اللجنة الأكاديمية للهندسة المدنية

تقارير لاب المساحة

رانيا حمد

Contact us :

Civilittee HU | لجنة المدني

www.civilittee-hu.com

Civilittee Hashemite



Hashemite University

Faculty of Engineering
Civil Engineering Department

Surveying Laboratory

Experiment No.1

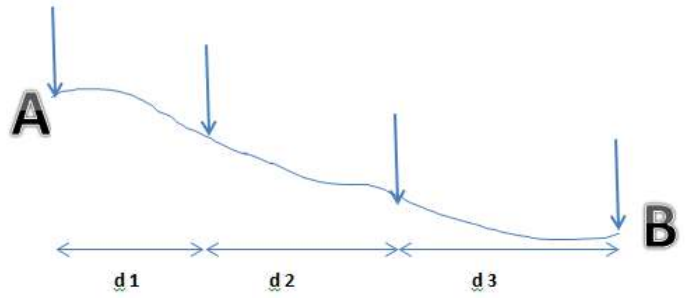
Name: **Rania Hamad**

SECTION 1

Experiment 1

I. SETTING OUT STRAIGHT LINES
II. Horizontal taping over sloping ground
III. Pace length

(Horizontal tapping over uneven or sloping ground)



Horizontal length:

Length	Forward (AB)	Backward (BA)	Average horizontal distance
d 1	**1.92**	**1.92**	**1.92**
d 2	**2.22**	**2.22**	**2.22**
d 3	**3.45**	**4.44**	**3.945**
Total	**7.59**	**8.58**	

1. Total horizontal distance forward (AB) =1.92+2.22+3.45= 7.59 m

Total horizontal distance Backward (BA) =1.92+2.22+4.44= 8.58 m

2. Average horizontal distance $= \frac{\boldsymbol{Forward(AB) + Backward(BA)}}{\mathbf{2}}$

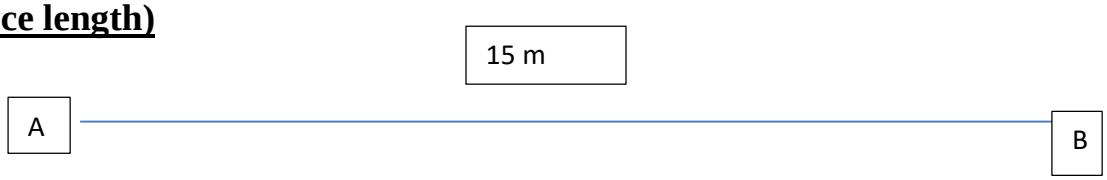
$for\ d1 \rightarrow \frac{1.92+1.92}{2} = 1.92$ m

3. Error = | Forward-Backward |=|7.59-8.58|=0.99

4. Accuracy relative to AB as 1/x $= \frac{error}{true\ value\ forward\ AB} = \frac{0.99}{7.59} = \frac{1}{7.7}$

5. Accuracy relative to BA as 1/x $= \frac{0.99}{8.58} = \frac{1}{8.7}$

(Pace length)



	NUMERS OF PACES				
NAME/ ID#	**Ahmad**	**Ali**	**Noor**	**Samar**	**Suzan**
A-B	**24**	**17**	**26**	**20**	**19**
B-A	**24**	**18**	**25**	**22**	**19**
sum	**48**	**35**	**51**	**42**	**38**
Pace length	**0.625**	**0.857**	**0.588**	**0.714**	**0.789**

1. Pace length for all student$= \frac{total\ distance}{number\ of\ paces}$

Total distance = 15 + 15 = 30 m

For Ahmad $\longrightarrow \frac{30}{48} = 0.625$ m / pace

2. The name of student that has the longest pace: Ali

3. The name of student that has the shortest pace: Noor

Hashemite University

Faculty of Engineering
Civil Engineering Department

Surveying Laboratory

Experiment No.2

Name: **Rania Hamad**

SECTION 1

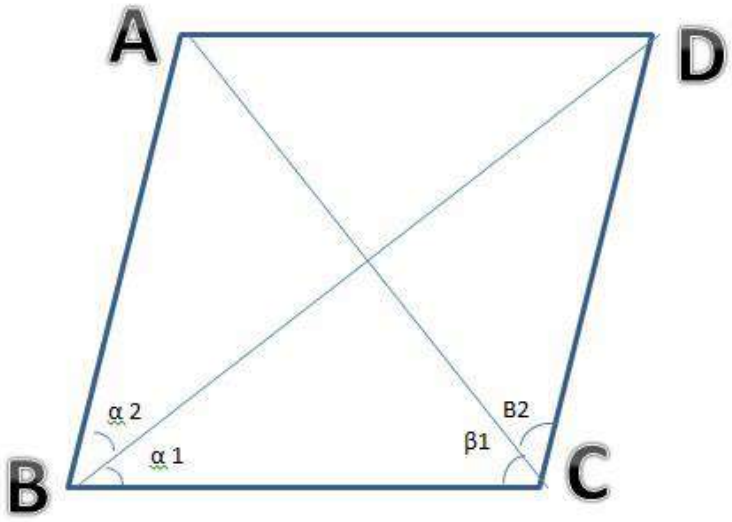
Experiment 2

Measuring the Sides and the Diagonals of a Quadrilateral

……

…

Measuring the sides & the diagonals of a quadrilateral



Measured lengths:

Length	Forward	Backward	Average=$\frac{FW+BW}{2}$
AB	**6.95**	**6.95**	**6.95**
BC	**5.55**	**5.55**	**5.55**
CD	**4.01**	**4.01**	**4.01**
DA	**7.18**	**7.18**	**7.18**
BD	**7.82**	**7.82**	**7.82**
AC	**8.70**	**8.68**	**8.69**

- the angles (α1, α2, β1, β2) using cosine law.

$(CD)^2=(BD)^2+(BC)^2-2(BD)(BC)COS\alpha 1$

$(4.01)^2=(7.82)^2+(5.55)^2-2(7.82)(5.55)\cos\alpha 1$

$\underline{\alpha_1 = 29.059°}$

$(AD)^2=(AB)^2+(BD)^2-2(AB)(BD)\cos\alpha 2$

$(7.18)^2=(6.95)^2+(7.82)^2-2(6.95)(7.82)\cos\alpha 2$

$\underline{\alpha_2 = 57.8125°}$

$(AB)^2=(BC)^2+(AC)^2-2(BC)(AC)\cos\beta 1$

$(6.95)^2=(5.55)^2+(8.69)^2-2(5.55)(8.69)\cos\beta 1$

$\underline{\beta_1 = 53.0255°}$

$(AD)^2=(AC)^2+(CD)^2-2(AC)(CD)\cos\beta 2$

$(7.18)^2=(8.69)^2+(4.01)^2-2(8.69)(4.01)\cos\beta 2$

$\underline{\beta_2 = 54.931°}$

- the diagonals length (BD, AC)

$(BD)^2=(BC)^2+(CD)^2-2(BC)(CD)\cos(\beta 1+\beta 2)$

$(BD)^2=(5.55)^2+(4.01)^2-2(5.55)(4.01)\cos(53.0255+54.931)$

BD=7.785 m

$(AC)^2=(AB)^2+(BC)^2-2(AB)(BC)\cos(\alpha 1+\alpha 2)$

$(AC)^2=(6.95)^2+(5.55)^2-2(6.95)(5.55)\cos(29.059+57.8125)$

AC=8.654m

- the diagonals error (BD, AC)

$$Error = \left|BD_{(measure)} - BD_{(calculated)}\right| = |7.82 - 7.785| = 0.035$$

$$Error = \left|AC_{(measure)} - AC_{(calculated)}\right| = |8.69 - 8.654| = 0.036$$

- the diagonals accuracy (BD, AC)

$$Accuracy\left(\frac{1}{X}\right) = \frac{Error}{true\ value(BD.Calculated)} = \frac{0.035}{7.785} = \frac{1}{222.43}$$

$$Accuracy\left(\frac{1}{X}\right) = \frac{Error}{true\ value(AC.Calculated)} = \frac{0.036}{8.654} = \frac{1}{240.4}$$



