1-5




T
50
30
60
S
50
80
T


20
80
20
60
20



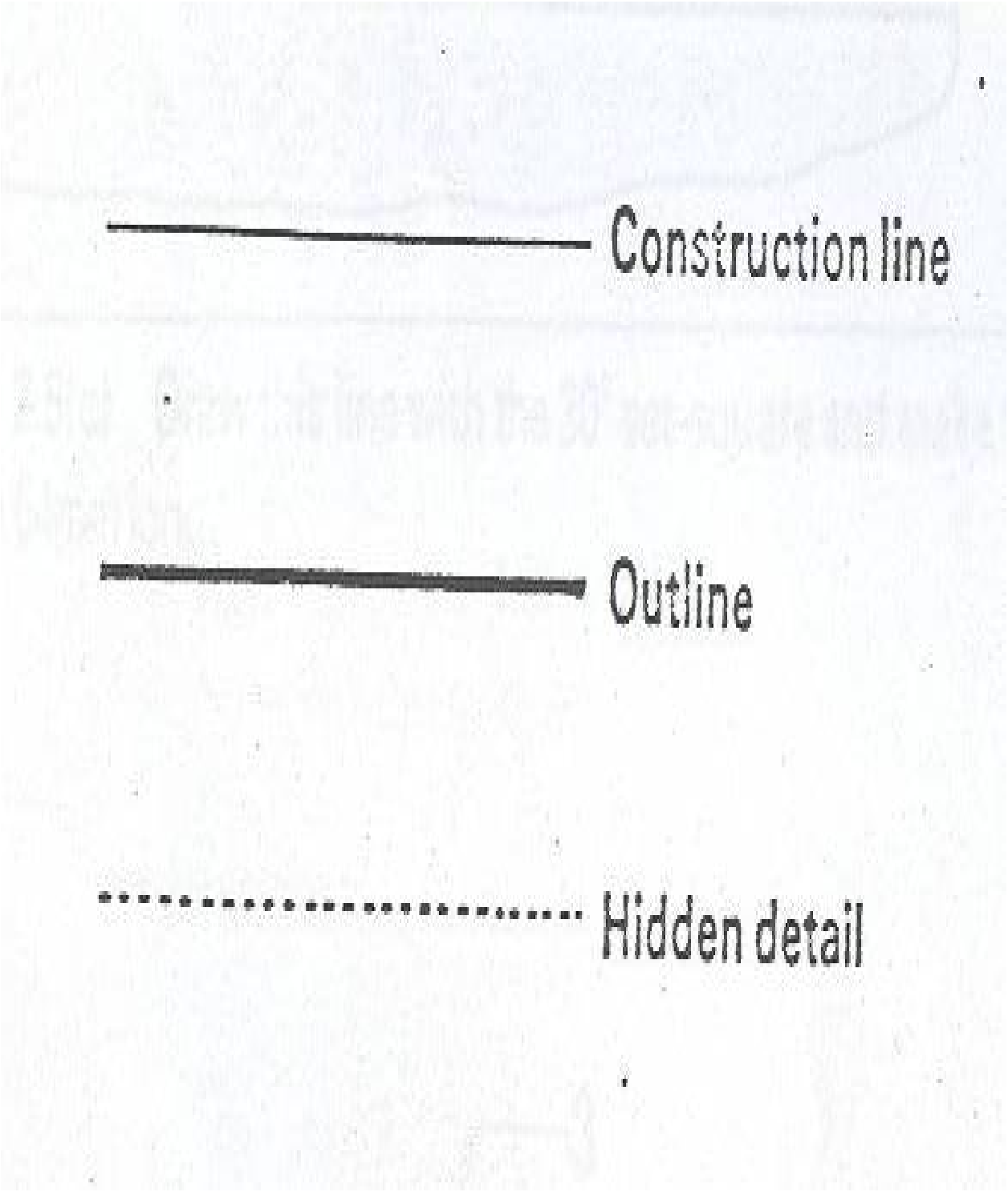
3.0 !SOMETRIC PROJECTIONS

Nine Stages in the Construction of the Isometric Box

Fig 2.3 shows the isometric box with its overall measurements. In all cases in this book, the isometric box will be 100x64x50mm.

The first thing to remember, is that every time you draw this box, you must draw your lines as thin as possible. The box is only a guide, the actual shape will be very different from the box. Construction lines should be as thin as possible, only you should be able to see them. Observe the various stages very carefully.

You can practice this box on any scrap of paper big enough, only when you are certain of its construction should you attempt the first drawing in Classwork 1. The following lines will be required in the work to be covered in all drawings in this book.


