RÉSZLETPONTSZÁMÍTÁS

A feladat sorszáma: 64.

Számitsa ki az alábbi vázlaton jelölt 501, 502 és 503-as földrészletek töréspontjainak, azaz 1-8 és 1'-4' pontok geodéziai rendszerbeni koordinátáit.

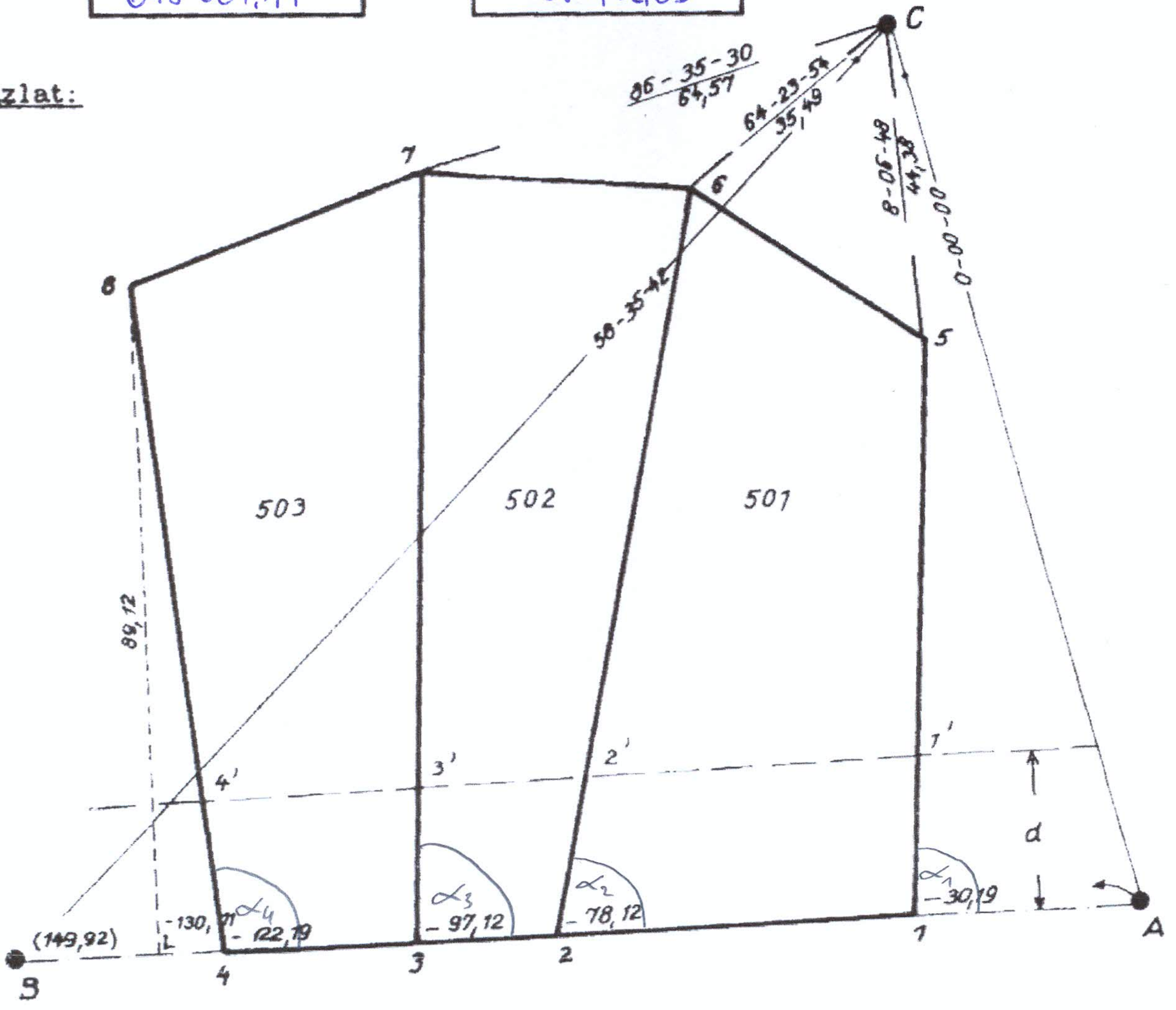
Alapadatok:

1. d= 18,72 méter. Az osztóvonal párhuzamos az AB alapvonallal.

2 Koordináta-jegyzék:

pont	Y[m]	X[m]
A	648 055.35	98 669.94
B	647 913,44	98 717,86
C	648 067,14	98 792,63

Vázlat:



$i_{C-5} = 08°\,06'\,48''$ $\qquad t_{C-5} = 44{,}38\,m$

$i_{C-B} = 58°\,35'\,42''$

$i_{C-6} = 64°\,23'\,54''$ $\qquad t_{C-6} = 35{,}49\,m$

$i_{C-7} = 86°\,35'\,30''$ $\qquad t_{C-7} = 64{,}57\,m$

$t_{AB} = 149{,}92\,m$

$t_{A1} = 30{,}19\,m$

$t_{A2} = 97{,}12\,m$

$t_{A4} = 122{,}19\,m$

$$\delta_{BA} = arctg\frac{Y_A - Y_B}{X_A - X_B} = \frac{648\,055{,}35 - 647\,913{,}44}{98\,669{,}94 - 98\,717{,}86} = \frac{+141{,}91}{-47{,}92} = 180° - 71°\,20'\,29'' = 108°\,39'\,31''$$

$$\delta_{CB} = arctg\frac{Y_B - Y_C}{X_B - X_C} = \frac{647\,913{,}44 - 648\,067{,}14}{98\,717{,}86 - 98\,792{,}63} = \frac{-153{,}7}{-74{,}77} = 180° + 64°\,03'\,31'' = 244°\,03'\,31''$$

$$\delta_{CA} = arctg\frac{Y_A - Y_C}{X_A - X_C} = \frac{648\,055{,}35 - 648\,067{,}14}{98\,669{,}94 - 98\,792{,}63} = \frac{-11{,}79}{-122{,}69} = 180° + 5°\,29'\,21'' = 185°\,29'\,21''$$

$$t_{CA} = \frac{Y_A - Y_C}{\sin\delta_{CA}} = \frac{648\,055{,}35 - 648\,067{,}14}{\sin 185°\,29'\,21''} = 123{,}25\,m$$

$$t_{C-B} = \frac{Y_B - Y_C}{\sin\delta_{CB}} = \frac{647\,913{,}44 - 648\,067{,}14}{\sin 244°\,03'\,31''} = 170{,}92\,m$$

$$z_{C-A} = \delta_{CA} - i_{CA} = \delta_{CA} - 0^\circ 00' 00'' = 185^\circ 29' 21''$$

$$z_{C-B} = \delta_{CB} - i_{CB} = 244^\circ 03' 31'' - 58^\circ 35' 42'' = 185^\circ 27' 49''$$

$$z_K = \frac{z_{CA} \cdot t_{CA} + z_{C-B} \cdot t_{CB}}{t_{CA} + t_{CB}} = \frac{185^\circ 29' 21'' \cdot 123{,}25 + 185^\circ 27' 49'' \cdot 170{,}92}{123{,}25 + 170{,}92} = 185^\circ 28' 28''$$

$$\delta_{CA_{jav.}} = z_K + i_{CA} = 185^\circ 28' 28''$$

$$\delta_{C-B_{jav.}} = z_K + i_{CB} = 185^\circ 28' 28'' + 58^\circ 35' 42'' = 244^\circ 04' 10''$$

$$\delta_7 = z_K + i_{C7} = 185^\circ 28' 28'' + 86^\circ 35' 30'' = 272^\circ 03' 58''$$

$$\delta_6 = z_K + i_{C6} = 185^\circ 28' 28'' + 64^\circ 23' 54'' = 249^\circ 52' 22''$$

$$\delta_5 = z_K + i_{C5} = 185^\circ 28' 28'' + 08^\circ 06' 48'' = 193^\circ 35' 16''$$

$$Y_5 = Y_C + t_{C5} \cdot \sin \delta_5 = 648\,067{,}14 + 44{,}38 \cdot \sin 193^\circ 35' 16'' = 648\,056{,}71$$

$$Y_6 = Y_C + t_{C6} \cdot \sin \delta_6 = 648\,067{,}14 + 35{,}49 \cdot \sin 249^\circ 52' 22'' = 648\,033{,}82$$

$$Y_7 = Y_C + t_{C7} \cdot \sin \delta_7 = 648\,067{,}14 + 64{,}57 \cdot \sin 272^\circ 03' 58'' = 648\,002{,}612$$

$$X_5 = X_C + t_{C5} \cdot \cos \delta_5 = 98\,792{,}63 + 44{,}38 \cdot \cos 193^\circ 35' 16'' = 98\,749{,}49$$

$$X_6 = X_C + t_{C6} \cdot \cos \delta_6 = 98\,792{,}63 + 35{,}49 \cdot \cos 249^\circ 52' 22'' = 98\,780{,}42$$

$$X_7 = X_C + t_{C7} \cdot \cos \delta_7 = 98\,792{,}63 + 64{,}57 \cdot \cos 272^\circ 03' 58'' = 98\,794{,}95$$

$$S = \frac{Y_B - Y_A}{t_{BA}} = \frac{647\,913{,}44 - 648\,055{,}35}{149{,}92} = \frac{-141{,}91}{149{,}92} = -0{,}946571504$$

$$K = \frac{X_B - X_A}{t_{BA}} = \frac{98\,717{,}86 - 98\,669{,}94}{149{,}92} = \frac{47{,}92}{149{,}92} = 0{,}319637139$$

