

THE ABNEY LEVEL

INSTRUCTIONS

To ascertain the height of a building or other object, the instrument is raised to the eye and the index-line on mirror is aligned on the objective, the bubble is then brought into the centre of its run, by turning the milled-headed wheel, so that it cuts the index-line. Then note the line on "proportion" scale that coincides with the upper sharp edge of arm-index. (Segment centre line on slotted arc types.) The distance from observer's position to base of the objective is now measured and the distance divided by the figure noted on the "proportion" scale; the result is the height required. For instance, supposing the edge of arm-index cuts line 3, and the distance is 150 feet, $150 \div 3 = 50$ feet = height of object. For finding small heights at close range another method can be used as follows:—Set the edge of arm-index to line 1 on "proportion" scale ($=45^\circ$ by arrow-point of Vernier), then look through the instrument, holding so that the bubble cuts the index-line on mirror. Move steadily backwards or forward until the object, index-line and bubble coincide. The distance measured from observer to object, plus height of observer, will be the height required.

For setting-out slopes and fall for drainage, the index is first set to the desired angle of slope and the instrument placed on a straight-edge, the ends of which are resting on stout wooden pegs driven in the ground. The bubble is brought to the centre of its run by driving one of the pegs further into the ground. This process is continued throughout the length of work.

The arrow-point in centre of Vernier scale is used as an index in conjunction with the degree scale, the Vernier reading to 10 mins. of arc on the smaller instrument and to 5 mins. on larger ones.

The following Tables will be found of much assistance. Table A gives certain angles of elevation or depression, which give unity of rise per amount of run. Thus 18° of elevation gives 1 vertical to 3.08 horizontal. Table B gives certain angles up to 85° the amount of rise and fall per 100 of run, measured horizontally. Heights can, therefore, be found as follows:—Thus, for 4° of elevation the rise would be 6.99 per 100 horizontal, and an object 300 feet from the observer extending an angle of 4° would be approx. $6.99 \times 3 = 21$ feet in vertical height.

TABLE A

Degrees.	One in	Degrees.	One in	Degrees.	One in	Degrees.	One in
1 ...	57.14	8 ...	7.12	18 ...	3.08	30 ...	1.73
2 ...	28.65	9 ...	6.31	20 ...	2.75	32 ...	1.60
3 ...	19.08	10 ...	5.67	22 ...	2.48	34 ...	1.48
4 ...	14.31	12 ...	4.70	24 ...	2.25	36 ...	1.38
5 ...	11.43	14 ...	4.01	26 ...	2.05	38 ...	1.28
6 ...	9.52	16 ...	3.49	28 ...	1.88	45 ...	1.00
7 ...	8.15						

TABLE B

Horizontal Distance = 100.		Horizontal Distance = 100.		Horizontal Distance = 100.	
Angle.	Rise or Fall.	Angle.	Rise or Fall.	Angle.	Rise or Fall.
1 ...	1.75	12 ...	21.26	35 ...	70.02
2 ...	3.49	13 ...	23.09	40 ...	83.91
3 ...	5.24	14 ...	24.93	45 ...	100.00
4 ...	6.99	15 ...	26.79	50 ...	119.18
5 ...	8.75	16 ...	28.67	55 ...	142.81
6 ...	10.51	17 ...	30.57	60 ...	173.21
7 ...	12.28	18 ...	32.49	65 ...	214.45
8 ...	14.05	19 ...	34.43	70 ...	274.75
9 ...	15.84	20 ...	36.40	75 ...	373.21
10 ...	17.63	25 ...	46.63	80 ...	567.10
11 ...	19.44	30 ...	57.74	85 ...	1143.00