Construction line
Outline
Hidden detail

AGE 224

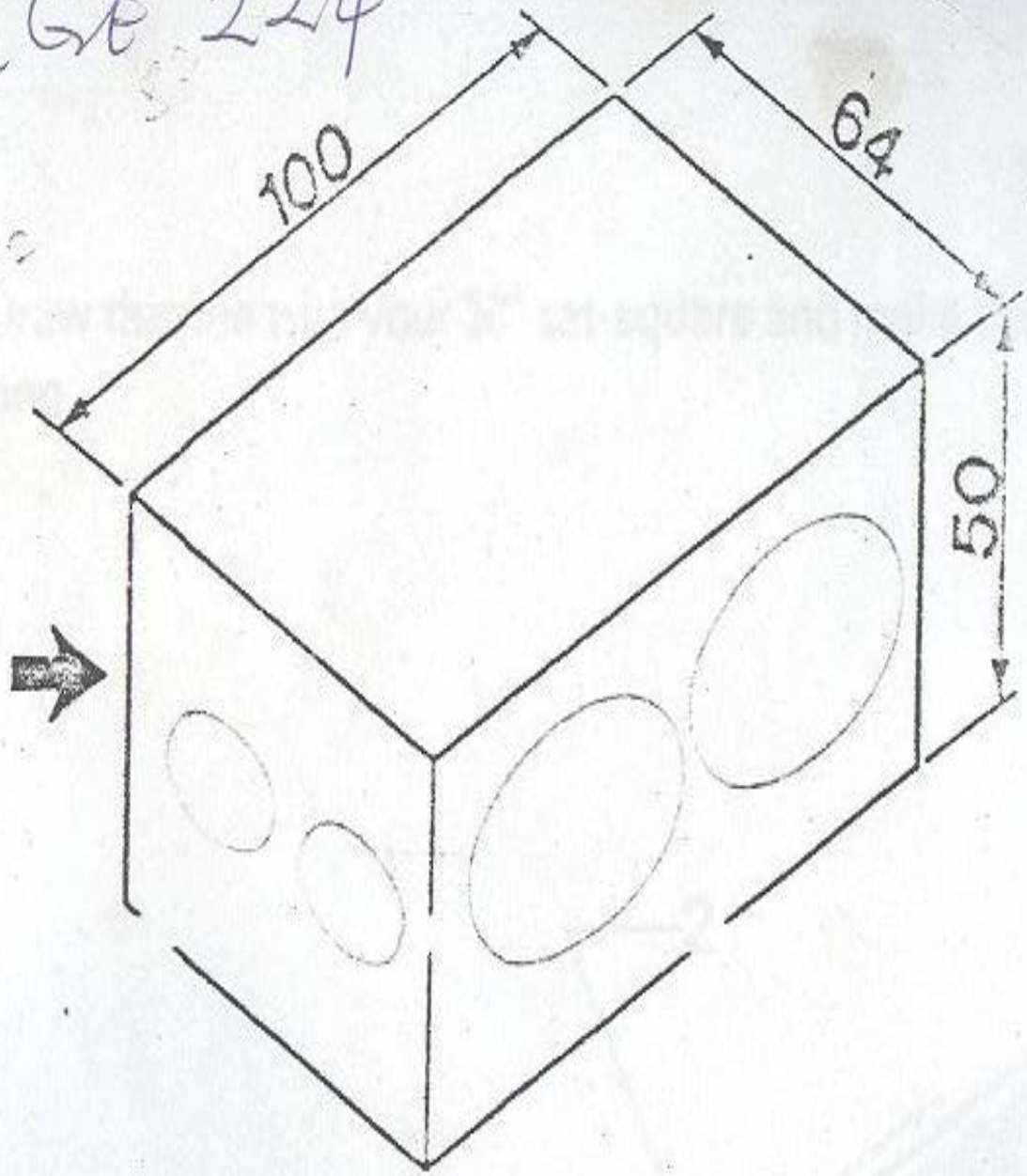
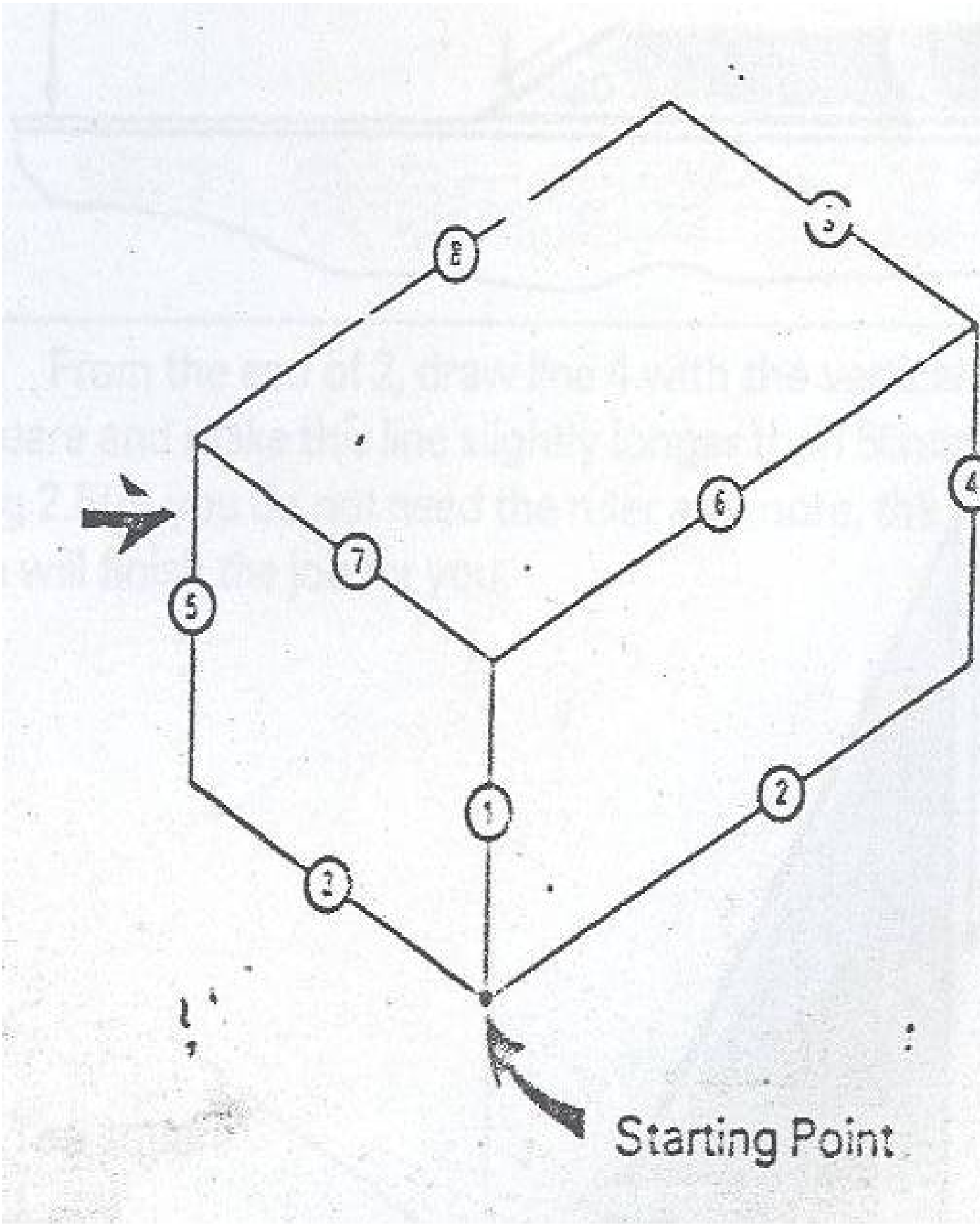


Fig 2.3 This is the isometric box on which all drawings isometric are based.


8
3
4
6
7
5
1
2
2
Starting Point

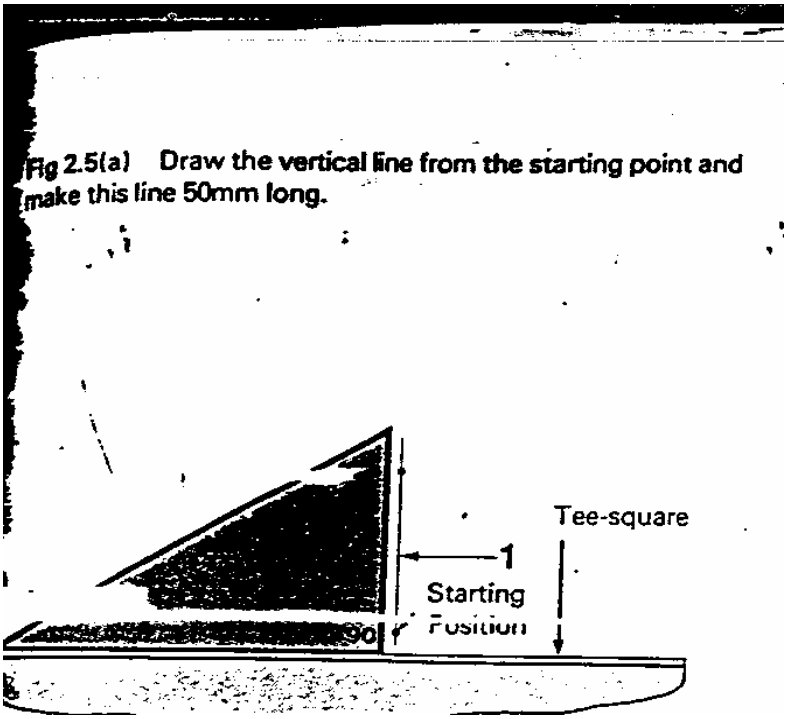


Fig 2.5(a) Draw the vertical line from the starting point and make this line 50mm long.

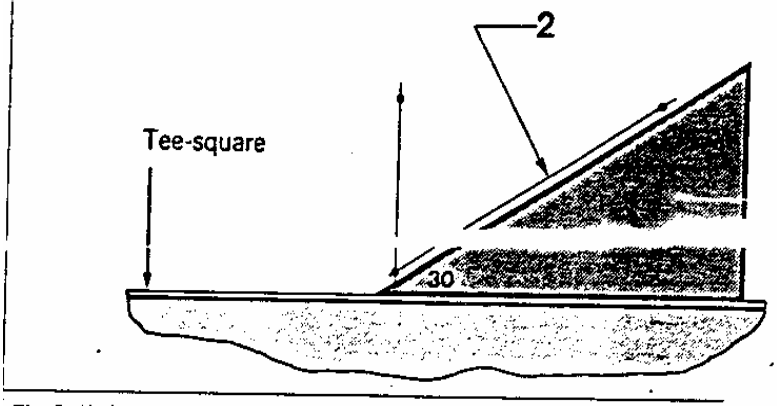


Fig 2.5(b) Draw this line with your 30° set-square and make this line 100mm long.

Fig 2.5(c) Draw this line with the 30° set-square and make this line 64mm long.

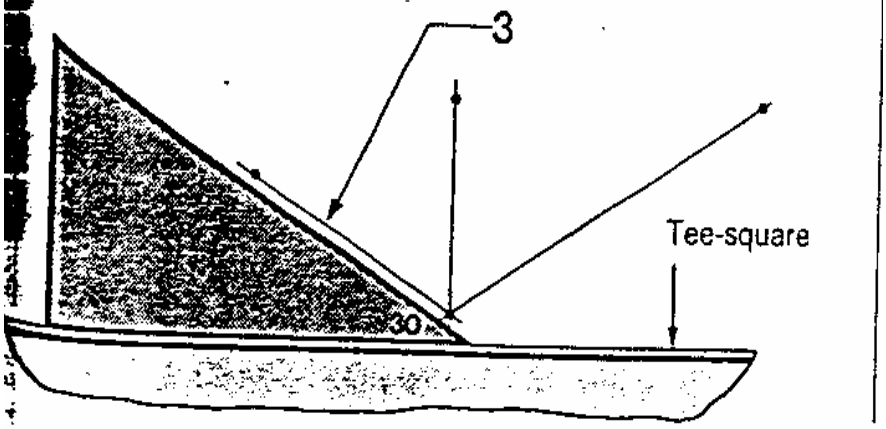


Fig 2.5(d) From the end of 2, draw line 4 with the vertical side of the set-square and make this line slightly longer than 50mm.