$a_1 = 30{,}19 \qquad b_1 = \emptyset$

$a_2 = 78{,}12 \qquad b_2 = \emptyset$

$a_3 = 97{,}12 \qquad b_3 = \emptyset$

$a_4 = 122{,}19 \qquad b_4 = \emptyset$

$a_8 = 130{,}11 \qquad b_8 = 89{,}12$

$Y_1 = Y_A + S \cdot a_1 = 648\,055{,}35 + (-0{,}946 \cdot 30{,}19) = 648\,026{,}77$

$X_1 = X_A + K \cdot a_1 = 98\,669{,}94 + 0{,}319 \cdot 30{,}19 = 98\,679{,}59$

$Y_2 = Y_A + S \cdot a_2 = 648\,055{,}35 + (-0{,}946 \cdot 78{,}12) = 647\,981{,}40$

$X_2 = X_A + K \cdot a_2 = 98\,669{,}94 + 0{,}319 \cdot 78{,}12 = 98\,694{,}91$

$Y_3 = Y_A + S \cdot a_3 = 648\,055{,}35 + (-0{,}946 \cdot 97{,}12) = 647\,963{,}42$

$X_3 = X_A + K \cdot a_3 = 98\,669{,}94 + 0{,}319 \cdot 97{,}12 = 98\,700{,}98$

$Y_4 = Y_A + S \cdot a_4 = 648\,055{,}35 + (-0946 \cdot 122{,}19) = 647\,939{,}69$

$X_4 = X_A + K \cdot a_4 = 98\,669{,}94 + 0{,}319 \cdot 122{,}19 = 98\,709{,}00$

$Y_8 = Y_A + S \cdot a_8 + K \cdot b_8 = 648\,055{,}35 + (-0{,}946 \cdot 130{,}11) + 0{,}319 \cdot 89{,}12 = 647\,960{,}68$

$X_8 = X_A + K \cdot a_8 - S \cdot b_8 = 98\,669{,}94 + 0{,}319 \cdot 130{,}11 - 0{,}946 \cdot 89{,}12 = 98\,795{,}89$

$$\delta_{1-5} = \operatorname{arctg} \frac{Y_5 - Y_1}{X_5 - X_1} = \frac{648\,056{,}71 - 648\,026{,}77}{98\,749{,}49 - 98\,679{,}59} = \frac{+29{,}94}{+69{,}9} = 23^\circ 11' 12''$$

$$\delta_{2-6} = \operatorname{arctg} \frac{Y_6 - Y_2}{X_6 - X_2} = \frac{648\,033{,}82 - 647\,981{,}40}{98\,780{,}42 - 98\,694{,}91} = \frac{+52{,}42}{+85{,}51} = 31^\circ 30' 34''$$

$$\delta_{3-7} = \operatorname{arctg} \frac{Y_7 - Y_3}{X_7 - X_3} = \frac{648\,002{,}61 - 647\,963{,}42}{98\,794{,}95 \quad 98\,700{,}98} = \frac{+39{,}19}{+93{,}97} = 22^\circ 38' 19''$$

$$\delta_{4-8} = \operatorname{arctg} \frac{Y_8 - Y_4}{X_8 - X_4} = \frac{647\,960{,}68 - 647\,939{,}69}{98\,795{,}89 \quad 98\,709{,}00} = \frac{+20{,}99}{+86{,}89} = 13^\circ 34' 51''$$

$$\alpha_1 = \delta_{B-A} - \delta_{1-5} = 108°39'31'' - 23°11'12'' = 85°28'19''$$

$$\alpha_2 = \delta_{B-A} - \delta_{2-6} = 108°39'31'' - 31°30'34'' = 77°08'57''$$

$$\alpha_3 = \delta_{B-A} - \delta_{3-7} = 108°39'31'' - 22°38'19'' = 86°01'12''$$

$$\alpha_4 = \delta_{B-A} - \delta_{4-8} = 108°39'31'' - 13°34'51'' = 95°04'40''$$

$$t_1 = \frac{d}{\sin\alpha_1} = \frac{18{,}72}{\sin 85°28'19''} = 18{,}779\,m$$

$$t_2 = \frac{d}{\sin\alpha_2} = \frac{18{,}72}{\sin 77°08'57''} = 19{,}201\,m$$

$$t_3 = \frac{d}{\sin\alpha_3} = \frac{18{,}72}{\sin 86°01'12''} = 18{,}765\,m$$

$$t_4 = \frac{d}{\sin\alpha_4} = \frac{18{,}72}{\sin 95°04'40''} = 18{,}794\,m$$

$$Y_1' = Y_1 \cdot t_1 \cdot \sin\delta_{1-5} = 648\,026{,}77 + 18{,}779 \cdot \sin 23°11'12'' = 648\,034{,}16$$

$$X_1' = X_1 \cdot t_1 \cdot \cos\delta_{1-5} = 98\,679{,}59 + 18{,}779 \cdot \cos 23°11'12'' = 98\,696{,}85$$

$$Y_2' = Y_2 \cdot t_2 \cdot \sin\delta_{2-6} = 647\,981{,}40 + 19{,}201 \cdot \sin 31°30'34'' = 647\,991{,}44$$

$$X_2' = X_2 \cdot t_2 \cdot \cos\delta_{2-6} = 98\,694{,}91 + 19{,}201 \cdot \cos 31°30'34'' = 98\,711{,}28$$

$$Y_3' = Y_3 \cdot t_3 \cdot \sin\delta_{3-7} = 647\,963{,}42 + 18{,}765 \cdot \sin 22°38'19'' = 647\,970{,}64$$

$$X_3' = X_3 \cdot t_3 \cdot \cos\delta_{3-7} = 98\,700{,}98 + 18{,}765 \cdot \cos 22°38'19'' = 98\,718{,}30$$

$$Y_4' = Y_4 \cdot t_4 \cdot \sin\delta_{4-8} = 647\,939{,}69 + 18{,}794 \cdot \sin 13°34'51'' = 647\,944{,}10$$

$$X_4' = X_4 \cdot t_4 \cdot \cos\delta_{4-8} = 98\,709{,}00 + 18{,}794 \cdot \cos 13°34'51'' = 98\,727{,}27$$

$$t_{4'3'} = \frac{Y_3' - Y_4'}{\sin\delta_{BA}} = \frac{647\,970{,}64 - 647\,944{,}10}{\sin 108°39'31''} = 28{,}01228\,m$$

$$t_{3'2'} = \frac{Y_2' - Y_3'}{\sin\delta_{BA}} = \frac{647\,911{,}44 - 647\,970{,}64}{\sin 108°39'31''} = 21{,}954\,m$$

$$t_{2'1'} = \frac{Y_{1'} - Y_{2'}}{\sin \delta_{BA}} = \frac{648\,034{,}16 - 647\,991{,}44}{\sin 108^\circ 39' 31''} = 45{,}09\,m$$

$$t_{4'1'} = \frac{Y_{1'} - Y_{4'}}{\sin \delta_{BA}} = \frac{648\,034{,}16 - 647\,944{,}10}{\sin 108^\circ 39' 31''} = 95{,}056\,m$$

$$T_{501/2} = \frac{t_{21} + t_{2'1'}}{2} \cdot d = \frac{47{,}93 + 38{,}4087}{2} \cdot 18{,}72 = 870{,}667\,m^2$$

