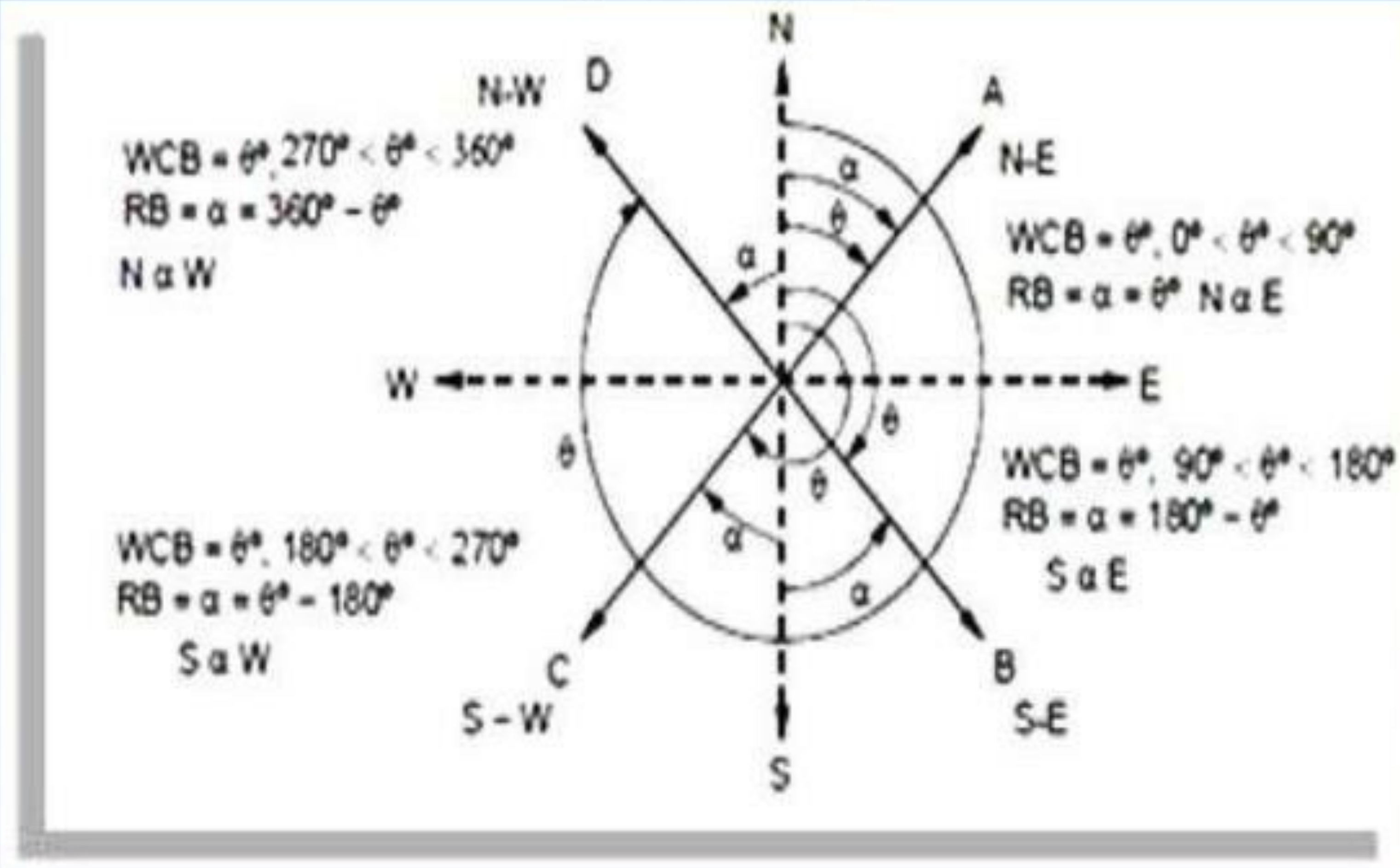
Designation of Bearings

- The bearing are designated in the following two systems.
- Whole Circle Bearing System (W.C.B)
- Quadrantal Bearing System (Q.B.)

