SNS COLLEGE OF TECHNOLOGY

AN AUTONOMOUS INSTITUTION

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COIMBATORE

DEPARTMENT OF CIVIL ENGINEERING

23CEB202 - SURVEYING
II YEAR / III SEMESTER

Unit 1 : Chain and Compass Surveying

Topic 7 : Chaining & Offset

Chaining

- Measuring a line with a chain / tape is called chaining
- Chained distance can be plotted only measured horizontally
- Flat and undulating or Sloping ground – proper care taken
- Sloping ground methods
  - Direct method
  - Indirect method

    Hypotenusal allowance

    Using clinometer

    Knowing the difference of level b/w the points

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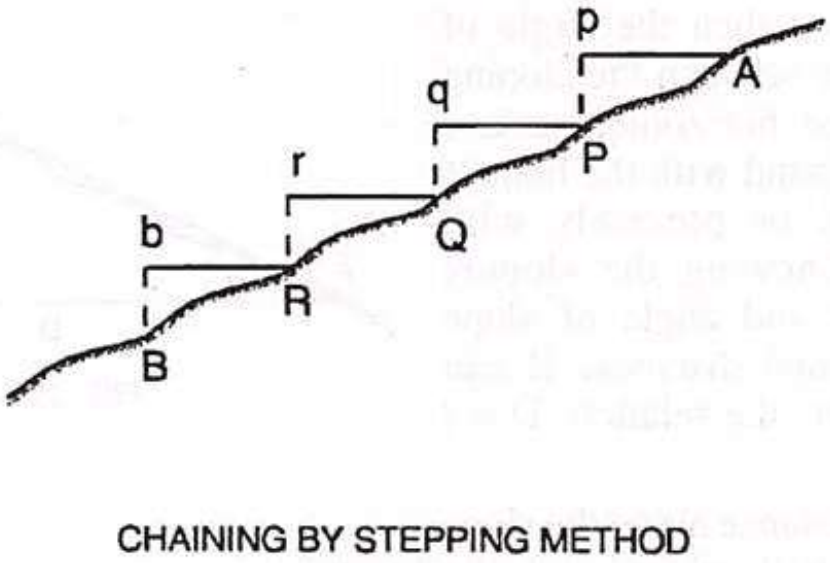
Chaining on sloping ground

1. Direct Method / Stepping Method :

- It consists measuring the line in short horizontal lengths called steps.
- It is required to measure the horizontal distance between the points A and B.
- convenience and to obtain better results, chaining is done from top of hill to the toe i.e. downhill.

Direct Method / Stepping Method



CHAINING BY STEPPING METHOD

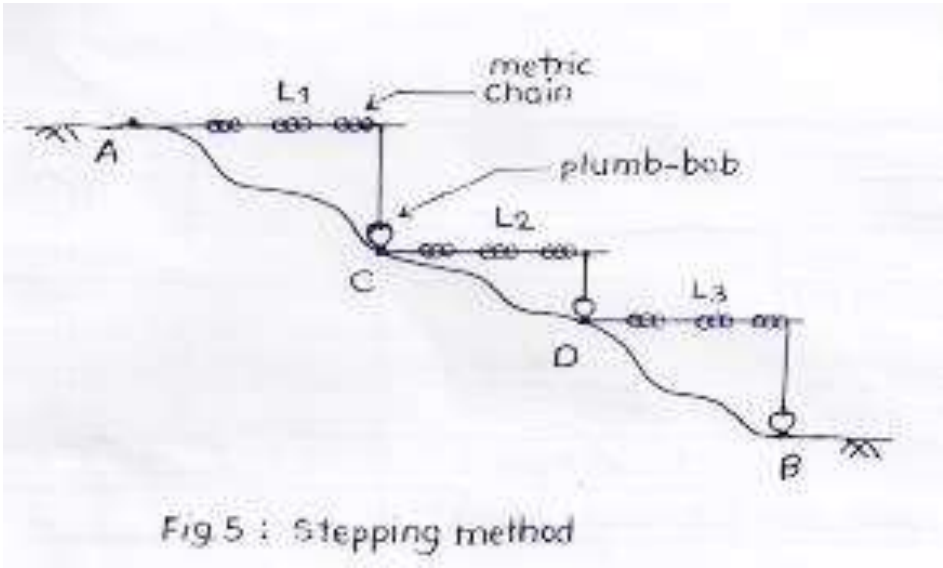


Fig 5 : Stepping method

Horizontal distance between AB = Ap + Pq + Qr + Rb.

Chaining on sloping ground

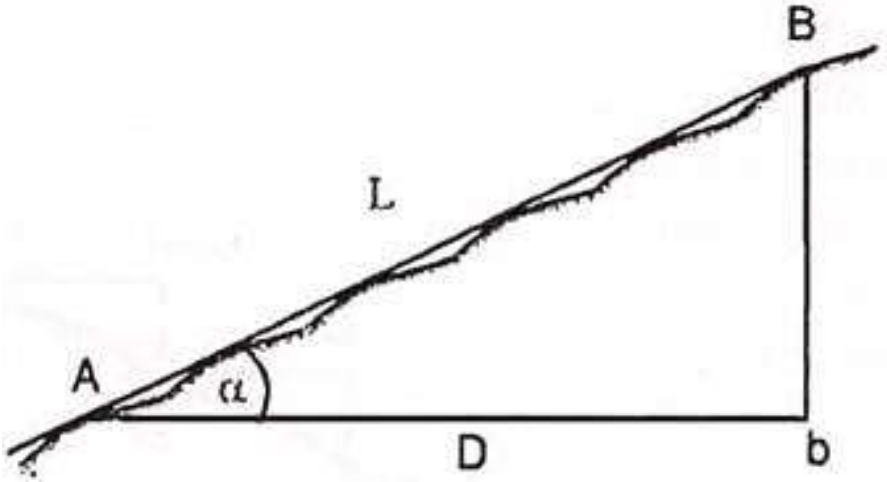
2. Indirect Method:

- whole length of the line is divided into different sections (approximately the same slope).
- Horizontal distance is calculated for each section separately
- Total horizontal distance = summing up all the horizontal distances of different sections.

Chaining on sloping ground

Method 1

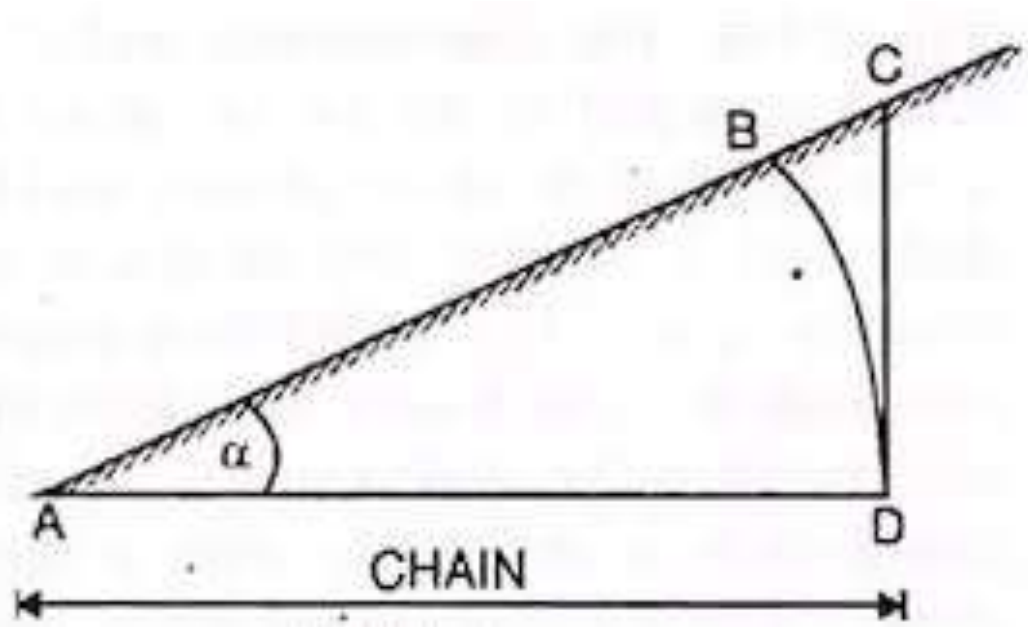
- The distance along the slope is measured (L)
- Then angle of slope is found with the help of Abney's level or precisely with theodolite.
- Horizontal distance D = L cos α