$$T_{502/2} = \frac{t_{32} + t_{3'2'}}{2} \cdot d = \frac{19{,}00 + 28{,}635}{2} \cdot 18{,}72 = 383{,}33\,m^2$$

$$T_{503/2} = \frac{t_{43} + t_{4'3'}}{2} \cdot d = \frac{25{,}07 + 27{,}99117}{2} \cdot 18{,}72 = 496{,}85\,m^2$$

$$T_{501/1} = \frac{Y_6 + Y_5}{2} \cdot (X_6 - X_5) - \frac{Y_6 + Y_{2'}}{2} \cdot (X_6 - X_{2'}) + \cancel{\frac{Y_5 + Y_{2'}}{2} \cdot (X_5 - X_{2'})} + \frac{Y_5 + Y_{1'}}{2} \cdot (X_5 - X_{1'}) -$$

$$- \cancel{\frac{Y_5 + Y_{2'}}{2} \cdot (X_5 - X_{2'})} - \frac{Y_{2'} + Y_{1'}}{2} \cdot (X_{2'} - X_{1'}) = \frac{648\,033{,}82 + 648\,056{,}71}{2} \cdot (80{,}42 - 49{,}49) -$$

$$- \frac{648\,033{,}82 + 647\,991{,}43}{2} \cdot (780{,}42 - 711{,}28) + \frac{648\,056{,}71 + 648\,034{,}16}{2} \cdot (749{,}49 -$$

$$- 696{,}85) - \frac{647\,991{,}43 + 648\,034{,}16}{2} \cdot (711{,}28 - 696{,}85) = 2734{,}86\,m^2$$

$$T_{502/1} = \frac{Y_7 + Y_6}{2} \cdot (X_7 - X_6) + \cancel{\frac{Y_6 + Y_{3'}}{2} \cdot (X_6 - X_{3'})} - \frac{Y_7 + Y_{3'}}{2} \cdot (X_7 - X_{3'}) + \frac{Y_6 + Y_{2'}}{2} \cdot (X_6 - X_{2'}) -$$

$$- \cancel{\frac{Y_6 + Y_{3'}}{2} \cdot (X_6 - X_{3'})} - \frac{Y_{3'} + Y_{2'}}{2} \cdot (X_{3'} - X_{2'}) = \frac{648\,002{,}61 + 648\,033{,}82}{2} \cdot (94{,}95 - 80{,}42) -$$

$$- \frac{648\,002{,}61 + 647\,970{,}64}{2} \cdot (794{,}95 - 718{,}30) + \frac{648\,033{,}82 + 647\,991{,}43}{2} \cdot$$

$$\cdot (780{,}42 - 711{,}28) - \frac{647\,970{,}64 - 647\,991{,}43}{2} \cdot (718{,}30 - 711{,}28) = 2295{,}878\,m^2$$

$$T_{503/1}=\cancel{\frac{Y_7+Y_{4'}}{2}\cdot(X_7-X_{4'})}+\frac{Y_8+Y_7}{2}\cdot(X_8-X_7)-\frac{Y_8+Y_{4'}}{2}\cdot(X_8-X_{4'})-\cancel{\frac{Y_7+Y_{4'}}{2}\cdot(X_7-X_{4'})}+$$

$$+\frac{Y_7+Y_{3'}}{2}\cdot(X_7-X_{3'})-\frac{Y_{4'}+Y_{3'}}{2}\cdot(X_{4'}-X_{3'})=\frac{647\,960,77+648\,002,61}{2}\cdot(95,86-94,95)-$$

$$-\frac{647\,960,77+647\,944,10}{2}\cdot(795,86-727,27)+\frac{648\,002,61+647\,970,64}{2}\cdot$$

$$\cdot(794,95-718,30)-\frac{647\,944,10+647\,970,64}{2}\cdot(727,27-718,30)=2603,02$$

Végeredmények:

1. (648 026,77; 98 679,59)	1'. (648 034,16; 98 696,85)
2. (647 981,40; 98 694,91)	2'. (647 991,43; 98 711,28)
3. (647 963,42; 98 700,98)	3'. (647 970,64; 98 718,30)
4. (647 939,69; 98 709,00)	4'. (647 944,10; 98 727,27)
5. (648 056,71; 98 749,49)	
6. (648 033,82; 98 780,42)	
7. (648 002,61; 98 794,95)	
8. (647 960,68; 98 795,89)	

$T_{501/2}=870,667\,m^2$	$T_{501/1}=2734,86\,m^2$
$T_{502/2}=383,33\,m^2$	$T_{502/1}=2295,878\,m^2$
$T_{503/2}=496,85\,m^2$	$T_{503/1}=2603,02\,m^2$

64 930

VÍZÉPÍTÉSI ÉS VÍZGAZDÁLKODÁSI TANSZÉK

GEODÉZIA 2.

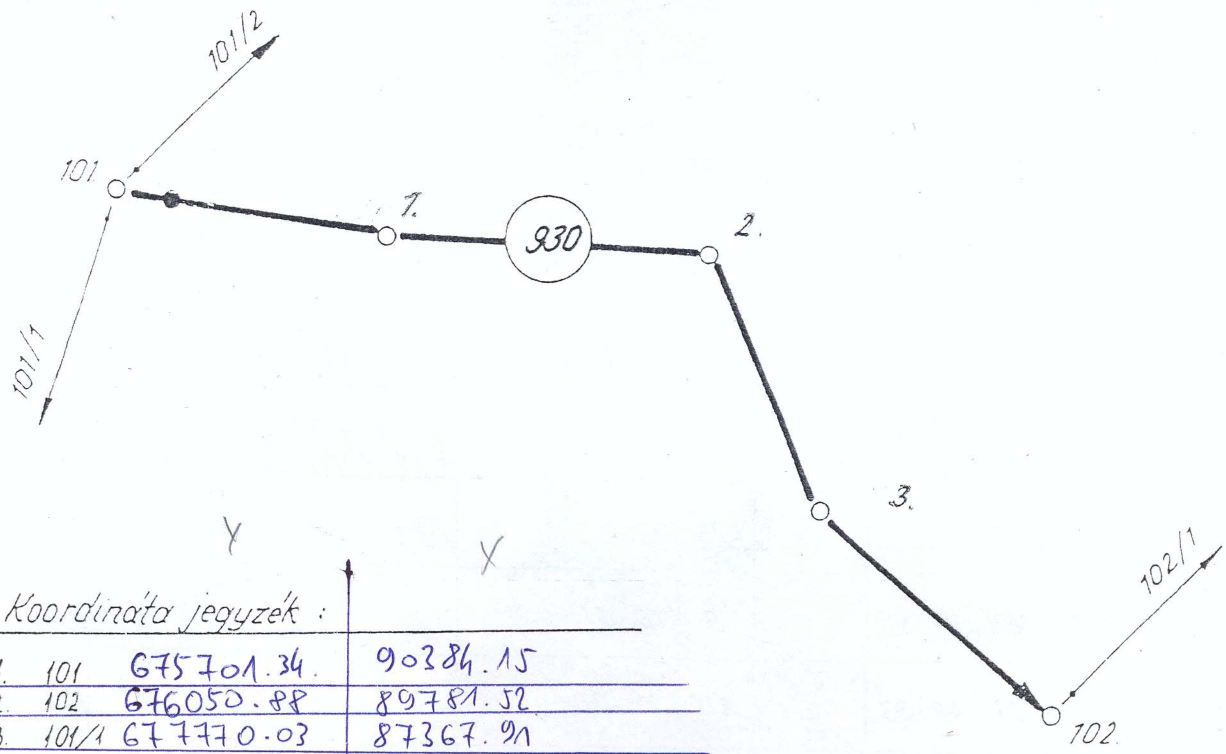
Név: ________________

A feladat száma:

Sokszögszámítás

Számítsa ki az ábrán látható 1., 2., 3. pont EOV koordinátáit!

