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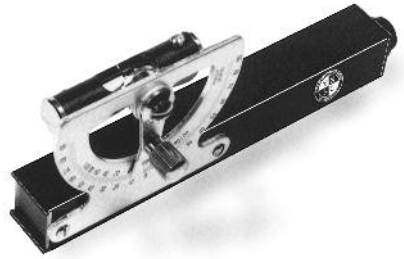
# How to Use an Abney Level



**Code: 36300 - 36305**

# Operating Instructions


Ref:.. \operat98\instructions 19\36300.qxp 07-01-19

# How to Use An Abney Level

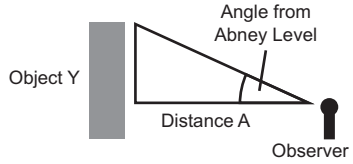
## To use the Abney Level:

When the instrument is raised to the eye, the user will view a horizontal ‘index line’ and a bubble. To take a reading to an object, align the index line with the object and rotate the moveable ‘index arm’ until the bubble is cut in half. Lock off the arm (model 36305 only) whilst checking the index line & bubble. Looking at the side of the level a reading can be taken in degrees or Percent.
A more accurate reading to minutes of a degree can be taken by using the vernier scale on the index arm. To do this, find the index mark which lines up exactly with a line on the degrees scale, using 60-0 on the left side of the scale, and 0-60 on the right. The angle can now be read to degrees and minutes. Percent readings are taken from the mark on the left hand top edge of the index arm.

**To Set Out a Slope:**
For setting out slopes and fall for drainage, the index is set to the required angle of slope and the level set on a straight edge resting on pegs. The bubble is set to the index line by driving the appropriate peg further into the ground. This process is continued along the length of work.

**To ascertain the the height of a building or object:**
Align the index line, bubble and object. Note the degrees reading. The distance measured from observer to base of an object and the height of observer is also required.

To find height Y use equation ‘Y=A tan angle’ and add the height of the observer to the result.




**To find small heights at close range:**
Another method can be used to find small heights - set the index arm to 45°, then look through the instrument, holding so that the bubble cuts the index line. Move steadily forwards or backwards until the object, index line and bubble coincide. The distance measured from observer to object, plus the height of the observer, will be the height required.

### The following conversion tables maybe of assistance

**Table A** gives certain angles of elevation or depression, which give unity of rise per amount of run. Thus 18 degrees of elevation gives 1 vertical to 3.08 horizontal.

**Table B** gives certain angles up to 85 degrees the amount of rise and fall per 100 of run, measured horizontally.

**Heights can, therefore, be found as follows:**
Thus, for 4 degrees of elevation the rise would be 6.99 per 100 horizontal, and an object 300 feet from the observer extending an angle of 4 degrees would be approximately 6.99 x 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 | 5.49 | 28 | 1.88 | 45 | 1.00 |
| 7 | 8.15 | | | | | | |

**Table B**

| 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 | 100.03 |
| 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 | 14.00 | 19 | 34.43 | 70 | 274.75 |
| 9 | 15.84 | 20 | 38.40 | 75 | 373.21 |
| 10 | 17.63 | 25 | 46.63 | 80 | 567.10 |
| 11 | 19.41 | 30 | 57.74 | 85 | 1,143.00 |