After Fig 2.5(d) you do not need the ruler anymore, the set-square will finish the job for you.

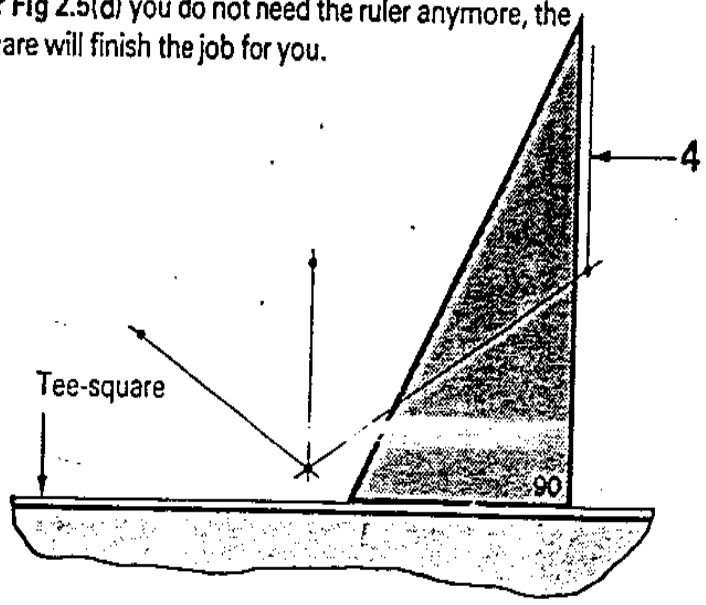


Fig 2.5(e) Draw 5 from the end of 3 and make this line slightly longer than 50mm.

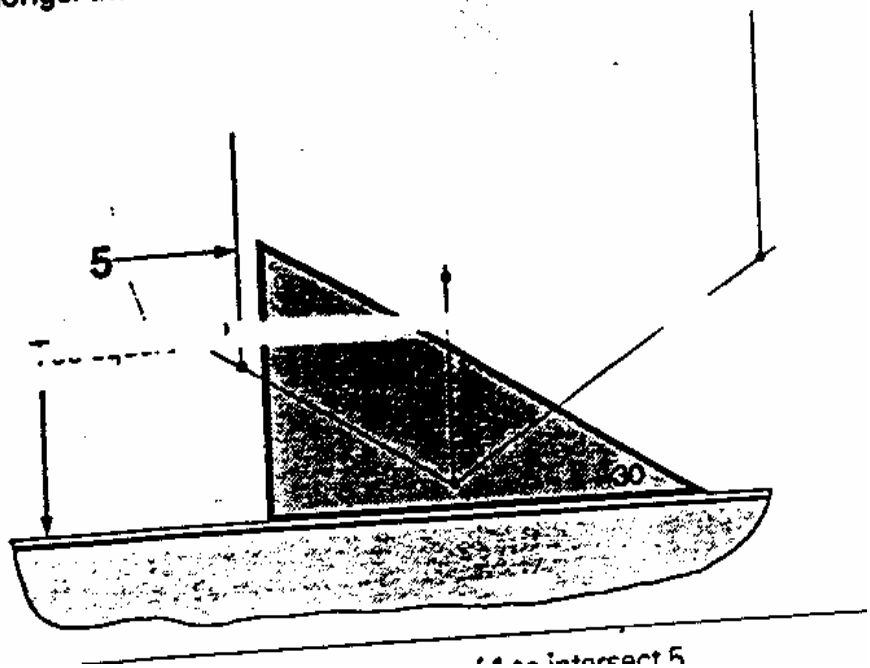


Fig 2.5(f) Draw 6 from the top of 1 to intersect 4.

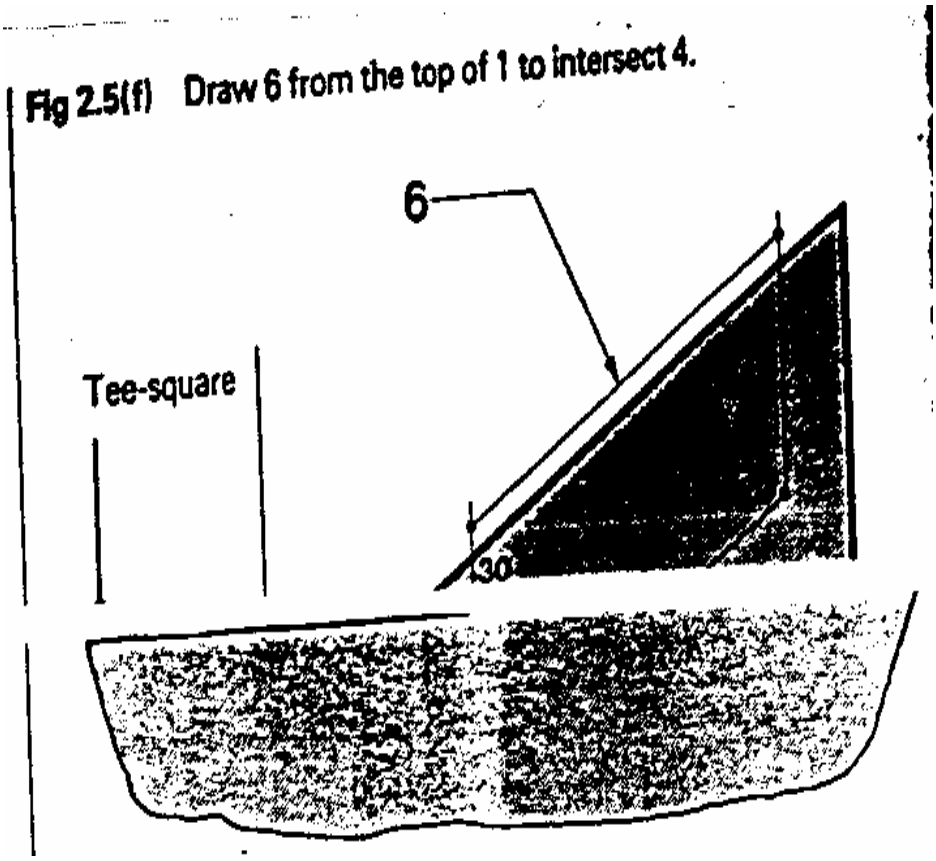
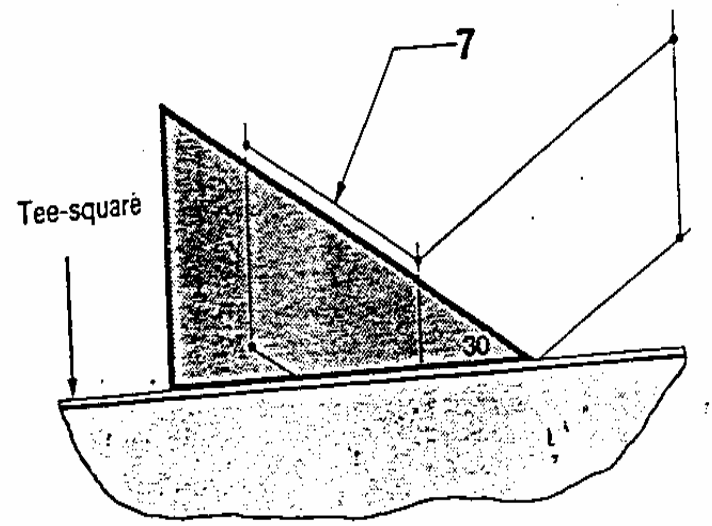


Fig 2.5(g) Draw 7 from the top of 1 to intersect 5.