Számítási vázlat:



Koordináta jegyzék:

		Y	X
1.	101	675701.34	90384.15
2.	102	676050.88	89781.52
3.	101/1	677770.03	87367.91
4.	101/2	674892.89	89182.99
5.	102/1	675267.8	86288.28

Távolságmérési jegyzőkönyv

Pontról-	pontra	Távolság
101.	1.	142.92
1.	2.	240.80
2.	3.	137.67
3.	102.	185.34

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Álláspont neve vagy száma, műszermag	Iránypont neve v. száma	I. távcsőállás °	′	″	I. középértéke ′	″	II. távcsőállás °	′	″	II. középértéke ′	″	I. és II. középértéke °	′	″	Törésszög vagy tájékozási szög °	′	″	Irányszög °	′	″
101	101/1	272	36	28			92	36	14			272	36	21	232	57	00	145	33	21
	101/2	340	59	44			161	59 00	62 02			340	59	53	232	56	42	213	56	35
	1	267	20	21			87	20	33			267	20	27				140	17	22 δ_k
										zk	zk	232	zk	=	232	56	55			
1	101	272	07	41			92	07	53			272	07	47						
	2	93	36	27			273	36	17			93	36	22	β_1 181	28	35	141	46	16
		181	28	46			181	28	24											
2	1	164	44	08			344	44	30			164	44	19						
	3	1	57	34			181	57	18			1	57	26	β_2 197	13	07	158	59	36
		197	13	26			197	12	48			197	13	07						
3	2	48	01	26			228	01	38			48	01	32						
	102	230	07	39			50	07	31			230	07	35	β_3 182	06	03	161	05	52
		182	06	13			182	05	53			182	06	03						
102	3	188	16	47			8	16	31			188	16	39				341	05	58
	102/1	39	48	33			219	48 49	60 01			39	48	47				152	49	19

$$B_1=(360^\circ+i_{12})-i_{11101}=360^\circ+93^\circ36'22''-272^\circ07'47''=181^\circ28'35''$$

$$B_2=(360^\circ+i_{2-3})-i_{1-3}=360^\circ+1^\circ57'26''-164^\circ44'19''=197^\circ13'07''$$

$$B_3=i_{3-102}-i_{3-2}=230^\circ07'35''-48^\circ01'32''=182^\circ06'03''$$

$$\delta_{101-10111}=\operatorname{arctg}\frac{Y_{10111}-Y_{101}}{X_{10111}-X_{101}}=\frac{677\,770{,}03-675\,701{,}34}{87\,367{,}91-90\,384{,}15}=\frac{+2068{,}69}{-3016{,}24}=180^\circ-34^\circ26'39''=$$

$$=145^\circ33'21''$$

$$\delta_{101-10112}=\operatorname{arctg}\frac{Y_{10112}-Y_{101}}{X_{10112}-X_{101}}=\frac{674\,892{,}89-675\,701{,}34}{89\,182{,}99-90\,384{,}15}=\frac{-808{,}45}{-1201{,}16}=180^\circ+33^\circ56'35''=$$

$$=213^\circ56'35''$$

$$t_{101-10111}=\frac{Y_{10111}-Y_{101}}{\sin\delta_{101-10111}}=\frac{677\,770{,}03-675\,701{,}34}{\sin 145^\circ33'21''}=\frac{2068{,}69}{\sin 145^\circ33'21''}=3657{,}50$$

$$t_{101-10112}=\frac{Y_{10112}-Y_{101}}{\sin\delta_{101-10112}}=\frac{674\,892{,}89-675\,701{,}34}{\sin 213^\circ36'35''}=\frac{-808{,}45}{\sin 213^\circ56'35''}=1447{,}88$$

$$z_{101-10111}=\delta_{101-10111}-i_{10111}=360^\circ+145^\circ33'21''-272^\circ36'21''=232^\circ57'00''$$

$$z_{101-10112}=\delta_{101-10112}-i_{10112}=360^\circ+213^\circ56'35''-340^\circ59'53''=232^\circ56'42''$$

$$z_K=\frac{z_{101-10111}\cdot t_{101-10111}+z_{101-10112}\cdot t_{101-10112}}{t_{101-10111}+t_{101-10112}}=\frac{232^\circ57'00''\cdot 3657{,}50+232^\circ56'42''\cdot 1447{,}88}{3657{,}50+1447{,}88}=$$

$$z_K=232^\circ56'55''$$

$\delta_K = Z_K + \iota_{101-1} = 232°56'55" + 267°20'27" = 140°17'22"$

$$\delta_{102-1021/1} = \operatorname{arctg} \frac{Y_{1021/1} - Y_{102}}{X_{1021/1} - X_{102}} = \frac{675\,267{,}80 - 676\,050{,}88}{86\,288{,}28 - 89\,781{,}52} = \frac{-783{,}08}{-3493{,}24} =$$

$= 180° + 12°38'06" = 192°38'06"$

$Z_V = \delta_{102-1021/1} - \iota_{102/1021/1} = 192°38'06" - 39°48'47" = 152°49'19"$

$\delta_V = Z_V + \iota_{102-3} = 152°49'19" + 188°16'39" = 341°05'58"$

$\delta_1 = \delta_K + 180° + \beta_1 = 140°17'22" + 180° + 181°28'35" = 141°45'57"$

$\delta_2 = \delta_1 + 180° + \beta_2 = 141°45'57" + 180° + 197°13'07" = 158°59'04"$

$\delta_3 = \delta_2 + 180° + \beta_3 = 158°59'04" + 180° + 182°06'03" = 161°05'07"$

$\delta_V' = \delta_3 + 180° = 161°05'07" + 180° = 341°05'07"$

$\delta_\phi = \delta_V - \delta_V' = 341°05'58" - 341°05'07" = 00°00'51"$

Szögzáróhiba javitás:

$$\frac{\delta_\phi}{n+1} = \frac{00°00'51"}{4} = 12{,}75"$$

$\delta_{k_{jav}} = 140°17'22'' + 00°00'06'' = 140°17'28''$

$\beta_{1jav} = 181°28'35'' + 00°00'13'' = 181°28'48''$

$\beta_{2jav} = 197°13'07'' + 00°00'13'' = 197°13'20''$

$\beta_{3jav} = 182°06'03'' + 00°00'13'' = 182°06'16''$

$\delta_{v_{jav}} = 341°05'58'' + 00°00'07'' = 341°06'05''$

Javított tájékozási irányértékek.

$\delta_{1-2} = \delta_{k_{jav}} + 180° + \beta_{1jav} = 140°17'28'' + 180° + 181°28'48'' = 141°46'16''$

$\delta_{2-3} = \delta_{1-2} + 180° + \beta_{2jav} = 141°46'16'' + 180° + 197°13'20'' = 158°59'36''$

$\delta_{3-102} = \delta_{2-3} + 180° + \beta_{3jav} = 158°59'36'' + 180° + 182°06'16'' = 161°05'52''$

$\delta_{v_{jav}} = \delta_{3-102} + 180° = 341°05'52''$

$\Delta Y_i = t_i \cdot \sin\delta_i$ $\qquad$ $\Delta X_i = t_i \cdot \cos\delta_i$

$\Delta Y_{101-1} = t_{101-1} \cdot \sin\delta_{k_{jav}} = 142{,}92 \cdot \sin 140°17'28'' = 91{,}31$

$\Delta Y_{1-2} = t_{1-2} \cdot \sin\delta_{1-2} = 240{,}80 \cdot \sin 141°46'16'' = 149{,}01$

$\Delta Y_{2-3} = t_{2-3} \cdot \sin\delta_{2-3} = 137,67 \cdot \sin 158°59'36'' = 49,35$

$\Delta Y_{3-102} = t_{3-102} \cdot \sin\delta_{3-102} = 185,34 \cdot \sin 161°05'52'' = 60,04$

$\Sigma \Delta Y = 349,71$

$\Delta X_{101-1} = t_{101-1} \cdot \cos\delta_{kjav} = 142,92 \cdot \cos 140°17'28'' = -109,95$

$\Delta X_{1-2} = t_{1-2} \cdot \cos\delta_{1-2} = 240,80 \cdot \cos 141°46'16'' = -189,16$

$\Delta X_{2-3} = t_{2-3} \cdot \cos\delta_{2-3} = 137,67 \cdot \cos 161°05'52'' = -175,35$

$\Sigma \Delta X = -602,98$

$d_y = (Y_v - Y_k) - \Sigma \Delta Y = (676\,050,88 - 675\,701,34) - 349,71 = -0,17$

$d_x = (X_v - X_k) - \Sigma \Delta X = (89\,781,52 - 90\,384,15) - (-602,98) = 0,35$

$\Sigma t = t_{101-1} + t_{1-2} + t_{2-3} + t_{3-102} = 142,92 + 240,80 + 137,67 + 185,34 = 706,73$

$\Delta Y_{101-1jav.} = \Delta Y_{101-1} + t_{101-1} \cdot \frac{d_y}{\Sigma t} = 91,31 + 142,92 \cdot \frac{-0,17}{706,73} = 91,28$