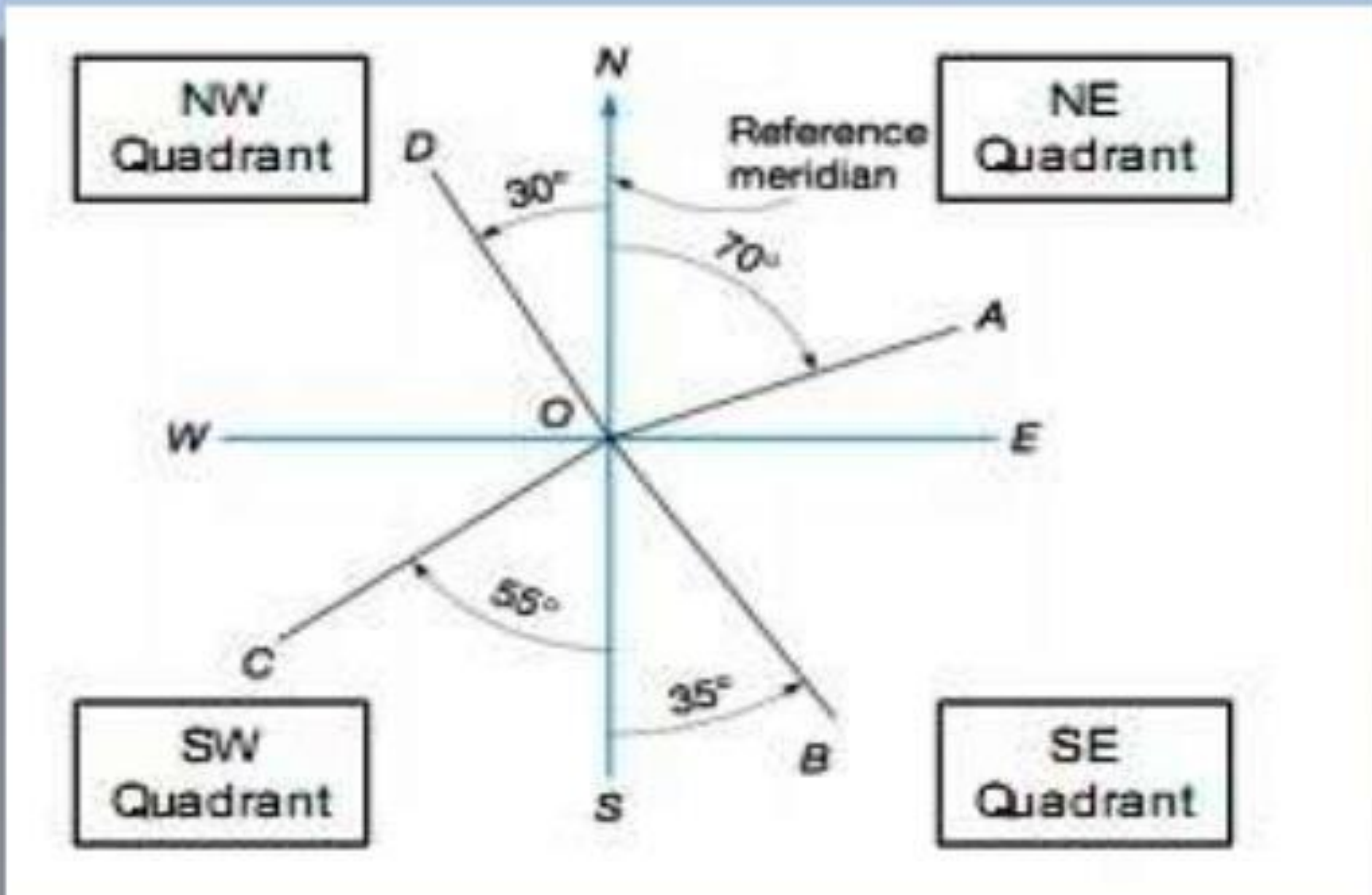
Whole Circle Bearing System (W.C.B)

