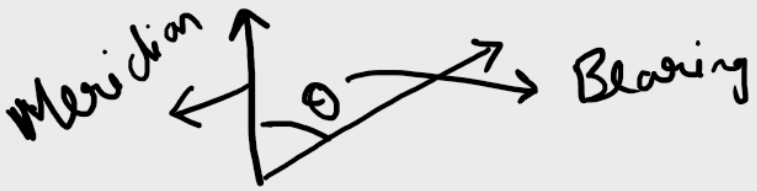
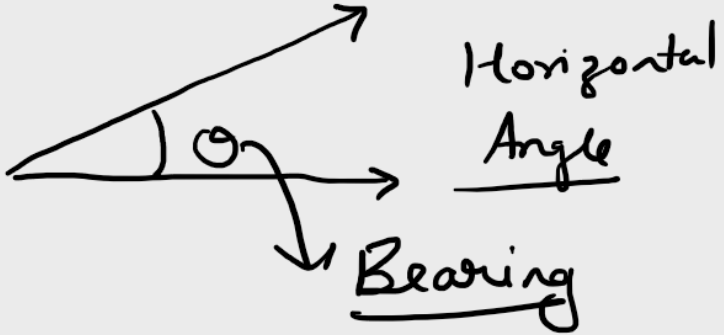
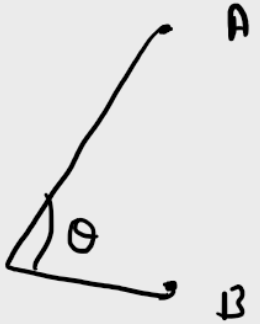
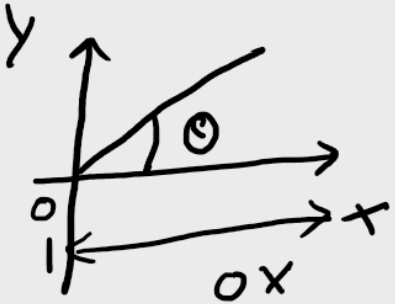
Module-2 Compass Surveying

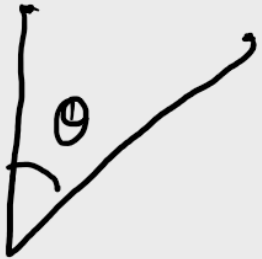
Chapter-5 (In B.C. Punmia)