Hashemite University

Faculty of Engineering
Civil Engineering Department

Surveying Laboratory

Experiment No.3

Name: **Rania Hamad**

SECTION 1

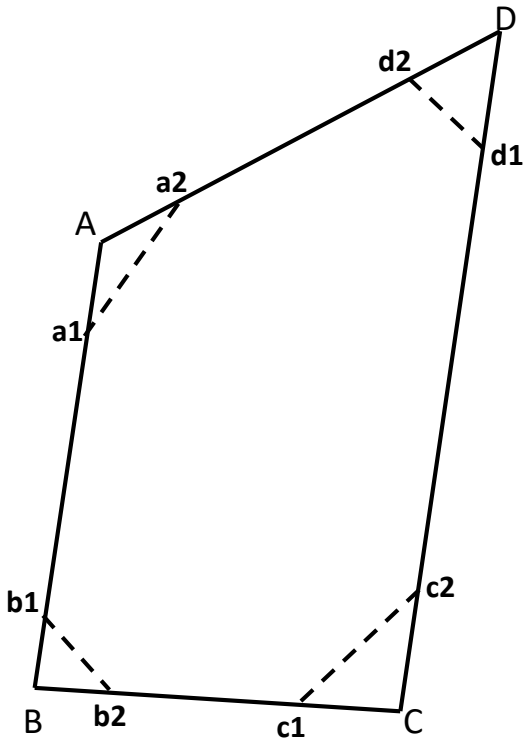
Experiment 3

Horizontal Control for Mapping by Linear Measurements

……

DATA SHEET

Length	Forward	Backward	avg
AB	**6.95**	**6.95**	**6.95**
BC	**5.55**	**5.55**	**5.55**
CD	**4.01**	**4.01**	**4.01**
DA	**7.18**	**7.18**	**7.18**
a1a2	**0.55**	**0.55**	**0.55**
b1b2	**0.70**	**0.70**	**0.7**
c1c2	**0.83**	**0.83**	**0.83**
d1d2	**0.75**	**0.75**	**0.75**



Aa1=……**0.5**…, Aa2=……**0.5**……

Bb1=……**0.5**…, Bb2=……**0.5**……

Cc1=……**0.5**…, Cc2……**0.5**……

Dd1=……**0.5**…, Dd2=……**0.5**……

- **the angles (A, B, C & D) using sine law:**

$$sin\frac{A}{2} = \frac{a1a2}{2l} = \frac{0.55}{2 \times 0.5} = 0.55 \rightarrow A = 66.73°$$

$$sin\frac{B}{2} = \frac{b1b2}{2l} = \frac{0.7}{2 \times 0.5} = 0.7 \rightarrow B = 88.854°$$

$$sin\frac{C}{2} = \frac{c1c2}{2l} = \frac{0.83}{2 \times 0.5} = 0.83 \rightarrow C = 112.197°$$

$$sin\frac{D}{2} = \frac{d1d2}{2l} = \frac{0.75}{2 \times 0.5} = 0.75 \rightarrow D = 97.181°$$

- **the angular closing error**

$$\sum angles = 66.73° + 88.854° + 112.197° + 97.181° = 364.962°$$

$$\boldsymbol{error} = |360° - 364.962°| = 4.962°$$

- **Draw the traverse ABCDA' to scale (1:100) using ruler and protractor**

*Traverse to scale (1/100):

$$AB = 6.95m = 695\ cm \rightarrow \frac{x}{695} = \frac{1}{100} \rightarrow x = 6.95cm$$

$$BC = 5.55m = 555cm \rightarrow \frac{x}{555} = \frac{1}{100} \rightarrow x = 5.55cm$$

$$CD = 4.01m = 401\ cm \rightarrow \frac{x}{401} = \frac{1}{100} \rightarrow x = 4.01cm$$

$$DA = 7.18m = 718\ cm \rightarrow \frac{x}{718} = \frac{1}{100} \rightarrow x = 7.18cm$$

- **The linear closing error** .

$\mathrm{AA}' = 0.728\mathrm{cm}_{(at\ scale 1:100)} = 0.728\ \mathrm{m}$

- **Draw the error's triangle using the horizontal scale 1:200 & the vertical scale 1:30**

  scale 1:200:

$$AB = 6.95m = 695\ cm \rightarrow \frac{x}{695} = \frac{1}{200} \rightarrow x = 3.475cm$$

$$BC = 5.55m = 555cm \rightarrow \frac{x}{555} = \frac{1}{200} \rightarrow x = 2.775cm$$

$$CD = 4.01m = 401\ cm \rightarrow \frac{x}{401} = \frac{1}{200} \rightarrow x = 2.005cm$$

$$DA = 7.18m = 718\ cm \rightarrow \frac{x}{718} = \frac{1}{200} \rightarrow x = 3.59cm$$

  scale 1:30:

$$AA' = 0.728m = 72.8\ cm \rightarrow \frac{x}{72.8} = \frac{1}{30} \rightarrow x = 2.43cm$$

- **the errors.**

$\mathrm{DD}' \rightarrow \frac{A'A}{AA'} = \frac{DD''}{AD} \rightarrow \frac{2.43}{11.845} = \frac{\mathrm{DD}''}{8.255} \rightarrow DD' = 1.694\ cm$

$\rightarrow \frac{1.694}{DD'} = \frac{1}{30} \rightarrow DD^{'} = 50.81cm \rightarrow DD^{'} = 0.5081m$

$\mathrm{CC}' \rightarrow \frac{A'\mathrm{A}}{AA'} = \frac{CC''}{AC} = \frac{2.43}{11.845} = \frac{\mathrm{CC}''}{6.25} \rightarrow CC' = 1.282\ cm$

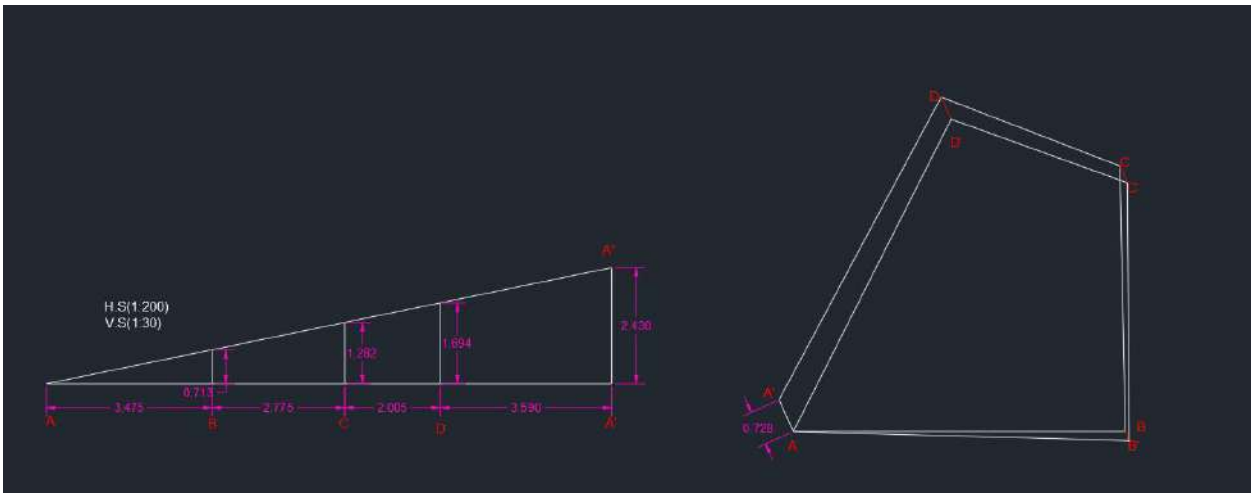
$\frac{1.282}{CC'} = \frac{1}{30} \rightarrow CC' = 38.46cm \rightarrow CC' = 0.3846m$

BB'$\rightarrow \frac{A'A}{AA'} = \frac{BB''}{AB} = \frac{2.43}{11.845} = \frac{BB''}{3.475} \rightarrow BB' = 0.713\ cm$