- The bearing of a line measured with respect to magnetic meridian in clockwise direction is called magnetic bearing and its value varies between 0^0 to 360^0.
- The Quadrants start from North and Progress in a clockwise direction as the first quadrant is 0^0 to 90^0 in clockwise direction, 2nd 90^0 to 180^0, 3rd 180^0 to 270^0, and up to 360^0 is 4th one.

Whole Circle Bearing System (W.C.B)



Reduced Bearing (RB)



The Following Table Should be Remembered for Conversion of WCB to RB

Case	WCB between	R.B.	QUADRANT
1	0^0 TO90^0	WCB	N-E
2	90^0 TO -180^0	180-WCB	S-E
3	180^0 TO -270^0	WCB-180^0	S-W
4	270^0 TO 360^0	360-WCB	N-W

The Following Table Should be Remembered for Conversion of RB to WCB

Case	R.B in quadrant	Rule of W.C.B.	W.C.B between
1	N-E	WCB=R.B	0^0 TO90^0
2	S-E	WCB =180-R.B	90^0 TO -180^0
3	S-W	WCB =R.B+180	180^0 TO -270^0
4	N-W	WCB =360-R.B	270^0 TO 360^0

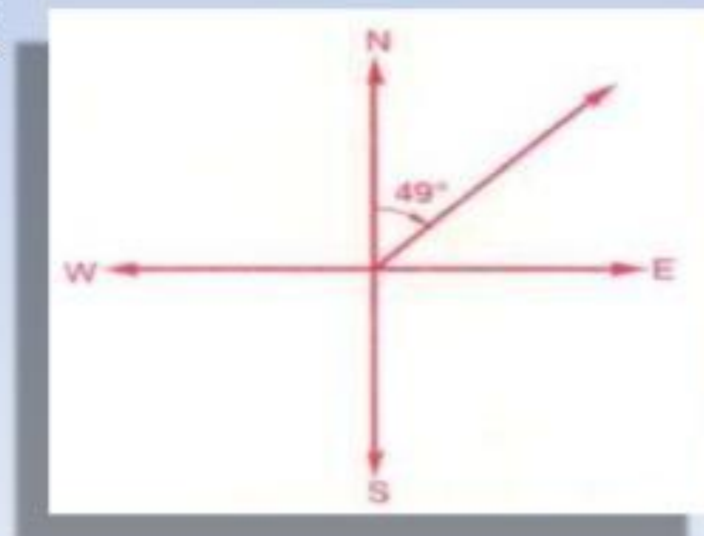
Examples

- Convert the following WCB into Reduced Bearing.
- 49^{0}
- 240^{0}
- 133^{0}
- 335^{0}

Examples

49^0

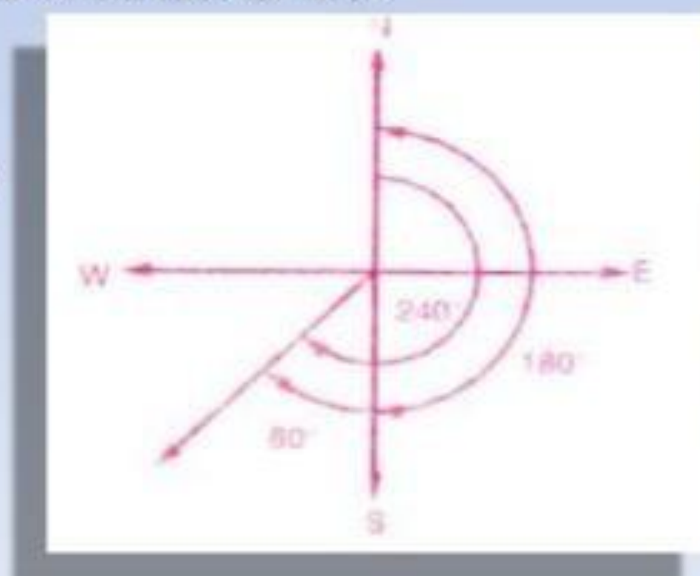
- Since the line falls in the first quadrant therefore the nearer pole is the north pole and is measured from North towards E as 49^0
- **There fore RB = N 49^0 E**



