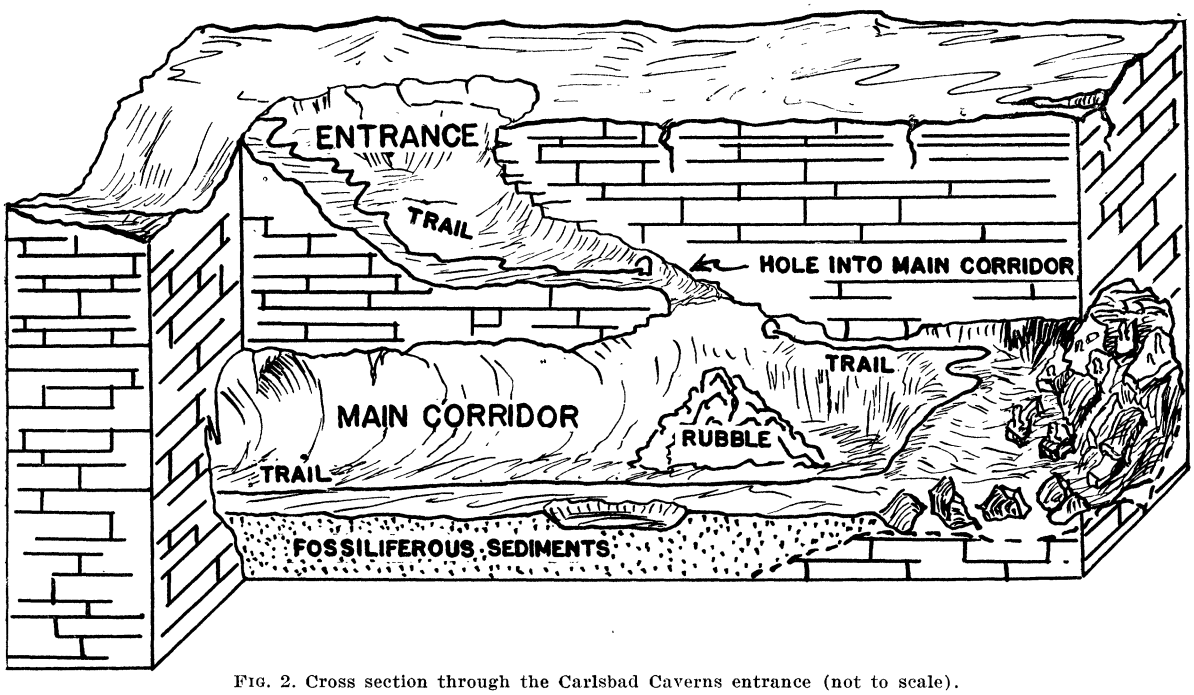


FIG. 2. Cross section through the Carlsbad Caverns entrance (not to scale).

Demands for this fertilizer by California citrus growers caused a mining company to remove the deposits and once again bare the fossiliferous sediments. One miner, J. L. White, became interested in the deeper, more scenic corridors and rooms. Stories told by him, and by those whom he guided through the caverns, created such a public demand to see the underground wonders that it was necessary to build trails to accommodate the increasing number of visitors.

Sediments of the fossil deposit were easily excavated and made excellent trail fill. It was the removal of this material that led to the original discovery of the gold mine of plant and animal remains. Careful sifting of the dirt has resulted in the finding of teeth, horned-toad scales, bones of bats, rodent skulls, ribs and leg bones of many types of mammals, furculas and skulls of birds, a section of bone that had apparently been used as a bead by an Indian, and numerous bits of wood and leaves. The importance of this deposit has finally been recognized. Its study and deciphering will eventually unfold a fragmentary record of the men, plants, and animals that once lived in or near the entrance to Carlsbad Caverns.

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Received February 4, 1953.

## A Simple Two-Dimensional Slide Rule for the Rapid Calculation of Time Intervals

A SIMPLE two-dimensional slide rule has been designed with which any desired units of time may be quickly and accurately computed. The same type of instrument lends itself to the computation of many other types of data provided they can be arranged in true arithmetic sequence and set up in tabular form. The instrument consists of two parts, a special overlapping chart of data and a sliding transparent window, with a measuring scale on the frame. Figures 1*A* and *B* show how this idea is adapted for counting time in days. The window used is 10 columns wide and of any desired length. On the main chart all the information is placed in the first 10 columns from the left, and the first 9 vertical columns are shifted up one row and duplicated, as in Fig. 1*A*. This arrangement allows any date or figure on the chart to be placed under the window in any desired position. This is the basic procedure to be followed in constructing any such chart.

If information is needed in two units, e.g., pounds and ounces, the width of the window and the basic chart would be equal to the number of smaller units in the larger unit, e.g., $16(a)$ in the case of pounds and ounces. The whole chart would be $31(2a\text{-}1)$ columns wide, since all but the last column would be duplicated. The horizontal frame of the window would count off in smaller units, i.e., ounces, and the vertical frame the larger units, i.e., pounds.

One other type of computation for which the two-dimensional slide rule may be applied is that of a problem that can be reduced to the formula $(R\text{-}B)C$, where $R$ is the reading, $B$ a blank and $C$ a constant. The chart would be set up to include values for $RC$

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JAN. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | FEB. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 31 | FEB. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | MAR. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | APR. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| APR. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | MAY 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| MAY 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | JUNE 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

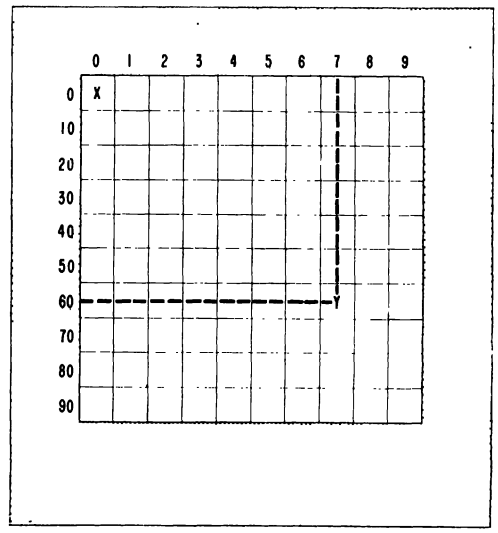


FIG. 1 *A* (left). A portion of the main chart to be used in computing time in days, the length to be adjusted as desired. Note that the first 9 columns to the left are raised one row and duplicated on the right. Any section on the chart 10 columns wide will give an accurate sequence of dates.

FIG. 1*B* (right). The window overlay to be used with Fig. 1*A*. The area inside the dotted frame is transparent. Place the window on the chart in such a position that the beginning date is at zero position ($x$). Then locate the closing date ($y$) through the window and read the numbers from the window frame representing the elapse of time in days (67).

from $R = 0$ to the largest value anticipated. In reading off computations, the window would be so placed that the number on the frame equal to $B$ is placed opposite the value for $R = 0$ on the chart, as 67 is placed opposite $y$ in Fig. 1*B*. The computation for $R$ would then lie at that point on the chart opposite the figures representing the $R$ reading on the frame. Similar applications will no doubt suggest themselves. The full value of such an instrument can be appreciated when a large number of computations is to be made.

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Received February 26, 1953.

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