Angles and directions

The direction of survey lines may be expressed in two ways:-

1. Relatively to each other
   directions are expressed in terms of angles between two consecutive lines.
2. Relatively to some refrence direction
   this case expressed in terms of bearings.

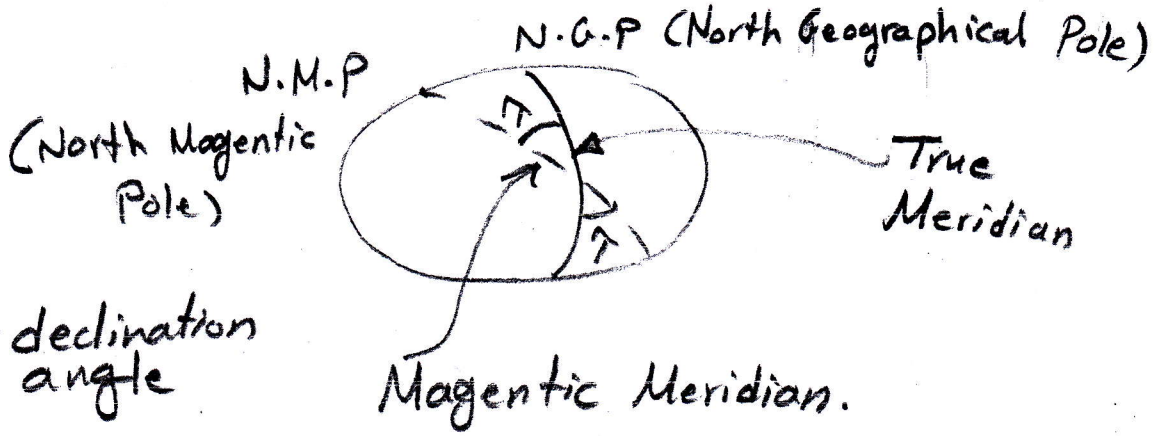
Meridian: the fixed direction on the surface of the earth with reference to which bearings of survey lines are expressed.

Bearing: the horizontal angle between the refrence meridian and the survey line measured in a clockwise direction.

The meridians of refrence directions employed in surveying may be one of the following:

1. True meridian: the line of intersection of the earth surface by a plane containing north pole, south pole and the given place is called true meridian or geographical meridian.

2. Magentic Meridian: is the line represents the direction of magnetic needle of compass if it left move freely. (the direction of needle to magnetic north).



3. Grid Meridian: are lines that are parallel to the central meridian.

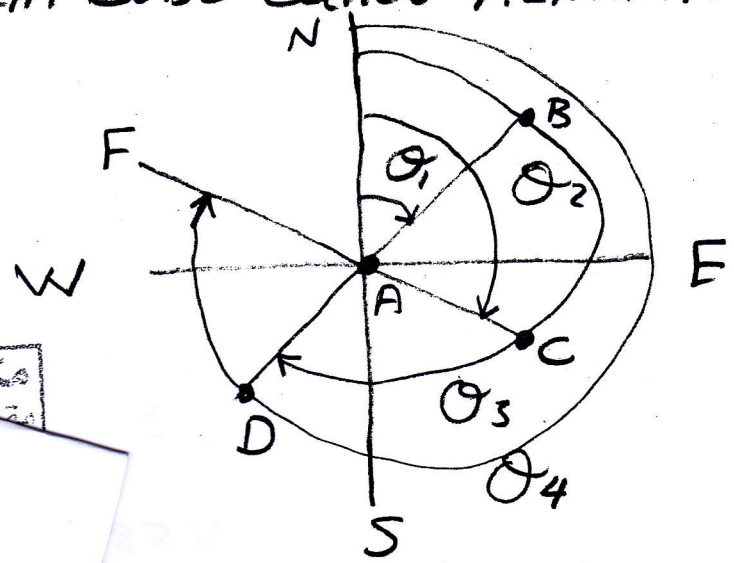
4. Assumed Meridian: the convenient direction assumed as a meridian for measuring bearings of survey lines.

note:
λ: is the delination angle written respect to E and W direction and it represents the angle between true Meridian and Magentic meridian.