Examples

240^0

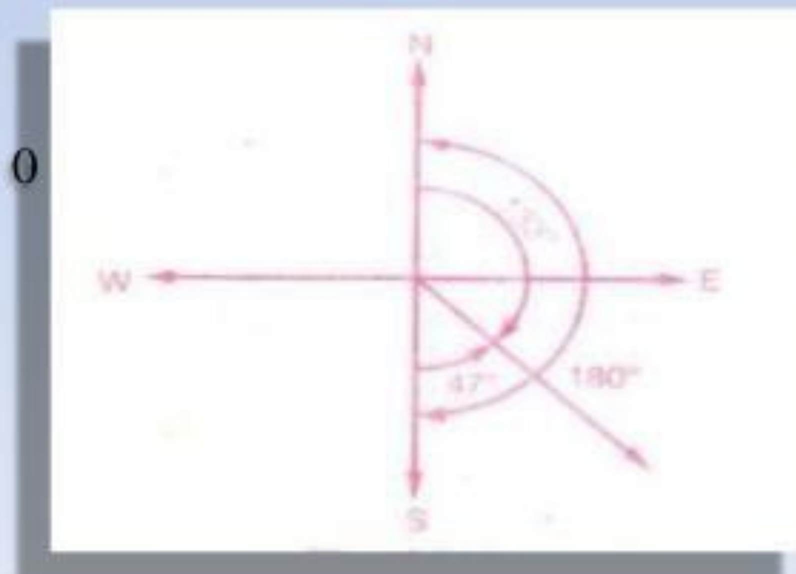
- Since the line falls in the third quadrant therefore the nearer pole is the north pole and is measured from North towards S as ^{0}
- RB = WCB- 180^0
- RB = $240^0 - 180^0 = 60^0$
- **RB= S 60^0 W**



Examples

133^{0}

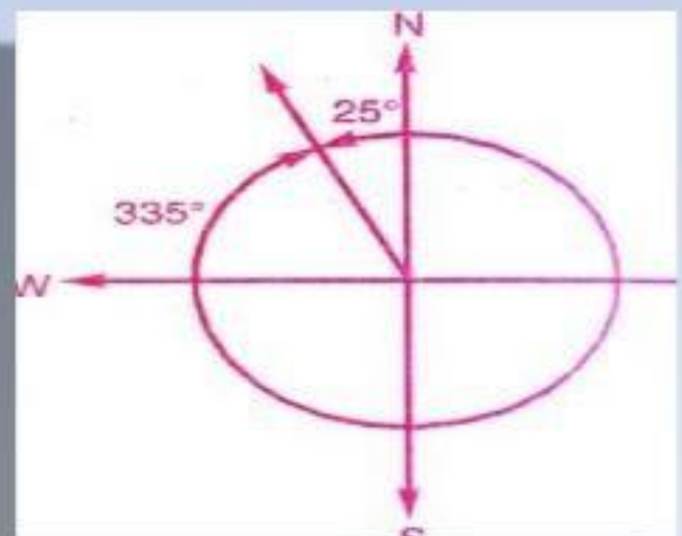
- Since the line falls in the second quadrant therefore the nearer pole is the south pole and is measured from South towards E as ^{0}
- RB = 180^{0} - ϴ
- RB = $180^{0} – 133^{0} = 47^{0}$
- **RB= S 47^{0} E**



Examples

335 ^{0}

- Since the line falls in the third quadrant therefore the nearer pole is the north pole and is measured from North towards W as ^{0}
- RB = 360 ^{0} – WCB
- RB = 360 ^{0} – 335 ^{0}
- **RB= N 25 ^{0} W**