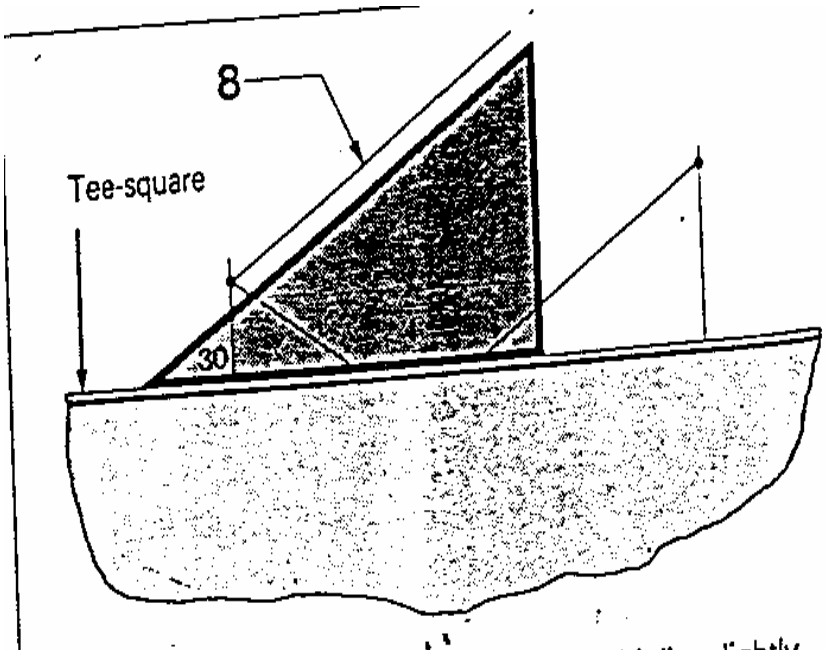
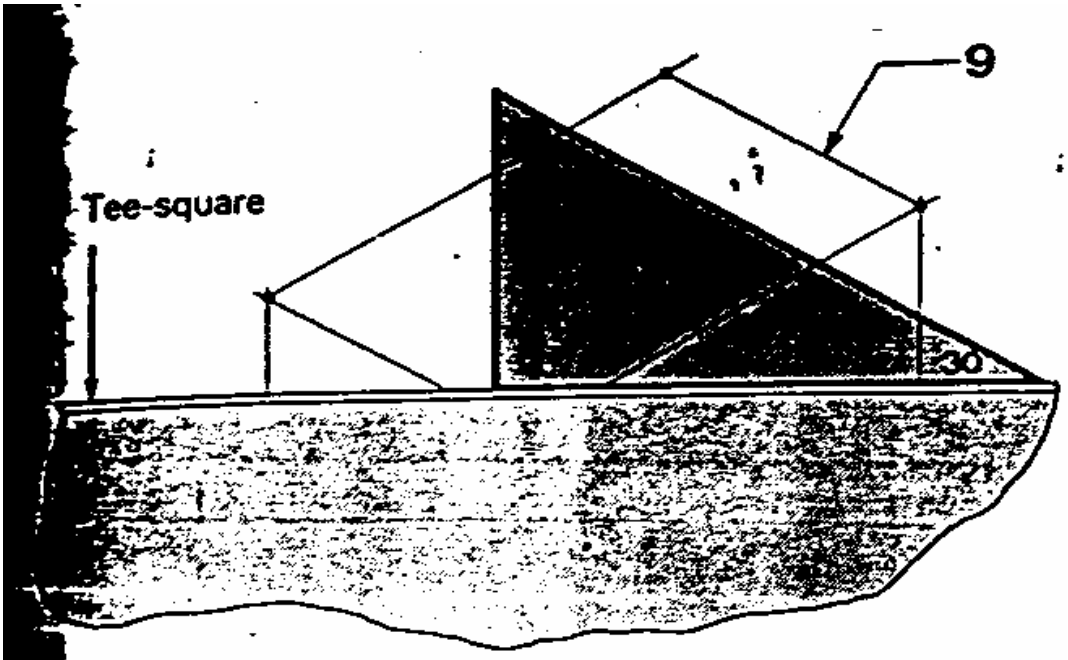
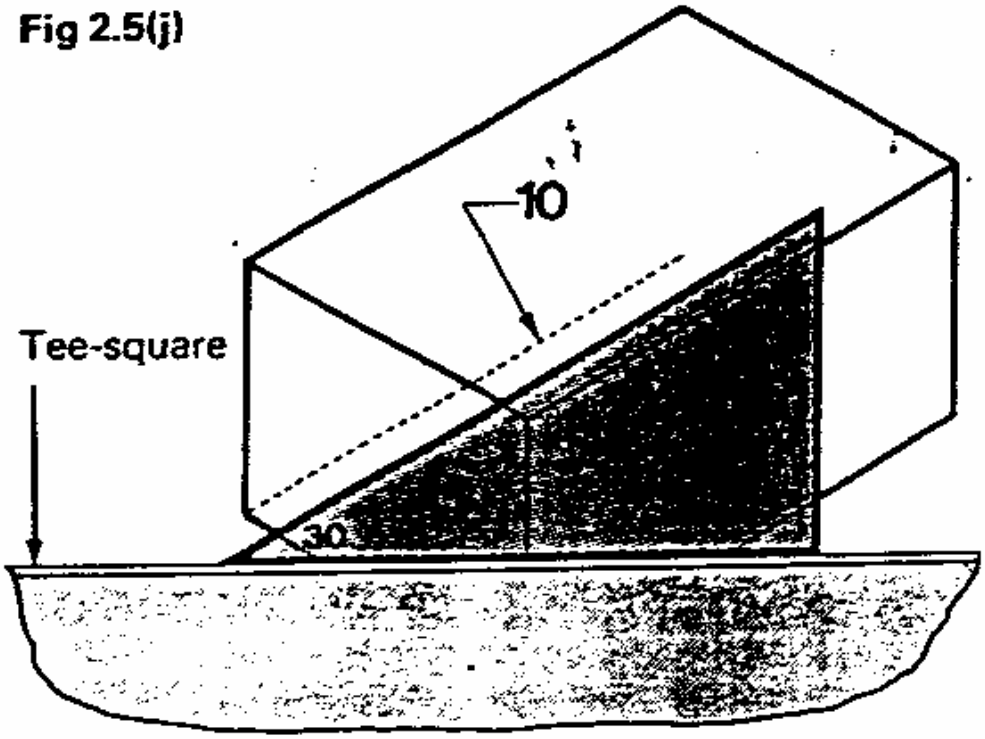


Fig 2.5(h) Draw 8 from the top of 5 and make this line slightly longer than 100mm.



(c) Fill Draw 9 from the top of 4 to intersect 8. This completes the box. The next three lines are hidden, they are therefore drawn as broken lines.

Fig 2.5(j)



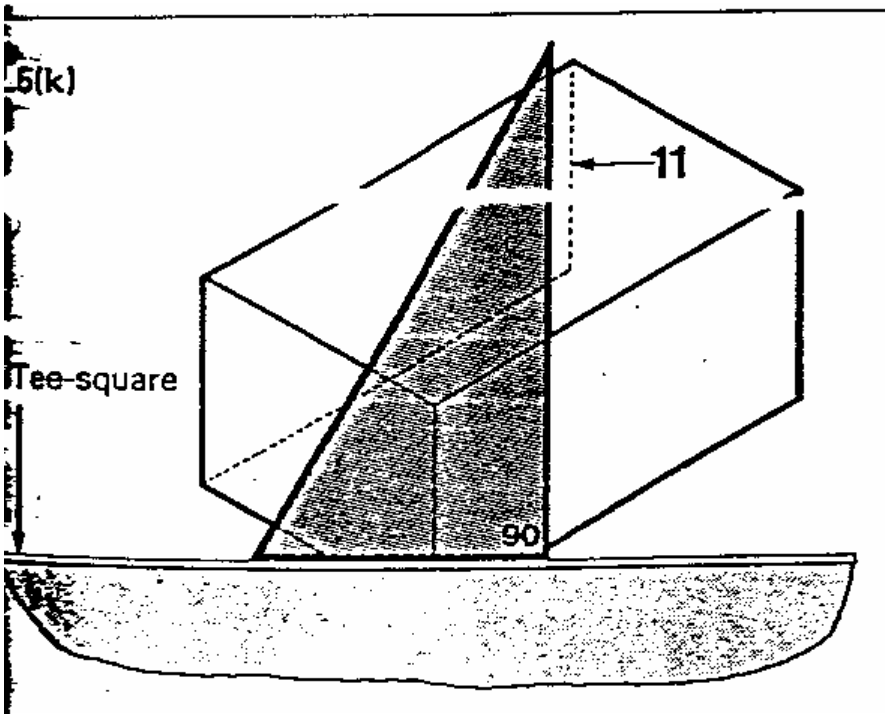
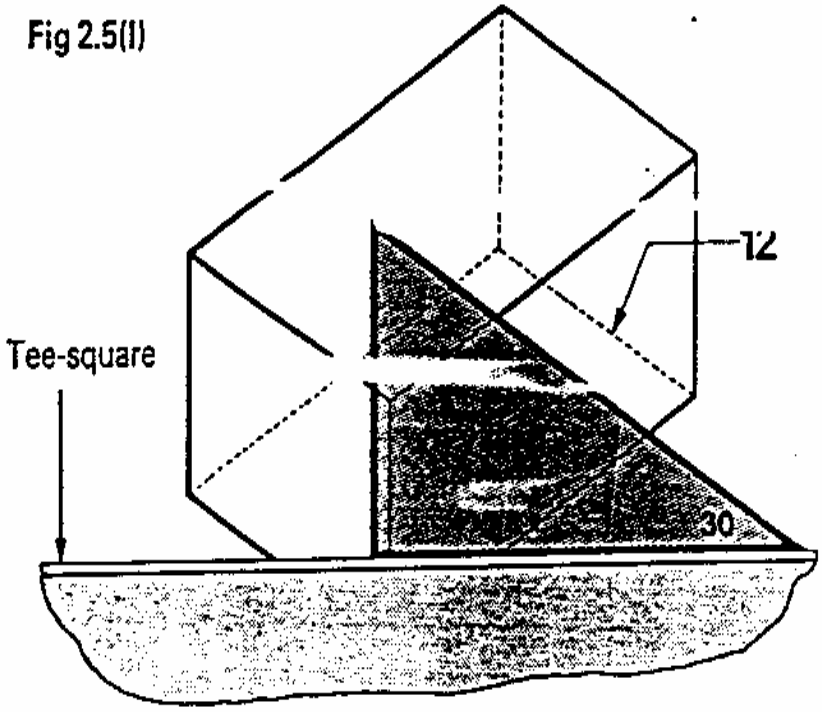