Chaining on sloping ground

Method 2 - Hypotenusal allowance

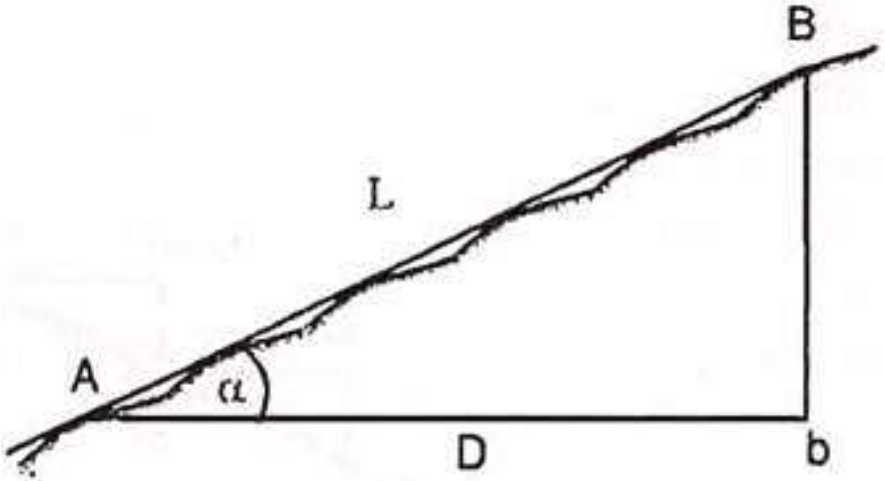
❖ The Hypotenusal allowance (BC) = 100 (sec α – 1) per 100 links / 20 m applied for every chain length



Chaining on sloping ground

Method 3

- Knowing the sloping distance l and
- The difference in elevation h,
- Horizontal distance D = $\sqrt{l^2 - h^2}$



Activity

Offset

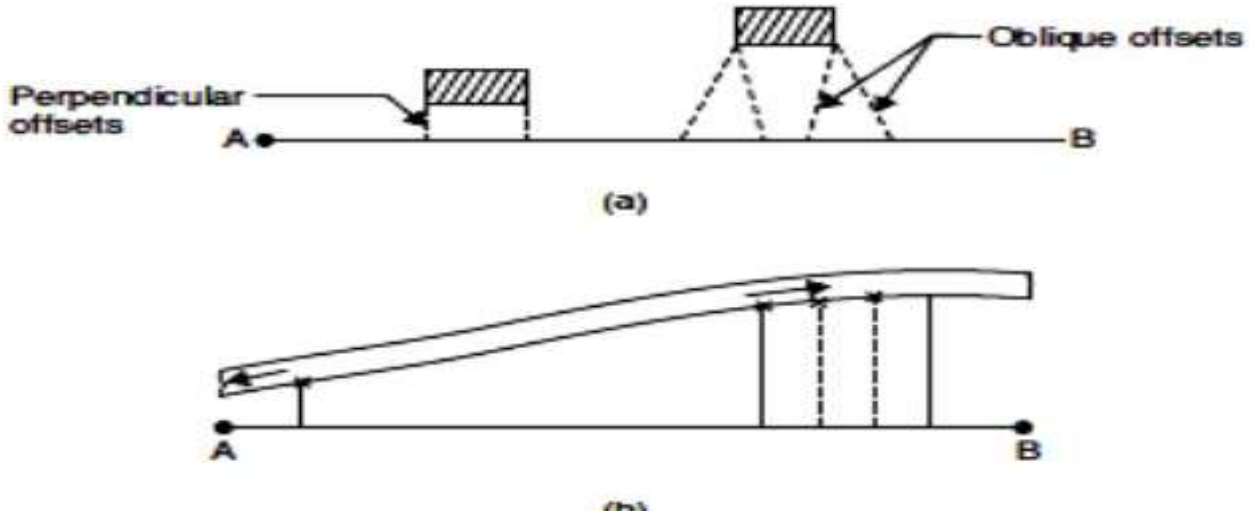
❖ Offset - Lateral measurements to chain lines for locating ground features

Type - Perpendicular & Oblique offsets

❖ If the object to be located is curved more number of offsets should be taken. For measuring - tapes are commonly used.