$\Delta Y_{1-2jav.} = \Delta Y_{1-2} + t_{1-2} \cdot \frac{d_y}{\Sigma t} = 149,01 + 240,80 \cdot \frac{-0,17}{706,73} = 148,95$

$\Delta Y_{2-3jav.} = \Delta Y_{2-3} + t_{2-3} \cdot \frac{d_y}{\Sigma t} = 49,35 + 137,67 \cdot \frac{-0,17}{706,73} = 49,32$

$$\Delta Y_{3-102jav} = \Delta Y_{3-102} + t_{3-102} \cdot \frac{dy}{\Sigma t} = 60{,}04 + 185{,}34 \cdot \frac{-0{,}17}{706{,}73} = 60{,}00$$

$$\Delta X_{101-1jav} = \Delta X_{101-1} + t_{101-1} \cdot \frac{dx}{\Sigma t} = -109{,}95 + 91{,}31 \cdot \frac{0{,}35}{706{,}73} = -109{,}90$$

$$\Delta X_{1-2jav} = \Delta X_{1-2} + t_{1-2} \cdot \frac{dx}{\Sigma t} = -189{,}16 + 240{,}80 \cdot \frac{0{,}35}{706{,}73} = -189{,}04$$

$$\Delta X_{2-3jav} = \Delta X_{2-3} + t_{2-3} \cdot \frac{dx}{\Sigma t} = -128{,}52 + 137{,}67 \cdot \frac{0{,}35}{706{,}73} = -128{,}45$$

$$\Delta X_{3-102jav} = \Delta X_{3-102} + t_{3-102} \cdot \frac{dx}{\Sigma t} = -175{,}35 + 185{,}34 \cdot \frac{0{,}35}{706{,}73} = -175{,}26$$

$$Y_1 = Y_{101} + \Delta Y_{101jav} = 675\,701{,}34 + 91{,}28 = 675\,792{,}62$$

$$Y_2 = Y_1 + \Delta Y_{1-2jav} = 675\,792{,}62 + 148{,}95 = 675\,941{,}57$$

$$Y_3 = Y_2 + \Delta_{2-3jav} = 675\,941{,}57 + 49{,}32 = 675\,990{,}89$$

$$Y_{102} = Y_3 + \Delta Y_{3-102jav} = 675\,990{,}89 + 60{,}00 = 676\,050{,}89$$

$$X_1 = X_{101} + \Delta X_{101jav} = 90\,384{,}15 + (-109{,}90) = 90\,274{,}25$$

$$X_2 = X_1 + \Delta X_{1-2jav} = 90\,274{,}25 + (-189{,}04) = 90\,085{,}21$$

$$X_3 = X_2 + \Delta X_{2-3jav} = 90\,085{,}21 + (-128{,}45) = 89\,956{,}76$$

$$X_{102} = X_3 + \Delta X_{3-102jav} = 89\,956{,}76 + (-175{,}26) = 89\,781{,}50$$

1. $(Y_1, X_1) = (675\ 792{,}62;\ 90\ 274{,}25)$

2. $(Y_2, X_2) = (675\ 941{,}57;\ 90\ 085{,}21)$

3. $(Y_3, X_3) = (675\ 990{,}89;\ 89\ 956{,}76)$

102. $(Y_{102}, X_{102}) = (676\ 050{,}89;\ 89\ 781{,}50)$

2.sz. gyakorlat

1., feladat:

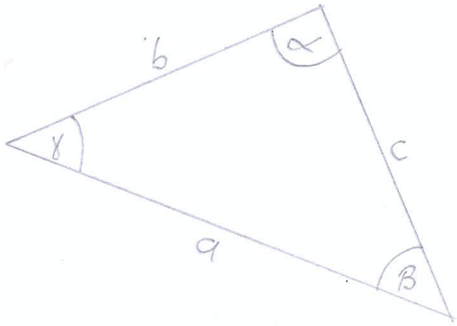
adott: $a = 1045{,}82$

$c = 852{,}98$

$\beta = 71°51'52''$

$b = ?$

$\alpha = ?$



$$b^2 = a^2 + c^2 - 2 \cdot a \cdot c \cdot \cos\beta$$

$$b^2 = 1\,045{,}82^2 + 852{,}98^2 - 2 \cdot 1045{,}82 \cdot 852{,}96 \cdot \cos 71°51'52''$$

$$\underline{b = 1\,125{,}16\ m}$$

$$\frac{a}{b} = \frac{\sin\alpha}{\sin\beta} \Rightarrow \sin\alpha = \frac{a}{b} \cdot \sin\beta = \frac{1\,045{,}82}{1125{,}16} \cdot \sin 71°51'52''$$

$$\underline{\alpha = 62°02'40''}$$

$$\gamma = 180° - (\alpha + \beta) = 46°05'28''$$

$$\underline{\gamma = 46°05'28''}$$

Czerovszki Zsolt /24./

ép.lev.1.évf.

2. sz. gyakorlat. 2. feladat

Adott:

$Y_0 = 640\,812{,}05$

$X_0 = 92\,003{,}18$

$\varphi = 42°18'45''$

$a_1 = 73{,}65$

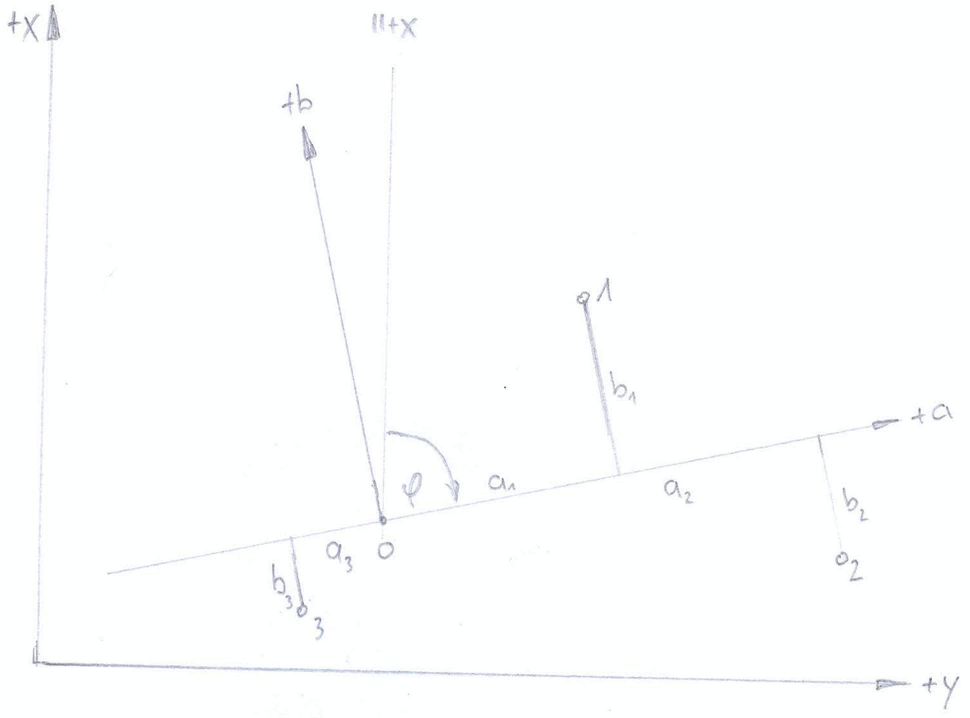
$b_1 = 26{,}74$

$a_2 = 103{,}18$

$b_2 = -41{,}28$

$a_3 = -74{,}08$

$b_3 = -20{,}05$



$1(Y_1; X_1); 2(Y_2; X_2); 3(Y_3; X_3) = ?$

$Y_1 = Y_0 + a_1 \cdot \sin\varphi - b_1 \cdot \cos\varphi = 640\,812{,}05 + 73{,}65 \cdot \sin 42°18'45'' - 26{,}74 \cdot \cos 42°18'45'' = 640\,841{,}86$

$X_1 = X_0 + a_1 \cdot \cos\varphi + b_1 \cdot \sin\varphi = 92\,003{,}18 + 73{,}65 \cdot \cos 42°18'45'' + 26{,}74 \cdot \sin 42°18'45'' = 92\,075{,}64$

$Y_2 = Y_0 + a_2 \cdot \sin\varphi - b_2 \cdot \cos\varphi = 640\,812{,}05 + 103{,}18 \cdot \sin 42°18'45'' - (-41{,}28 \cdot \cos 42°18'45'') = 640\,912{,}03$

$X_2 = X_0 + a_2 \cdot \cos\varphi + b_2 \cdot \sin\varphi = 92\,003{,}18 + 103{,}18 \cdot \cos 42°18'45'' + (-41{,}28 \cdot \sin 42°18'45'') = 92\,051{,}69$

$Y_3 = Y_0 + a_3 \cdot \sin\varphi - b_3 \cdot \cos\varphi = 640\,812{,}05 + (-74{,}08 \cdot \sin 42°18'45'') - (-20{,}05 \cdot \cos 42°18'45'') = 640\,777{,}01$

$X_3 = X_0 + a_3 \cdot \cos\varphi + b_3 \cdot \sin\varphi = 92\,003{,}18 + (-74{,}08 \cdot \cos 42°18'45'') + (-20{,}05 \cdot \sin 42°18'45'') = 91\,934{,}90$

1. (640 841,86 ; 92 075,64)

2. (640 912,03 ; 92 051,69)

3. (640 777,01 ; 91 934,90)

Czerovszki Zsolt 124.1
ép. lev. 1. évf.