$\frac{0.713}{BB'} = \frac{1}{30} \rightarrow BB' = 21.39cm \rightarrow BB' = 0.2139m$

- **the relative error**

relative error $= \frac{AA'}{AB+BC+CD+DA} = \frac{0.728}{6.95+5.55+4.01+7.18} = 0.0307m \rightarrow \frac{1}{X} = \frac{1}{32.54}m$





Hashemite University

Faculty of Engineering
Civil Engineering Department

Surveying Laboratory

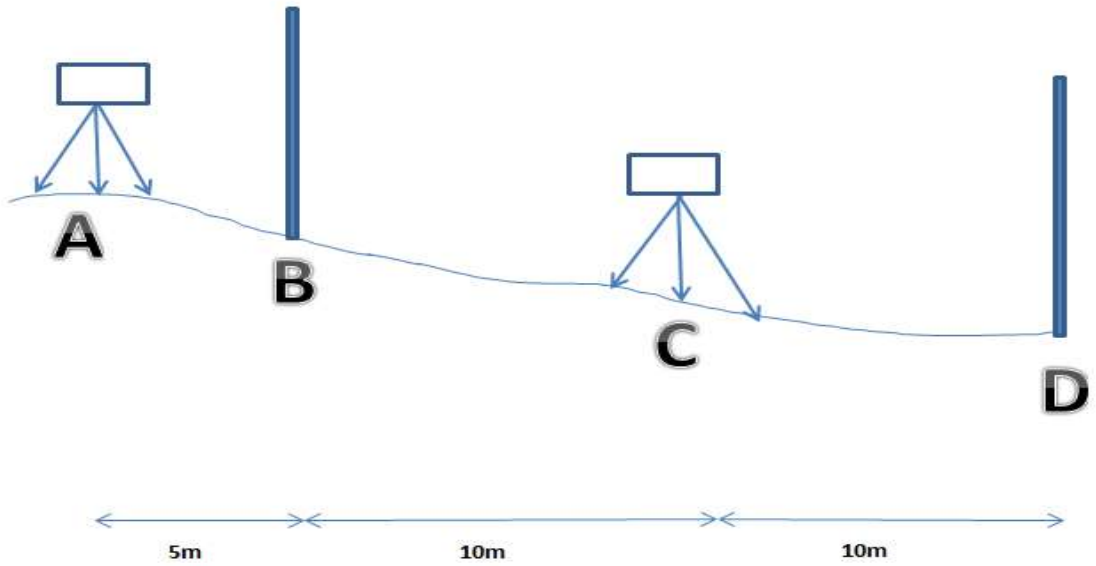
Experiment No.3

Name: **Rania Hussein Hamad**

SECTION 1

Experiment 4

Testing the Level (Collimation Test)



	Rod reading
R_{cb}	**1.36**
R_{cd}	**1.475**
R_{ab}	**1.41**
R_{ad}	**1.528**

- **The true difference in elevation between the points (B & D)**

$$\Delta H = R_{CD} - R_{CB} = 1.475 - 1.36 = 0.115m$$

- **The collimation error (m/m)**

$$e = \frac{\left((R_{ad} - R_{ab}) - (R_{cd} - R_{cb})\right)}{(d_{cb} + d_{cd})}$$

$$= \frac{(1.528 - 1.41) - (1.475 - 1.36)}{10 + 10} = 1.5 \times 10^{-4} m/m$$

- **Correct the rod readings for all points**

$$R`_{CD} = R_{CD} - 10e$$
$$= 1.475 - (10 \times 1.5 \times 10^{-4})$$
$$= 1.4735\, m$$

$$R`_{CB} = R_{CB} - 10e$$
$$= 1.36 - (10 \times 1.5 \times 10^{-4})$$
$$= 1.3585\, m$$

$$R`_{AB} = R_{AB} - 5e$$
$$= 1.41 - (5 \times 1.5 \times 10^{-4})$$
$$= 1.4093\, m$$

$$R`_{AD} = R_{AD} - 25e$$
$$= 1.528 - (25 \times 1.5 \times 10^{-4})$$
$$= 1.5243\, m$$

- **Check:**

$$R_{CD} - R_{CB} = R`_{CD} - R`_{CB}$$

$$R`_{CD} - R`_{CB} = 1.4735 - 1.3585$$
$$= 0.115\, m = R_{CD} - R_{CB}$$

$Check\ ok$

	Rod reading	Corrected rod reading
R cb	**1.36**	**1.3585**
R cd	**1.475**	**1.4735**
R ab	**1.41**	**1.4093**
R ad	**1.528**	**1.5243**

Hashemite University

Faculty of Engineering
Civil Engineering Department

Surveying Laboratory

Experiment No.5

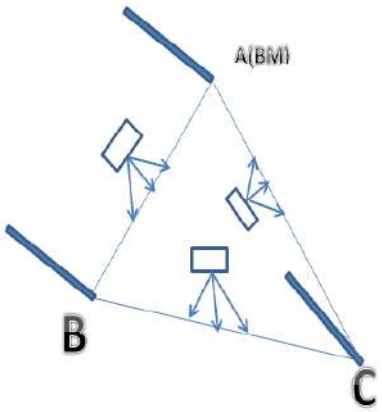
Name: **Rania Hussein Hamad**

SECTION 1

Experiment 5

Experiment 5

Differential leveling



BS	FS	Hi	Elevation	Cumulative distance	Point
1.492		**601.492**	**600**	-	A(B.M)
1.209	**1.195**	**601.506**	**600.297**	**16**	B
1.166	**1.183**	**601.489**	**600.323**	**24.4**	C
	1.489		**600**	**38.4**	A
$\sum B.S$=3.867	$\sum F.S$=3.867				

AB = 16 m , CA=14 m, CB=8.4 m

$HI_1 = Elev.A + B.S_A = 600 + 1.492 = 601.492\ m$

$Elev.B = HI_1 - F.S_B = 601.492 - 1.195 = 600.297\ m$

$HI_2 = Elev.B + B.S_B = 601.492 + 1.209 = 601.506\ m$

$Elev.C = HI_2 - F.S_C = 601.506 - 1.183 = 600.323\ m$

$HI_3 = Elev.C + B.S_C = 600.323 + 1.166 = 601.489\ m$

$Elev.A = HI_3 - F.S_A = 601.489 - 1.489 = 600\,m$

- **The arithmetic check:**

$\sum B.S - \sum F.S = 3.867 - 3.867 = 0$

Last elev. – First elev. =600-600=0

0=0 **CHECK IS *OK***

- **The error in elevation (A):**

  Error in ELEV(A) = Last elev. – First elev.

  = 600-600 = 0

- **The allowable error if (the factor =12mm):**

  $K = \frac{38.4}{1000}$

  allowable error $= 0.012 \times \sqrt{K} = 0.012 \times \sqrt{0.0384} = 2.352 \times 10^{-3} = 0.00235$

- **Discus error according to the allowable error.**

  (There is no error) error =0

- **the accuracy**

$accuracy = \frac{ERROR}{TOTAL\ DESTANCE} = 0$

Point	elevation	Correction(# of set up)	Corrected elevation using (# of set up)	Correction (cumulative distance)	Corrected elevation using (cumulative distance)
A	600	-	-	-	600
B	600.297	0	600.297	0	600.297

C	600.323	0	600.323	0	600.323
A	600	0	600	0	600

- $Correction(\#\ of\ set\ up) = \frac{\#\ of\ set\ up}{total\ \#of\ set\ up} \times ERROR \rightarrow ERROR = 0$

  $\rightarrow Correction(\#\ of\ set\ up)\ for\ all\ point = 0$

- $Corrected\ elevation\ using\ \#of\ set\ up =$
  $Elevation - Correction(\#\ of\ set\ up)$
  $600.297 - 0 = 600.297\ m$
  $600.323 - 0 = 600.323m$
  $600 - 0 = 600m$