❖ short offset - judged by naked eye or less than 15 m - Most commonly used

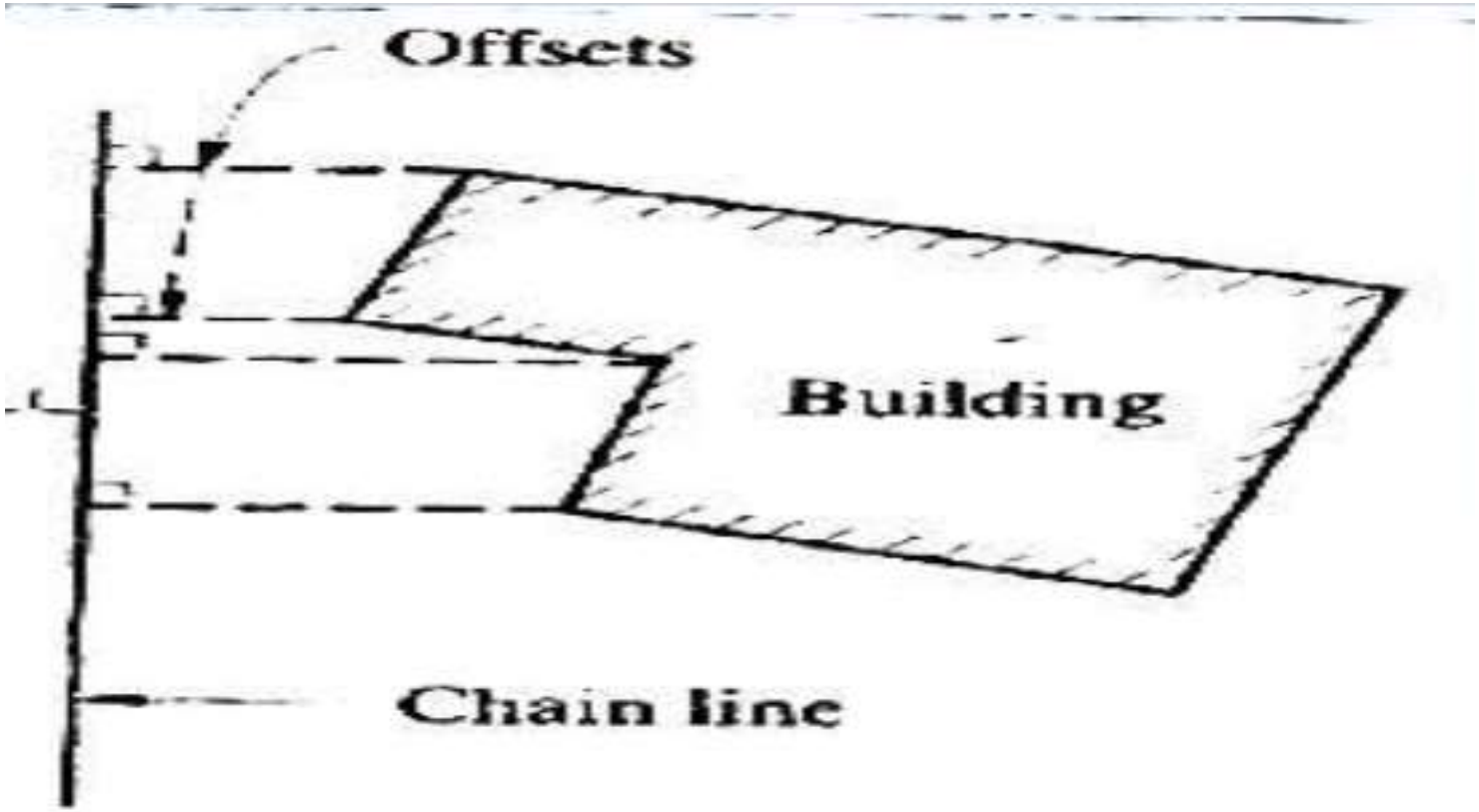
❖ long offset - offset greater than 15m



Perpendicular Offsets

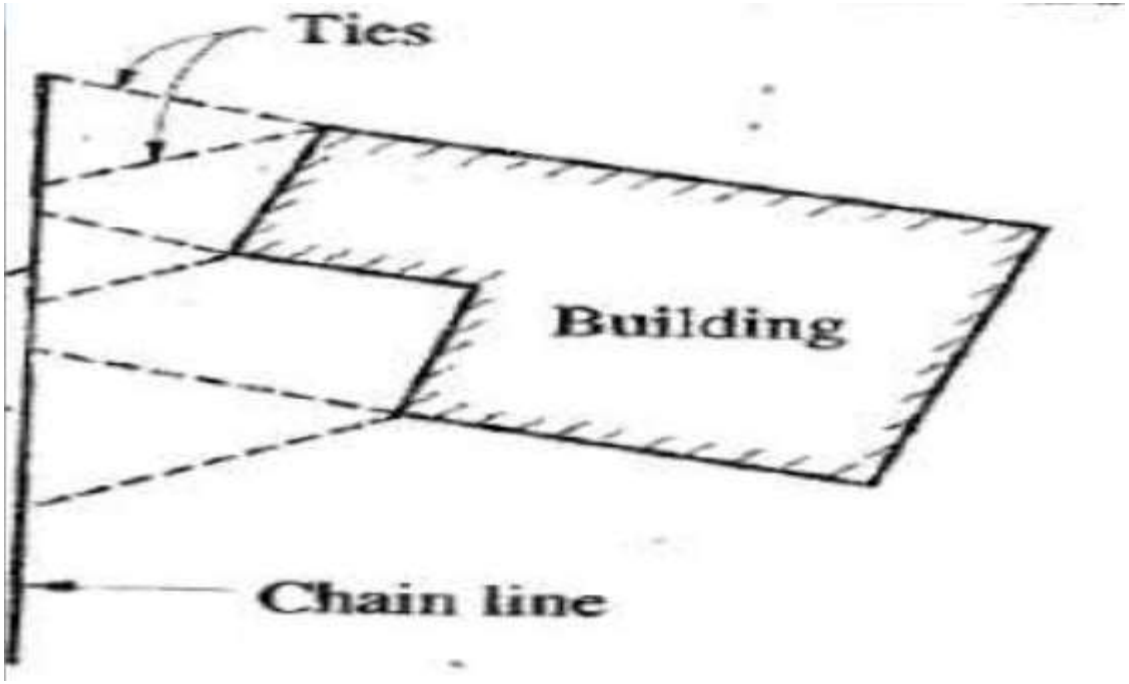
- Perpendicular to the chain line.
- By holding zero end of the tape at the object and swinging the tape on the chain line. The shortest distance measured from object to the chain line is usually the perpendicular offset.
- By setting right angle in 3:4:5
- By cross-staff or optical square
- Perpendicular offset usually preferred than oblique.

Perpendicular Offsets



Oblique Offset

- Oblique distance is always greater than perpendicular distance.
- All the offsets which are not taken at the right angle to chain line - oblique offsets.