Designation of bearings :-

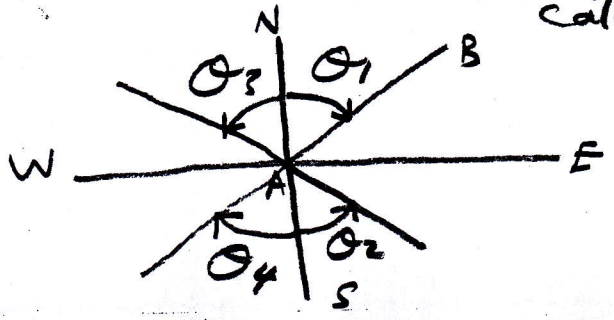
1) Whole Circle Direction (W.C.D) or whole Circle Bearing (W.C.B)

is the horizontal angle measured from true north or magnetic north to the specified line in clockwise direction. The value of angle ranged from 0° to 360°. This system also called Azimuth.



2) Quadrantal bearing system (Q.B)

bearings of survey lines are measured eastward or westward from north or south whichever is nearer. The value of angle ranged from 0° - 90°. This system also called bearing

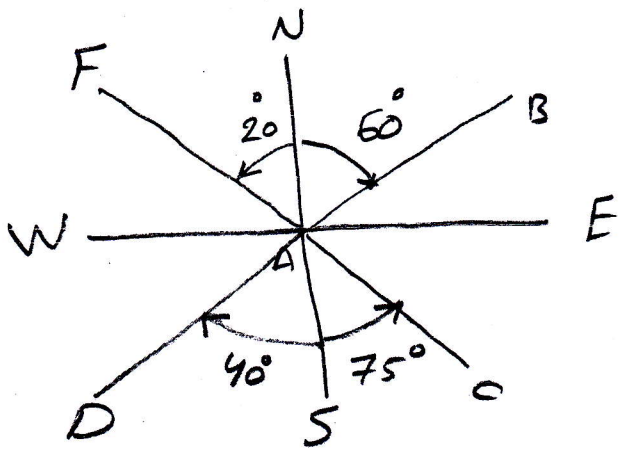


Example/

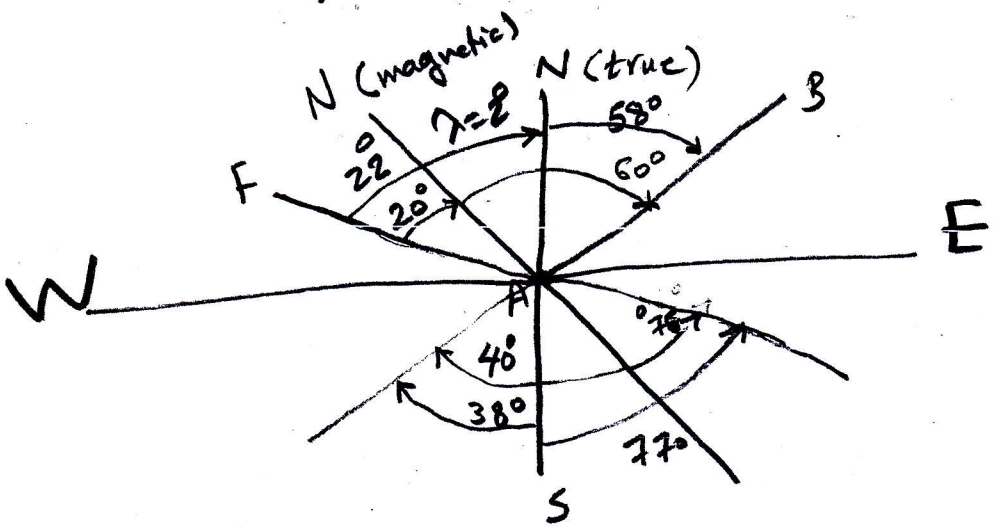
bearing $AB = N\ 60^\circ E$
" $AC = S\ 75^\circ E$
" $AD = S\ 40^\circ W$
" $AF = N\ 20^\circ W$

