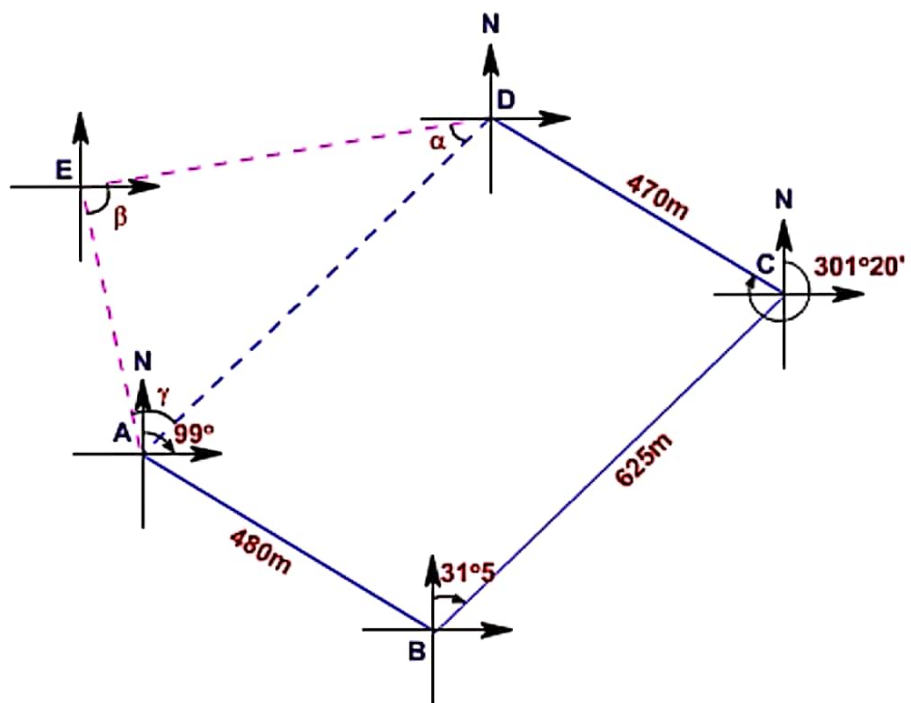


In a traverse ABCDE, the length of the sides DE and EA could not be measured.

Line	AB	BC	CD	DE	EA
Length (m)	480	626	470	?	?
WCB (m)	99° 00'	31° 05'	301° 20'	235° 00'	153° 25'

Determine the missing data.



Let us consider the closed traverse ABCD. Let the line DA is having length and bearing (WCB) be l and q respectively.

Line	Length (m)	WCB	Latitude (m)	Departure (m)
AB	480	99° 00'	- 75.088	474.090
BC	625	31° 05'	535.261	322.678
CD	470	301° 20'	244.408	-401.454
DA	l	q	$l \cos q$	$l \sin q$

Thus in closed traverse ABCD,

$$\text{Latitude} = 0 \text{ or, } l \cos q + 704.581 = 0 \text{ or, } l \cos q = - 704.581$$

$$\text{Departure} = 0 \text{ or, } l \sin q + 395.314 \text{ or } l \sin q = - 395.314$$

$$\therefore l = \sqrt{(-395.314)^2 + (-704.581)^2}$$

$$= 807.903 \text{ m}$$

$$\theta = \tan^{-1} \frac{(-395.314)}{(-704.581)}$$

$$= \text{S } 29^\circ 17' 43'' \text{ W}$$

$$= 209^\circ 17' 43'' \text{ (W.C.B.)}$$

$$= S 29^{\circ} 17' 43'' W$$

$$= 209^{\circ} 17' 43'' \text{ (W.C.B.)}$$

Now in the $\triangle ADE$,

$$a = \text{Bearing of DE} - \text{Bearing of DA}$$

$$= 235^{\circ} 00' - 209^{\circ} 17' 43'' = 25^{\circ} 42' 17''$$

$$b = \text{Bearing of EA} - \text{Bearing of DE}$$

$$= 153^{\circ} 25' - (235^{\circ} 00' - 180^{\circ}) = 98^{\circ} 25'$$

$$g = \text{Back bearing of DA} + (360^{\circ} = \text{back bearing of EA})$$

$$= (209^{\circ} 17' 43'' - 180^{\circ}) + (360^{\circ} - (153^{\circ} 25' + 180^{\circ}))$$

$$= 55^{\circ} 52' 43''$$

Now in $\triangle ADE$

$$\text{from } \frac{DE}{\sin \alpha} = \frac{AD}{\sin \beta}$$

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$$\text{from } \frac{DE}{\sin \alpha} = \frac{AD}{\sin \beta}$$

$$DE = AD \frac{\sin \gamma}{\sin \beta} = 807.902 \frac{\sin (55^\circ 52' 43'')}{\sin (98^\circ 25')} = 676.104\text{m}$$

$$\text{and from } \frac{AE}{\sin \alpha} = \frac{AD}{\sin \beta}$$

$$AE = \frac{AD \sin \alpha}{\sin \beta} = 807.902 \frac{\sin (25^\circ 42' 17'')}{\sin (98^\circ 25')} = 354.229\text{m}$$