

Practice exercise for the computation of the line leveling.

Our task is to find the reduced level of point no. 35. In order to do this, we created a levelling line that connects this point to two benchmarks, 1002 and 5040. The field book below contains the measurements of the forward and backward levelling.

Point ID	Distance	Backsight	Foresight	Rise/Fall	Reduced level
1002	–	0974			102.478
CP1	51	1224	0969		
CP2	48	0961	1223		
CP3	35	1469	1189		
CP4	51	1187	1723		
35	35	1339	1778		
CP5	59	1172	1020		
CP6	64	1058	0966		
CP7	56	1517	0945		
CP8	32	0925	1012		
5040	31		1137		102.328
5040	–	1122			102.328
CP9	38	0743	0912		
CP10	22	1632	1246		
CP11	50	0823	1742		
CP12	55	1168	1027		
35	60	2315	1489		
CP13	42	1313	1727		
CP14	52	1646	1056		
CP15	37	1595	1420		
CP16	53	1015	1597		
1002	59		1021		102.478

Completed field book:

Point ID	Distance	Backsight	Foresight	Rise/Fall	Elevation [m]
1002	–	0974			102.478
CP1	51	1224	0969	+5	
CP2	48	0961	1223	+1	
CP3	35	1469	1189	-228	
CP4	51	1187	1723	-254	
35	35	1339	1778	-591	
CP5	59	1172	1020	+319	
CP6	64	1058	0966	+206	
CP7	56	1517	0945	+113	
CP8	32	0925	1012	+505	
5040	31		1137	-212	102.328
Σ	462	10852	11962	-136	-150
5040	–	1122			102.328
CP9	38	0743	0912	+210	
CP10	22	1632	1246	-503	
CP11	50	0823	1742	-110	
CP12	55	1168	1027	-204	
35	60	2315	1489	-321	
CP13	42	1313	1727	+588	
CP14	52	1646	1056	+257	
CP15	37	1595	1420	+226	
CP16	53	1015	1597	-2	
1002	59		1021	-6	102.478
Σ	468	13372	13237	+135	+150

Computation of the elevation of the unknown point:

Point ID	Distance	Forward	Backward	Average	Correction	Corrected elevation difference	Reduced level [m]
1002							102.478
	222	-1067	+1063	-1065	-7	-1072	101.406
35	242	+931	-928	+930	-8	+922	
5040							102.328
Σ	464			-135	$\Delta h_{\text{meas}} = -15 \text{ mm}$		$\Delta h_{\text{true}} = -150 \text{ mm}$