$\Delta E_{AB} = E_B - E_A = -96.4 - (-186.8) = 90.40$

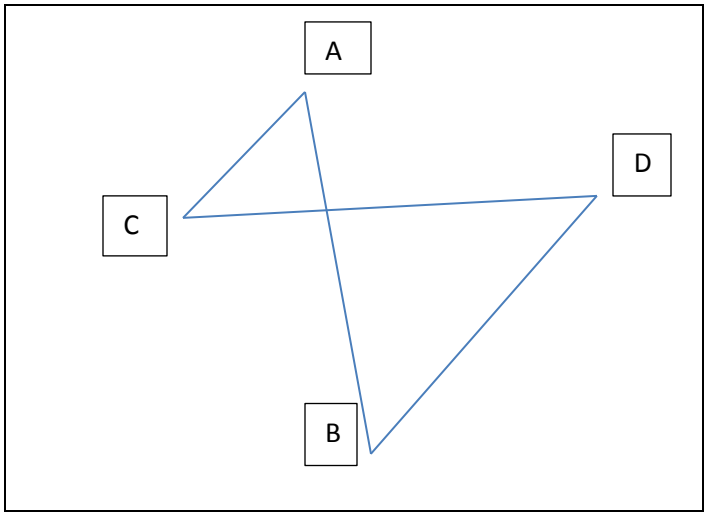
$\Delta N_{AB} = N_B - N_A = 102.8 - 212.3 = -109.5$

$L_{AB} = \sqrt{\Delta E^2_{AB} + \Delta N^2_{AB}}$

$L_{AB} = 141.99$ m

$\alpha_{AB} = \tan^{-1} = \frac{90.40}{-109.5} = -39° 32' 31.5'' + 180$

$\alpha_{AB} = 140° 27' 28.5''$



- **Instrument at station (A) :**

$H = K.S.COS^2\theta + C.COS^2\theta$

$L_{AC} = (100).(1.66).[COS^2(10° 12')]$

$L_{AC} = 160.79$ m

$V = \frac{1}{2} K.S.Sin2\theta$

$V = (\frac{1}{2}).(100).(1.66).[Sin(2*10° 12')]$

V= 28.93 m

ASSUME $R.L._A = 100$

$R.L._C = R.L._A + H.I. + V - h$

$R.L._C = 128.715$

- **Instrument at station (B) :**

$L_{BD} = (100).(2.04).[COS^2(12° 30')]$

$L_{BD} = 194.44$ m

$V = (\frac{1}{2}).(100).(2.04).[Sin(2*12° 30')]$

V= 43.11 m

$R.L._B = R.L._A + 6.5 = 106.5$

$R.L._D = R.L._B + H.I. - V - h$

$R.L._D = 106.5+1.42-43.11-1.84$

$R.L._D = 62.97$ m

For closed Traverse ABDCA :

Line	L	α	Δ E	Δ N
AB	141.99	140° 27′ 28.5′′	90.397	-109.497
BD	194.44	84° 45′	193.624	17.792
DC	L	α	L sin α	L cos α
CA	160.79	46° 30′	116.633	110.681
			400.65+Lsin α	**18.976+ Lcos α**

$L_{DC} \sin \alpha_{DC} = -400.654$

$L_{DC} \cos \alpha_{DC} = -18.976$

L_{DC} = 1112.25 m

. $\alpha_{DC} = \tan^{-1} = \frac{-400.654}{-18.976} =$ 21° 6′ 49.4′′ +180

. ***α_{CD} = 21 °6′ 49.4′′***

$\tan \theta = \frac{65.745}{1112.25} = 0.059$

Gradient of Line CD = 5.91 %