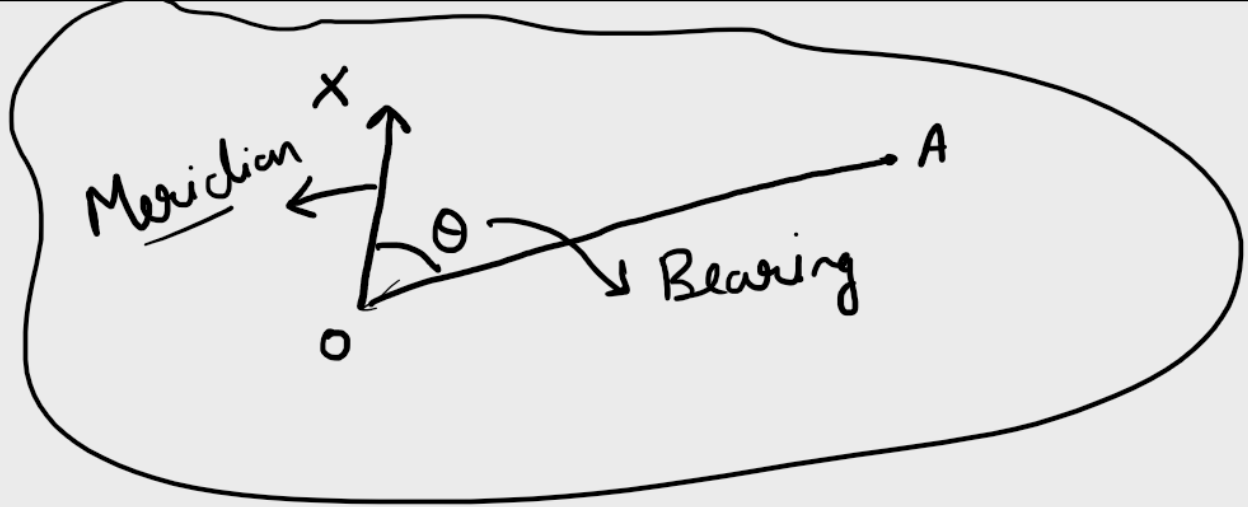








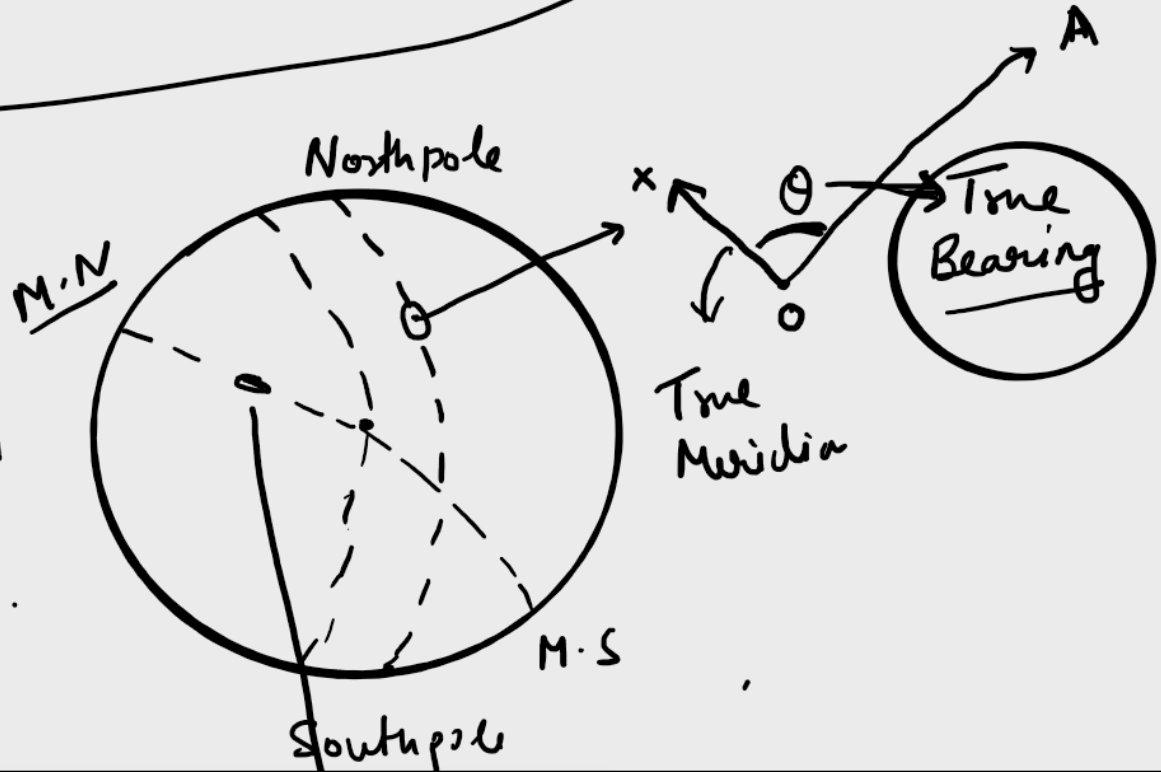




Types of Meridian

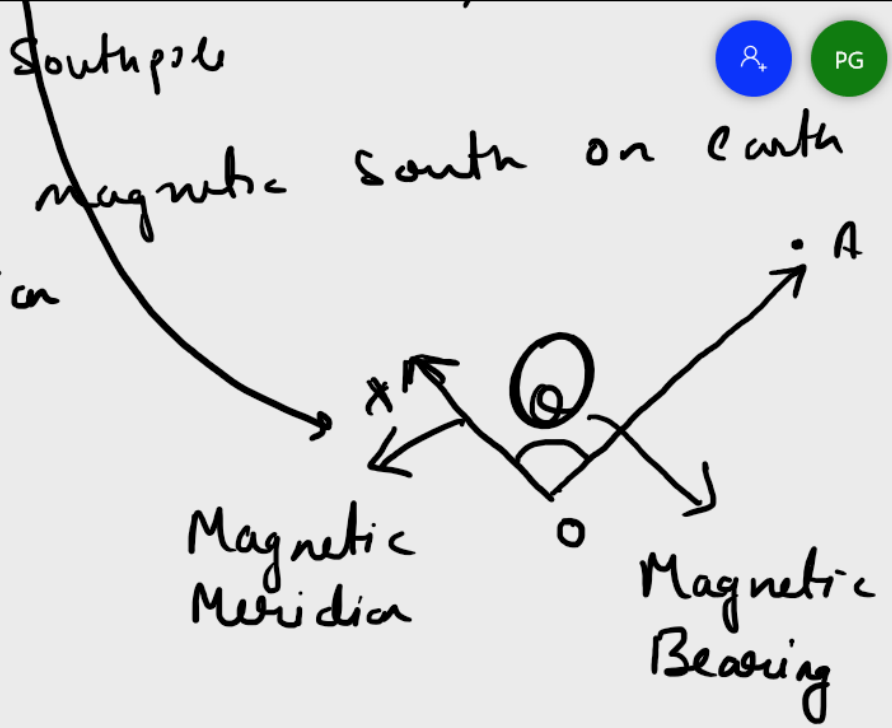
(a) True Meridian.

Any line connecting true north & true south of earth is called true Meridian

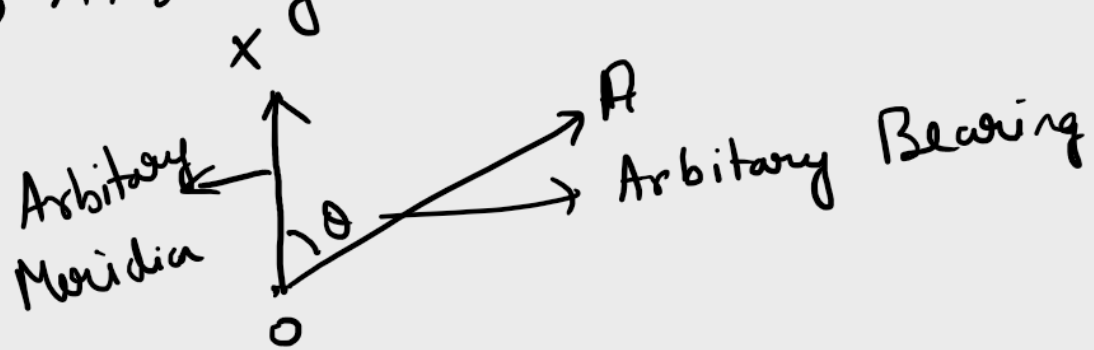


(b) Magnetic Meridian

→ Line connecting magnetic north & magnetic south on earth is known as Magnetic Meridian



Arbitary Meridian



Types of Bearing

(a) True Bearing

(b) Magnetic Bearing ✓

(c) Arbitary Bearing

* Systems of Bearing

(a) Whole Circle Bearing System (W.C.B)

(b) Quadrantal Bearing System / Reduced Bearing System (Q.B)