(1) Draw bearings of these lines.
(2) if bearings of these lines were magnetic, find the true if $\lambda = 2^\circ W$

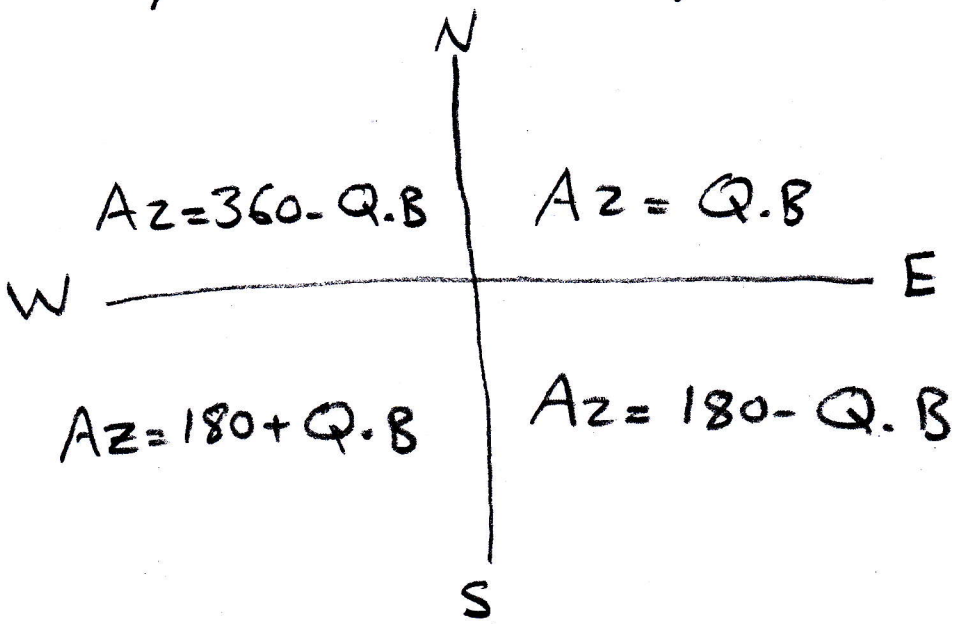
Sol.



True bearing $AB = N\ 58^\circ E$
$AC = S\ 77^\circ E$
$AD = S\ 38^\circ W$
$AF = N\ 22^\circ W$



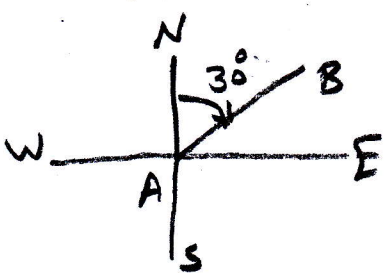
The relationship between (Q.B) and Azimuth