Methods of setting perpendicular offset

(i) Swinging

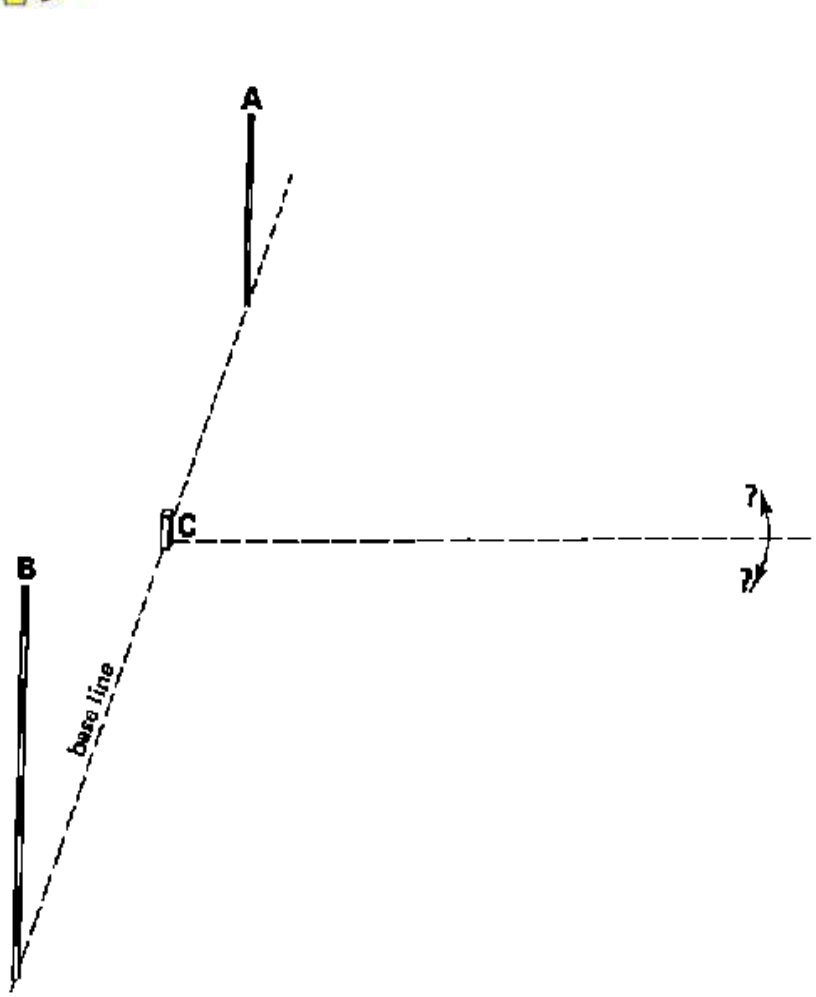
(ii) Using cross staffs

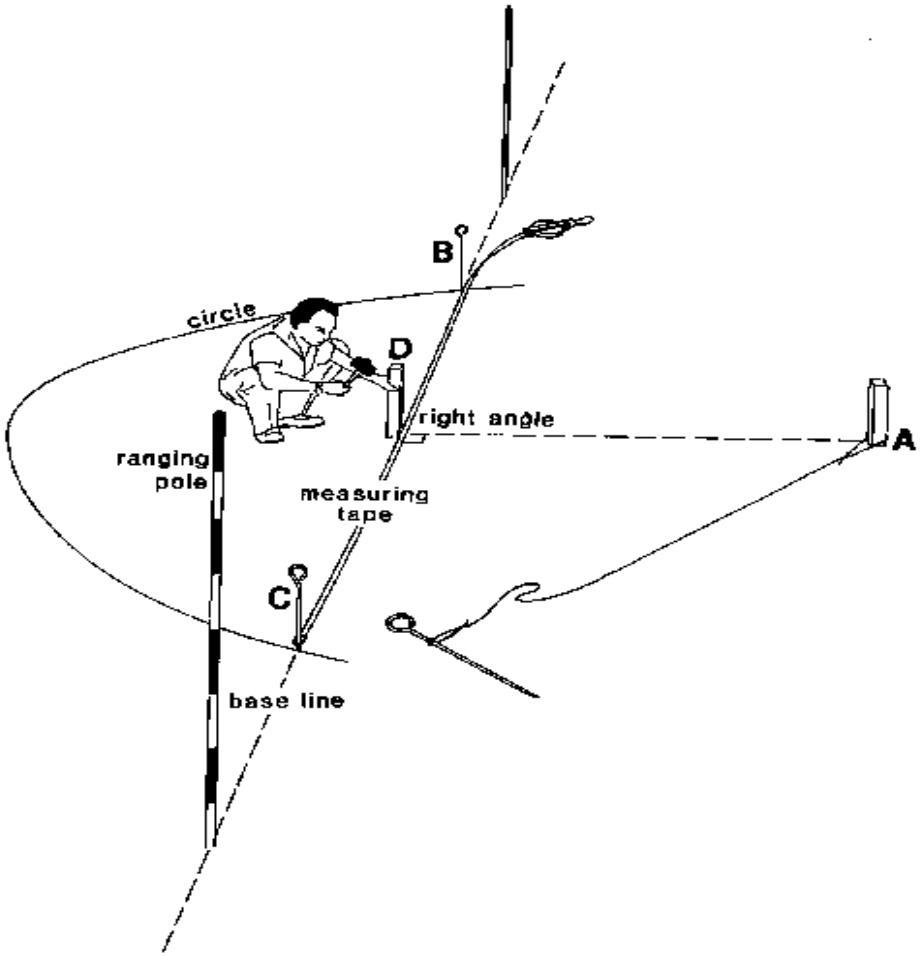
(iii) Using optical or prism square.

Perpendicular Offset by Swinging

- Chain is stretched along the survey line.
- An assistant holds the end of tape on the object.
- Surveyor swings the tape on chain line and selects the point on chain where offset distance is the least and notes chain reading as well as offset reading in a field book on a neat sketch of the object

Perpendicular Offset by Swinging



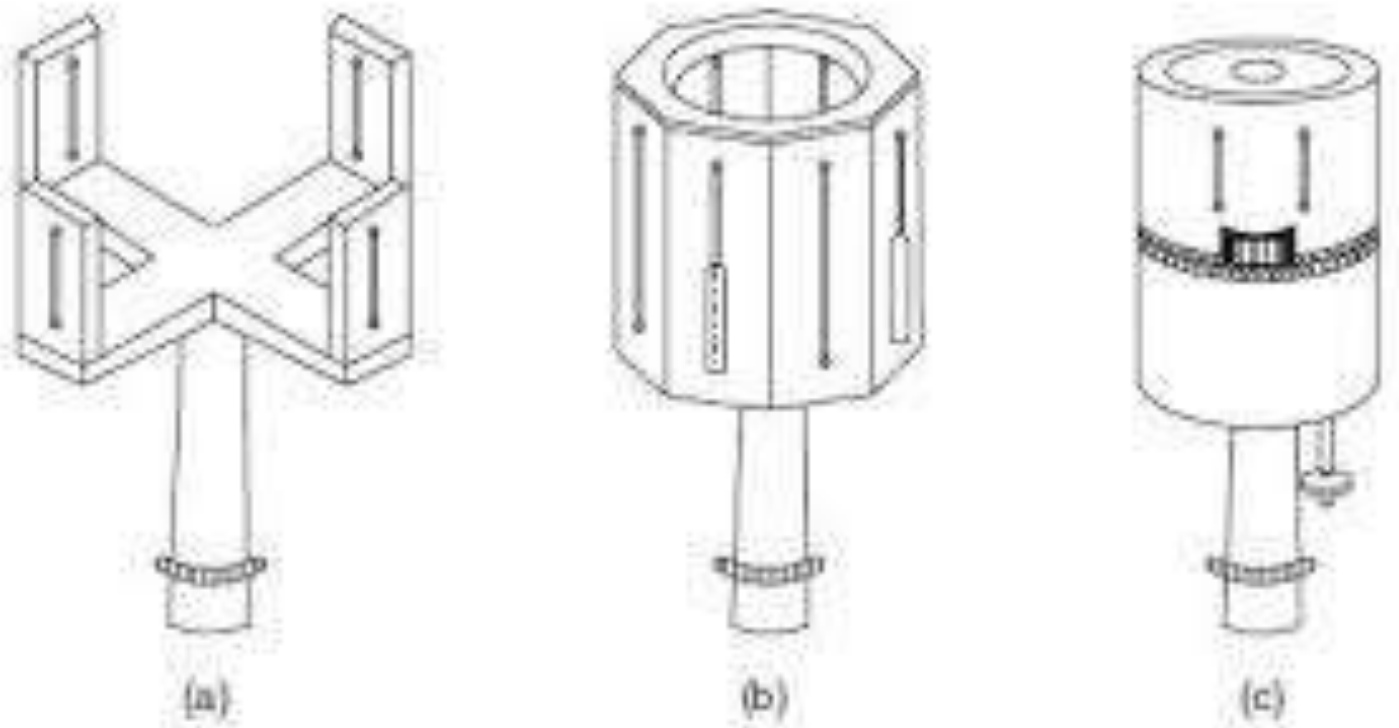


Perpendicular Offsets Using Cross Staffs

- All cross staffs are having two perpendicular lines of sights - mounted on stand.
- First line of sight is set along the chain line and without disturbing setting right angle line of sight is checked to locate the object.

1. Open cross staff - it is possible to set perpendicular only
2. French cross staff - even 45° angle can be set.
3. Adjustable cross staff - set any angle also, since there are graduations and upper drum can be rotated over lower drum.

