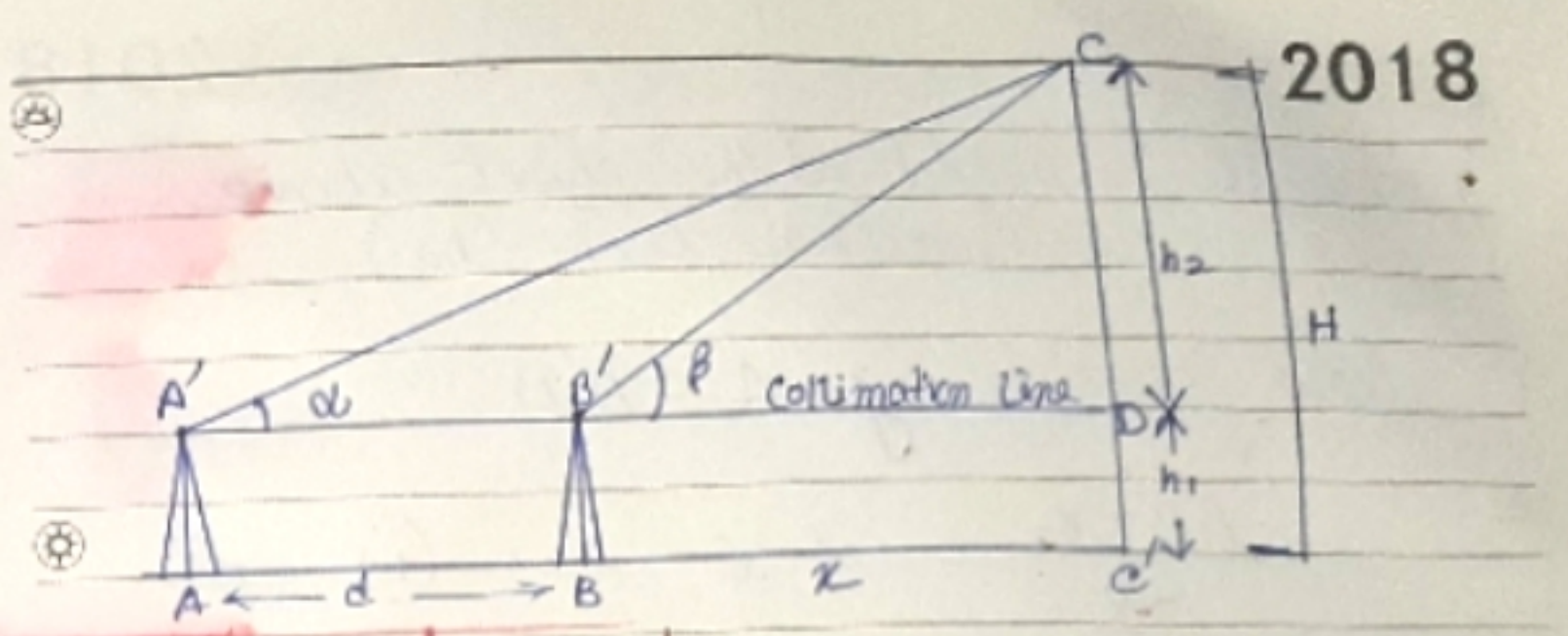
Final DSR-4

FIELD BOOK — 2018

Determination of Height and Horizontal Distance by Transit Theodolite
[Base Inaccessible]
[Same Vertical Plane Method]



Instrument at	object	Faces	circle VC	Vertical Reading VD	→ Mean of vernier	Mean of faces	Height of instrument	Dist.(d) in m.	Remarks
A	C	Left	11°38′	11°38′	11°38′	11°38′30″	1.4m.	AB = 11.83 m.	
		Right	11°39′	11°39′	11°39′				
B	C	Left	15°55′	15°55′	15°55′	15°55′30″			
		Right	15°56′	15°56′	15°56′				

Distance AB (d) = 11.83 m. and BC′ is unknown (say x)

∠CA′D and ∠CB′D here been measured by theodolite

IMPORTANT POINTS

where A = first station of observation
B = second " " "
h_1 = Instrument height at station A & B
h_2 = Height of the object above the collimation line
H = Height of the object above ground
α = Vertical angle at A station
β = " " " B "
d = Horizontal distance between A & B

IMPORTANT POINTS

Step-I :- Height of the object above collimation line (h_2)

Now considering $\Delta C A' D$

$$\frac{A'B' + x}{CD} = \cot \alpha \quad \text{---} (1)$$

and considering $\Delta C B' D$

$$\frac{x}{CD} = \cot \beta \quad \text{---} (11)$$

subtracting the equation no. (11) from equation no. (1), we get

$$\frac{A'B' + x}{CD} - \frac{x}{CD} = \cot \alpha - \cot \beta$$

or, $\frac{11.83 + x}{CD} - \frac{x}{CD} = \cot 11°38'30'' - \cot 15°55'30''$

or, $\frac{11.83 + x - x}{CD} = 4.85 - 3.50$

or, $\frac{11.83}{CD} = 1.35$

or, $CD \times 1.35 = 11.83$

or, $CD = \frac{11.83}{1.35}$ or, $CD = 8.76m$.

IMPORTANT POINTS

$\therefore h_2 = 8.76\,m.$

Step - II :- Height of the object above the ground = H

$H = (h_1 + h_2)$

$H = (1.4 + 8.76)\,m.$

$H = 10.16m.$

Step - III :- Calculation of Horizontal distance between station B and the base of object = BC'

From the figure $B'D \parallel BC'$

$BB' \parallel C'D$

Now from the right angle triangle

$CB'D$, $\frac{x}{CD} = \cot B$

$\text{or } x = \cot B \times CD$

$\text{or, } x = \cot 15^\circ 55' 93'' \times 8.76$

$\text{or } x = 30.69m.$

Step-IV :- calculation of horizontal distance between first Station and the base of the object B.

$A'D \circ\circ A C'$

$AC' = AB + x$

or $AC' = d + x$

or $AC' = (11.83 + 30.79)\ m$

or $AC' = 42.52\ m$.