



DESCRIPTION

A slide rule is a simple device for multiplying and dividing whole numbers or whole numbers and decimals to an amazing degree of accuracy.

You can multiply 1.5×1.75 , but in order to multiply $1\frac{1}{2} \times 1\frac{3}{4}$, you must change them to decimals first.

For new users of a slide rule, it must be understood that a slide rule will only give an answer in figures, and the user must himself decide where the decimal point goes, or whether it is necessary to add one or more noughts. For example, in order to multiply $.3 \times 2$, the slide rule can only be used to multiply 3×2 , giving the answer 6, and the user must put the decimal point in front of the 6 to give the correct answer of .6. Similarly, multiplying $.3 \times 200$, it will be necessary to add a nought after the 6, which will give the answer 60.

It will be seen, therefore, that after the figure 9.5 on the first x scale, there follows the figure 1, which, as far as a slide rule is concerned, is the same as 10, 100, 1000 etc., or 1, .01, .001 etc.

The Circulator Slide Rule is exactly the same and just as accurate as an ordinary 8" long slide rule. The advantage is, however, that being only 3" in diameter and $\frac{1}{8}$ " thick it can be kept in the smallest of pockets and carried about ready for use anywhere.

Starting from the outer edge, there are 4 scales. The first, third and fourth scales, which are shown in black, are all fixed scales, engraved on the base. The second scale, shown in red, can be rotated fully and is engraved on the under-side of the top disc.

The oval disc above these two is known as the cursor. It is merely used for marking a position while rotating the top disc. On the side of the cursor are the following markings x, x, x² and $\frac{1}{x}$. These refer to the four scales starting from the outer edge.

When rotating the top disc, it is best to hold the slide rule placing the index finger over the top edge and the thumb over the bottom edge; in other words, with the index finger and thumb forming a semi-circle round the edge of the slide rule. The cursor can also be held in position under the index finger.

After setting the top disc in the selected position using the other hand, the slide rule can be held with the index finger under the base and the thumb on top of the top disc, which will stop the discs from rotating, and the cursor can then be moved round as necessary.

CHOICE OF SCALES

The two scales marked x are used for general calculations involving multiplying and dividing. The third scale marked x^2 is graduated as the square of the first scale, i. e. underneath the 2 of the first x scale (the black one) will be seen the figure 4 on the third scale (the x^2 scale) because $2^2 = 4$. Similarly the fourth scale gives the reciprocal of the first scale, so that underneath the figure 2 of the first scale will be seen the figure 5 on the fourth scale, because $\frac{1}{2} = .5$.

CALCULATIONS These are best shown by examples, which are also clarified by the illustration.

(1) Multiplying Example: Multiply 1.2×1.3 .

Rotate the cursor until the vertical line on the cursor is over 1.2 of the first x scale (the black one), holding the slide rule as described above. Now rotate the second x scale, i. e. the top red disc, until unity is also under the vertical line of the cursor. Now rotate the cursor until the vertical line is over the 1.3 of the second x scale (the red one) and the answer 1.56 appears under the cursor line on the first x scale (the black one).

In order to multiply 1.2×13 , exactly the same procedure would be adopted and the answer would be 15.6.

(2) Dividing Example: $15.6 \div 1.3$

Rotate the cursor until the cursor line is over 1.56 on the first x scale (the black one). Hold the slide rule with the thumb and index finger in a semi-circle as described above; rotate the second x scale (the top red disc) until the 1.3 appears under the cursor line. Now move the cursor until the cursor line is over unity (1) of the second x scale and the answer 1.2 appears under the cursor line on the first x scale (the black one). The answer is, of course, 12 by inspection, not 1.2.

(3) Squares Example: What is 1.2^2 ?

Set the cursor line over the 1.2 of the first x scale and read the answer under the cursor line on the third scale (the x^2). The answer shown will be 1.44. If the calculation is 12^2 , the procedure and the reading will be the same, but instead of the answer being 1.44, it is 144, as the user must put the decimal point in the right position.

(4) Square Roots (Use Black x and x^2 scales)

(a) Numbers between 1 and 100

Set the cursor to the number on the x^2 scale and read the answer under the cursor on the black x scale.

(b) Numbers outside the range of 1 to 100.

When determining the square root of a number larger than 100 or smaller than 1, it first has to be converted into two factors, one of which lies in the range 1 to 100, the other being an even power of ten e. g.,

$$533 = 5.33 \times 10^2 \quad 0.533 = 53.3 \times 10^{-2} \quad 533,000 = 53.3 \times 10^4$$

The square root of the first factor is then determined as in (a) and multiplied by the square root of the second e. g.,

$$\begin{aligned}\sqrt{533} &= \sqrt{5.33 \times 10^2} = 2.31 \times 10 = 23.1 \\ \sqrt{0.533} &= \sqrt{53.3 \times 10^{-2}} = 7.3 \times 10^{-1} = .73 \\ \sqrt{533,000} &= \sqrt{53.3 \times 10^4} = 7.3 \times 10^2 = 730\end{aligned}$$

(5) Reciprocals (Use black x and $1/x$ scales)

Set the cursor over the number on the black x scale, and read the reciprocal on the $1/x$ scale.