(a) Whole Circle Bearing System

Reference → North

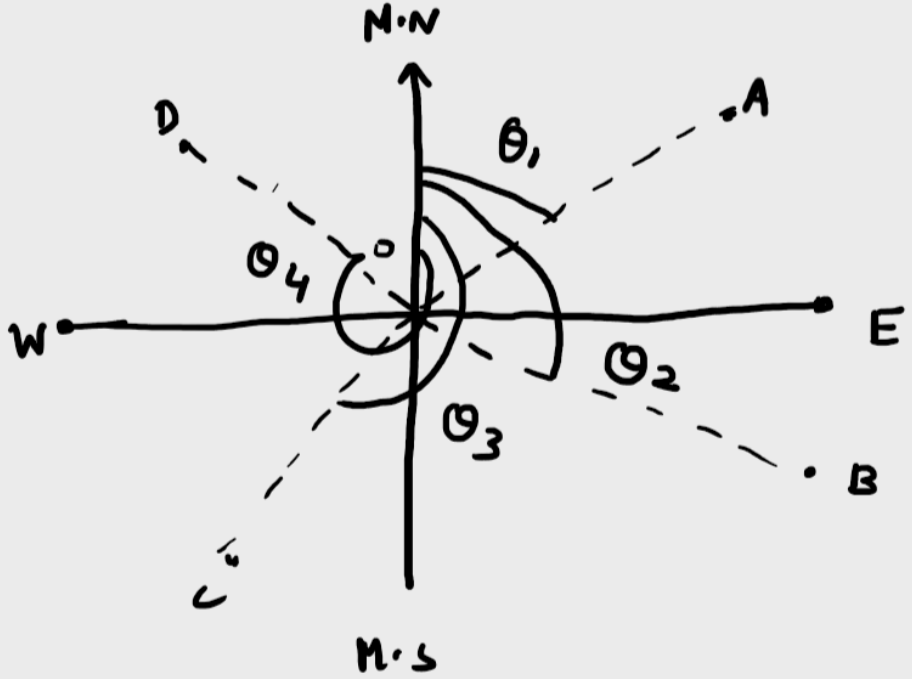
$\theta \rightarrow 0^\circ - 360^\circ$

$OA \rightarrow \theta_1$, $OB \rightarrow \theta_2$

$OC \rightarrow \theta_3$, $OD \rightarrow \theta_4$

Representation - θ

Movement → clockwise



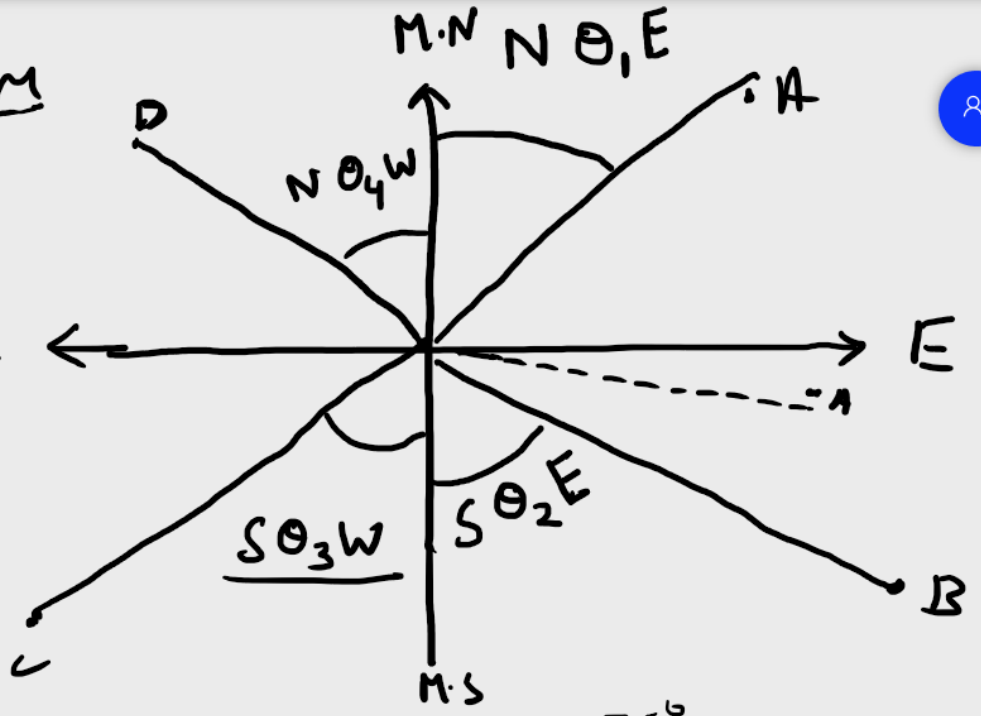
(b) Quadrantal Bearing System

Reference → North, South

Representation → N θ E, N θ W

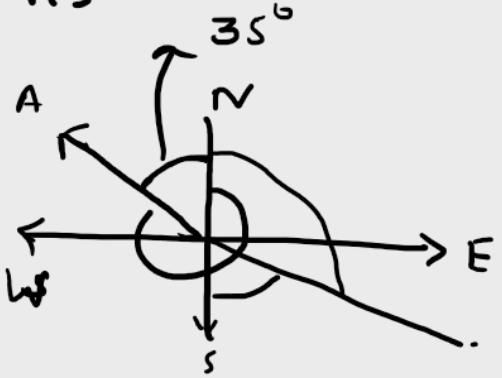
Movement → (clockwise, Anticlockwise)