Fig 2.5(l)



Classwork 1

All dimensions in millimetres

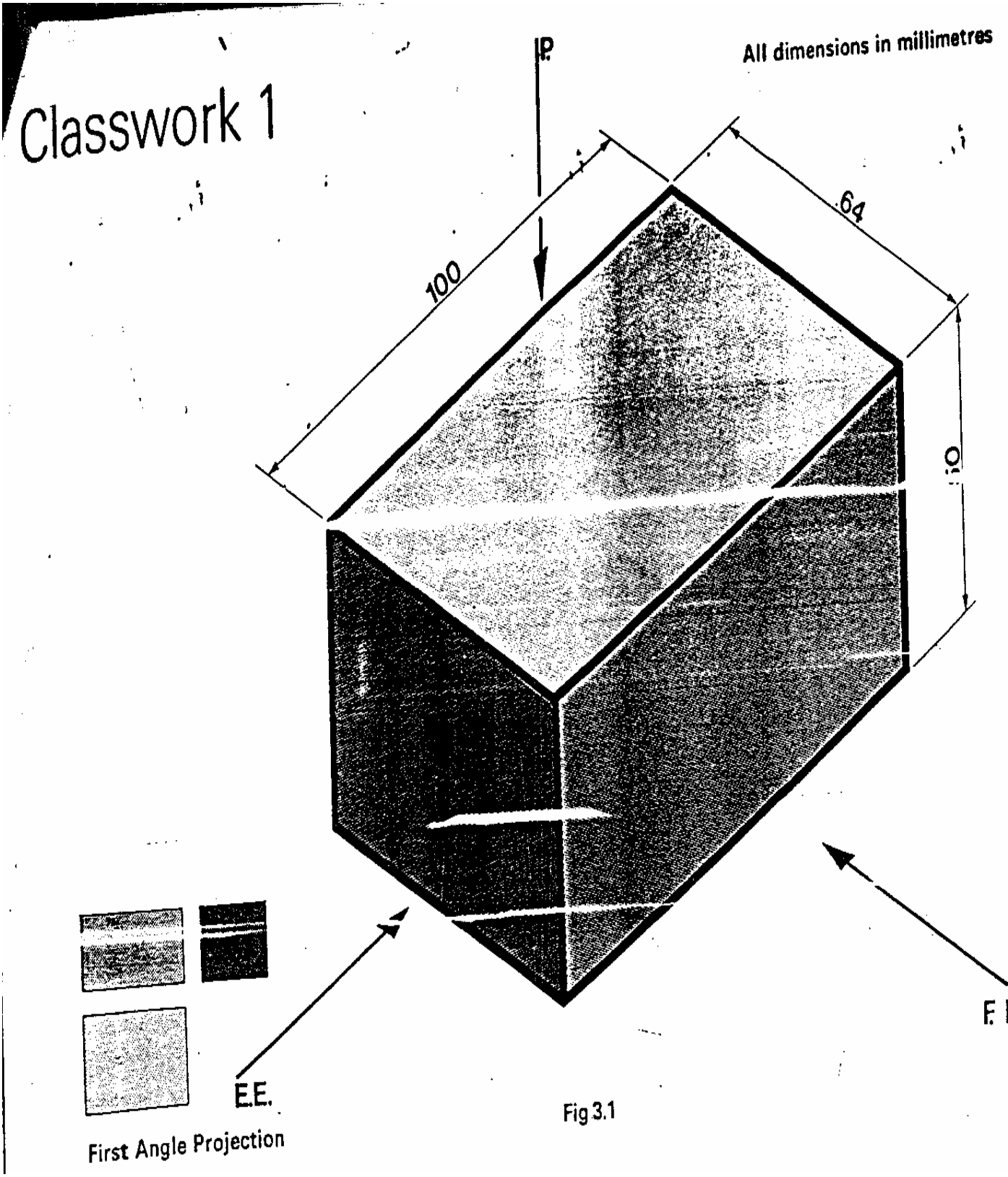
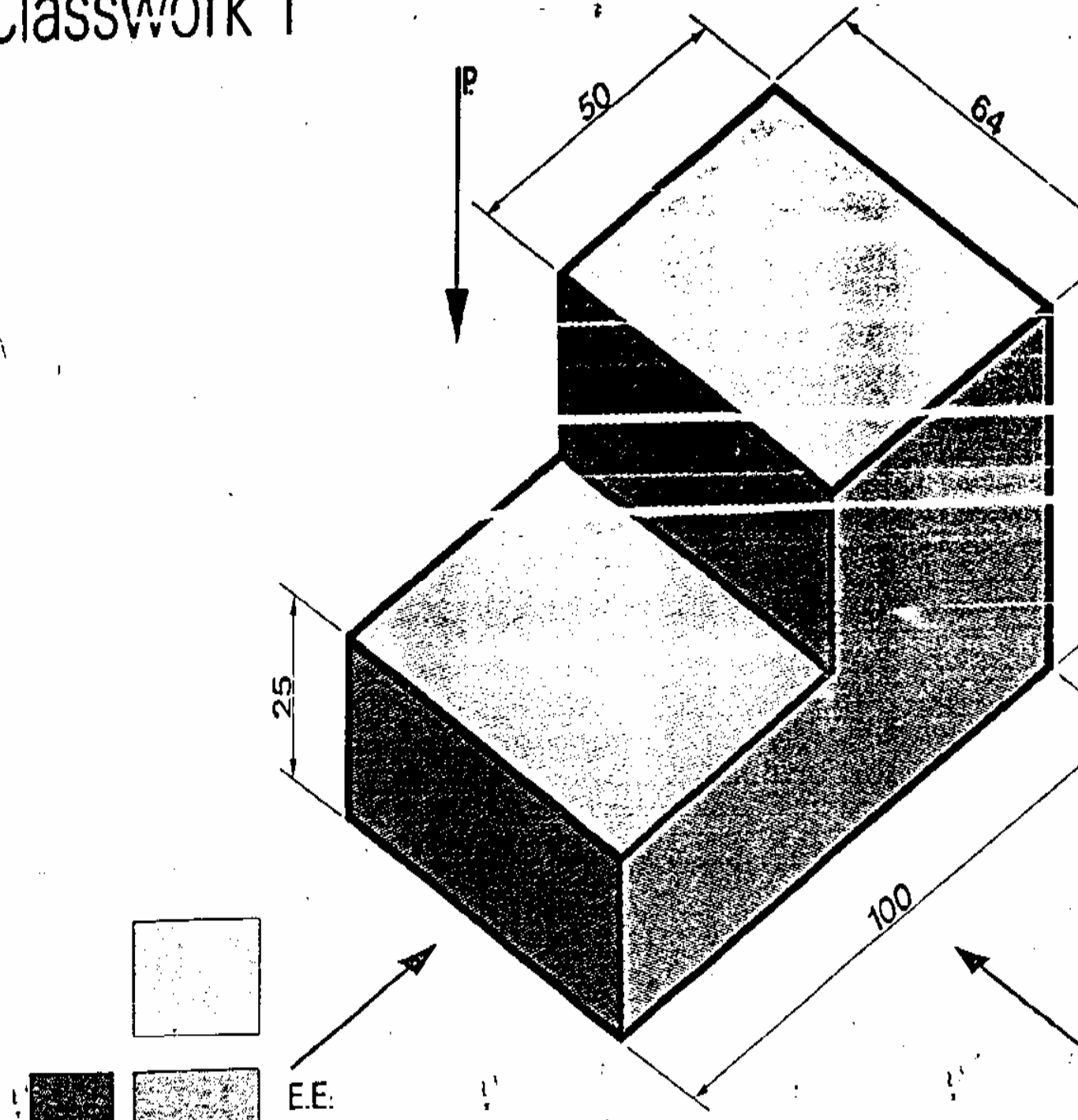