Perpendicular Offsets Using Cross Staffs



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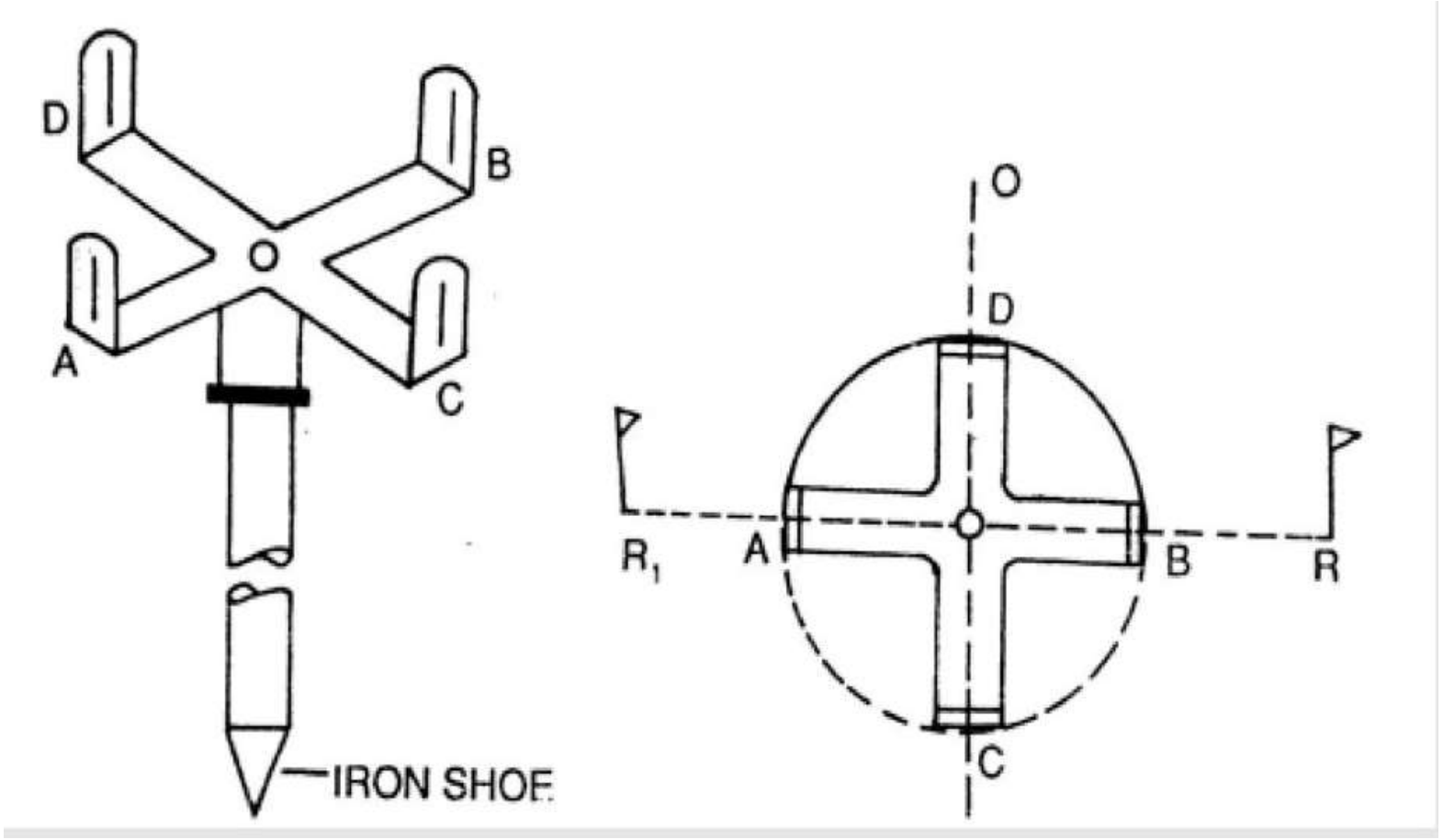
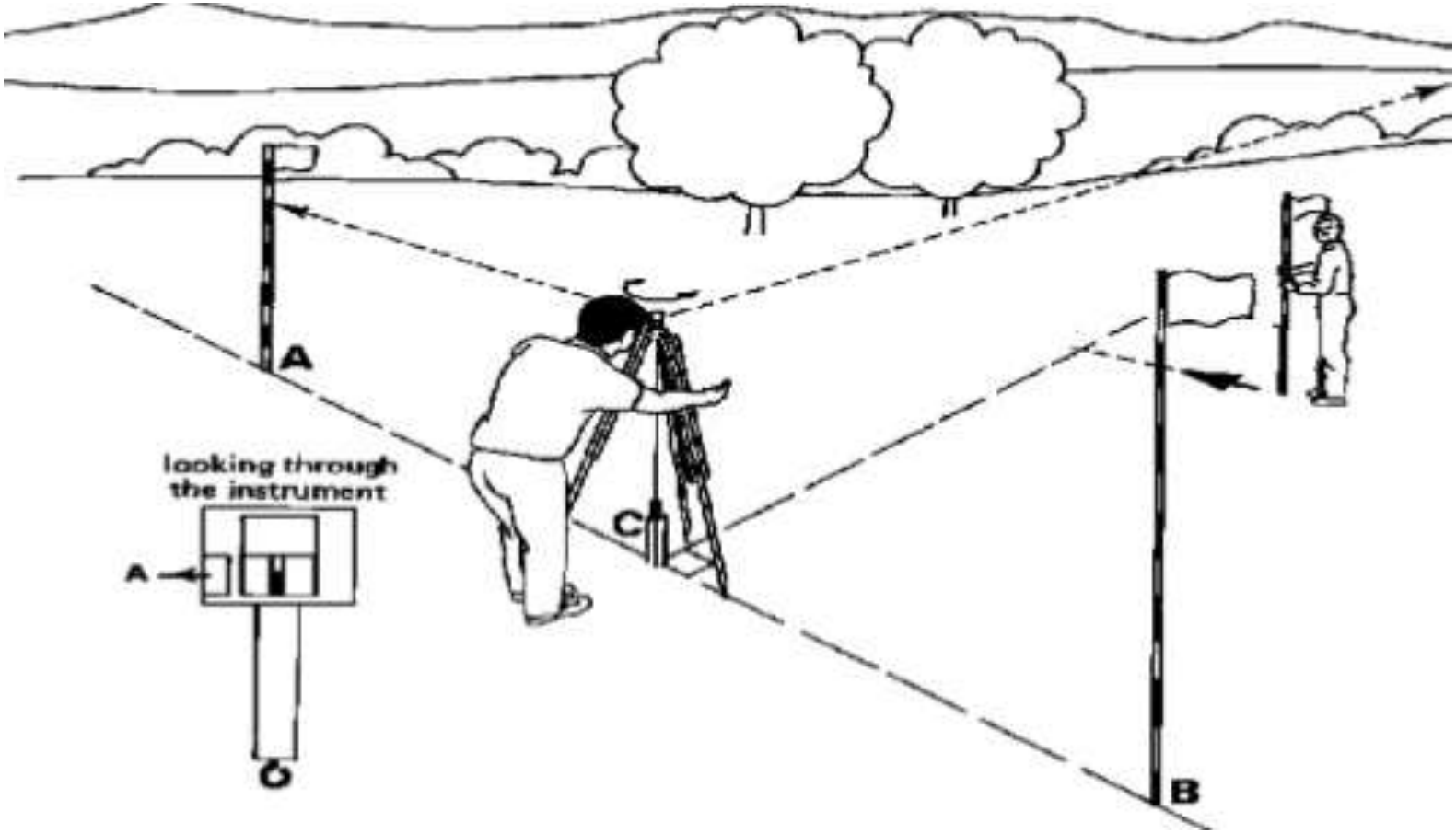


Perpendicular Offsets Using Optical Square and Prism Square



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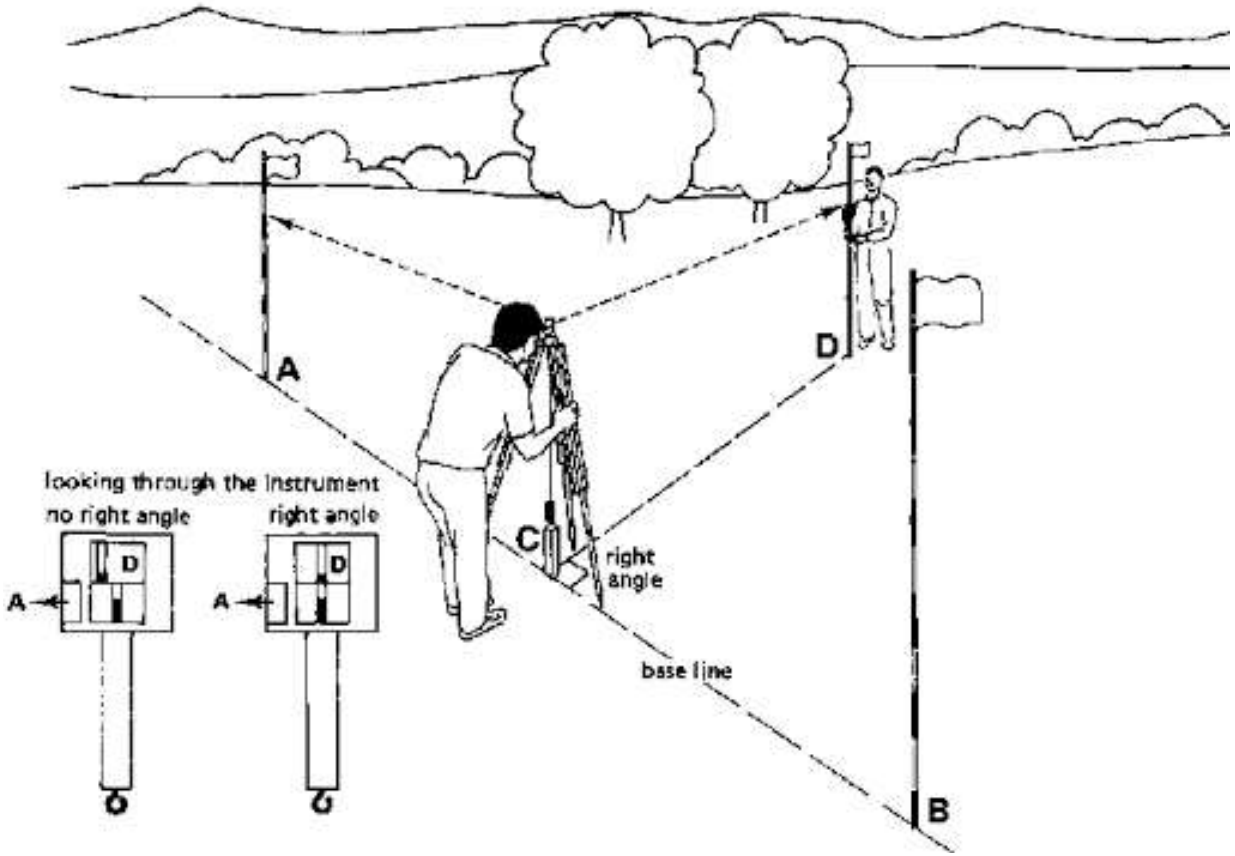