Examples

Convert the following WCB into RB

- 190^0
- 260^0
- 315^0

Examples

Sol[n]

190^0

- RB= WCB – 180^0
- RB = 190^0- 180^0
- **RB = S 10^0 W**

260^0

- RB = WCB-180^0
- RB= 260^0 – 180^0
- **RB = S 80^0 W**

Examples

Sol^n

315^0

- RB = 360^0 – WCB
- RB = 360^0 – 315^0
- **RB = N45^0 W**

Examples

- Convert the following reduced bearings into whole circle bearings:
- N 65° E
- S 43° 15′ E
- S 52° 30′ W
- N 32° 42′ W

Examples

Let ‘θ’ be whole circle bearing.

(i) Since it is in NE quadrant,

$\theta = \alpha = \mathbf{65^\circ}$ **Ans.**

(ii) Since it is in South East quadrant

$43^\circ\ 15' = 180^\circ - \theta$

or $\theta = 180^\circ - 43^\circ\ 15' = \mathbf{136^\circ\ 45'}$ **Ans.**

Examples

(iii) Since it is in SW quadrant

$52^\circ\ 30' = \theta - 180^\circ$

or $\theta = 180^\circ + 52^\circ\ 30' = \mathbf{232^\circ\ 30'}$

(iv) Since it is in NW quadrant,

$32^\circ\ 42' = 360^\circ - \theta$

or $\theta = 360^\circ - 32^\circ\ 42' = \mathbf{327^\circ\ 18'}$

Examples

- The following fore bearings were observed for lines, AB, BC, CD, DE, EF and FG respectively. Determine their back bearings:
- *148°*
- *65°*
- *285°*
- *215°*
- *N 36° W*
- *S 40° E*

Examples

Solution:

- **The difference between fore bearing and the back bearing of a line must be 180°. Noting that** in WCB angle is from 0° to 360°,
- we find **Back Bearing = Fore Bearing** ± **180°**
- + 180° is used if θ is less than 180° and
- – 180° is used when θ is more than 180°

Examples

Hence,

- *BB of AB* = $145^\circ + 180^\circ = 325^\circ$
- *BB of BC* = $65^\circ + 180^\circ = 245^\circ$
- *BB of CD* = $285^\circ - 180^\circ = 105^\circ$
- *BB of DE* = $215^\circ - 180^\circ = 35^\circ$
- In case of RB, back bearing of a line can be obtained by interchanging N and S at the same time E and W. Thus
- *BB of EF = S 36° E*
- *BB of FG = N 40° W.*

Example

The Fore Bearing of the following lines are given Find the Back Bearing.

(a) FB of AB= 310^{0} 30’

(b) FB of BC= 145^{0} 15’

(c) FB of CD = 210^{0} 30’

(d) FB of DE = 60^{0} 45’

Example

Solution

(a) BB of AB = $310^0\,30' - 180^0\,0' = \mathbf{130^0\,30'}$

(b) BB of BC = $145^0\,15' + 180^0\,0' = \mathbf{325^0\,15'}$

(c) BB of CD = $210^0\,30' - 180^0\,0' = \mathbf{30^0\,30'}$

(d) BB of DE = $60^0\,45' + 180^0\,0' = \mathbf{240^0\,45'}$

Example

FB of the following lines are given, find the BBs.

(a) FB of AB = **S 30^0 30' E**

(b) FB of BC = **N 40^0 30'W**

(c) FB of CD= **S 60^0 15' W**

(d) FB of DE = **N $45^0$30' E**

Example

Solution

- (a) BB of AB = **N 30 ^{0} 30’ W**
- (b) BB of BC = **S 40 ^{0} 30’ E**
- (c) BB of CD = **N 60 ^{0} 15’ E**
- (d) BB of DE = **S 45 ^{0} 30’ W**