2.sz. gyakorlat

3. feladat

Adott:

$Y_1 = 641\ 328{,}16$

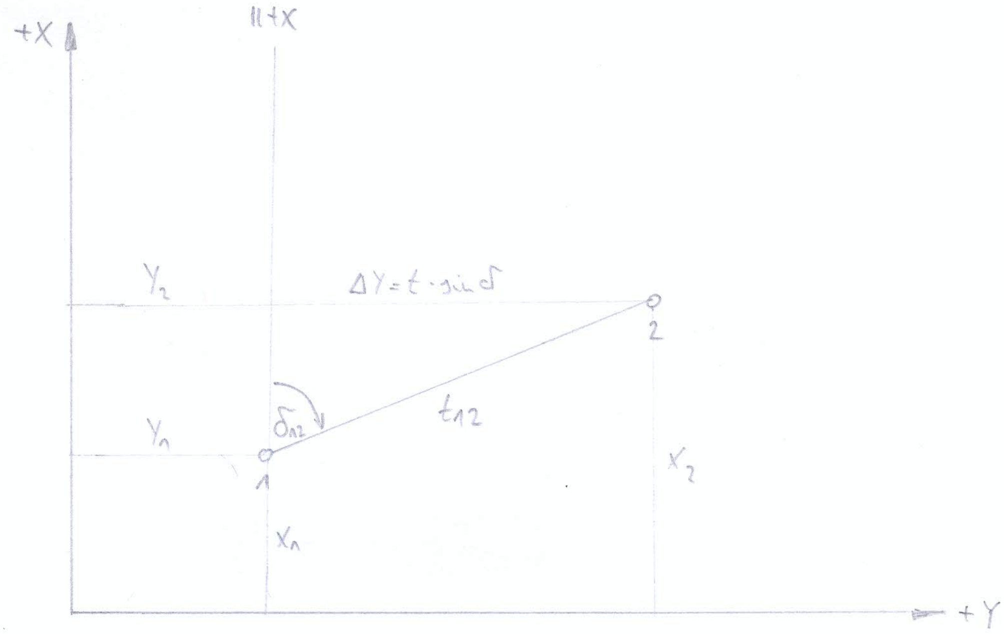
$X_1 = 92\ 988{,}17$

$t_{12} = 1\ 216{,}08\ m$

$\delta_{12} = 168°44'16''$

$Y_2 = ?$

$X_2 = ?$



$Y_2 = Y_1 + t_{12} \cdot \sin\delta_{12} = 641\ 328{,}16 + 1216{,}08 \cdot \sin 168°44'16'' = 641\ 565{,}66$

$X_2 = X_1 + t_{12} \cdot \cos\delta_{12} = 92\ 988{,}17 + 1216{,}08 \cdot \cos 168°44'16'' = 91\ 795{,}51$

2.(641 565,66; 91 795,51)

Czerovszki Zsolt 124.1
ép. lev. 1. évf.

2. sz. gyakorlat

4. feladat

Adott:

$Y_1 = 640\,906{,}10$

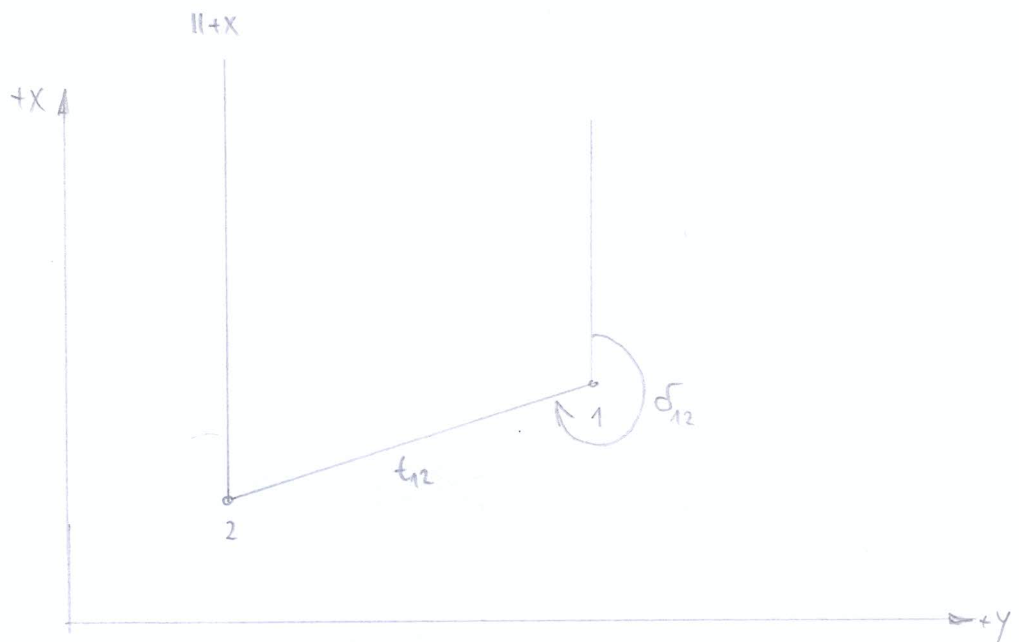
$X_1 = 93\,004{,}15$

$Y_2 = 640\,338{,}89$

$X_2 = 92\,215{,}35$

$\delta_{12} = ?$

$t_{12} = ?$



$$tg\,\delta_{12} = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{640\,338{,}89 - 640\,906{,}10}{92\,215{,}35 - 93\,004{,}15} = \frac{-567{,}21}{-788{,}80} \Rightarrow 35°43'09''$$

$$\delta_{12} = \frac{-}{-} \Rightarrow = 180° + 35°43'09'' = 215°43'09''$$

$$\underline{\underline{\delta_{12} = 215°43'09''}}$$

$$t_{12} = \frac{Y_2 - Y_1}{\sin\delta_{12}} = \frac{640\,338{,}89 - 640\,906{,}10}{\sin 215°43'09''} = \frac{-567{,}21}{\sin 215°43'09''} = 971{,}56\,m$$

$$\underline{\underline{t_{12} = 971{,}56\,m}}$$

Ell.:

$$t_{12} = \frac{X_2 - X_1}{\cos\delta_{12}} = \frac{92\,215{,}35 - 93\,004{,}15}{\cos 215°43'09''} = \frac{-788{,}80}{\cos 218°43'09''} = 971{,}56\,m$$

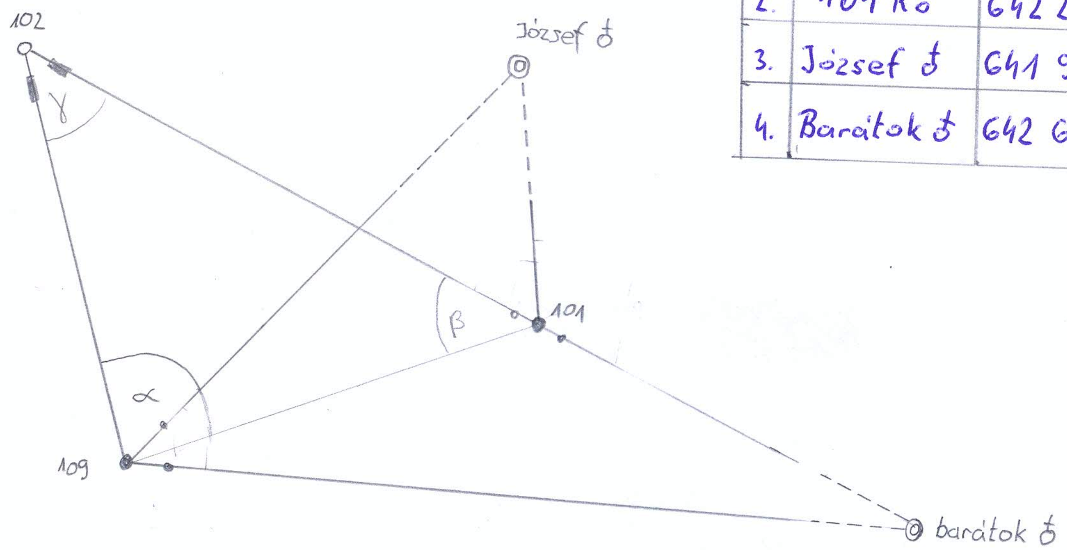
Czerovszki Zsolt /24.1

ép. lev. 1. évf.