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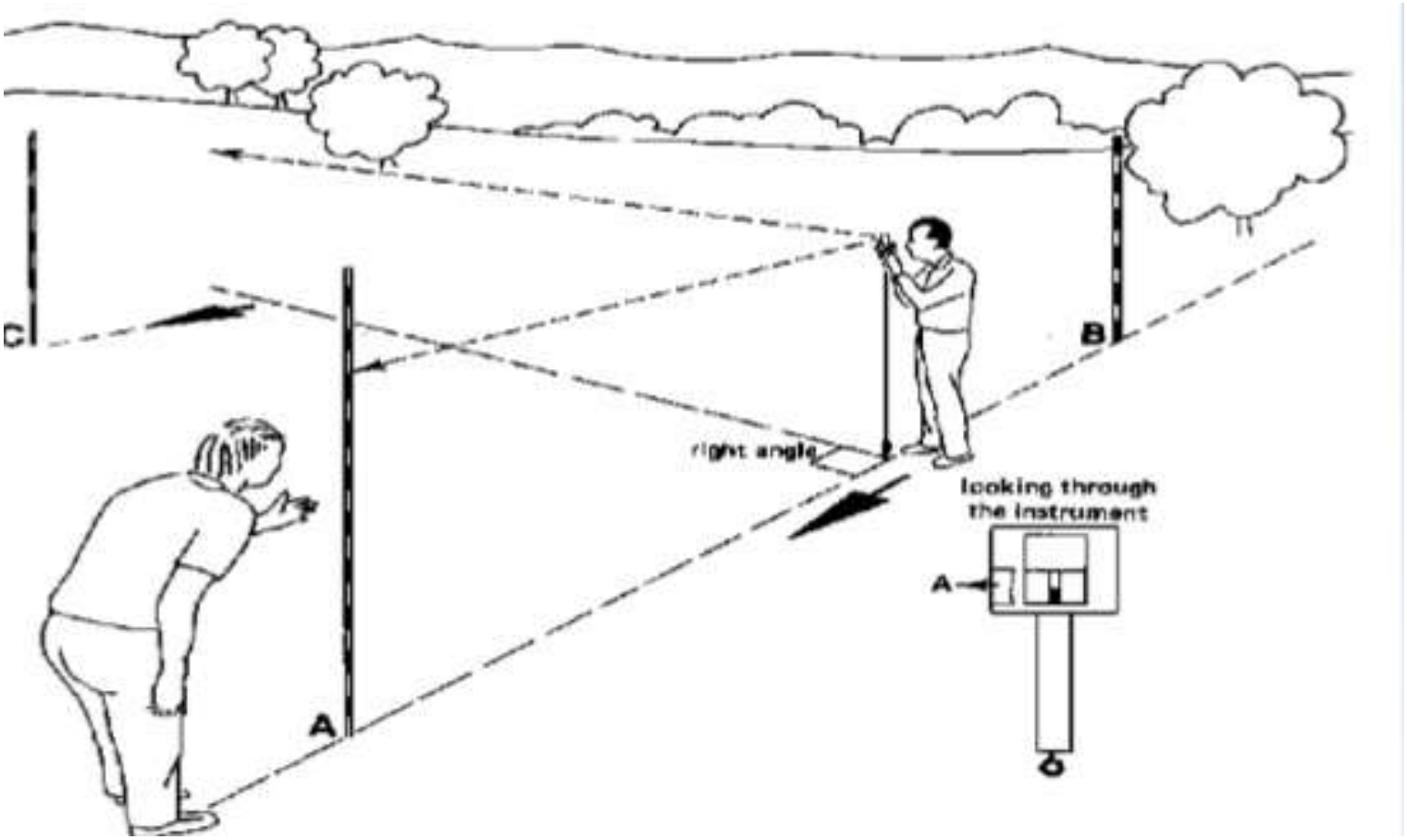

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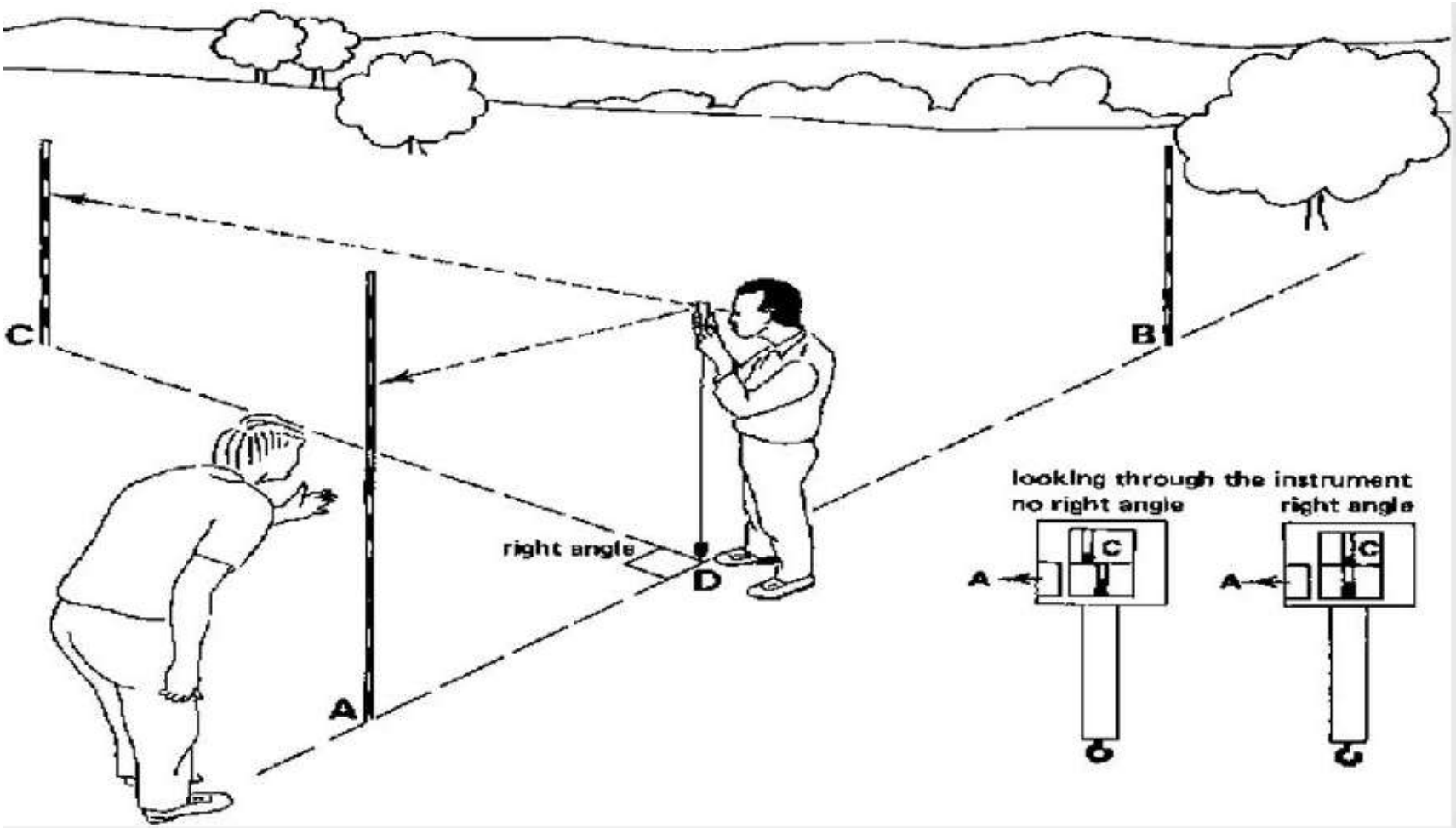

