resection sheet

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Three-point resection

1. From the known coordinates of A, B, and C calculate lengths a and c, and angle α at station B. c: 41.7350262608734 a: 6.963461782748601 alpha: 169-4-12

2. Subtract the sum of angles x, y, and α in figure ABCP from 360° to obtain the sum of angles A + C

$$A + C = 360^\circ - (\alpha + x + y)$$

   - A + C: 65-14-23

3. Calculate angles A and C using the following:

   - A: 22-49-31
   - C: 42-24-51

4. From angle A and azimuth AB, calculate azimuth AP in triangle ABP. Then solve for length AP using the law of sines, where $\alpha\alpha$1 = 180° - A - x.Calculate the ∆E and ∆N of AP followed by the coordinates of P.

   - Solve the triangle ABP(Round1):
   - AP: 32.62646401200535
   - azimuthAB: 12-24-10
   - azimuthAP: 35-13-52
   - deltaE: 26.65030422241778 deltaN: 18.82146218494358
   - **P: 836537.5433042224 818647.9924621849**

- Solve the triangle ABP(Round2):
  - AP: 32.619147037426494
  - azimuthAB: 12-24-10
  - azimuthAP: 35-17-17
  - deltaE: 26.62555889420214 deltaN: 18.843788552746577
  - **P: 836537.5185588943 818648.0147885528**

5. In the manner outlined in step 4, use triangle BCP to calculate the coordinates of P to obtain a check.

   - Solve the triangle BCP(Round1):
     - CP : 11.41923988409439
     - azimuthBC: 203-19-57
     - azimuthCP: 160-55-6
     - deltaE: -10.791793992092192 deltaN: 3.7331249594321028
     - **P : 836547.2562060079, 818644.6261249594**
     - Difference between P1 and P2: 9.717117445543408 3.3613701018039137
   - Solve the triangle BCP(Round2):
     - CP : 11.455825633046228
     - azimuthBC: 203-19-57
     - azimuthCP: 160-52-4
     - deltaE: -10.823076487008173 deltaN: 3.7545913614040383
     - **P : 836547.2249235129, 818644.6475913614**
     - Difference between P1 and P2: errorE 9.706364618614316 errorN 3.3671971913427114

6. Error between two rounds
    - For P1 only: errorE 0.020529668079689145 errorN 0.02729349152650684

Leveling

- Given the (arbitrary) RL of BM11 as 25.362 mpd.
- Result : 25.362 + 0.171 = 25.533 mpd.

Appendix

Round1

Parameters	Value
c	41.7350262608734
a	6.963461782748601
alpha	169-4-12
X	1.9173459941888038
Y	0.27635834264286885
A	22-49-31
C	42-24-51
AP	32.62015515078579
azimuthAB	12-24-10
azimuthAP	35-13-42
P1	[836537.5390885624, 818647.9874950612]
deltaE	26.646088562305245
deltaN	18.816495061278612
CP	11.41923988409439
azimuthBC	203-19-57
azimuthCP	160-55-6
P2	[836547.2562060079, 818644.6261249594]
deltaE	-10.791793992092192
deltaN	3.7331249594321028

Round2

Parameters	Value
c	41.7350262608734
a	6.963461782748601
alpha	169-4-12
X	1.9156830832625982
Y	0.27609654325506955
A	22-53-7
C	42-27-52
AP	32.619147037426494
azimuthAB	12-24-10

Parameters	Value
azimuthAP	35-17-17
P1	[836537.5185588943, 818648.0147885528]
deltaE	26.62555889420214
deltaN	18.843788552746577
CP	11.455825633046228
azimuthBC	203-19-57
azimuthCP	160-52-4
P2	[836547.2249235129, 818644.6475913614]
deltaE	-10.823076487008173
deltaN	3.7545913614040383

Script Output

source code: resection.py

```
### Round 1 ###
c: 41.7350262608734
a: 6.963461782748601
alpha: 169-4-12
A+C: 65-14-23
X: 1.9173459941888038
Y: 0.27635834264286885
A: 22-49-31
C: 42-24-51
AP: 32.62015515078579
azimuthAB: 12-24-10
azimuthAP: 35-13-42
AP: 11.41923988409439
azimuthAB: 203-19-57
azimuthAP: 160-55-6
P1: [836537.5390885624, 818647.9874950612] deltaE: 26.646088562305245 deltaN: 18.816495061278612
P2: [836547.2562060079, 818644.6261249594] deltaE: -10.791793992092192 deltaN: 3.7331249594321028
errorE 9.717117445543408 errorN 3.3613701018039137
### Round 2 ###
c: 41.7350262608734
a: 6.963461782748601
alpha: 169-4-12
A+C: 65-21-0
X: 1.9156830832625982
Y: 0.27609654325506955
A: 22-53-7
C: 42-27-52
AP: 32.619147037426494
azimuthAB: 12-24-10
azimuthAP: 35-17-17
AP: 11.455825633046228
azimuthAB: 203-19-57
azimuthAP: 160-52-4
P1: [836537.5185588943, 818648.0147885528] deltaE: 26.62555889420214 deltaN: 18.843788552746577
P2: [836547.2249235129, 818644.6475913614] deltaE: -10.823076487008173 deltaN: 3.7545913614040383
errorE 9.706364618614316 errorN 3.3671971913427114
### Between Round Error ###
errorE 0.020529668079689145 errorN 0.02729349152650684
```