θ → 0° – 90°



W.C.B → Q.B

QB → W.C.B



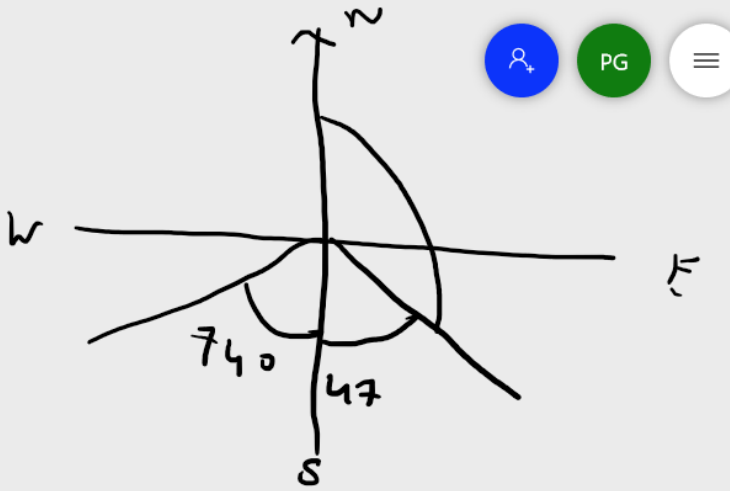
Q. 325°, 99° (WCB → Q.B)

N 35° W, S 81° E

S 47° E, S 74° W

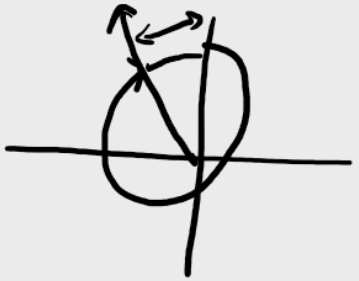
133°

180 + 74 = 254°



Q. Convert W.C.B into QB

346°, 287°, 173°, 42°



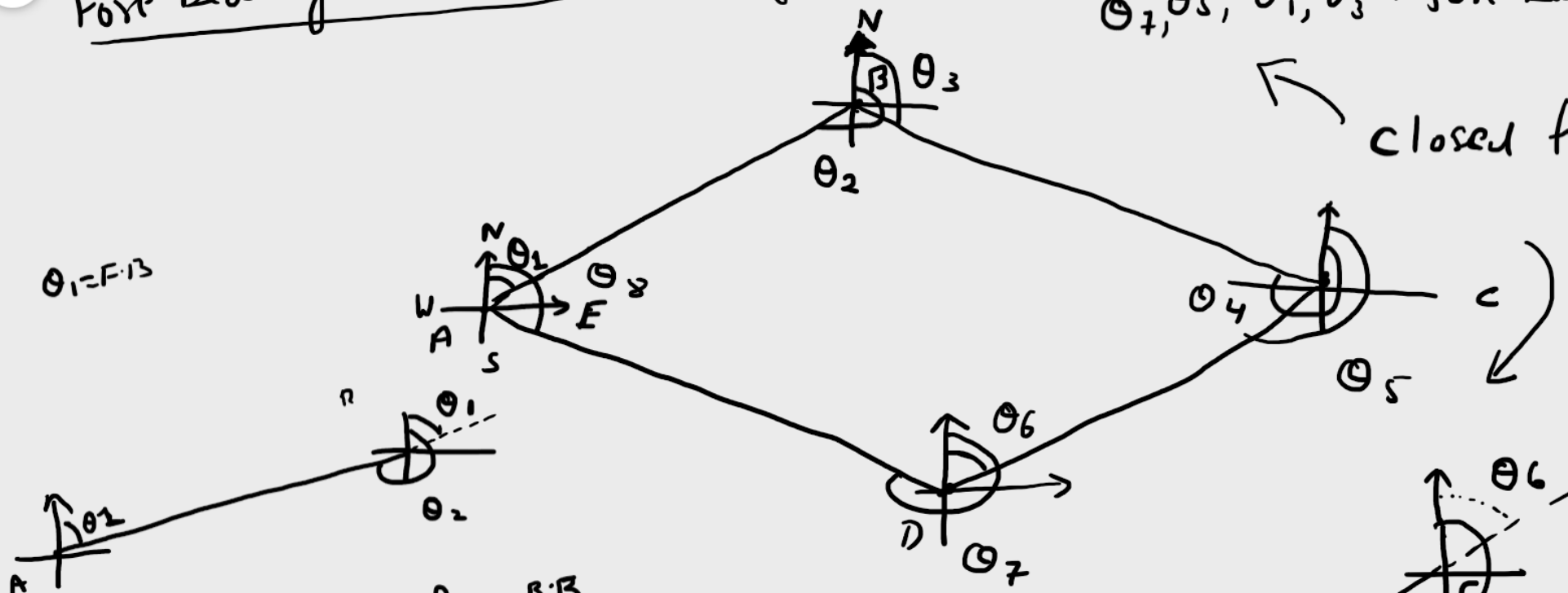
N14°W, N73°W, S7°E, N42°E

Fore Bearing and Back Bearing

$\theta_8, \theta_6, \theta_4, \theta_2$ → Back Bearing

$\theta_7, \theta_5, \theta_1, \theta_3$ → fore Bearing

closed traverse



$\theta_1 = F.B$

$\theta_2 = B.B$

$\theta_2 = \theta_1 + 180$

$B.B = F.B + 180°$

θ_5 → F.B

θ_6 → B.B

$B.B = F.B \pm 180^\circ$ [+ when $F.B < 180^\circ$; − when $F.B \geq 180^\circ$]