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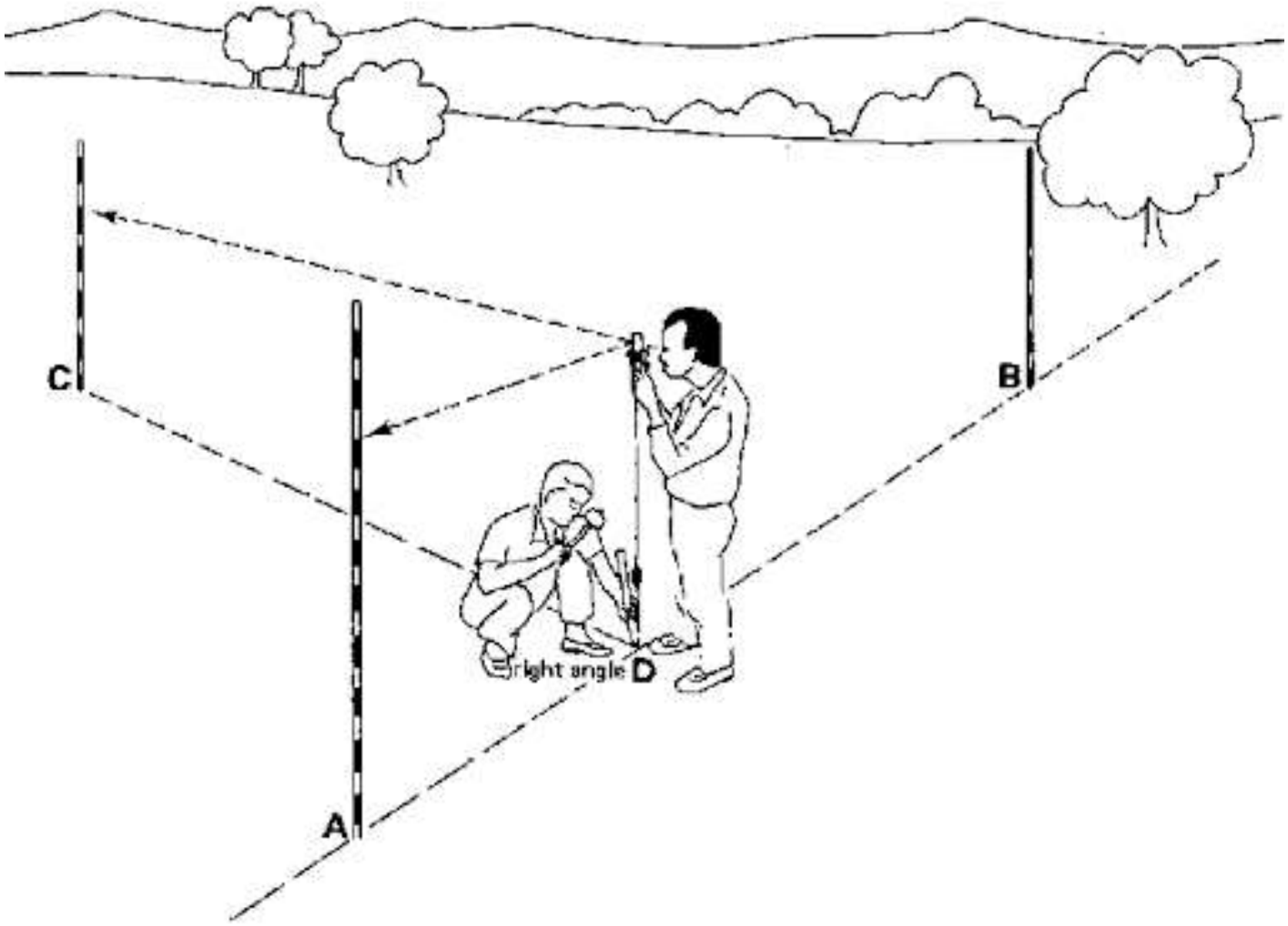
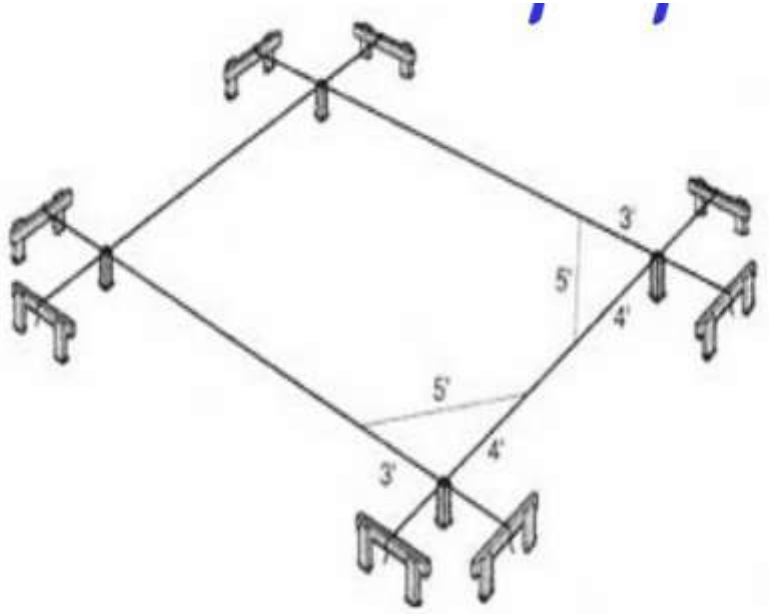
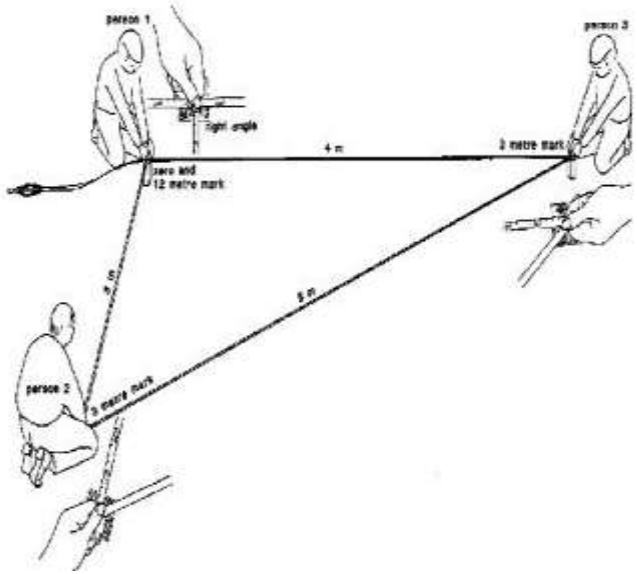
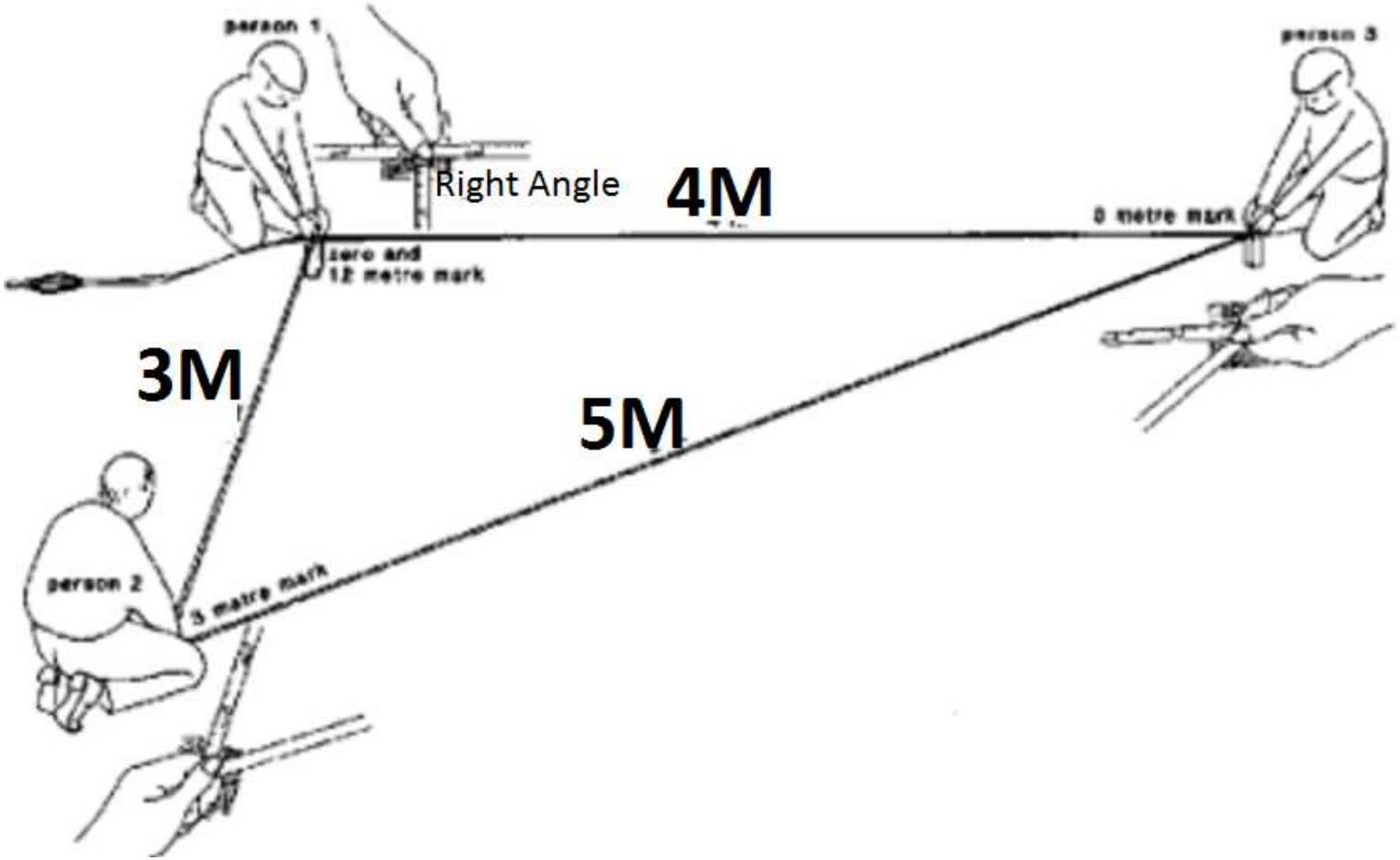