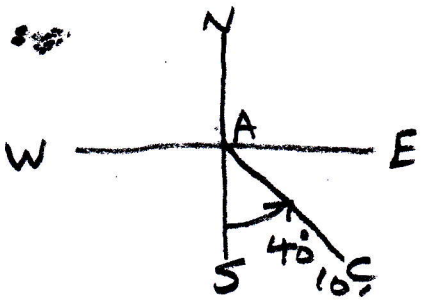
Example/ Convert from Q.B to W.C.B

AB = N 30° E , AC = S 40° 10′ E

AD = S 25° 35′ W , AF = N 15° 20′ W

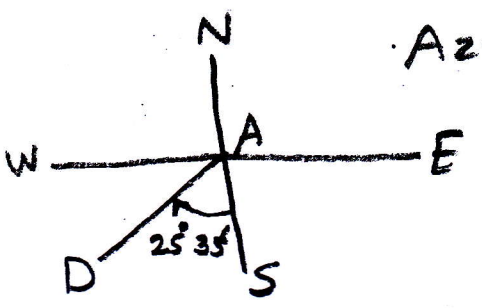


Azmiuth AB = 30°



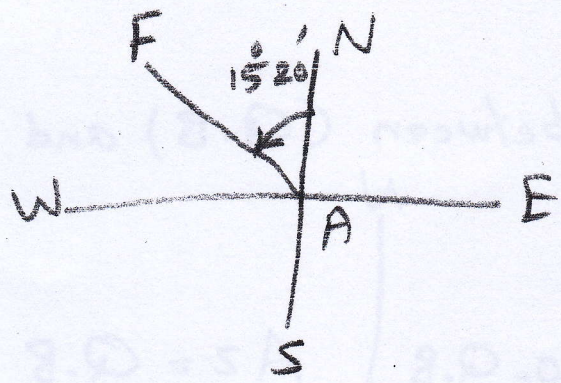
180° − 40° 10′

Azmiuth AC = 139° 50′



180° + 25° 35′

Azmiuth AD = 205° 35′



(6)

$360° - 15° 20'$

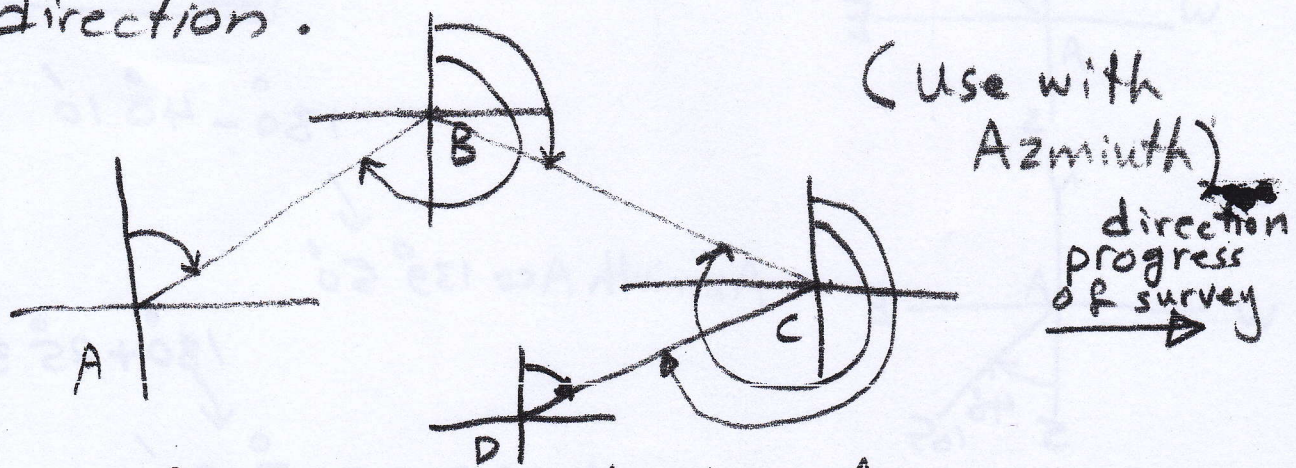
↓

Azmuth AF = $344° 40'$

note/ if you write $177° 40' 33''$ in the calculater use the button (o, ,,) between the number and this number appears as $177^{\circ} 40' 33''$.