Fig 3.1

First Angle Projection

Classwork 1

All dimensions in millime

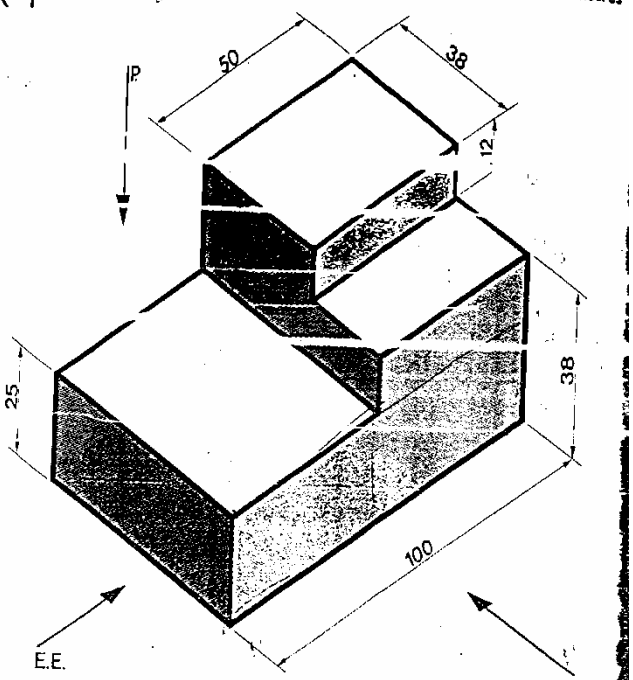


Third Angle Projection

Fig 3.2

Classwork 1

All dimensions in millimetres



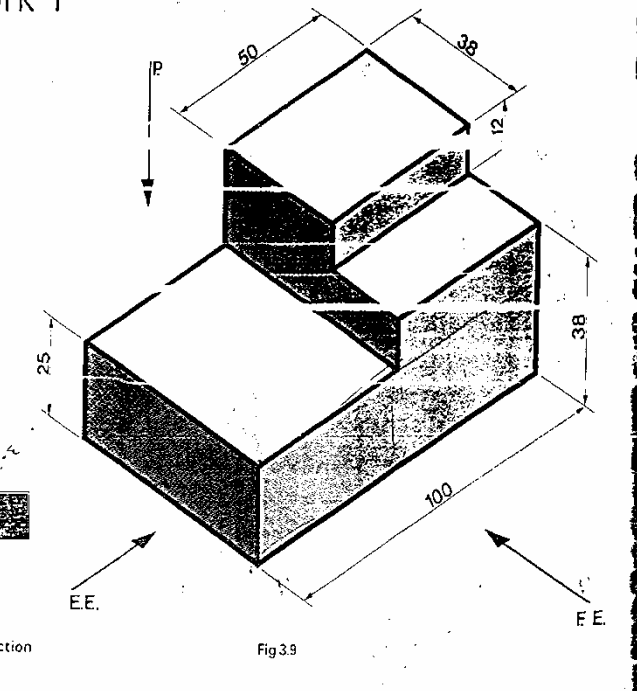
First Angle Projection

Fig 3.9

54

Classwork 1

All dimensions in millimetres



First Angle Projection

Fig 3.9

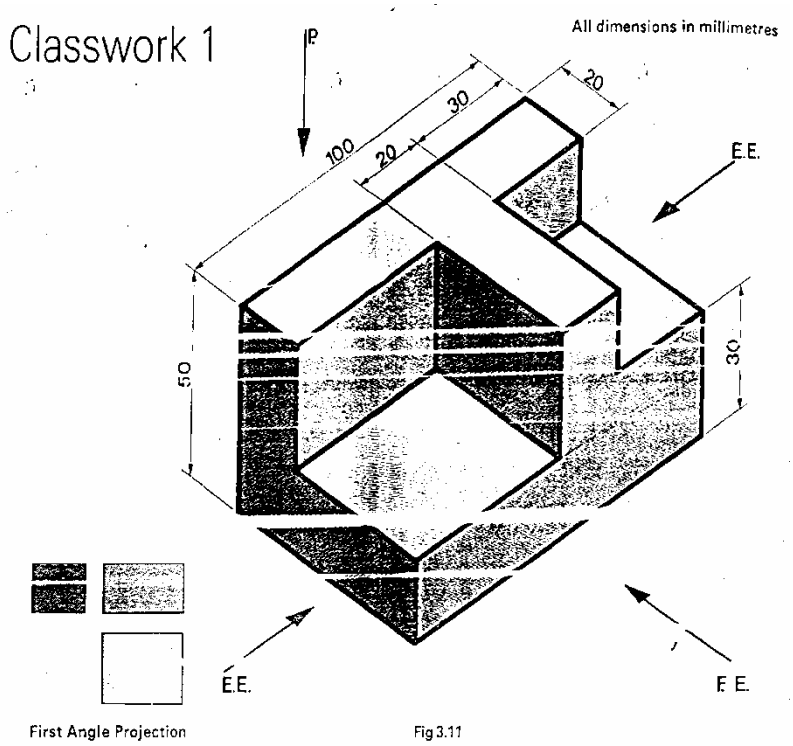


Fig 3.11

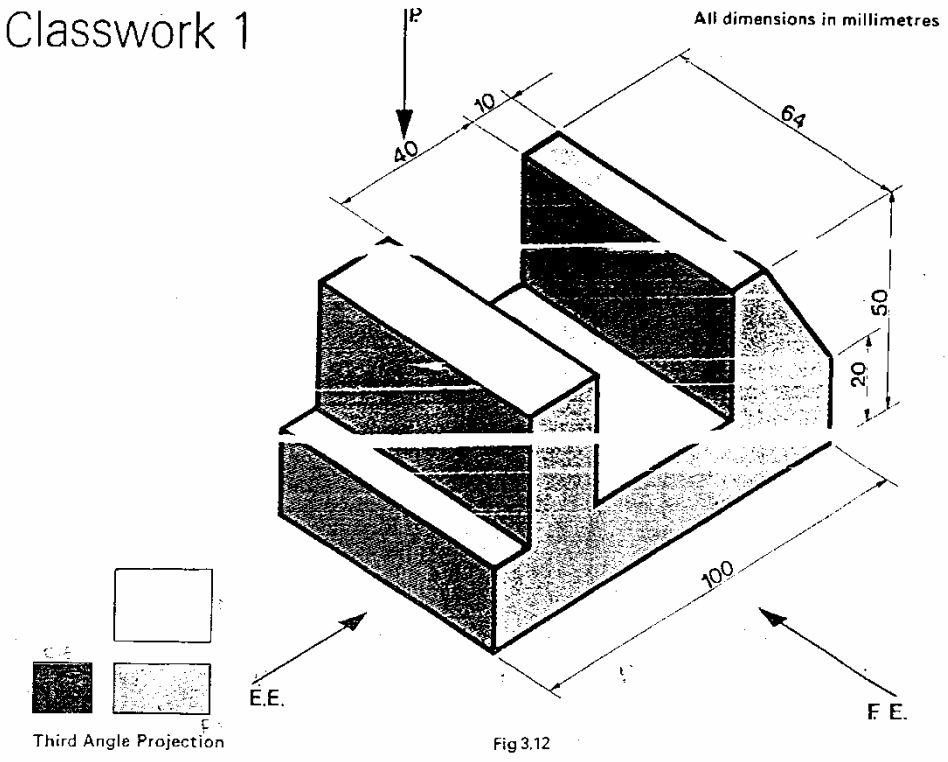


Fig 3.12