- Correction (cumulative distance) = $\frac{comulative\ distance}{total\ destande} \times ERROR$

$\rightarrow ERROR = 0 \rightarrow$ Corrected elevation using (# of set up) $for\ all\ point = 0$

- $Corrected\ elevation\ using\ cumulative\ distance\ =$
  $Elevation\ -\ Correction\ Cumulative\ distance$
  $600.297 - 0 = 600.297\ m$
  $600.323 - 0 = 600.323m$
  $600 - 0 = 600m$

Hashemite University

Faculty of Engineering
Civil Engineering Department

Surveying Laboratory

Experiment No.6

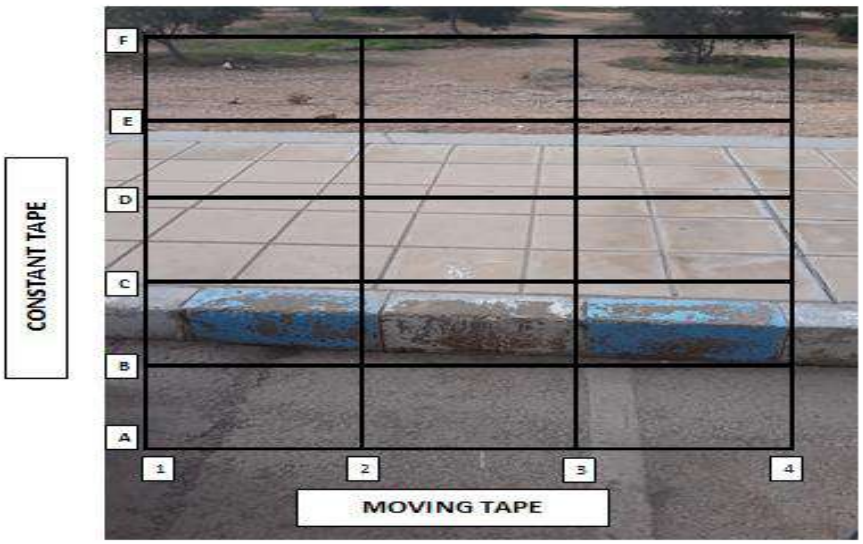
Name: **Rania Hussein Hamad**

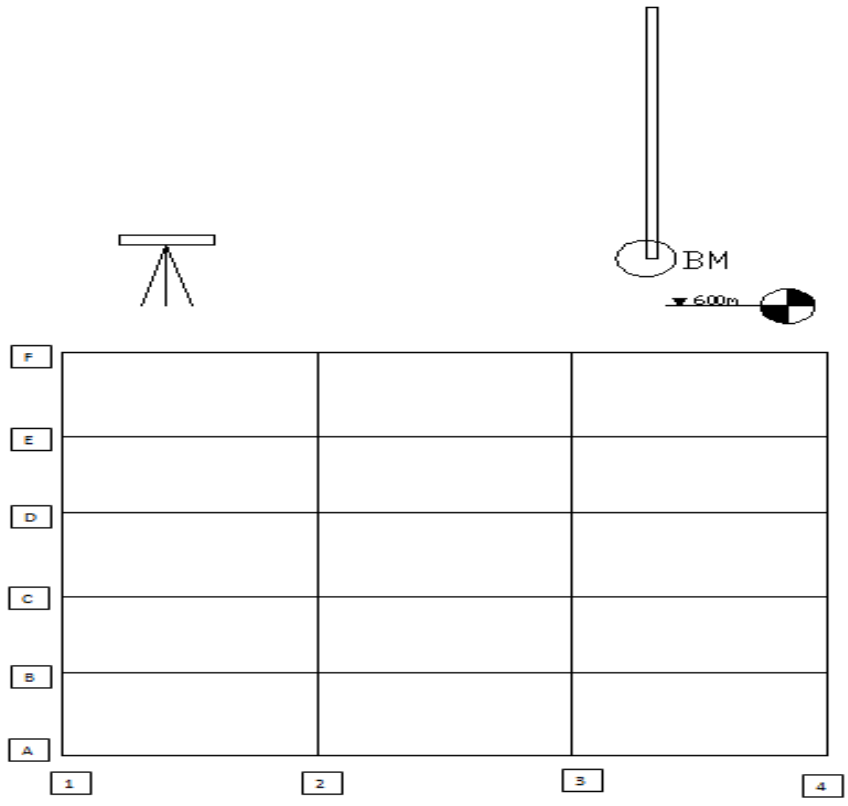
SECTION 1

Experiment 6

Experiment 6

Contouring From Grid (Spot Elevation)





Make the grid which has (1m*1m) dimension on the area shown above, choose any point around your area and assume it the bench mark which has (600m) elevation.

Read the rod reading for all point from (A1 TO F4) and write it in the table.

BS	IS	FS	hi	Elev.	Point
1.138			601.138	600	Bm
	1.271			599.867	A1
	1.26			599.878	A2
	1.255			599.883	A3
	1.256			599.882	A4
	1.038			600.1	B1
	1.033			600.105	B2
	1.025			600.113	B3
	1.020			600.118	B4
	1.020			600.118	C1
	1.013			600.125	C2
	1.007			600.131	C3
	1.003			600.135	C4
	1.00			600.138	D1
	0.993			600.145	D2
	0.985			600.153	D3
	0.977			600.161	D4
	1.059			600.079	E1
	1.063			600.075	E2
	1.078			600.06	E3
	1.050			600.088	E4
	1.188			599.95	F1
	1.218			599.92	F2
	1.261			599.877	F3
		1.264		599.874	F4

- **Sample of calculation:**
- HI = 600+1.138=601.138

Elevation = HI – FS =601.138 – 1.264= 599.874

Elevation = HI – IS =601.138 – 1.271 = 599.867

- ***CHECK:***

$$\sum BS - \sum \text{FS} = \text{Last Elev} - \text{First Elev}$$

$$1.138 - 1.264 = 599.874 - 600$$

$$-0.126 = -0.126 \quad \text{It's OK}$$

- **Elevation**

	A	B	C	D	E	F
1	**599.867**	**600.1**	**600.118**	**600.138**	**600.079**	**599.95**
2	**599.878**	**600.105**	**600.125**	**600.145**	**600.075**	**599.92**
3	**599.883**	**600.113**	**600.131**	**600.153**	**600.06**	**599.877**
4	**599.882**	**600.118**	**600.135**	**600.161**	**600.088**	**599.874**

Maximum Elevation = 600.161
Minimum Elevation = 599.867

- **2. Draw the grid and place elevation on each point (The drawing should be to scale).**
- **3. Draw the contour lines (5 lines) and write the elevations on contour lines.**