$\theta_6 + 180 = \theta_5$

$\theta_6 = \theta_5 - 180^\circ$

$B.B = F.B - 180^\circ$

Q. F.B, 45°, 98°, 138°, 272°, 195°, 352°

B.B = $45+180$, $98+180$, $138+180$, $272-180$, $352-180$, $195-180$, ~~$360-180$~~

Q. F.B: N 45° W, N 65° E, S 89° W, S 34° E

B.B: S 45° E, S 65° W, N 89° E, N 34° W

$B \cdot B = 90^\circ$

$B \cdot B = F \cdot B \pm 180^\circ$

$90 = F \cdot B \pm 180^\circ$

$FB = 270^\circ$,

12 256

$256^\circ = F \cdot B \pm 180$

$256 - 180^\circ = F \cdot B$

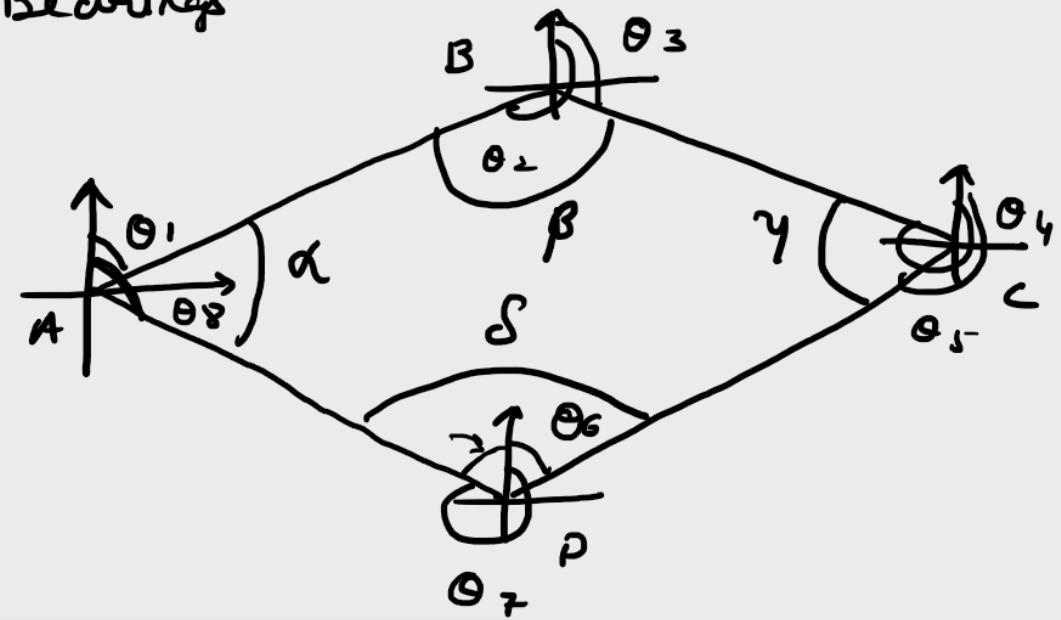
Interior Angle Measurement from Bearings

$\beta = \theta_2 - \theta_3$

$\alpha = \theta_8 - \theta_1$

$\gamma = \theta_4 - \theta_5$

$\delta = \theta_6 + 360 - \theta_7$



β = B.B of AB - F.B of BC

= B.B of previous line - F.B of next line (+) ∟

α = B.B of DA - F.B of AB

= B.B of previous line - F.B of next line (+) ∟

γ = B.B of BC - F.B of CD (+) ∟

B.B of Previous line - F.B of Next line

δ = B.B of CD - B.B of DA

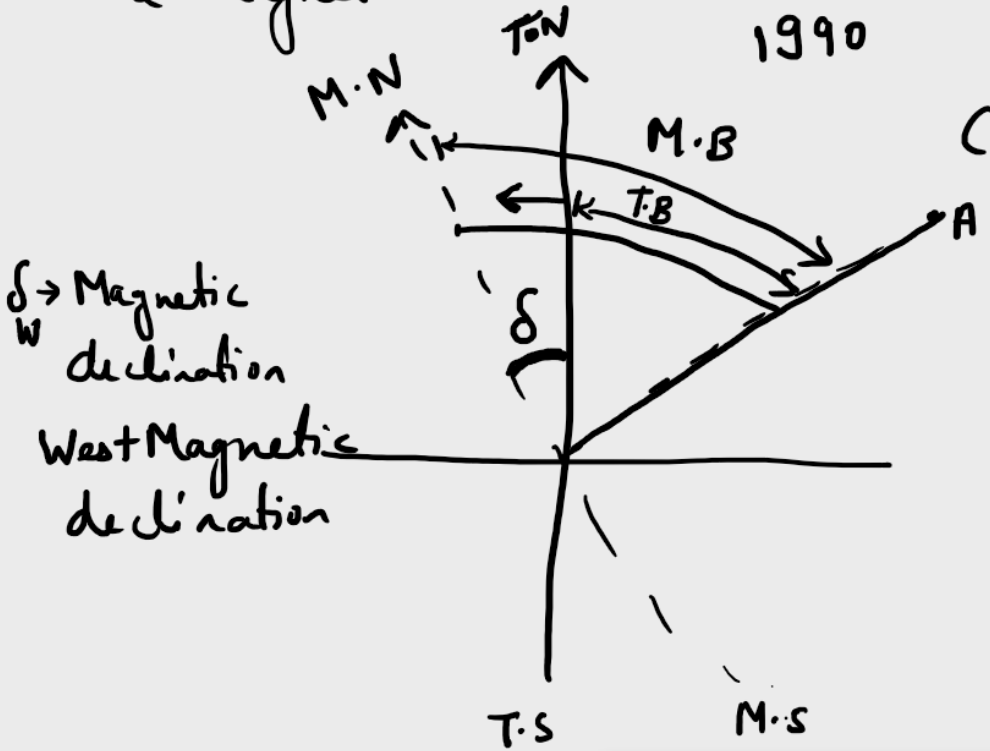
= B.B of previous line - F.B of Next line