3. gyakorlat: Előmetszés

Koordináta-jegyzék

Sor	pont neve	Y [m]	X [m]
1.	109 Kő	641 168,96	92 990,04
2.	101 Kő	642 283,81	92 841,48
3.	József ♁	641 955,08	93 859,78
4.	Barátok ♁	642 669,57	92 554,00



Szögmérési Jegyzőkönyv

Állás-pont	Irányított pont	I. távcsőállás °	′	″	I. Középért ′	″	II. távcsőállás °	′	″	II Középért. ′	″	I-II Közép értéke °	′	″	tájékozási szög °	′	″	Irányszög °	′	″
109 Kő	102 Kő											210	02	47	145	34	48	355	37	35
	József ♁	256	30 31	58 10	31	04	76	32	04 12	32	08	256	31	36	145	35	00	42	06	36
	Barátok ♁	320	36 37	51 01	36	56	140	37 38	58 10	38	04	320	37	30	145	34	39	106	12	09
														ZK=	145	34	48			
101 Kő	102 Kő											146	30	19	167	45	09	314	15	28
	József ♁	174	20	49 50	20	52	354	21 22	53 03	21	58	174	21	25	167	45	07	342	06	32
	Barátok ♁	318	55	49 59	55	54	138	56 57	52 04	56	58	318	56	26	167	45	15	126	41	41
														ZK=	167	45	09			

Czerovszki Zsolt /24./
ép.lev. 1. évf.

$$\delta_{109-7} = \text{arc tg} \frac{Y_7 - Y_{109}}{X_7 - Y_{109}} = \frac{641\,955{,}08 - 641\,168{,}96}{93\,859{,}78 - 92\,990{,}04} = \frac{+786{,}12}{+869{,}71} = 42°06'36''$$

$$\delta_{109-B} = \text{arc tg} \frac{Y_B - Y_{109}}{X_B - X_{109}} = \frac{642\,669{,}57 - 641\,168{,}96}{92\,554{,}00 - 92\,990{,}04} = \frac{+1500{,}61}{-436{,}04} = 180° - 73°47'51'' = 106°12'09''$$

$$\delta_{101-7} = \text{arc tg} \frac{Y_7 - Y_{101}}{X_7 - X_{101}} = \frac{641\,955{,}08 - 642\,283{,}81}{93\,859{,}78 - 92\,841{,}48} = \frac{-328{,}73}{+1018{,}30} = 360° - 17°53'28'' = 342°06'32''$$

$$\delta_{101-B} = \text{arc tg} \frac{Y_B - Y_{101}}{X_B - X_{101}} = \frac{642\,669{,}57 - 642\,283{,}81}{92\,554{,}00 - 92\,841{,}48} = \frac{+385{,}76}{-287{,}48} = 180° - 53°18'19'' = 126°41'41''$$

$$t_{109-7} = \frac{Y_7 - Y_{109}}{\sin\delta_{109-7}} = \frac{641\,955{,}08 - 641\,168{,}96}{\sin 42°06'36''} = 1172{,}34\text{ m}$$

$$t_{109-B} = \frac{Y_B - Y_{109}}{\sin\delta_{109-B}} = \frac{642\,669{,}57 - 641\,168{,}96}{\sin 106°12'09''} = 1562{,}68\text{ m}$$

$$z_{109-7} = \delta_{109-7} - i_7 = 42°06'36'' - 256°31'36'' = 145°35'00''$$

$$z_{109-B} = \delta_{109-B} - i_B = 106°12'09'' - 320°37'30'' = 145°34'39''$$

$$z_k = \frac{(z_{109-7} \cdot t_{109-7}) + (z_{109-B} \cdot t_{109-B})}{t_{109-7} + t_{109-B}} = \frac{(145°35'00'' \cdot 1172{,}34) + (145°34'39'' \cdot 1562{,}68)}{1172{,}34 + 1562{,}68} = 145°34'48''$$

$$e_{\text{józsefő}} = z_{109-7} - z_k = 145°35'00'' - 145°34'48'' = 12''$$

$$e_{\text{Barcitető}} = z_{109-B} - z_k = 145°34'39'' - 145°34'48'' = -8''$$

$$e_{\text{józsefmegengedett}} = \frac{20}{\sqrt{t_{109-7}}} = \frac{20}{\sqrt{1{,}17}} = 18{,}49 = 18''$$

$$e_{\text{Barcitető megeng.}} = \frac{20}{\sqrt{t_{109-B}}} = \frac{20}{\sqrt{1{,}56}} = 16{,}01 = 16''$$

$$Z_{101-7} = \delta_{101-7} - \iota_{101-7} = 342°06'32'' - 174°21'25'' = 167°45'07''$$

$$Z_{101-B} = \delta_{101-B} - \iota_{101-B} = 126°41'41'' - 318°56'26'' = 167°45'15''$$

$$t_{101-B} = \frac{Y_B - Y_{101}}{\sin \delta_{101-B}} = \frac{642\,669{,}57 - 642\,283{,}81}{\sin 126°41'41''} = 481{,}10\,m$$

$$t_{101-7} = \frac{Y_7 - Y_{101}}{\sin \delta_{101-7}} = \frac{641\,955{,}08 - 642\,283{,}81}{\sin 342°06'32''} = 1070{,}05\,m$$

$$Z_{K_2} = \frac{Z_{101-7} \cdot t_{101-7} + Z_{101-B} \cdot t_{101-B}}{t_{101-7} + t_{101\,B}} = \frac{167°45'07'' \cdot 1070{,}05 + 167°45'15'' \cdot 481{,}10}{1070{,}05 + 481{,}10} = 167°45'09''$$

$$e_j = Z_{101-7} - Z_k = 167°45'07'' - 167°45'09'' = -2''$$

$$e_B = Z_{101\,B} - Z_k = 167°45'15'' - 167°45'09'' = 6''$$

$$e_{j\,megeng.} = \frac{20}{\sqrt{t_{101-7}}} = \frac{20}{\sqrt{1{,}070}} = 19''$$

$$e_{B\,megeng.} = \frac{20}{\sqrt{t_{101-B}}} = \frac{20}{\sqrt{0{,}48}} = 29''$$

$$\delta_{109-101} = \operatorname{arctg} \frac{Y_{101} - Y_{109}}{X_{101} - X_{109}} = \frac{642\,283{,}81 - 641\,168{,}96}{92\,841{,}48 - 92\,990{,}04} = \frac{+1114{,}85}{-148{,}56} = 180° - 82°24'35'' =$$

$$= 97°35'25''$$

$$\alpha = 360° - \delta_{109-102} + \delta_{109-101} = 355°37'35'' + 97°35'25'' = 101°57'50''$$

$$\delta_{109-102} = Z_{K_1} + \iota_{109-102} = 145°34'48'' + 210°02'47'' = 355°37'35''$$

$$\delta_{101-102} = Z_{K_2} + \iota_{101-102} = 167°45'09'' + 146°30'19'' = 314°15'28''$$

$$t_{109-101} = \frac{Y_{101} - Y_{109}}{\sin \delta_{109-101}} = \frac{642\,283,81 - 641\,168,96}{\sin 97°35'25''} = 1105,08\,m$$

$$\beta = \delta_{101-102} - \delta_{101-109} = 314°15'28'' - 277°35'25'' = 36°40'03''$$

$$\gamma = 180° - (\alpha + \beta) = 180° - (101°57'50'' + 36°40'03'') = 41°22'07''$$

$$\delta_{101-109} = 180° + \delta_{109-101} = 180° + 97°35'27'' = 277°35'25''$$

$$t_{102-101} = \frac{t_{109-101}}{\sin \gamma} \cdot \sin \alpha = \frac{1105,08}{\sin 41°22'07''} \cdot \sin 101°57'50'' = 1664,803\,m$$

$$t_{109-102} = \frac{t_{109-101}}{\sin \gamma} \cdot \sin \beta = \frac{1105,08}{\sin 41°22'07''} \cdot \sin 36°40'03'' = 1016,25\,m$$

$$Y_{102} = Y_{109} + t_{109-102} \cdot \sin \delta_{109-102} = 641\,168,96 + 1016,25 \cdot \sin 355°37'35'' = 641\,091,46$$

$$X_{102} = X_{109} + t_{109-102} \cdot \cos \delta_{109-102} = 92\,990,04 + 1016,25 \cdot \cos 355°37'35'' = 94\,003,33$$

Ell.:

$$Y_{102} = Y_{101} + t_{101-102} \cdot \sin \delta_{101-102} = 642\,283,81 + 1664,803 \cdot \sin 314°15'28'' = 641\,091,46$$

$$X_{102} = X_{101} + t_{101-102} \cdot \cos \delta_{101-102} = 92\,841,48 + 1664,803 \cdot \cos 314°15'28'' = 94\,003,33$$

$$\underline{\underline{102.\,(641\,091,46;\ 94\,003,33)}}$$

Czerovszki Zsolt /24./
1. évf. ép. lev.