Contour Interval

$$Contour\ interval = \frac{max.elevation - min.elevation}{(\#of\ line - 1)}$$

$$= \frac{600.161 - 599.867}{5 - 1} = 0.0735$$

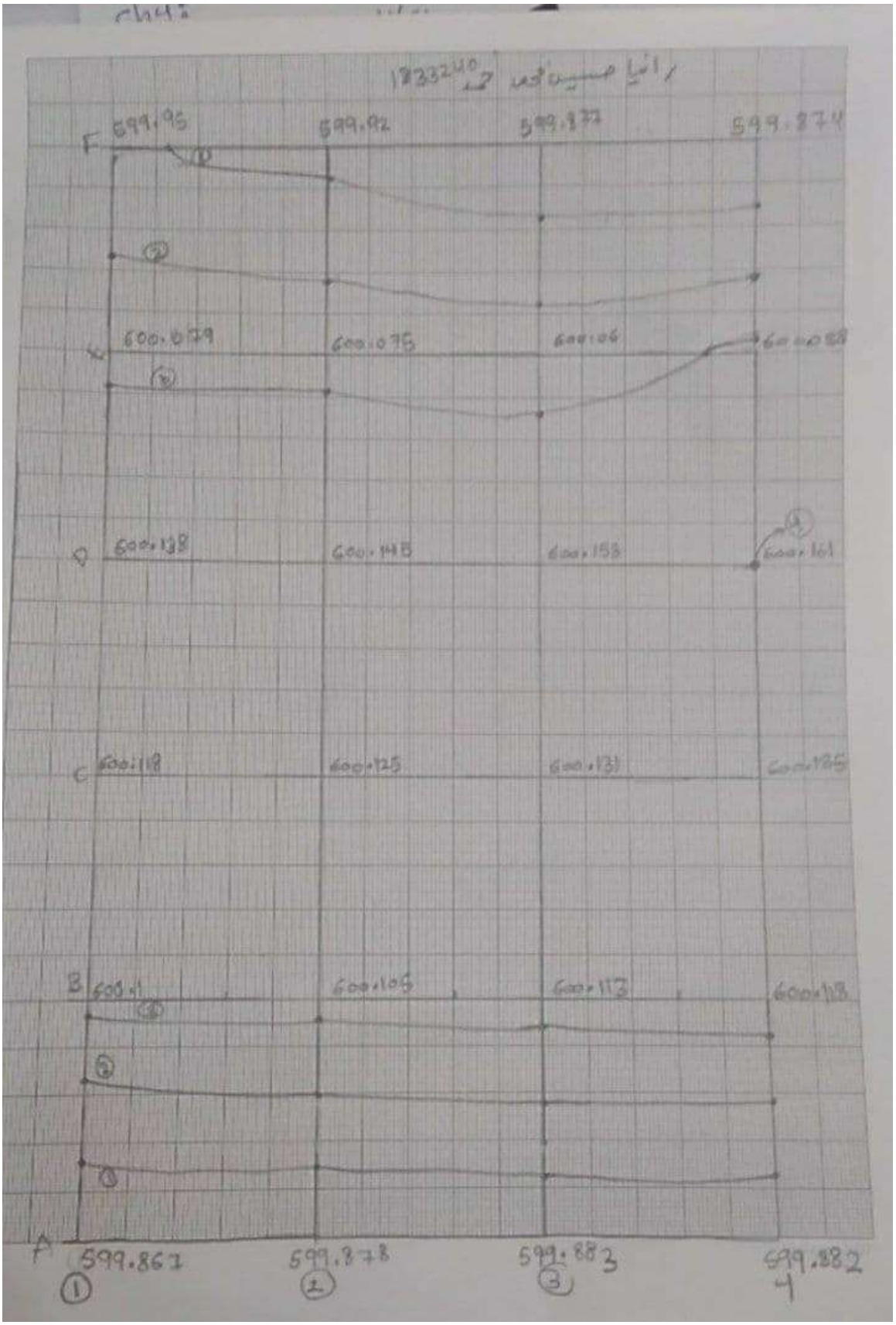
- Contour line 1 = min. elevation + Contour interval
  Contour Line 1 = 599.867+0.0735 = 599.9405

- Contour line 2 = Contour line 1 + Contour interval
  Contour Line 2 =599.9405+ 0.0735 = 600.014

- Contour line 3 = Contour line 2 + Contour interval
  Contour Line 3 =600.014+ 0.0735 = 600.0875

- Contour line 4 = Contour line 3 + Contour interval
  Contour Line 4 =600.0875+ 0.0735 = 600.161

- Contour line 5 = Contour line 4 + Contour interval
  Contour Line 5 =600.161 + 0.0735 = 600.2345


F
599.95
599.92
599.877
599.874
E
600.079
600.075
600.06
600.088
D
600.138
600.145
600.158
600.161
C
600.118
600.125
600.131
600.135
B
600.1
600.105
600.113
600.118
A
599.861
599.878
599.883
599.882
1
2
3
4

Hashemite University

Faculty of Engineering
Civil Engineering Department

Surveying Laboratory

Experiment No.6

Name: **Rania Hussein Hamad**

SECTION 1

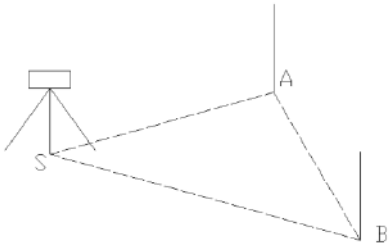
Experiment 7

Experiment 7

Horizontal & Vertical angles using Total station (TS02 PLUS)

.....

Horizontal angle



ANGLE	TARGET	FACE LEFT (I)	FACE RIGHT(II)	mean	angle
ASB	A	266◦ 39' 51"	86◦ 40' 3"	$266° 39'57''$	$54° 37'3.5''$
	B	321◦ 16' 58"	141◦ 17' 3"	$321° 17'0.5''$	
	Diff.	$54° 37'7''$	$54° 37'0''$		
		$54°37'3.5''$			

- $Mean \rightarrow point\ A: 266° + \frac{39'51''+40'3''}{2} = 266°\ 39'\ 57''$

$$\rightarrow point\ B: 321° + \frac{16'58''+17'3''}{2} = 321°\ 17'\ 0.5''$$

- $Angle = mean\ B - mean\ A = 321°\ 17'0.5'' - 266°\ 39'57'' = 54°\ 37'\ 3.5''$
- $The\ value\ of\ Difference$:

FL: $321°\ 16'\ 58" - 266°\ 39'51'' = 54°\ 37^{'}\ 7''$

FR: $141°\ 17'\ 3" - 86°\ 40'\ 3" = 54°\ 37^{'}0''$

$$Angle\ = mean\ = \frac{diff_{FL} + diff_{FR}}{2} = \frac{54°\ 37^{'}\ 7^{''} + 54°\ 37^{'}0''}{2} = 54°\ 37'\ 3.5''$$

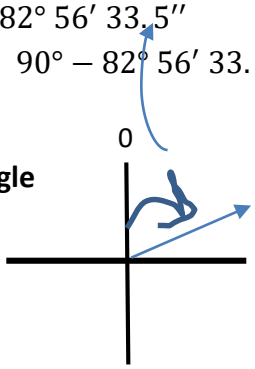
Vertical angle

	FL	FR	sum	Index error
A	82◦ 56’ 37”	277◦ 3’ 30”	$360° 0' 7''$	$-0° 0' 3.5''$
Corrected A	$82° 56' 33.5''$	$277° 3' 26.5''$	$360° 0'0''$	

- $SUM = FL + FR = 82°56' 37'' + 277° 3' 30'' = 360° 0' 7''$
- $ERROR = 360° 0'0'' - 360° 0' 7'' = -0°0'7''$
- $Index\ error = \frac{error}{2} = \frac{-0°0'7''}{2} = -0° 0' 3.5''$
- $corrected\ A_{FL} = 82° 56' 37'' - 0° 0' 3.5'' = 82° 56' 33.5''$
- $corrected\ A_{FR} = 277° 3' 30'' - 0° 0' 3.5'' = 277° 3' 26.5''$

- $Zenithal\ angle = 82° 56' 33.5''$
- $Elevation\ angle = 90° - 82° 56' 33.5'' = 7° 3' 26.5''$

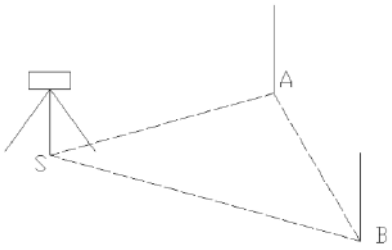
Write your zero vertical angle



Horizontal angle

HOME WORK (Calculation Of Open Traverse)

A IS NORTH, AS=5m, SB=3m.