Forward and backward direction

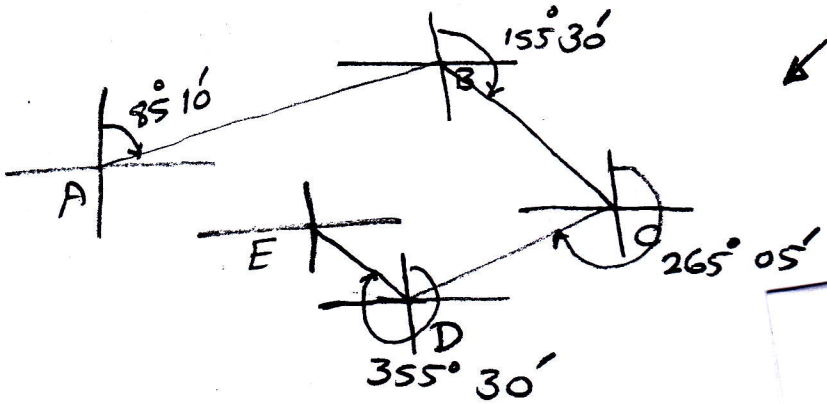
if the bearing of specified line measured with progress of survey is named forward direction, while the bearing in the opposite direction of the progress of survey is called backward direction.



0° backward direction = forward direction $\mp 180^{\circ}$

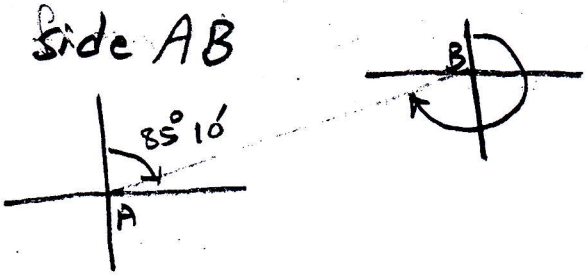
Example / Find the backward direction for traverse side, if the sides of traverse were forward as follows:

AB = 85° 10′ , BC = 155° 30′, CD = 265° 05′ and DE 355° 30′.



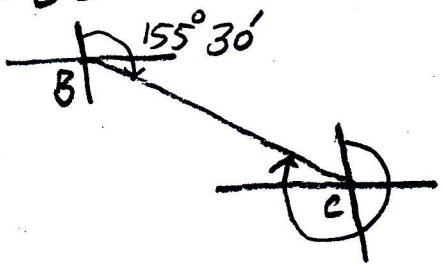
Open traverse (not check)

Side AB



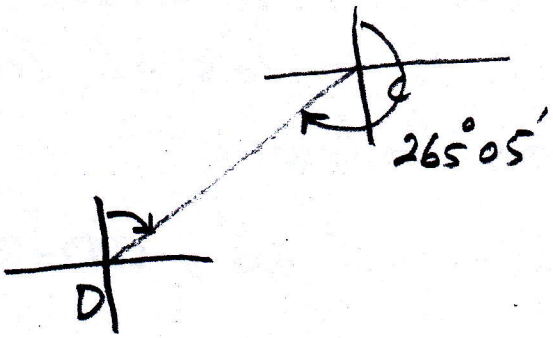
Forward AB = 85° 10′
backward AB = 180° + 85° 10′
= 265° 10′

side BC



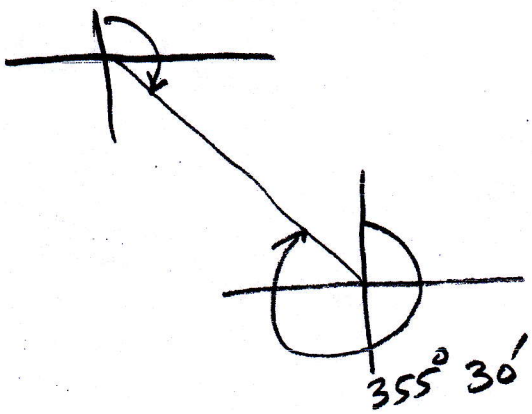
forward BC = 155° 30′
backward BC = 180° + 155° 30′
= 335° 30′

side CD



forward CD = 265° 05′
backward CD = 265° 05′ − 180°
= 85° 05′

side DE



forward DE = 355° 30′
backward DE = 355° 30′ − 180°
= 175° 30′