Q1) a) 30°& 120°

b) Multiplying const :- f/i , additive constant :- f+i

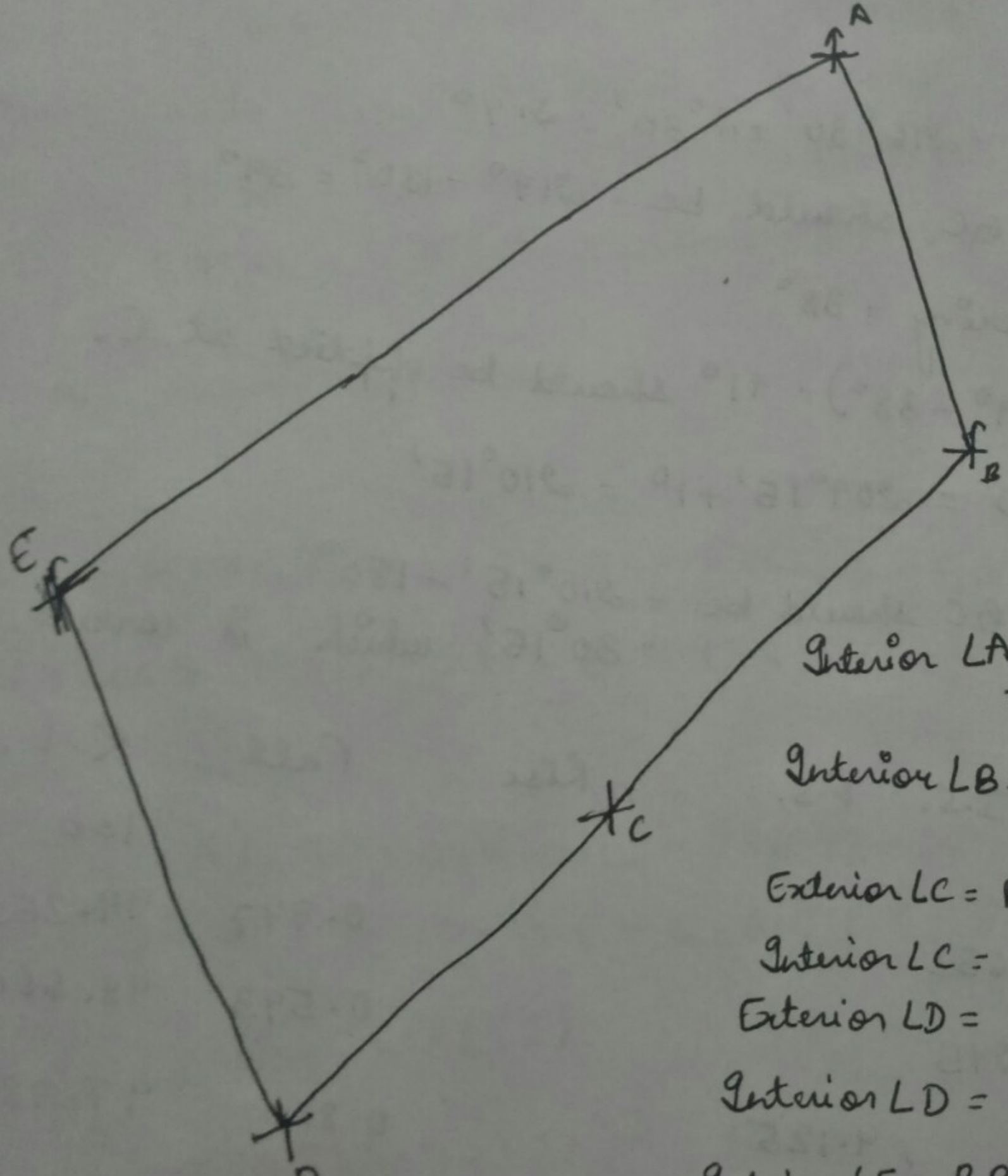
c) S 42°15' W

d) To determine the relative heights of different objects on or below the surface of the earth.

e) add.

f) Parallelism.

