



SLOPE ANGLE CORRECTION COMPUTER PROGRAM FOR A ONE-MAN SURVEY

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PROBLEM

In surveys which require slope corrections, for example, staking, making of grid, or road traverses, an accurate measurement of the ground slope is required. Normally an assistant's height is sufficient, but in doing a survey alone another method is necessary.

SOLUTION

By sighting onto the ground and knowing the distance from the eye height, the following formula can be used to accurately calculate the slope angle.

DEFINITION

The angle of sight (A/S) is the declination above (+) or below (-) the horizon, measured with a clinometer.

METHOD

The geometric relationship of the line of sight to slope angle is given by the following formula and illustrated on Figure 128.

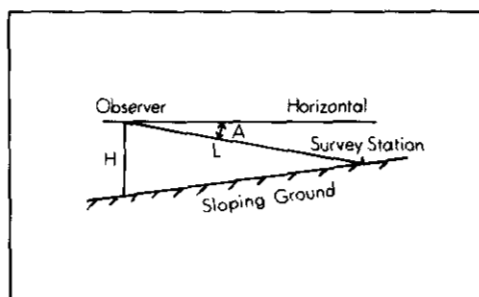


Figure 128. Diagram outlining the survey method.

The ground slope $C^\circ = \text{Arctan } (B^\circ)$

where $B = (L \sin A + H)/(L \cos A)$

L is the length (in this case, metres)

H is the eye height (metres)

A is the angle of sight (A/S) (in degrees)

Note: it is necessary to keep the sign + or - of the A/S in this program.

A computer program for TRS 80 (Model I, Level II) using a negative A/S is as follows:

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10 LPRINT "SLOPE ANGLE CORRECTION"
20 LPRINT""
30 LPRINT "          BY GEORGE ADDIE P.ENG"
40 LPRINT ""
50 LPRINT "          MARCH 12 1984"
60 INPUT "LENGTH IS      ";L
70 INPUT "OBSERVER'S EYE HEIGHT  ";H
85 LPRINT ""
90 LPRINT "ANGLE OF SIGHT","TRUE SLOPE"
100 LPRINT ""
110 FOR A=-1 TO -30 STEP-1
120 B=(L*SIN(.01745329*A)+H)/(L*COS(.01745329*A))
125 C=ATN(B)*57.29578
130 LPRINT A,C
140 NEXT A
150 END

```

The results are found in Table 1 for a distance of 5 metres and eye height of 1.518 metres.

TABLE 1
TABLE FOR 5 METRES, EYE HEIGHT OF 1,518 METRES,
AND NEGATIVE ANGLE OF SIGHT

ANGLE OF SIGHT	TRUE SLOPE (IN DEGREES)
-1	15.9707
-2	15.0489
-3	14.123
-4	13.1928
-5	12.2582
-6	11.3192
-7	10.3757
-8	9.42754
-9	8.47473
-10	7.51712
-11	6.55466
-12	5.58723
-13	4.61478
-14	3.63719
-15	2.65437
-16	1.66624
-17	.672708
-18	-.326344
-19	-1.33096
-20	-2.34127
-21	-3.35738
-22	-4.37933
-23	-5.40727
-24	-6.44125
-25	-7.48138
-26	-8.52778
-27	-9.58049
-28	-10.6396
-29	-11.7053
-30	-12.7776

To produce a table for positive A/S, line 110 is changed to: For A = 1 to 30 Step 1.

Tables can be made for any length (L) by changing the input on line 60, any eye height by changing line 70, and any number of angles of sight by changing line 110.

CONCLUSION

The computer program presented calculates slope angles measured from eye level, based on the angle of sight and distance to the ground. This can then be used to calculate the necessary slope correction for staking or making grids.