Classwork 1

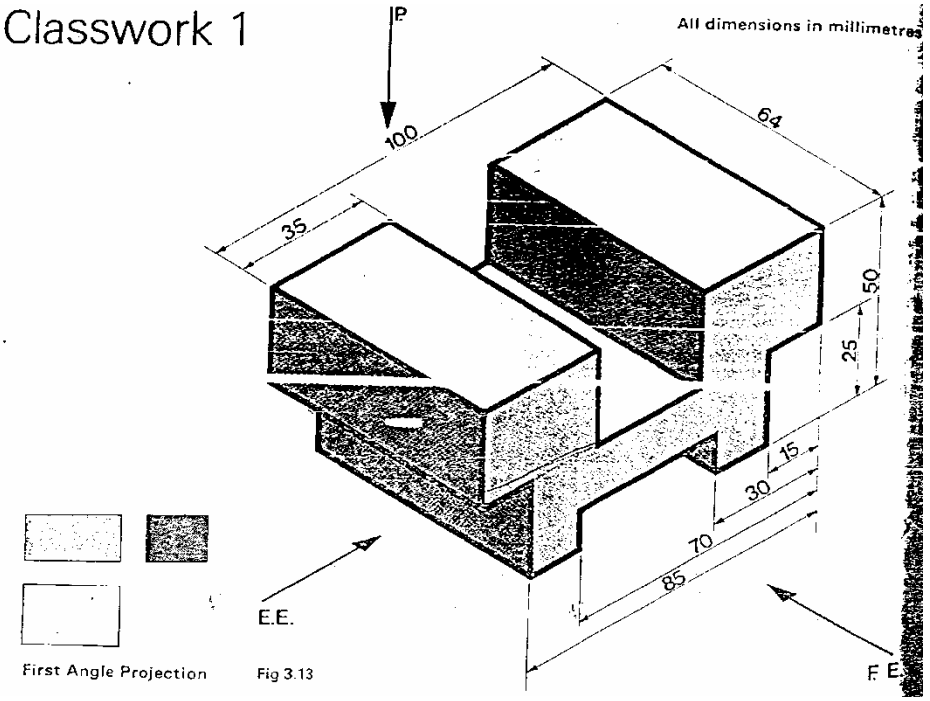


Fig 3.13

Classwork 1

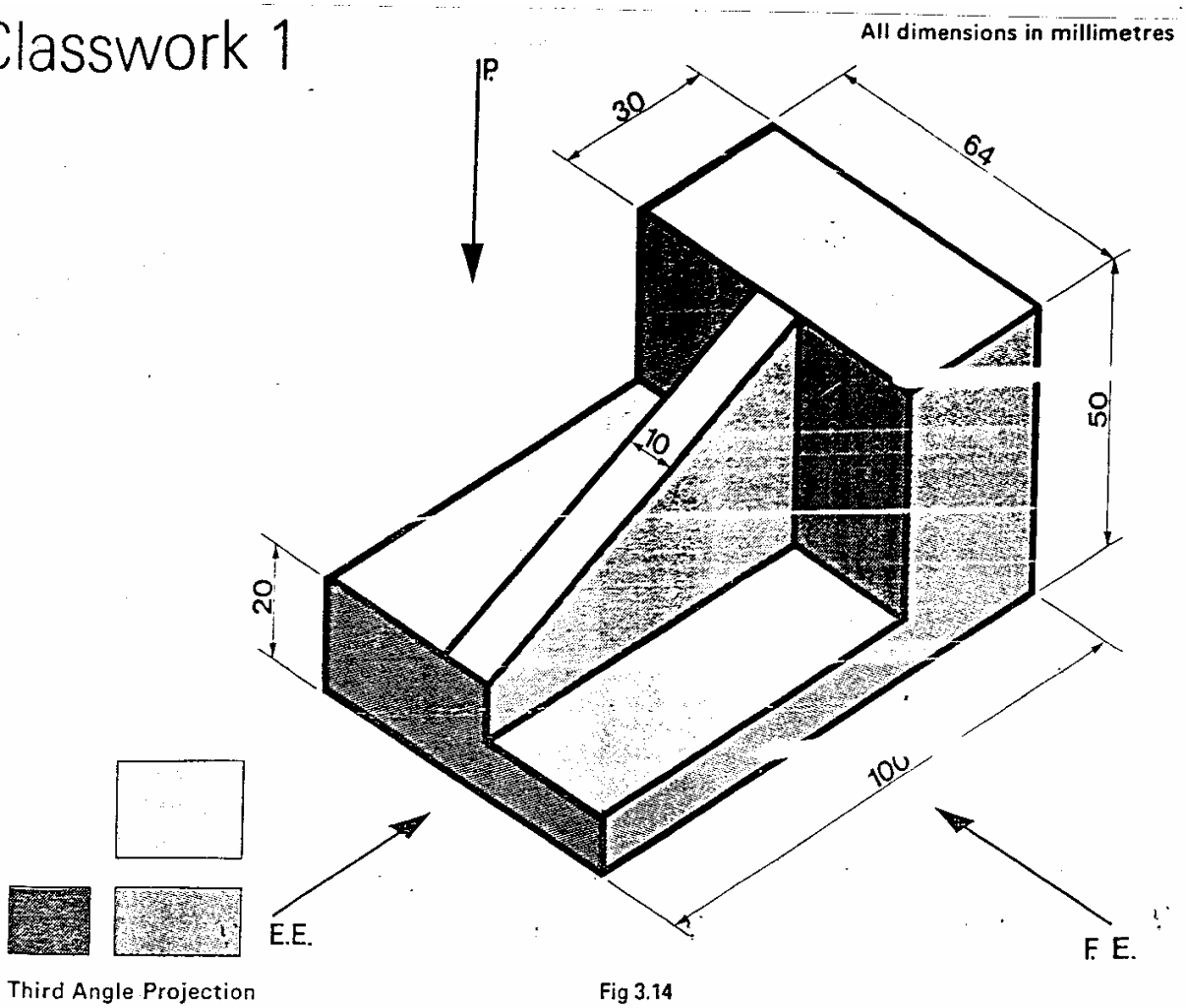


Fig 3.14

UNIVERSITY OF AGRICULTURE, ABEOKUTA

University Examinations - Second Semester 2009/2010 Session

COLLEGE OF ENGINEERING; DEPARTMENT OF AGRICULTURAL ENGINERING

Course Title: **AGE 224** - Technical Drawing II (2 Units)

Instructions: **Answer Question 1 and any other two.**
Time Allowed: **2 Hours** All dimensions are in mm.

