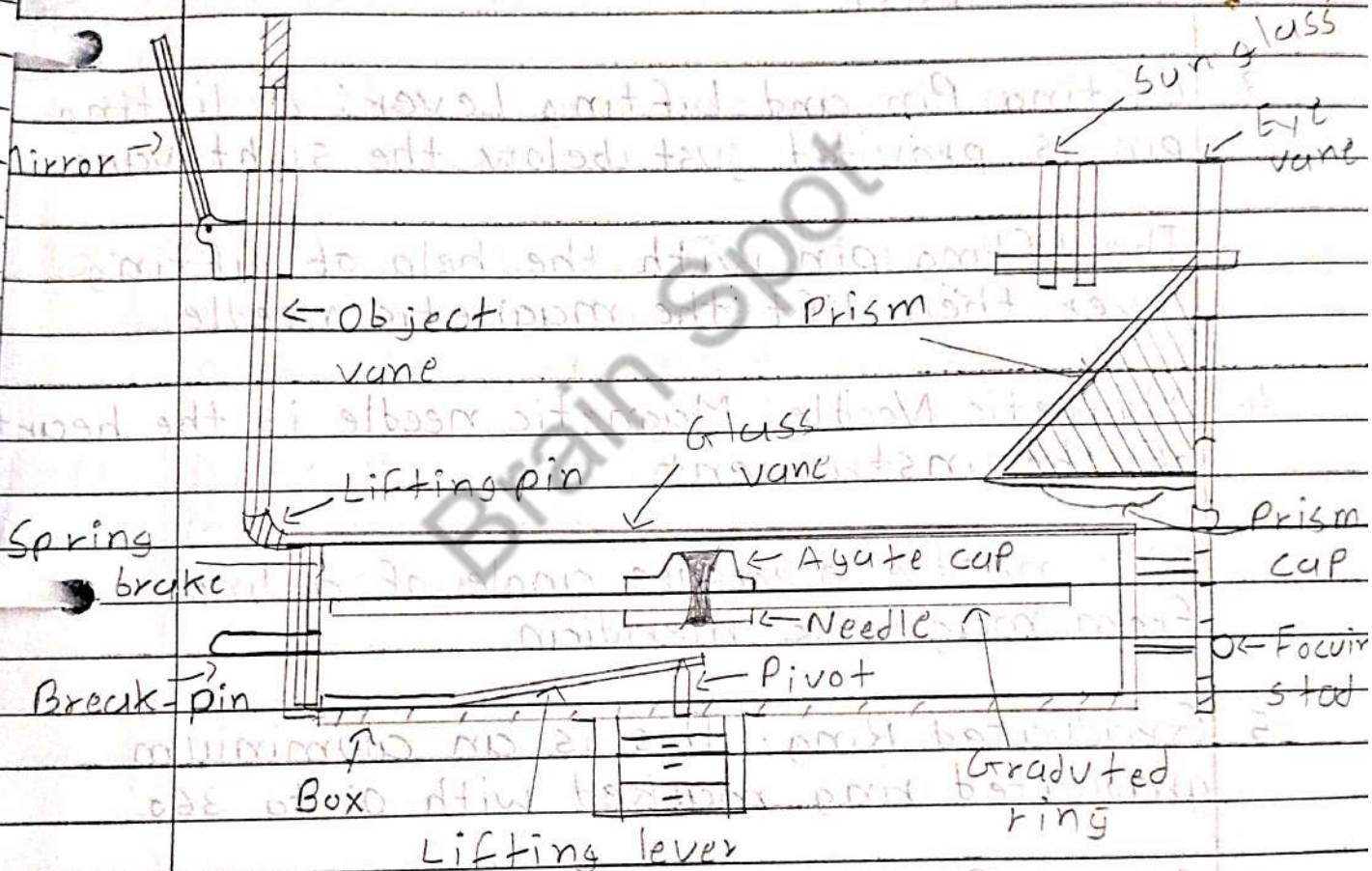
4. Compass Survey

1 Draw the neat sketch of prismatic compass and name its part along with the use of prismatic compass.



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These are the main comonents of prismatic compass.

1 Cylindrical Metal Box: This box is having diameter of 8 to 12 cm.

Cylindrical Metal Box protects the compass and forms entire casing or body of the compass.

2 Pivot: Pivot is provided at the center of the compass.

3 Lifting Pin and Lifting Lever: A lifting pin is provided just below the sight vane.

The lifting pin with the help of lifting lever then lift the magnetic needle.

