Bearings of lines

The bearing of a line is the horizontal angle which the line makes with some reference direction or meridian.

The reference direction in surveying is of three types i) true meridian; ii) magnetic meridian; iii) arbitrary meridian.

True Meridian

The points of intersection of the earth's axis and the surface of the earth are known as the north geographical pole and the south geographical pole. The true or geographical meridian passing through a point on the earth's surface is the line in which the plane passing through the given point, and the north and south poles intersects the surface of the earth.

(পৃথিবীর কোন ও বিন্দুগামী পৃথিবীপৃষ্ঠের উপরস্থ উত্তর ও দক্ষিণ মেরুবিন্দু যুক্ত রেখা। True or geographical meridian পৃথিবীপৃষ্ঠের যেকোনো একটি বিন্দুর উপর দিয়ে অতিক্রান্ত সেই রেখা, যে রেখা বরাবর ঐ বিন্দুর উপর বিন্দুতে অবস্থিত দিক উত্তর ও দক্ষিণ মেরু পৃথিবীপৃষ্ঠের যুক্ত করে) The horizontal angle between the true meridian and a line is called a true bearing of the line or azimuth

Magnetic Meridian

The direction indicated by a freely suspended and properly balanced magnetic needle, unaffected by local attractive forces is called the magnetic meridian.

The angle which a line makes with the magnetic meridian is called a magnetic bearing of the line.

(মুক্তভাবে ঝুলে থাকা ও সঠিক ভারসাম্যে থাকা একটি চৌম্বকীয় শলাকা, যা কোনো চৌম্বকীয় পদার্থ দ্বারা স্থানীয়ভাবে প্রভাবিত নয় সেটি দ্বারা নির্দেশিত মেরুদ্বয়ই হল চৌম্বকীয় উত্তর ও দক্ষিণ মেরু)।

The angle which a line makes with the magnetic meridian is called magnetic bearing of the line.

Arbitrary Meridian

For small surveys any convenient direction may be taken as a meridian. It is usually the direction from a survey station to some well-defined permanent object (ছোটখাটো জরিপকার্যের জন্য কোনো সুবিধাজনক দিক, সাধারণত: কোনো সুনির্দিষ্ট বস্তু বা স্থানকে Arbitrary meridian হিসেবে ধরা হয়)।

The angle between this meridian and a line is known as an arbitrary or assumed bearing of the line.

Designation of Bearings

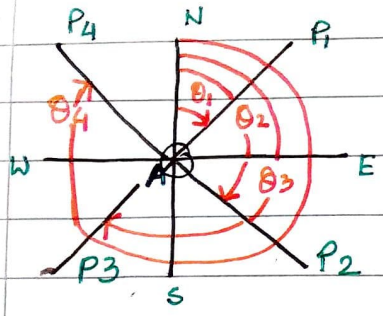
There are two systems to express bearings, viz.

1) the Whole circle system and
2) the quadrantal system.

Whole Circle System (W. C. B)

In this system the bearing of a line is always measur[ed] clockwise from the north point of the reference meridian toward the line right round the circle. The angle thus measured is called the whole circle bearing. It may have any value between

0° and 360°. Thus in figure, the Whole Circle Bearing of AP_1 is θ_1, that of AP_2 is θ_2, AP_3 is θ_3 and AP_4 is θ_4.

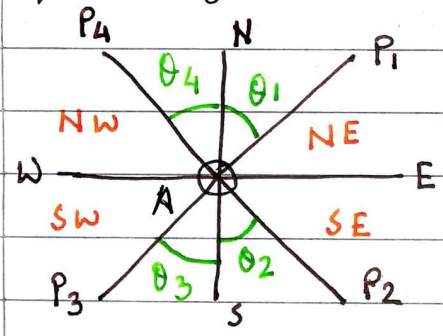


The bearings observed with a Prismatic Compass or Theodolite are the Whole Circle bearings.

Quadrantal System

In this system the bearing of a line is measured clockwise or counterclockwise from the north point or the south point, whichever is nearer the line, towards the east or west.

So it is absolutely necessary to state the point from which the angle is measured.



In this system the bearing is ~~0° to 360°~~ 0° to 90° in each quadrant. The quadrantal bearing, therefore, never exceeds 90°.

There are two ~~bearings~~ notations in each bearings of line is expressed.

Thus the bearing of AP_1 is θ_1 N.E ; that of AP_2 is θ_2 SE. ; and so on

We can express it as the bearing of AP_3 is $S\theta_3W$. and the AP_4 is $N\theta_4W$.

They are often called the reduced bearing

To obtain the reduced bearing we have to make some necessary calculation.

When the whole circle bearing of a line exceeds 90°, it must be reduced to the corresponding angle less than 90°, which has the same numerical values of the ~~triangulation~~ trigonometrical functions. The angle is known as the reduced bearing (R.B).

The rule of obtaining Reduced Bearing from Whole Circle Bearing

Case	W.C.B. between	Rule for R.B.	Quadrant
I	0° & 90°	= W.C.B	N.E.
II	90° & 180°	= 180° - W.C.B	S.E.
III	180° & 270°	= W.C.B - 180°	S.W.
IV	270° & 360°	= 360° - W.C.B	N.W

Example

Case	Whole Circle Bearings	Reduced/Quadrantal Bearings
i)	68° 32′	N. 68° 32′ E
ii)	132° 12′	(180° - 132° 12′) = 47° 48′ SE = S 47° 48′ E
iii)	236° 37′	(236° 37′ - 180°) = 56° 37′ SW = S 56° 37′ W
iv)	334° 52′	(360° - 334° 52′) = 25° 8′ NW = N 25° 8′ W

Fore & Back Bearings

The bearing of a line in the direction of the progress of survey is called the fore or forward bearing (F.B.) While its bearing in the opposite direction is known as the back or reverse bearing (B.B.) The fore and back bearing of a line differ exactly by 180°.