4. sz. gyakorlat /ívmetszés/

Adott:

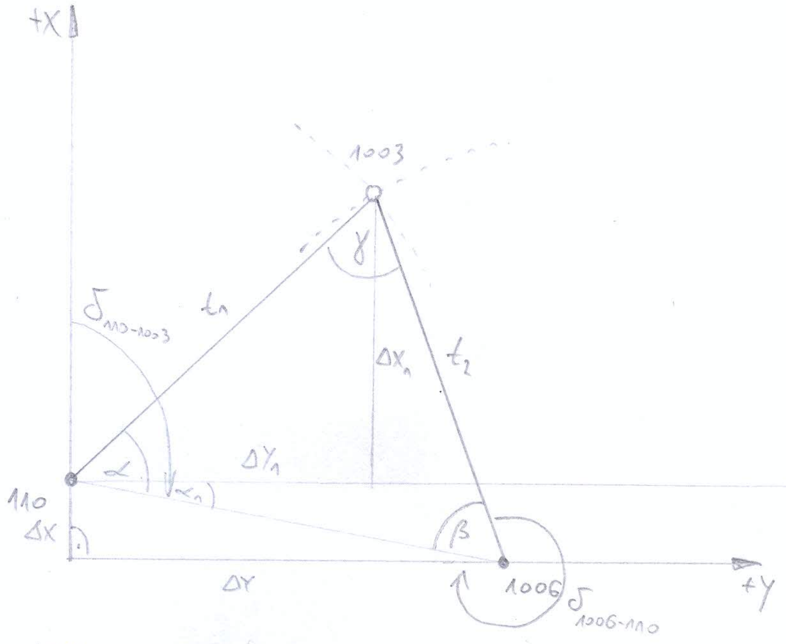
Koordináta jegyzék:

	Y	X
110	640 010,91	101 882,38
1006	640 363,46	101 744,16

Távolságok:

$t_1 = 390{,}29$

$t_2 = 454{,}63$



$\Delta X = X_1 - X_2 = 101\,882{,}38 - 101\,744{,}16 = 138{,}22$

$\Delta Y = Y_1 - Y_2 = 640\,363{,}46 - 640\,010{,}91 = 352{,}55$

$t_3 = \sqrt{\Delta x^2 + \Delta Y^2} = 378{,}68\,m$

$S = \frac{1}{2}(t_1 + t_2 + t_3) = \frac{1}{2}(390{,}29 + 454{,}63 + 378{,}68) = 611{,}8$

$tg\,\alpha/2 = \sqrt{\frac{(S-t_3)\cdot(S-t_1)}{S\cdot(S-t_2)}} = \sqrt{\frac{233{,}12 \cdot 221{,}51}{96\,156{,}606}} = 0{,}7328 \Rightarrow \alpha = 72°28'10''$

$tg\,\beta/2 = \sqrt{\frac{(S-t_3)\cdot(S-t_2)}{S\cdot(S-t_1)}} = \sqrt{\frac{233{,}12 \cdot 157{,}17}{135\,519{,}818}} = 0{,}51996 \Rightarrow \beta = 54°56'44''$

$\gamma = 180° - (\alpha + \beta) = 52°35'06''$

$\cos \alpha_1 = \frac{\Delta Y}{t_3} = \frac{352{,}55}{378{,}68} \Rightarrow \alpha_1 = 21°24'33''$

$\delta_{110-1003} = 90° - (\alpha - \alpha_1) = 38°56'23''$

$\delta_{110-1006} = \delta_{110-1003} + \alpha = 111°24'33''$

$\underline{Y_{1003}} = Y_1 + t_1 \cdot \sin \delta_{110-1003} = 640\,010{,}91 + 390{,}29 \cdot \sin 38°56'23'' = \underline{640\,256{,}21}$

$\underline{X_{1003}} = X_1 + t_1 \cdot \cos \delta_{110-1003} = 101\,882{,}38 + t_1 \cdot \cos 38°56'23'' = \underline{102\,185{,}95}$

Ell.: $\delta_{1006-1003} = \delta_{110-1006} + 180° + \beta = 346°21'17''$

$\underline{Y_{1003}} = Y_2 + t_2 \cdot \sin \delta_{1006-1003} = \underline{640\,256{,}21}$

$\underline{X_{1003}} = X_2 + t_2 \cdot \cos \delta_{1006-1003} = \underline{102\,185{,}95}$

Derekszogu-koordinatameres						
d=	11.13					
ay	648055.35					
ax	98669.94					
db	265.6610503	342.4875	a	0		
tb	149.78	123.25	b	58.595		
1	30.19	0	5	8.11333333	44.38	
2	78.12	0	6	64.3983333	35.49	
3	97.12	0	7	86.59166667	64.57	
4	122.19	0				
8	130.11	-89.12				
b	149.92					
metszéspontok					polaris pontok szamitasa	
sor	nev	d	by	bx	cy	cx
1	MODOK GABOR	11.13	647906.00	98658.61	648018.26	98787.48
2		11.46	647905.82	98661.22	648020.32	98788.11
3	[illegible]	11.79	647905.69	98663.83	648022.39	98788.70
4		12.12	647905.61	98666.44	648024.46	98789.26
5		12.45	647905.57	98669.05	648026.55	98789.78
6		12.78	647905.58	98671.67	648028.65	98790.26
7		13.11	647905.63	98674.28	648030.75	98790.71
8		13.44	647905.73	98676.89	648032.86	98791.12
9		13.77	647905.88	98679.50	648034.98	98791.50
10		14.10	647906.07	98682.11	648037.11	98791.83
11		14.43	647906.30	98684.71	648039.24	98792.13
12	[illegible]	14.76	647906.58	98687.31	648041.37	98792.39
13		15.09	647906.91	98689.91	648043.51	98792.62
14		15.42	647907.28	98692.50	648045.65	98792.81
15	[illegible]	15.75	647907.69	98695.08	648047.80	98792.96
16		16.08	647908.16	98697.65	648049.95	98793.07
17		16.41	647908.66	98700.21	648052.10	98793.15
18		16.74	647909.21	98702.77	648054.25	98793.19
19		17.07	647909.81	98705.31	648056.40	98793.19
20		17.40	647910.45	98707.85	648058.55	98793.15
21		17.73	647911.13	98710.37	648060.70	98793.07
22		18.06	647911.86	98712.88	648062.85	98792.96
23		18.39	647912.63	98715.38	648064.99	98792.81
24	[illegible]	18.72	647913.44	98717.86	648067.14	98792.63
25	[illegible] Szabolcs	19.05	647914.30	98720.33	648069.28	98792.40
26		19.38	647915.20	98722.79	648071.41	98792.14
27		19.71	647916.15	98725.23	648073.54	98791.84
28		20.04	647917.13	98727.65	648075.67	98791.50
29		20.37	647918.16	98730.05	648077.78	98791.13
30		20.70	647919.23	98732.44	648079.90	98790.72
31		21.03	647920.34	98734.80	648082.00	98790.27
32		21.36	647921.50	98737.15	648084.10	98789.79
33		21.69	647922.69	98739.47	648086.18	98789.27
34		22.02	647923.92	98741.78	648088.26	98788.71
35		22.35	647925.20	98744.06	648090.33	98788.12

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