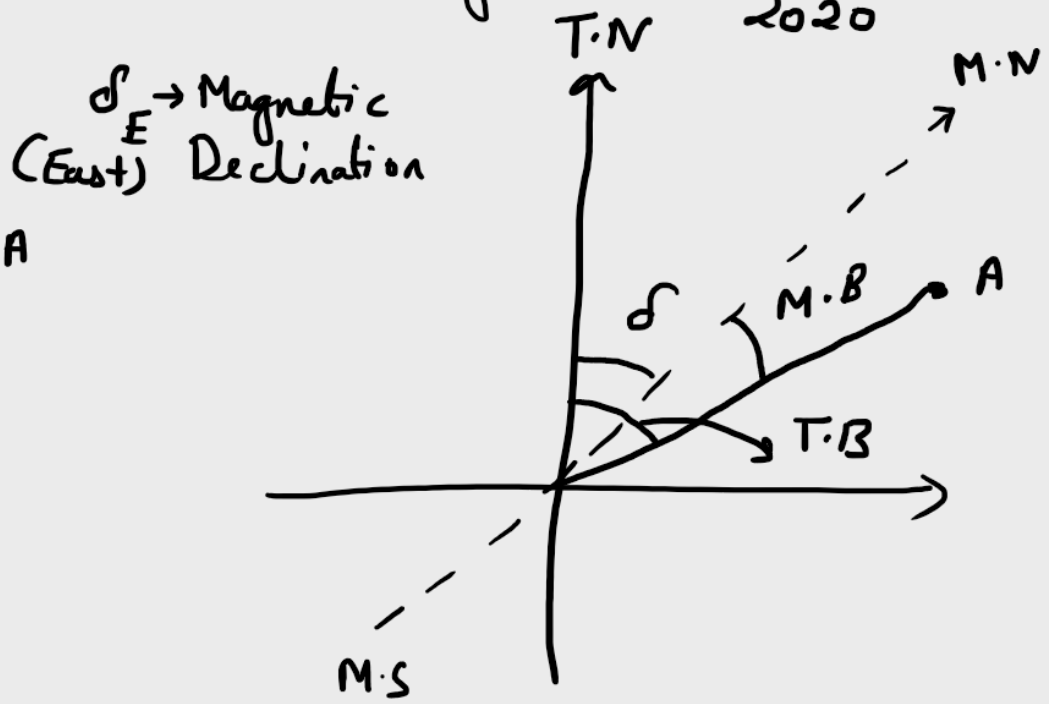
(-) (Exterior)

+360

Magnetic Declination.

The difference of horizontal angle b/w True Meridian & Magnetic Meridian is known as Magnetic declination





T.B = M.B − δ_W , T.B = M.B + δ_E

T.B

Q. Magnetic Bearing is 356° And declination is 4° W in 2019, δ is 6° West in 1992, find. Magnetic Bearing in 2019

Solution

T.B (1992) = T.B (2019) (1992)

T.B = M.B − δ_W

T.B = 356° − 6° = 350°

Solution

T.B (2992) = T.B (2019) (2992)

T.B = M.B - δ_W

T.B = 356° - 6° = 350°

(2019)

T.B = 350°

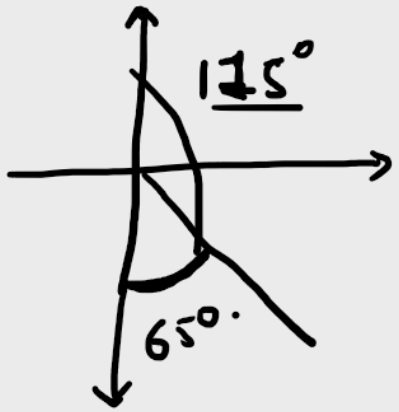
T.B = M.B - δ_W

350° = M.B - 4°

M.B = 354°

Question Magnetic Bearing of line is S 65° E & declination is 6° E, find true Bearing of line.

Ans S 59° E, S 71° E



T.B = M.B + δ

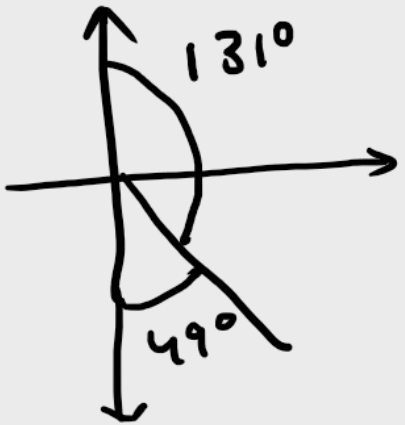
T.B = 115 + 6

= 121°

T.B = S 59° E

Q. Magnetic Bearing of line is S 49° E, & declination is 4° W, find true Bearing of line

Soln S 53° E (V)