Find latitude and departure of SB, and then fill this table to find **AB length, angle A and angle B.**

	Angle	Azimuth	length	latitude	Departure	Bearing
A	$36°51'21.5$					
		$180°\ 0'0''$	5m	-5	0	Due south
S	$54°37'3.5''$					
		$54°37'3.5''$	3m	1.737	2.446	$N54°37'3.5''E$
B	$88°31'35.45''$					
		$323°8'38.95''$	4.07m	3.263	-2.446	$N36°51'05''W$
∑	$180°0'0.45''$			0	0	

CALCULATION :

$Azimuth\ AS = Azimuth\ SA + 180°0'0'' = 0 + 180°0'0'' = 180°0'0''$

$latitude\ AS = 5\ cos(180°\ 0'0'') = -5$

$departure\ AS = 5\ sin(180°\ 0'0'') = 0$

$Azimuth\ SB = Azimuth\ AS - 180°0'0'' + Angle\ s = 54°37'3.5''$

$latitude\ SB = 3\ cos(54°37'3.5'') = 1.737$

$departure\ SB = 3\ sin(54°\ 37'3.5'') = 2.446$

$$\sum Lat = 0 \ \rightarrow -5 + 1.737 + x = 0 \rightarrow x = 3.263$$

$$\sum dep = 0 \rightarrow 0 + 2.446 + x = 0 \rightarrow x = -2.446$$

$$length\ BA = \sqrt{Dep^2 + lat^2} = \sqrt{-2.446^2 + 3.263^2} = 4.07m$$

$$azimuth\ BA = \ tan^{-1}\left(\frac{dep}{lat}\right) + 360 = 323°8'95''$$

$$bearing = 360 - azimuth = N\ 36°51'21.05''W$$

$$Angle\ A + 323°8'38.95'' - 180°0'0'' = 180°0'0''$$

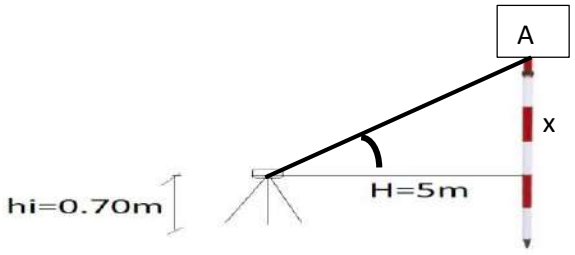
$$\rightarrow angle\ A = 36°51'21.5$$

$$angle\ B + 54°37'3.5'' + 180°0'0'' = 323°8'38.95'' \rightarrow angle\ B = 88°31'35.45''$$

Vertical angle

<u>HOME WORK (Calculation Of height)</u>

Find the length of range pole.



$\theta = elevation\ angle\ = 7°\ 3^{'}\ 26.5''$

$\tan\theta = \frac{x}{5} \rightarrow\ 5 \times \tan(7°3'26.5'') = 0.619$

$length\ of\ range\ pole = 0.619 + HI = x + 0.7 = 1.319m$

Hashemite University

Faculty of Engineering
Civil Engineering Department

Surveying Laboratory

Experiment No.8

Name: **Rania Hussein Hamad**

SECTION 1

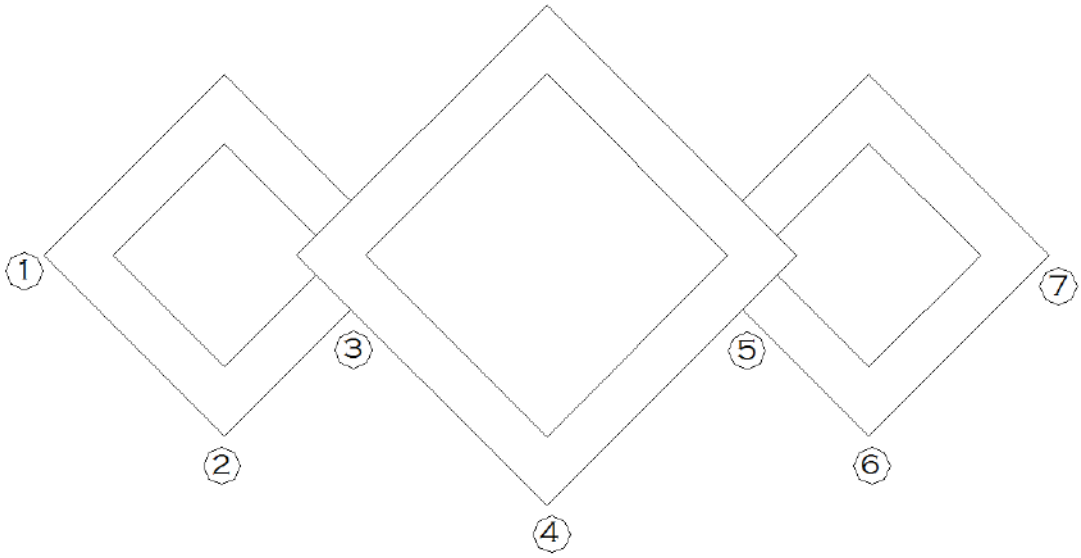
Experiment 8

Experiment 8

Total station (TS02 Plus) & Quick-survey

.....

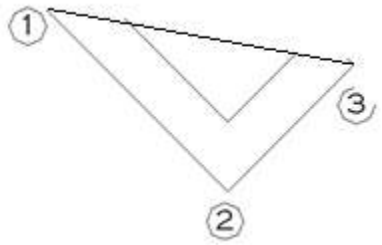
Find the coordinate of point (1 to 7) and fill it in the table below.



POINT	EASTING x	NORTHING y	Coordinate point
1	11.975	9.882	(11.975, 9.882)
2	10.981	7.333	(10.981, 7.333)
3	12.862	6.605	(12.862, 6.605)
4	11.868	3.895	(11.868, 3.895)
5	14.562	2.855	(14.562, 2.855)
6	13.875	0.981	(13.875, 0.981)
7	16.37	0.033	(16.37, 0.033)

HOMEWORK

1. Draw the points and match them on (AutoCAD program).
2. Find the area of triangle 123 using coordinate method



SHOW YOUR Calculation

$Area \rightarrow 2A = XA\ (YB - YC) + XB\ (YC - YA) + XC\ (YA - YB)$

$2A = 2A = 11.975(7.333 - 6.605) + 10.981(6.605 - 9.882) + 12.862(9.882 - 7.333) = 5.5183$

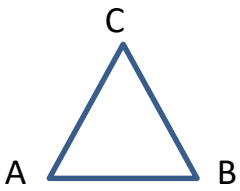
$\rightarrow \boldsymbol{Area = 2.7592}$

Or

$$2A = \big((11.975 \times 7.333) + (10.981 \times 6.605) + (12.862 \times 9.882)\big) - \big((9.882 \times 10.981) + (7.333 \times 12.862) + (6.605 \times 11.975)\big) = 5.5183$$