(23)



Interior $\angle A = BB_{EA} - FB_{AB}$
$= 240°15' - 140°45' = 99°30'$

Interior $\angle B = BB_{AB} - FB_{BC}$
$= 318°15' - 216°30' = 101°45'$

Exterior $\angle C = FB_{CD} - BB_{BC} = 171°15'$

Interior $\angle C = 360° - 171°15' = 188°45'$

Exterior $\angle D = FB_{DE} - BB_{CD} = 289°30'$

Interior $\angle D = 70°30'$

Interior $\angle E = BB_{DA} - FB_{EA} = 79°30'$

Check sum of interior angle $= (2N-4) \times 90 = 540$

$\angle A + \angle B + \angle C + \angle D + \angle E = 540$

∴ The angles computed are correct.

Line DE & EA are free from local attraction,
∴ FB & BB of DE & EA are correct also BB of CD & FB of AB is correct.

Actual BB of AB should be = $140°45' + 180°$
$= 320°45'$

But observed bearing = $318°15'$

∴ A correction of $(320°45' - 318°15') = +2°30'$ should be applied at B.

Corrected FB of BC = $216°30' + 2°30' = 219°$

∴ Actual BB of BC should be = $219° - 180° = 39°$

But observed bearing = $38°$

∴ A correction of $(39° - 38°) = +1°$ should be applied at C.

Corrected FB of CD = $209°15' + 1° = 210°15'$

∴ Actual BB of BC should be = $210°15' - 180°$
$= 30°15'$ which is correct.

Q4)

S.No	B.S.	I.S.	F.S.	Rise	Fall	R.L.	
						100	
1.	1.905				0.747	99.253	
2.			2.652		0.593	98.660	
3.			3.245		0.880	97.780	CP
4.	1.854			0.104		97.884	
5.			1.750		0.200	98.084	CP
6.	1.350			1.550		97.619	
7.			1.815		0.465	97.384	
8.			2.050		0.235	96.289	
9.			3.145		1.095	97.709	
10.			1.725	1.42			
	$\Sigma BS = 5.109$		$\Sigma FS = 7.4$	$\Sigma Rise = 1.724$	$\Sigma Fall = 4.015$		

Arithmetical check

$\Sigma BS - \Sigma FS = \Sigma Rise - \Sigma Fall$ = last RL − First RL

$\Rightarrow 5.109 - 7.4 = 1.724 - 4.015 = 97.709 - 100$

$\Rightarrow -2.291 = -2.291 = -2.291$ (checked)

Q6)

Side	Length	Bearing	latitude	Departure
			$725\cos\theta$	$725\sin\theta$
AB	725	θ		
BC	1060	N62°30'E	+498.45	+940.24
CD	L	N37°36'E	0.7923L	0.6101L
DE	945	S55°18'W	−537.90	−776.92
EA	577.2	S2°40'W	−576.63	−26.85

For a closed traverse

$\Sigma L = 0$

$725\cos\theta + 498.45 + 0.7923L - 576.63 - 537.90 = 0$

$725\cos\theta = 616.08 - 0.7923L$ (1)

$\Sigma D = 0$

$725\sin\theta + 940.24 + 0.6101L - 776.92 - 26.85 = 0$

$725\sin\theta = -136.47 - 0.6101L$ (2)

Squaring & Adding (1) & (2)

$(725)^2 = (616.08 - 0.7923L)^2 + (-136.47 - 0.6101L)^2$

$525625 = (379554.5664 + 0.6277L^2 - 976.240L) + (18624.0609 + 0.3722L^2 + 166.5207L)$

$525625 = (0.6277L^2 + 0.3722L^2) + (379554.5664 + 18624.0609) + (-976.240L + 166.5207L)$

$525625 = 0.9999L^2 + 398178.6273 - 809.7193L$

$0.9999L^2 - 127446.3727 - 809.7193L = 0$

$\therefore L = 944.72m$

Substituting the value of L in (1)

$725 \cos\theta = 616.08 - 0.7923 \times 944.72$

$725 \cos\theta = -132.421$

$\cos\theta = -0.1826$

Substituting the value of (L) in (2)

$725 \sin\theta = -136.47 - 0.6101 \times 944.72$

$\sin\theta = -0.9832$

$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{0.9832}{0.1826} = 5.1040$

$\theta = 78^\circ.54'$

$\therefore$ Both latitude & departure are -ve, line AB falls in SW quadrant

$\therefore \theta = S78^\circ 54' W$