3-4-5 Method


3'
5'
4'
5'
4'
3'


person 1
person 3
right angle
4 m
3 metre mark
zero and
12 metre mark
5 m
5 m
person 2
3 metre mark

3-4-5 Method


person 1
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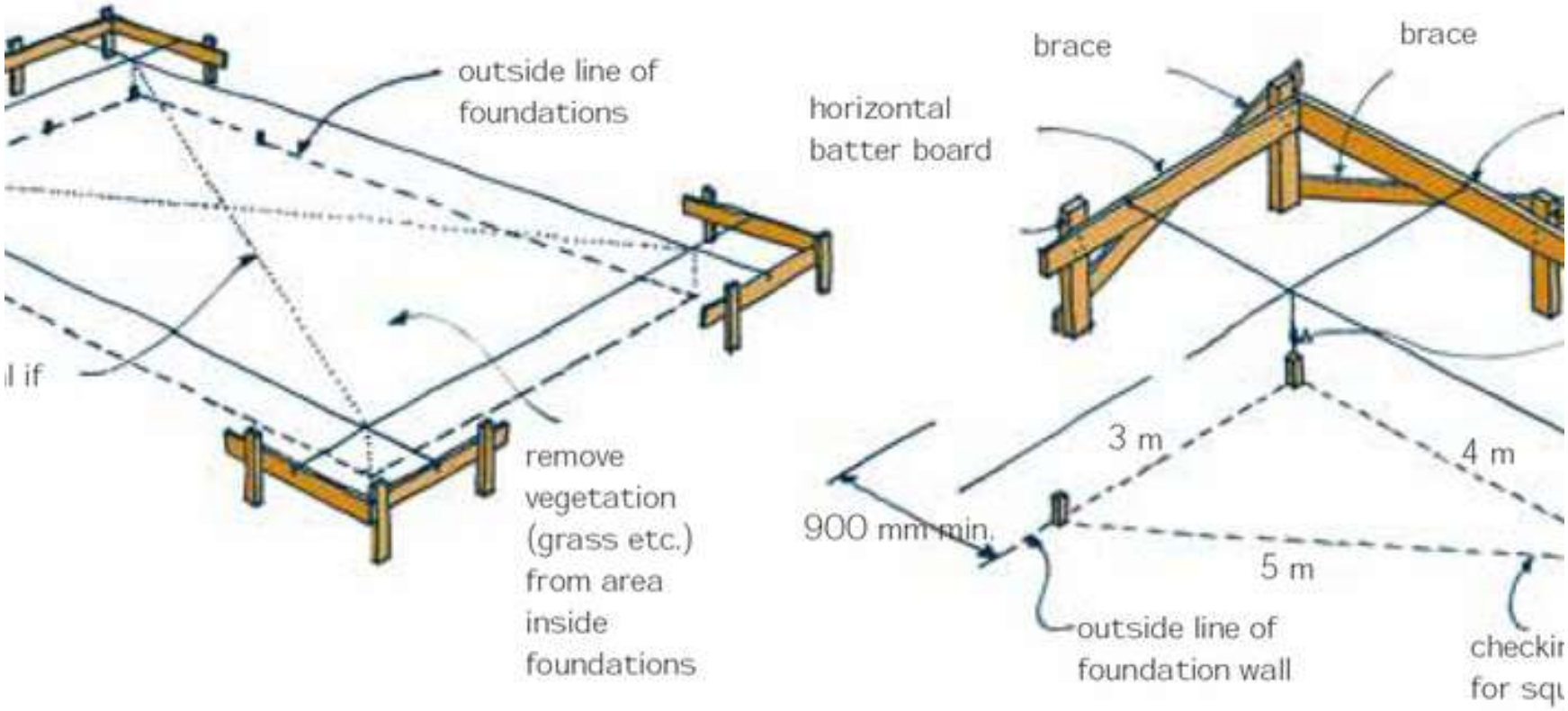
outside line of
foundations
l if
remove
vegetation
(grass etc.)
from area
inside
foundations
horizontal
batter board
brace
brace
3 m
4 m
900 mm min.
5 m
outside line of
foundation wall
checkir
for squ

Q & A Session

Area enclosed by straight line irregular figures (Problems)

THANK YOU