QUESTION 1

Produce the Isometric Drawing of the three – views of a bracket shown in Figure 1. **60**

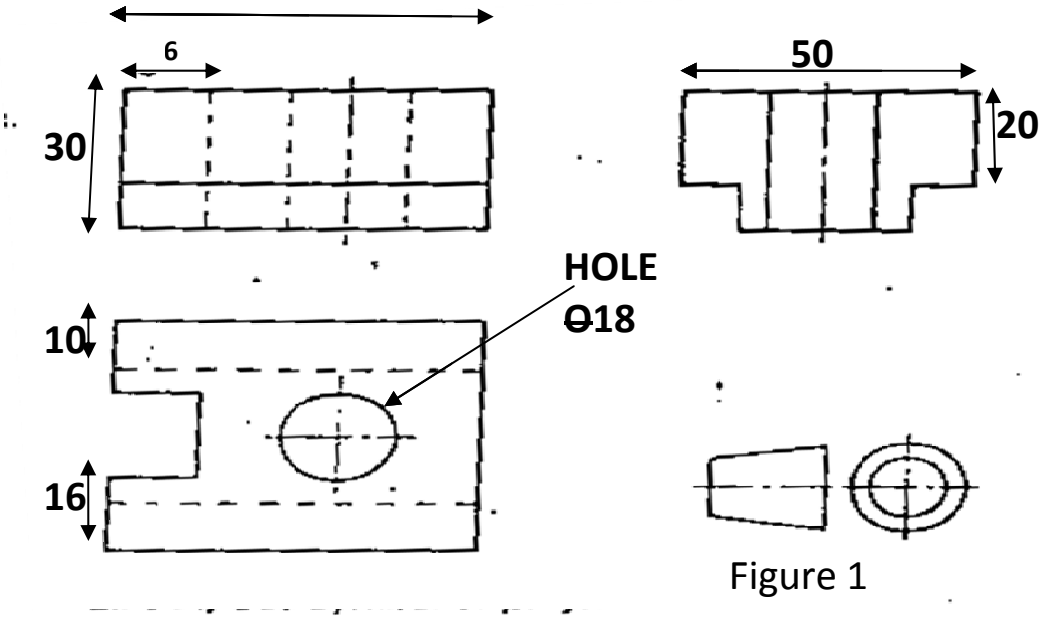
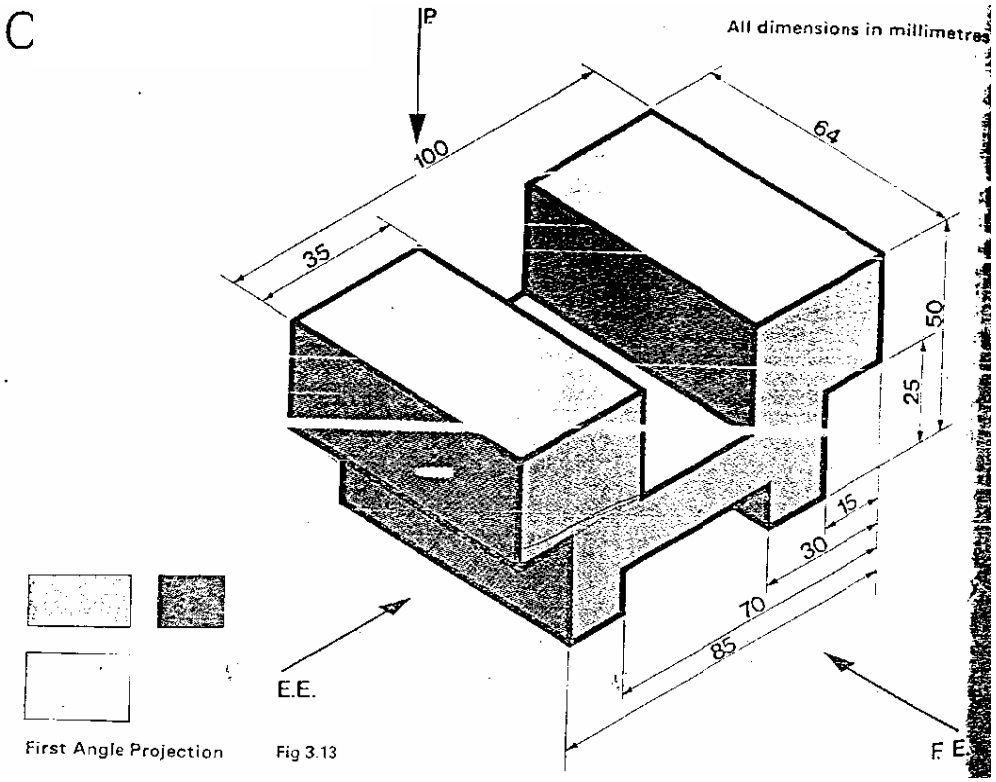


Figure 1

QUESTION 2

Using Third Angle Projection, draw three views of the object in Figure 2 as orthographic.



QUESTION 3

Using the shortest seam, produce full size pattern of the object in Figure 3.

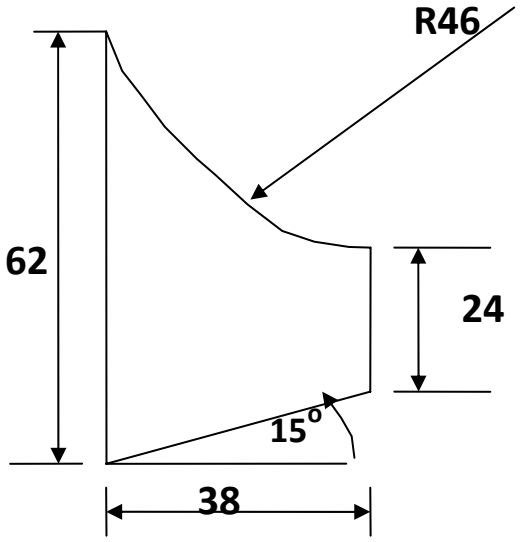


Figure 3

QUESTION 4

Draw, **FREEHAND**, on plain unlined drawing paper, the orthographic views in First angle projection of the structure in Figure 4.

Figure 4

Classwork 1

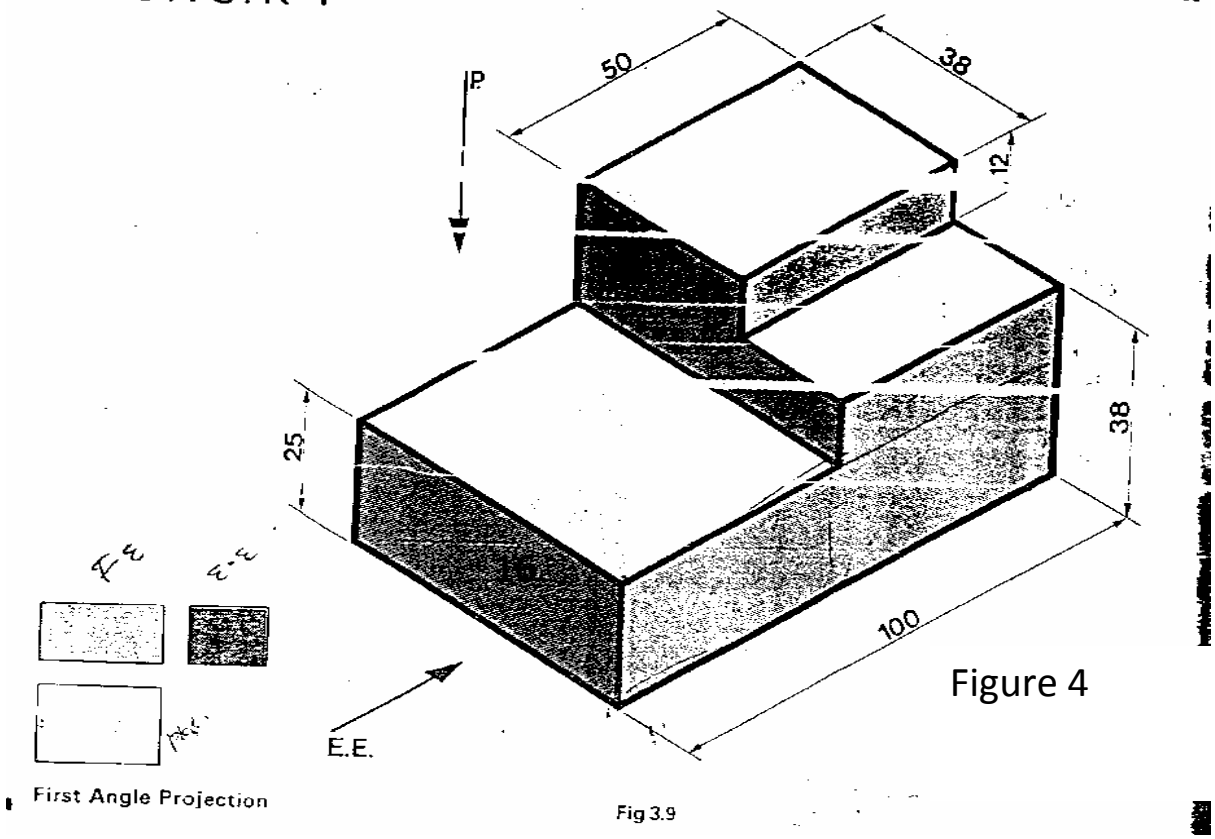


Figure 4

QUESTION 5

Construct an ellipse in which the major axis AB is 100mm and the minor axis CD is 50mm