A SIMPLE HEIGHT AND DEPTH MEASURING INSTRUMENT

PRACTICAL ACTION
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techical brief

Measuring tall objects is a requirement which may arise from time to time in various fields of science and technology. Unfortunately, most types of apparatus which give direct readings are expensive to buy, particularly when one takes their infrequent use into account. The surveying instrument described in this article can be easily made and is inexpensive as the materials used in its construction are readily-available:

- 1 wooden 12" rule
- 1 strip of thin, flexible wood, of similar size
- Another strip of wood, 8" long x 1/8" thick and about the same width as the rule
- Two small wood screws
- 1 thin piece of card
- 1 length of thin string attached to a small weight to make a plumb bob
- A small set-square.

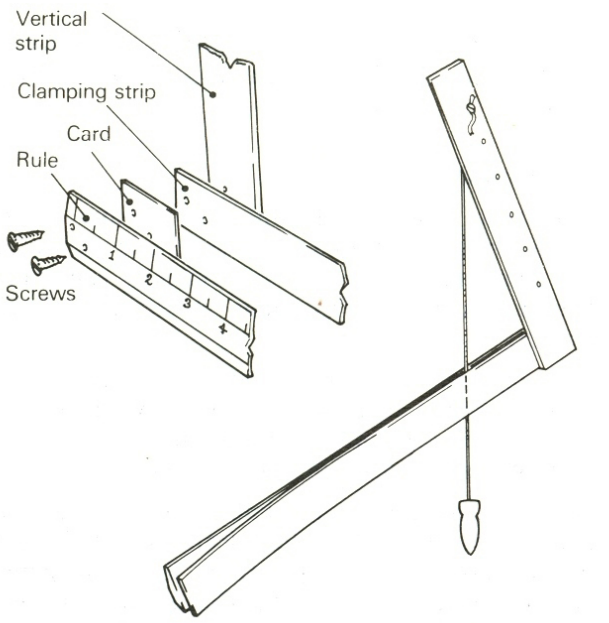

Figure 1: Parts of the measuring instrument.

Construction

1. Cut the flexible strip to the same shape as the ruler and the 8" x 1/8" strip to the same width.

2. Cut the thin card into a square so that the length of its sides is equal to the width of the ruler.

3. Clamp these three parts to the ruler in the following order. First the card which should fit flush at the zero end of the ruler. Next, the flexible strip which must lie along the back of the ruler. Lastly, the 8" x 1/8" strip set at an angle of 90° to the top of the rule and attached at the zero end. This is all illustrated in Fig. 1.

4. Screw this assembly together with two small screws which can be countersunk either from the front or the back. Wood glue may be additionally used between the layers if desired.

5. Place a set-square along the top of the rule, line up its vertical side with the zero mark on the rule and draw a line running up the vertical strip. Mark points on this line at intervals of half-an-inch (Fig. 2).

6. At each of these points, drill a small hole in the vertical strip and mark each alternate hole 1, 2, 3, etc., to correspond with the inch graduations of the rule.

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Use of the instrument

1. Pace or measure a known distance from a point vertically below the point on the object whose height is to be measured.

2. Take a plumb bob and pass the free end of the string through the hole in the vertical strip corresponding to this distance. Tie a knot in the string at the rear of the hole to prevent it from slipping out.

3. Standing at this known distance from the object to be measured, sight the top of the object by eye along the top of the ruler (Fig. 2). Allow the string with the weight on its end to move freely, under gravity, between the flexible strip and the ruler.

4. When the string has stopped swinging, clamp it by trapping it between the flexible strip and the ruler with finger and thumb. Read off the height on the ruler's upper edge in the same units used to measure the horizontal distance set on the vertical strip. If '6' on the vertical strip represented 6 yards then '2' on the ruler will mean a height of 2 yards.

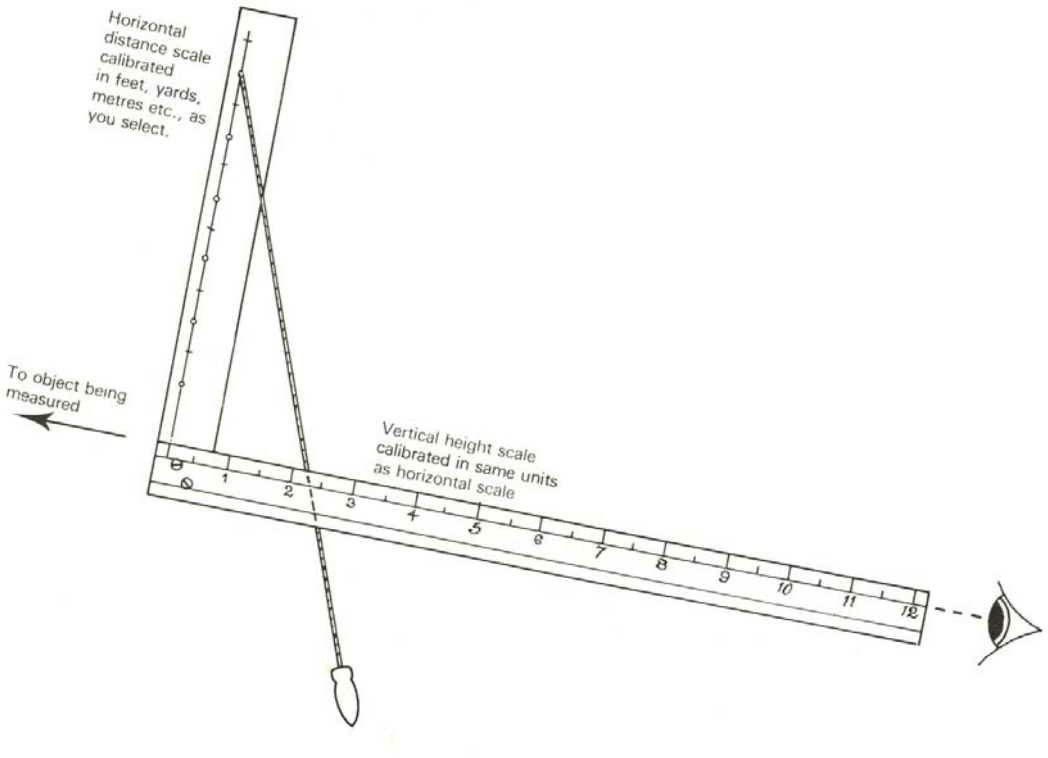

Figure 2: Using the measuring instrument.

There is always the possibility of the ground sloping between your viewing position and the base of the object. It is as well, therefore, to take a second reading - the depth reading - which also adds your eye level height to the measurement.

Depth reading

Turn the instrument around and look down from point A (Fig. 2) to the point vertically below the point on the object being measured. Again, trap the string when the weight is stationary and read off the ruler the depth of the base of the object below your eye level. Add this to the reading of height and you will obtain the total height of the object from its base.

This article was originally written by Brian Padgett, then head of AT-UK for Appropriate Technology Vol8 No 2, September 1981.

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