4 Magnetic Needle: Magnetic needle is the heart of the instrument.

This needle measure angle of a line from magnetic meridian.

5 Graduated Ring: This is an aluminium graduated ring marked with 0° to 360°.

6 Prism: Prism is used to read graduations on ring and to take exact reading by compass.

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7 Object vane: Object vane is diametrically opposite to the prism and eye vane.

8 Eye Vane: This eye vane is provided with prism and can be lift up and down up by the object of higher level.

9 Glass Cover: It covers the instrument box from the top needle and ring.

10 Sun Glass: These are placed in front of the eye slit and.

11 Reflecting Mirror: It is used to get image of an object located abow or below the instrument level.

12 Brake Pin: To damp the oscillation of the needle before taking a reading and to bring it to rest quickly.

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2 Difference between Prismatic Compass and Surveyor's compass.

	Prismatic Compass	Surveyor's Compass.
1	The graduated ring is attached with a needle.	The graduted ring is attached with a box.
2	This compass can be used without tripoad.	This compass can not be used without tripoad.
3	The magnetic needle do not act as an index.	The magnetic needle acts as an index.
4	The reading is taken through the Prism.	The reading is taken through the top glass.
5	The ring are in whole circle bearing.	The ring are in quadrantal system.
6	There is a prism at viewing end.	There is no prism at viewing end.
7	Graduation are mark 0 to 360.	Graduation are mark 0 to 90 each quadrant.

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3 Define.

(1) True Meridian:

True Meridian is the plane that passes through true north poles and true south poles.

(2) Magnetic Meridian:

Magnetic Meridian is a line joining the magnetic north pole and magnetic south pole inside the earth.

(3) Fore Bearing:

The bearing of a line measured in the forward direction of survey is called the Fore Bearing.

(4) Back Bearing:

The bearing of a line measured in the opposite direction of survey is called the back bearing.

(5) True Bearing:

The True bearing of a line is the horizontal angle between the true meridian and line.

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(6) Magnetic Bearing:

The magnetic bearing of a line is the horizontal angle which the line makes with the magnetic north

4 Difference between

(i) WCB and QB

	WCB	QB
1	In WCB, the magnetic north line is consider as a reference line.	In QB, both magnetic line is consider as a reference line.
2	The range of WCB is 0° to 360°	The range of QB is 0° to 90°
3	WCB is measured only clockwise direction.	QB is measured both clock and anticlockwise direction.
4	Prismatic compass measured WCB.	Surveyor compass measured QB.
5	Ex. 49°	Ex. N 49° E

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i) Cumulative error and Compensating error.

	Cumulative error	Compensating error
1	Cumulative error is a systematic error.	Compensating error is a non-systematic error.
2	This error follow mathematical rules.	This error can not follow mathematical rules.
3	This is instrumental error.	This is personal error.
4	This error we can correct using formula.	This error we can not correct using formula.

5 What do mean by local attraction?

Local attraction is the influence that prevents magnetic needle pointing to magnetic north pole.

It is caused by any iron material in the area of compass station.

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Local attraction at a place can be detected by observing bearings from both ends of the line in the area.

Local attraction exists there either at one or both ends of the line.

=> What are the sources of Local attraction?

The sources of local attraction may be natural or artificial.

Natural sources include Iron ores or magnetic rockes.

Artificial sources include steel structures, iron pipes, current carrying conductors.

Sources : Wire carrying electric current,
railway rails,
underground pipe,
metal buttons etc.

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6 What is meant by traverse surveying? What is Close and Open traverse?

Traverse Surveying is a method in the field of surveying establish control network.

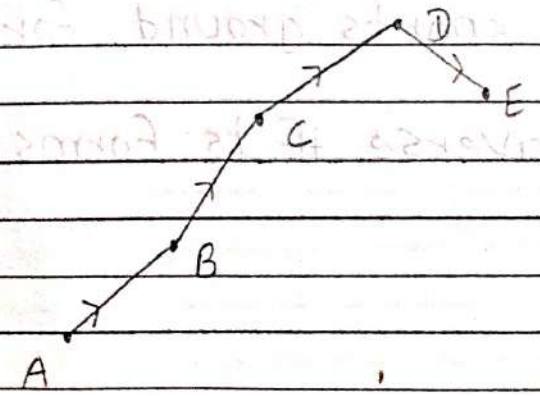
Traverse network involve placing survey stations along a line or path of travel

Traverse surveying is less reconnaissance and organization needed.