T.B = M.B − δ

T.B = 131 − 4

= 127°

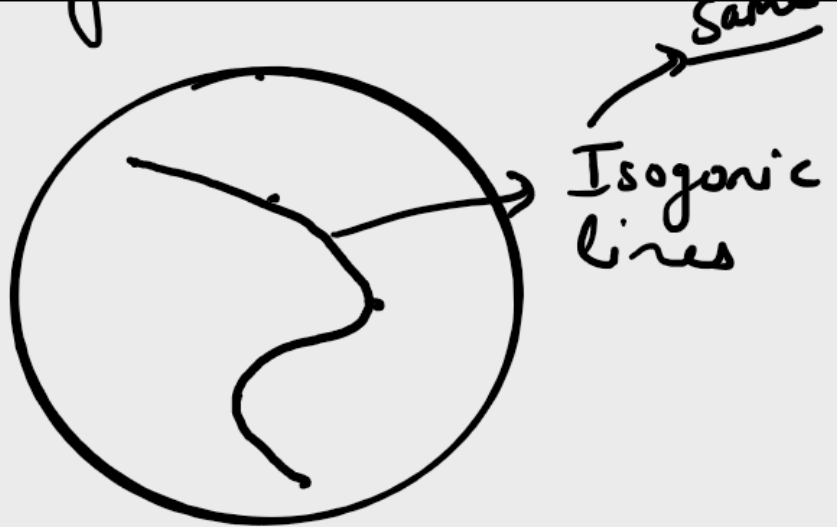
T.B = S 53° E

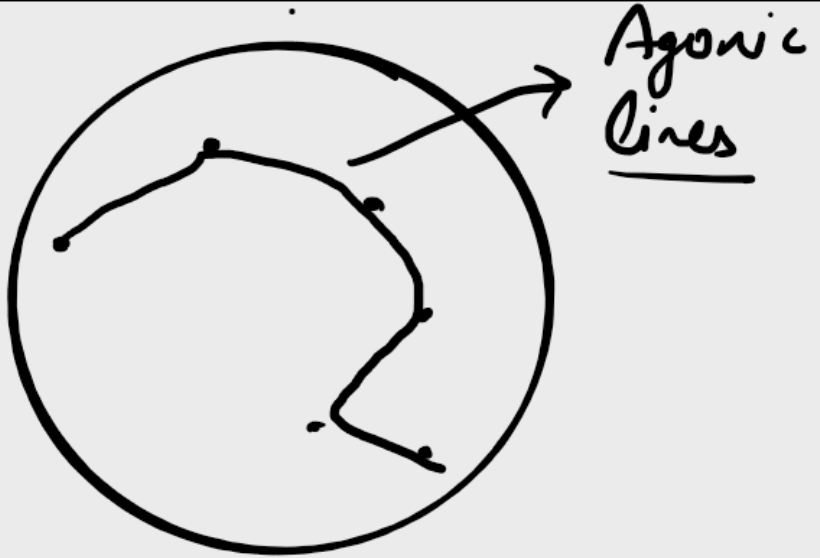
Isogonic lines (Most Important)

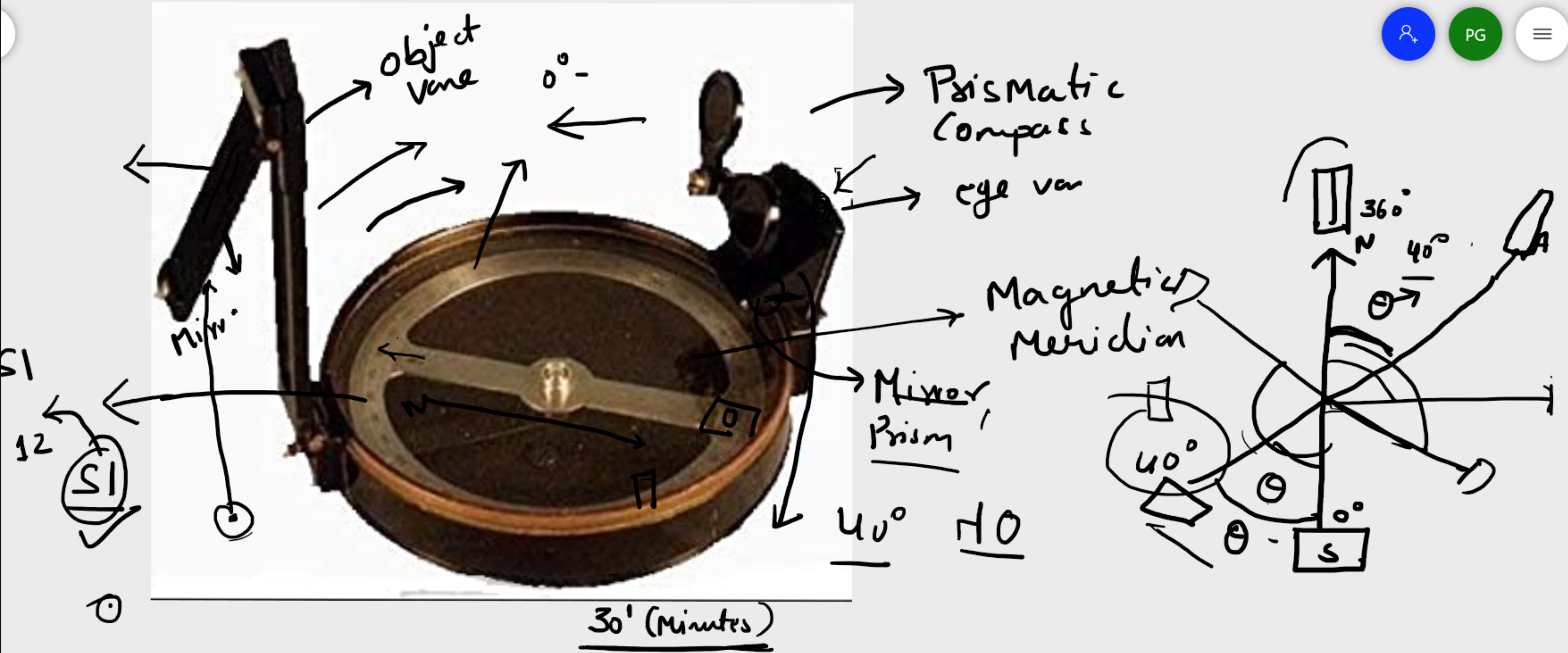
The line joining the points of equal declination is known as Isogonic lines