$\rightarrow \boldsymbol{area = 2.7592}$

Example



	EASTING (X)	NORTHING (Y)
A	0	0
B	4	0
C	2	6
A	0	0

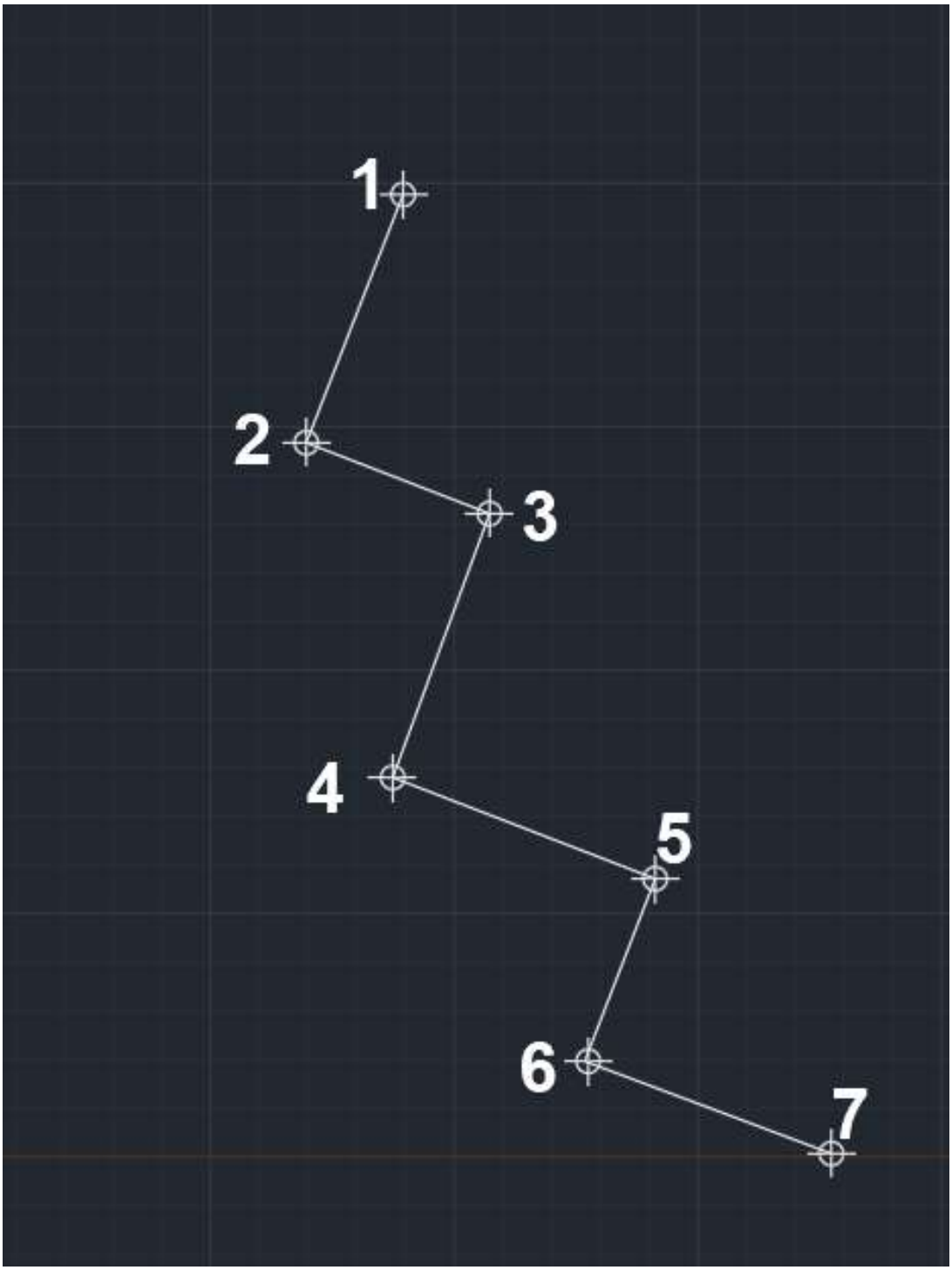
2A= ((0*0) + (4*6) + (2*0))-((0*4) + (0*2) + (6*0))

2A= (0+24+0)-(0+0+0) =24 → **A=12**

OR

2A=X_A (Y_B-Y_C) +X_B (Y_C-Y_A) +X_C (Y_A-Y_B)

2A=0(0-6)+4(6-0)+6(0-0)=0+24+0=24→**A=12**


1
2
3
4
5
6
7



Hashemite University

Faculty of Engineering
Civil Engineering Department

Surveying Laboratory

Experiment No.9

Name: **Rania Hussein Hamad**

SECTION 1

Experiment 9

Experiment 9

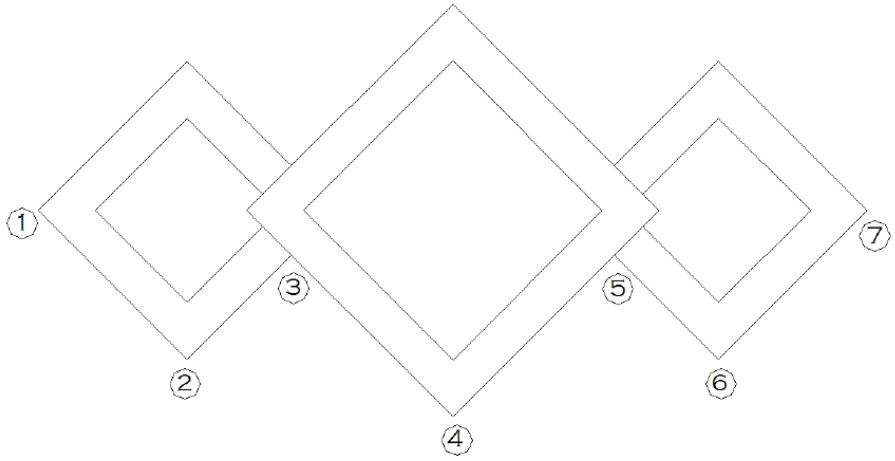
Total station-TS02 PLUS programs

(Tie distance / Remote height / Area)

……

I- Tie Distance:

Find the distances listed in the table below



A

S

Polygonal method (new pt2)

The side	length
1-2	2.768
2-3	1.975
3-4	
4-5	
5-6	
6-7	

Polygonal method (new pt1)

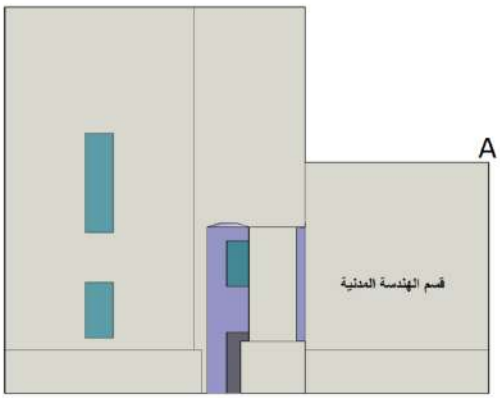
The side	length
1-3	3.42
3-5	
2-7	

Radial method

The side	length
A-1	15.985
A-2	13.293
A-3	

II- Remote height:

Find the distance AB using remote height program.

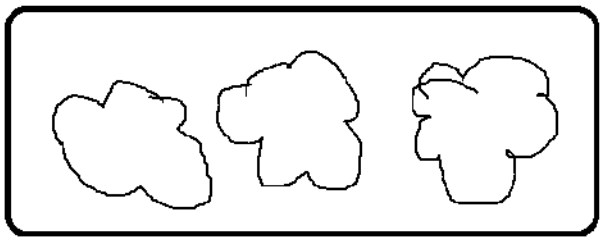


(Base point)

The elevation AB is Δ **=** ……9.413……

III- Area:

Measure the area of basin.



The area is ……5.994……

POINT	EASTING x	NORTHING y	Coordinate point
1	11.975	9.882	(11.975, 9.882)
2	10.981	7.333	(10.981, 7.333)
3	12.862	6.605	(12.862, 6.605)
4	11.868	3.895	(11.868, 3.895)
5	14.562	2.855	(14.562, 2.855)
6	13.875	0.981	(13.875, 0.981)
7	16.37	0.033	(16.37, 0.033)

HOMEWORK

1. Calculate the remaining distances using the coordinate in the experiment 8, show your calculation.

The side	length
1-2	2.768
2-3	1.975
3-4	2.887
4-5	2.888
5-6	1.996
6-7	2.669

The side	length
1-3	3.42
3-5	4.12
2-7	9.07

The side	length
A-1	15.985
A-2	13.293
A-3	13.054

$$length_{3-4} = \sqrt{(x_4 - x_3)^2 + (y_4 - y_3)^2}$$

$$= \sqrt{(11.868 - 12.862)^2 + (3.895 - 6.605)^2}$$

$$= 2.887$$

$$length_{4-5} = \sqrt{(x_5 - x_4)^2 + (y_5 - y_4)^2}$$

$$= \sqrt{(14.562 - 11.868)^2 + (2.855 - 3.895)^2}$$

$$= 2.888$$

$$length_{5-6} = \sqrt{(x_6 - x_5)^2 + (y_6 - y_5)^2}$$

$$= \sqrt{(13.875 - 14.562)^2 + (0.981 - 2.855)^2}$$

$$= 1.996$$

$$length_{6-7} = \sqrt{(x_7 - x_6)^2 + (y_7 - y_6)^2}$$

$$= \sqrt{(16.37 - 13.875)^2 + (0.033 - 0.981)^2}$$

$$= 2.669$$

$$length_{3-5} = \sqrt{(x_5 - x_3)^2 + (y_5 - y_3)^2}$$

$$= \sqrt{(14.562 - 12.862)^2 + (2.855 - 6.605)^2}$$

$$= 4.12$$

$$length_{2-7} = \sqrt{(x_7 - x_2)^2 + (y_7 - y_2)^2}$$

$$= \sqrt{(16.37 - 10.981)^2 + (0.033 - 7.333)^2}$$

$$= 9.07$$

2. Find the coordinate of point A

By drawing circle below and find the intersect between them we find the coordinate of point A:

The first circle radius = 15.985 & the center was point 1 (11.975, 9.882)

The second circle radius = 13.293 & the center was point 2 (10.981, 7.333)

Then intersection is point **A (8.6691, -5.7574).**

<u>The drawing is attached to an AutoCAD file</u>

<u>Or</u>

$$length_{A-1} = \sqrt{(x_A - x_1)^2 + (y_A - y_1)^2}$$

$$15.985 = \sqrt{(x_A - 11.975)^2 + (y_A - 9.882)^2}$$

$$15.985^2 = (x_A - 11.975)^2 + (y_A - 9.882)^2 \rightarrow \mathbf{1}$$

$$length_{A-2} = \sqrt{(x_A - x_2)^2 + (y_A - y_2)^2}$$

$$13.293 = \sqrt{(x_A - 10.981)^2 + (y_A - 7.333)^2}$$

$$13.293^2 = (x_A - 10.981)^2 + (y_A - 7.333)^2 \rightarrow \mathbf{2}$$

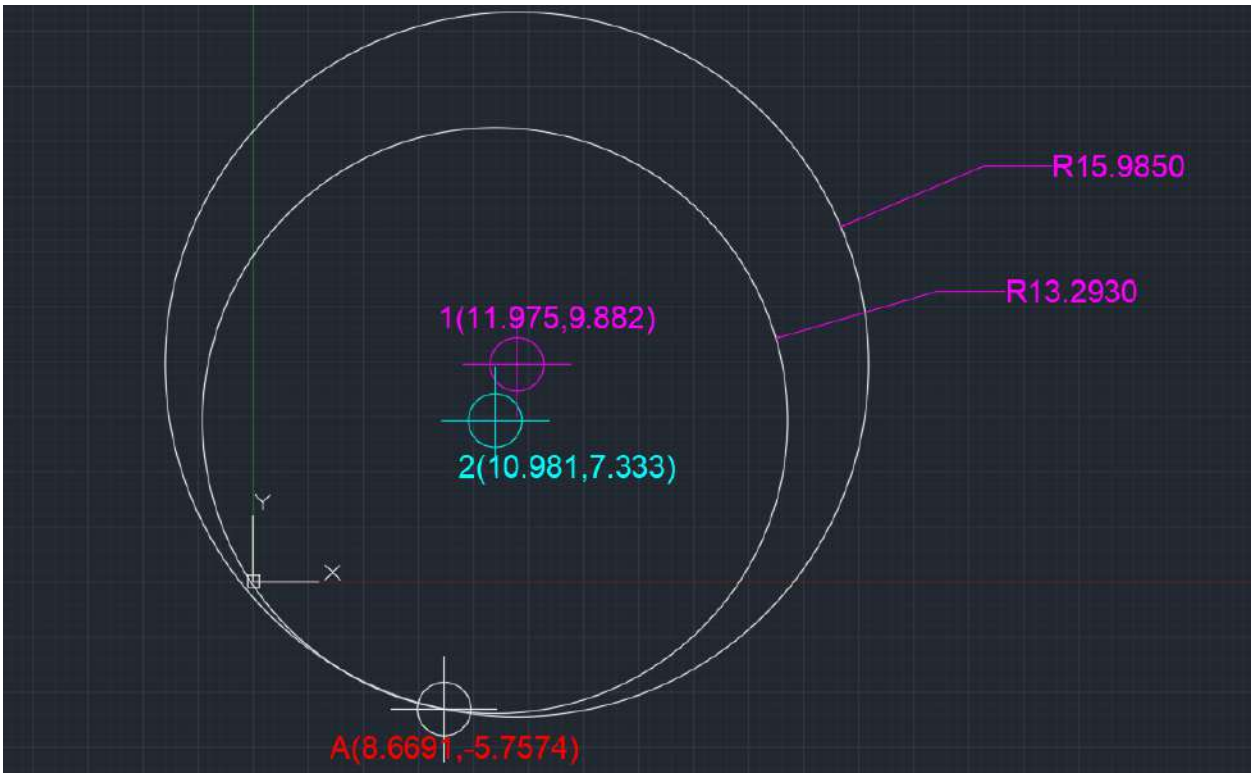
$$BY\ SOLVE\ 1\ \&2 \rightarrow\ x_A = 8.6691\ , y_A = -5.7574$$

$$\boldsymbol{A\ (8.6691, -5.7574)}$$

$$length\ _{A-3} = \sqrt{(x_A - x_3)^2 + (y_A - y_3)^2}$$

$$= \sqrt{(8.6691 - 12.862)^2 + (-5.7574 - 6.605)^2}$$

$$= 13.054$$



Hashemite University

Faculty of Engineering
Civil Engineering Department

Surveying Laboratory

Experiment No.10

Name: **Rania Hussein Hamad**

SECTION 1

Experiment 10

Experiment 10

Total station-TS02 PLUS

(Station setup/ Survey)

……

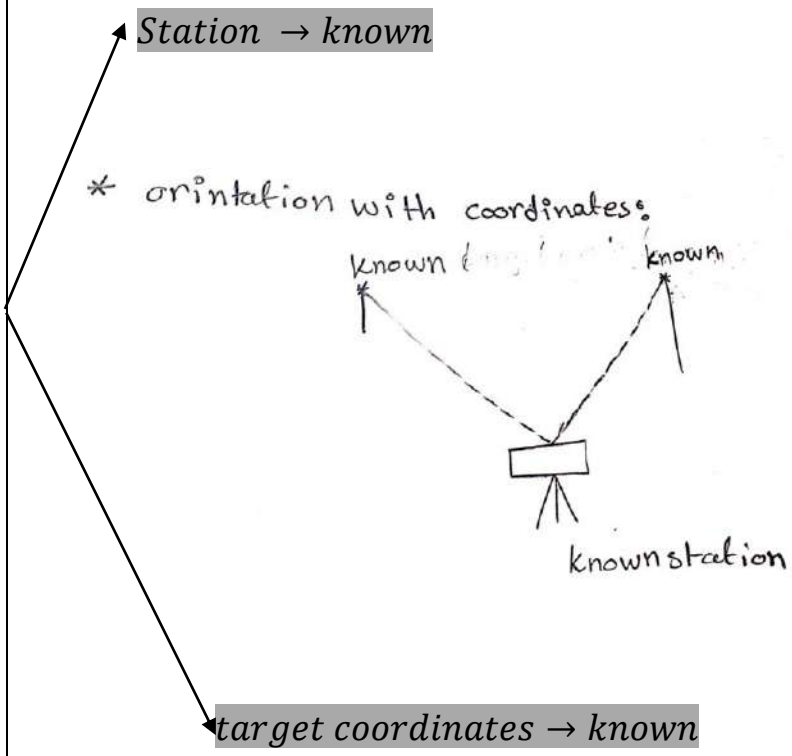
1. **Set up the total station using *resection* method , Where the coordinate of points is :**
   A (10, 10) B (12.30, 10)
   The station of TS02plus is:
   Pt ID Name: S1
   (EAST, NORTH) = (11.160 , 6.760)

2. **Find the coordinate of point (C & D) from video.**

POINT	EASTING	NORTHING
C	4.376	5.113
D	4.403	6.040

3. **List three methods for station setup and draw sketch explanatory for each one.**

Setup method	Description	Picture
Orientation with Angle	**The station is known. Aim at a target to set the orientation.**	$Station \rightarrow known$ * orintation with angle: north known known station $angle\ with\ north \rightarrow known$

Orientation with Coordinates	**The station and target coordinates are known. Aim at a target to set the orientation and height.**	
Resection	**The station is unknown. Measure to two or more target points to compute station coordinates and orientation. Scale setting is configurable.**	