The traverse is more accurate than the other surveying.

There are two type of traverse.
1) Close traverse
2) Open traverse.

1 Open Traverse.



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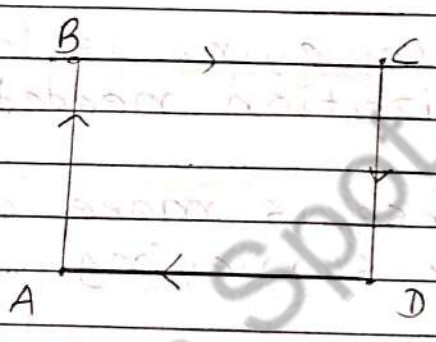
Open traverse is starts at one point and terminates at anthor point.

Open traverse is also called as unclose traverse.

Open traverse is suitable for surveying of roads, coastal lines etc.

2 Close traverse:



Close traverse is starts from same point and end from the same point.

Close traverse is suitable for boundaries of ponds, sports ground, forests etc.

Close traverse if is forms a closed polygon.

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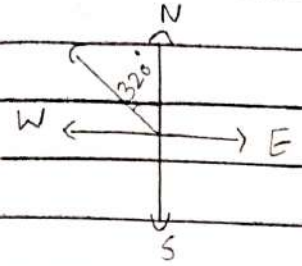
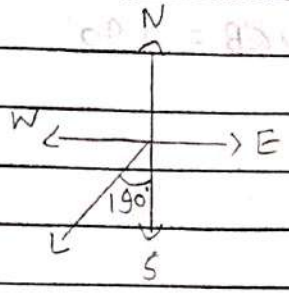
7 Convert the following bearings.

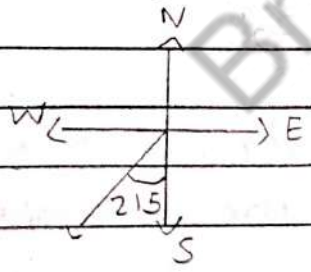
① 320° → RB = 360 - 320 = N 40 W



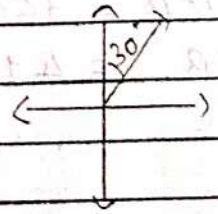
② 190° → RB = WCB - 180 = 190 - 180° = S 10° W



③ 215° → RB = WCB - 180° = 215 - 180 = S 35° W



④ 30° → RB = WCB = N 30° E



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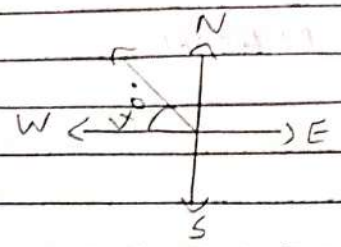
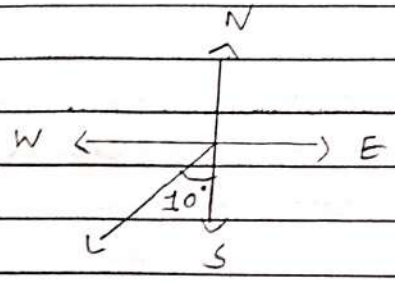
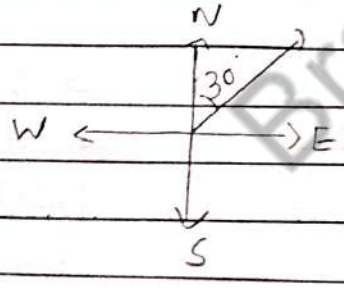
⑤ N 40 W → RB = 360 - WCB → WCB = 360 - 40
= 320°



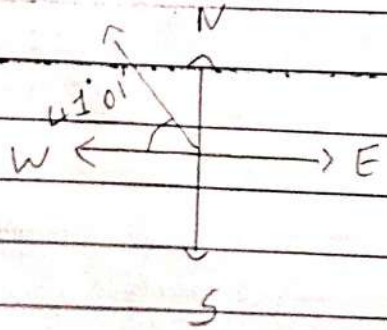
⑥ S 10 W → RB = WCB - 180 → RB WCB = RB + 180
WCB = 190°



⑦ N 30 E → RB = WCB = 30°



⑧ 320° 59' → RB = 360 - WCB = 360 - 320° 59'
RB = 41° 01'