Agonic lines

The line joining the points of zero declination are called Agonic lines


Isogonic
lines


Agonic
lines


object vane
0°-
Prismatic Compass
eye van
Magnetic Meridian
Mirror Prism
40°
HO
30' (Minutes)
Mirr.
SI
12
360°
N
40°
40°
θ
0°
S

Prismatic Compass

W. C. B

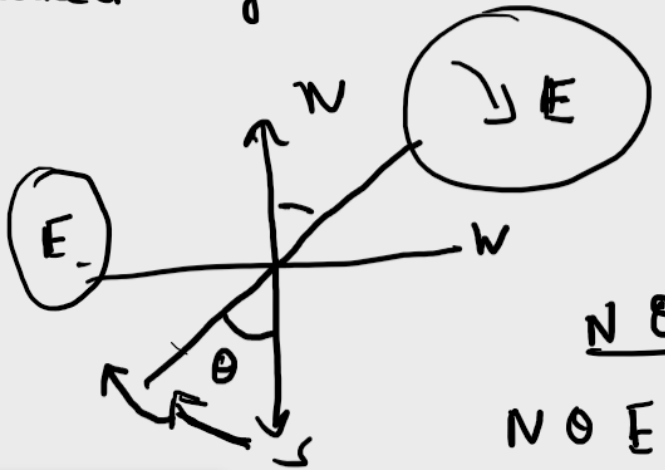
0 - 360°

Needle is attached with graduated ring

Surveyor Compass

Q. B

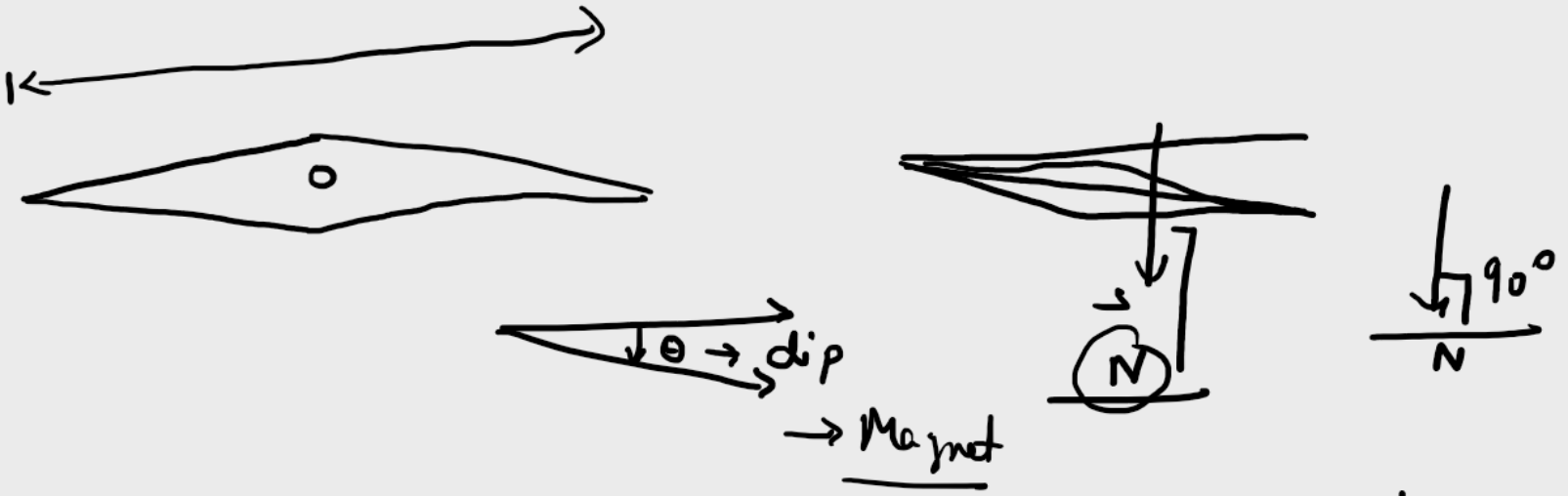
Needle is not attached with graduated ring



N θ E

N θ E

Magnetic dip



Poles → 90°

Equator - 0°

→ Line joining the points of equal dip are called Isodinic lines

→ Line joining the points of zero dip are called Aclinic lines

Magnetic declination

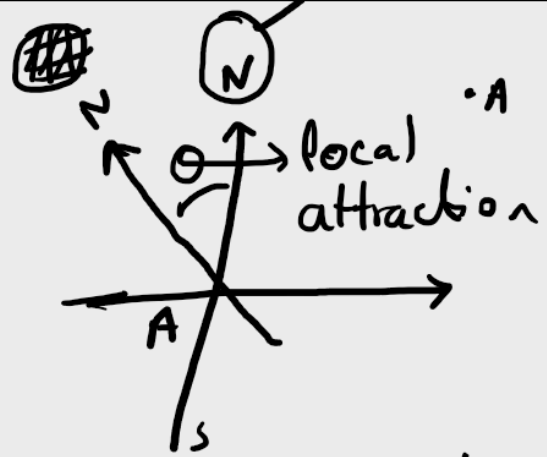
1) Daily variation → Variation in 24 hrs, declination in day time will be more than declination in night time

2) Yearly variation / Annual variation
   → Variation in Year (365 days), More in Summer, Less in winter
   → Declination at pole will be more than equator

3) Secular Variation → 20 - 30 yrs

4) Irregular variation → (Earthquakes, Tsunami, floods)

Local Attraction



Suppose line AB

Case I: B.B − F.B ≠ 180° → (local attraction)

Case II: B.B − F.B = 180° → (local attraction)

Both have local attraction

(✓) a) Both station do not have local attraction

(X) b) Both station have local attraction of same amount