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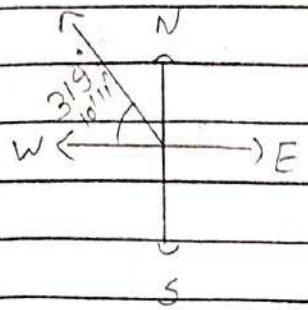
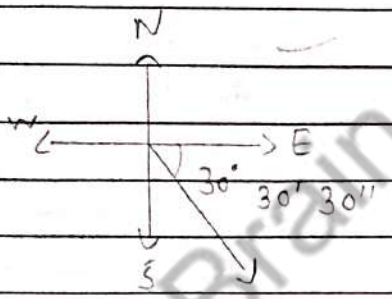
⑨ N 40° 49' 49" W → RB = 360 - WCB
= 360 - 40° 49' 49"
= 319° 10' 11"



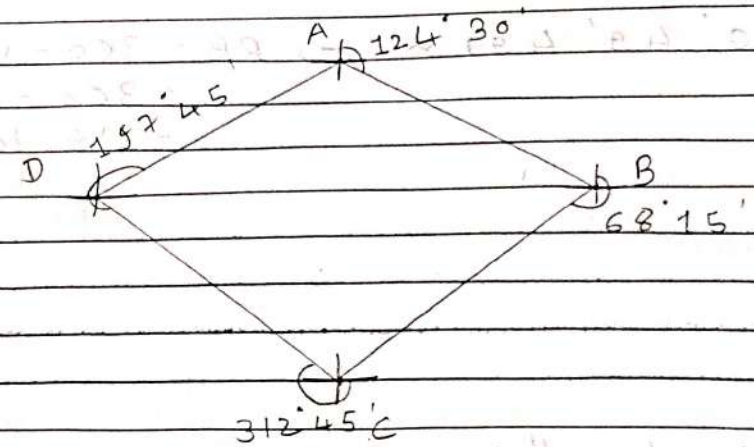
⑩ S 30° 30' 30" E → RB = 180 - WCB
= 180 - 30° 30' 30"
= 149° 29' 30"



Brain Spot

8 Find the interior angle for a close traverse having following data.

Line	FB
AB	124° 30'
BC	68° 15'
CD	312° 45'
DA	197° 45'



→ BB = FB ± 180°

→ AB = BB = 304° 30'
BC = BB = 248° 45'
CD = BB = 132° 15'
DA = BB = 17° 45'

→ Included angle:

∠A = F.B of AB − BB of DA
= 124° 30' − 17° 45'
= 106° 45'

∠B = B.B of AB − F.B of BC
= 304° 30' − 68° 15'
= 236° 15'

∠C = F.B. of CD − B.B of ~~CD~~
= 132° 15' − 248° 15'
= 64° 30'

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$\angle D$ = F.B. of DA - B.B of CD
= 197° 45' - 132° 45'
= 65° 00'

→ Sum of Angles = $\angle A + \angle B + \angle C + \angle D$
= 106° 45' + 123° 45' + 64° 30' + 65° 00'
= 360°

9 Find the interies angles for a close traverse having following data,

Line	FB	BB
AB	N 45° 30' E	S 45° 30' W
BC	S 60° 00' E	N 60° 00' W
CD	S 10° 30' W	N 10° 30' E
DA	N 75° 45' W	S 75° 45' E

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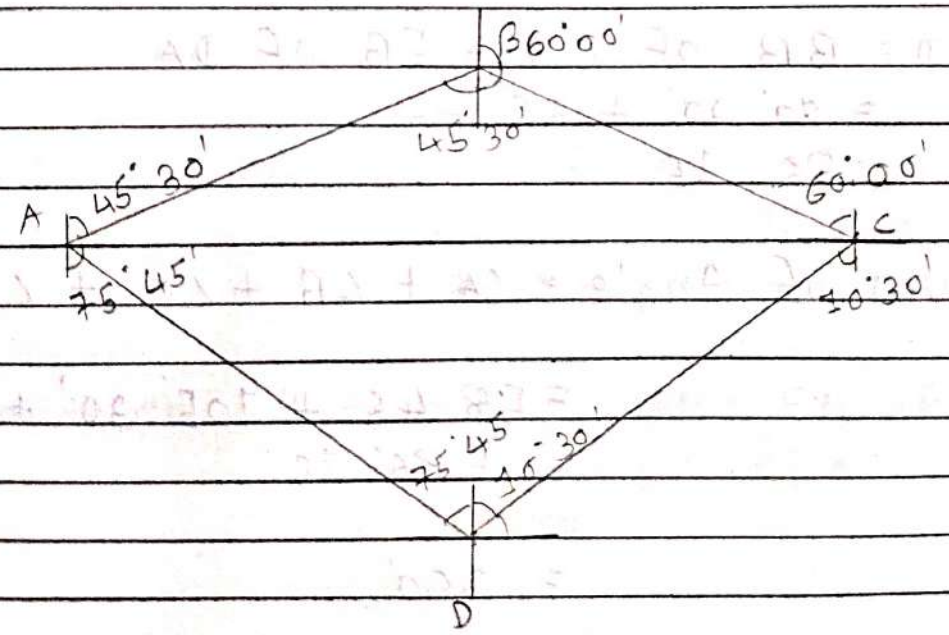

-> Interior Angle:

$\angle A = 180^\circ - (\text{FB of } AB + \text{BB of } DA)$

$= 180^\circ - (45^\circ 30' + 75^\circ 45')$

$= 58^\circ 45'$

$\angle B = \text{B.B of } AB + \text{FB of } BC$

$= 45^\circ 30' + 60^\circ 00'$

$= 105^\circ 30'$

$\angle C = 180^\circ - (\text{BB of } BC + \text{FB of } CD)$

$= 180^\circ - 70^\circ 30'$

$= 109^\circ 30'$

$\angle D = \text{BB of } CD + \text{FB of } DA$

$= 90^\circ 30' + 75^\circ 45'$

$= 86^\circ 15'$

-> Sum of Angle $= \angle A + \angle B + \angle C + \angle D$

$= 58^\circ 45' + 105^\circ 30' + 109^\circ 30' + 86^\circ 15'$

$= 360^\circ$

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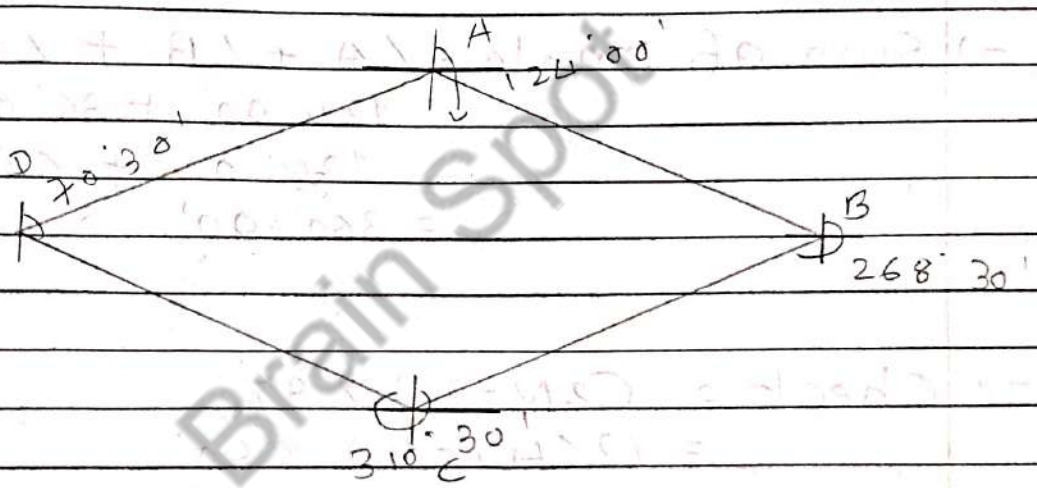
10 The following are the observation for bearings for a traverse. Find the internal angles. Apply necessary checks.

Line	FB	BB
AB	124° 00'	304° 30'
BC	268° 30'	88° 30'
CD	310° 30'	132° 30'
DA	70° 30'	248° 00'



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→ Interier ∠A = B.B of DA - FB of AB
= 248° 00' - 124° 00'
= 124° 00'

Interier ∠B = B.B of AB - FB of BC
= 304° 30' - 268° 30'
= 36° 00'

exterior $\angle C$ = F.B of CD - BB of BC
= 310° 30' - 88° 30'
= 222° 00'

Interior $\angle C$ = 360° 00' - 222° 00'
= 138° 00'

Interior $\angle D$ = BB of CD - FB of DA
= 132° 30' - 70° 30'
= 62° 00'

Sum of angle = $\angle A + \angle B + \angle C + \angle D$
= 124° 00' + 36° 00' + 138° 00' + 62° 00'
= 360° 00'

Check = $(2N - 4) \times 90°$
= $(2(4) - 4) \times 90°$
= 360°

The angles observed with a surveye compass in traverssing the line AB, BC, CD, DE and EF.

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