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# The SLIDE RULE



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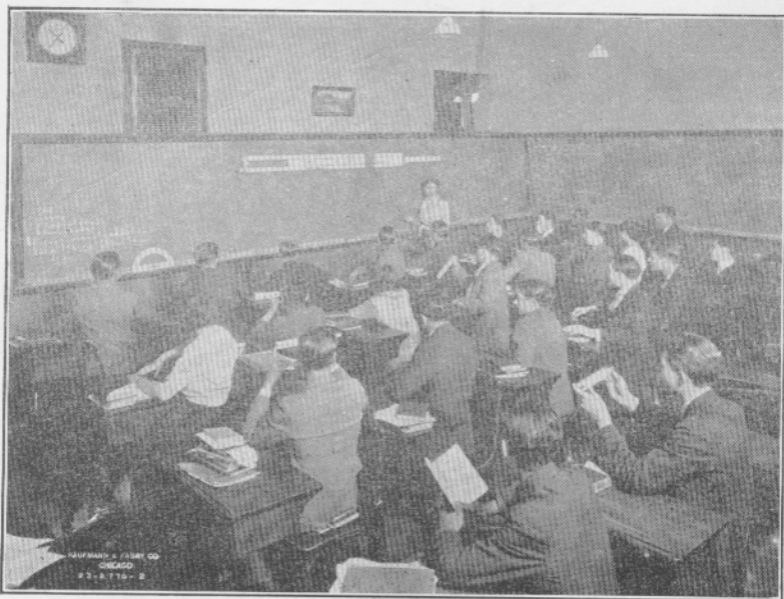
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## WOMEN TEACHERS MAKE USE OF THE SLIDE RULE.



That the use of the slide rule is by no means confined to the engineer, is well illustrated in the above photograph.

This picture shows a class at the Hyde Park High School in Chicago, Ill., which is under the direction of a

woman teacher, listening to a lecture on the use of the slide rule.

This particular class is learning the application of the slide rule to geometry, where it is of considerable value in numerical problems.

## TRIGONOMETRY AND THE SLIDE RULE

To gain and to keep the interest of the pupil is one of the most important duties of the High School Instructor. Books contain knowledge that will be extracted by the student who is keenly interested in a particular subject, but in most cases it is necessary that the teacher strive to make his subject appear as attractive as possible if he is going to hold the attention of his pupils.

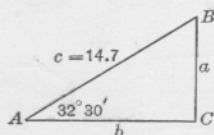
History, Geography and Science Classes are to-day making use of the motion pictures for this very purpose, and this method has everywhere met with real success.

For the same reason the Chemistry teacher has his pupils experiment with the compounds and elements about which they study in their class room. They mix these according to studied formulæ and watch how their reactions follow certain known laws. This laboratory work arouses a real live interest in the subject and students take up the subject with far more zeal than they would if they were studying this subject from books alone.

Trigonometry teachers to-day are making use of two devices—the transit and the slide rule—that should make their subject an attractive one to every modern boy. The transit, the operation of which is based on the laws of trigonometry, is an excellent apparatus to illustrate a practical use of trigonometry and to give the students at least a casual knowledge of a very interesting profession.

The slide rule, which is in more general use, owing to its lower cost, is used to rapidly check problems worked out by the logarithmic method. It further illustrates the application of logarithms to a practical tool, and most important of all, awakens the interest of the pupil in his subject, as the operation of the slide rule is fascinating to even the boy or girl who takes only a casual interest in mathematics.

The following example, will clearly illustrate the advantage of the slide rule as a check in trigonometry.



Suppose we desire to solve this right triangle. The work as usually done by a student is as follows:

$$\begin{aligned} a &= c \sin A \\ &= 14.7 \sin 32^\circ 30' \\ \log 14.7 &= 1.16732 \\ \log \sin 32^\circ 30' &= 9.73022 - 10 \\ \therefore \log a &= .89754 \\ \text{and } a &= 7.90 \end{aligned}$$

$$\begin{aligned} b &= c \cos A \\ &= 14.7 \cos 32^\circ 30' \\ \log 14.7 &= 1.16732 \\ \log \cos 32^\circ 30' &= 9.92603 - 10 \\ \therefore \log b &= 1.09335 \\ \text{and } b &= 12.4 \end{aligned}$$

$$\begin{aligned} B &= 90^\circ - 32^\circ 30' \\ &= 57^\circ 30' \end{aligned}$$

The following is the check generally used:

$$\begin{aligned} a^2 &= c^2 - b^2 = (c + b)(c - b) \\ 2 \log a &= \log(c + b) + \log(c - b) \\ 1.79508 &= \log 27.1 + \log 2.3 \\ &= 1.43297 + 0.36173 \\ &= 1.79470 \end{aligned}$$

This checks to three figures, which is as much as can be expected, since  $c$ ,  $a$  and  $b$  are given to three figures.

Note that this check does not detect an error made in finding " $a$ " and " $b$ " from their logarithms, unless the student finds  $\log "a"$  and " $b$ " from the tables without reference to the work on his paper.

Another check sometimes used is this:

$$c^2 = a^2 + b^2$$

$$14.7^2 = 7.90^2 + 12.4^2$$

$$216.09 = 62.41 + 153.76$$

$$216.09 = 216.17$$

|        |       |        |
|--------|-------|--------|
| 14.7   | 7.9   | 12.4   |
| 14.7   | 7.9   | 12.4   |
| 102 9  | 71 1  | 49 6   |
| 588    | 553   | 248    |
| 147    | 62.41 | 124    |
| 216.09 |       | 153.76 |

This check also gives results correct to only three figures.

Now compare these checks with the slide rule check.

According to formula—

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Set  $\sin C$  to  $c$ , or  $90^\circ$  to  $14.7$ .

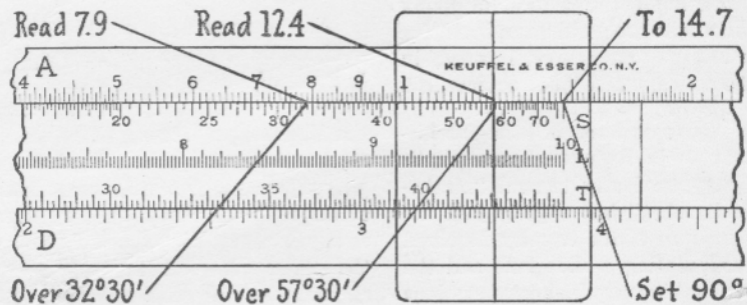
Over  $32^\circ 30'$  (A) will be found 7.9 (a).

Over  $57^\circ 30'$  (B) will be found 12.4 (b).

One of the important advantages of the slide rule over the other methods of check is that it enables the user to locate quickly the point of error. The first methods shown would merely indicate that a mistake has been made, but would not give an inkling where it had occurred, so the entire problem would have to be worked out again.

If, for instance, we had found  $a = 6.24$  instead of  $a = 7.90$ , the correct answer, and had made our setting in the manner above described, we would immediately see that this answer was incorrect and would check back through computations leading to the finding of "a" to determine just where the error was made. If our answer for "b" checked O. K., we would not have to go through the computations made to find that answer.

The slide rule to-day is recognized by highest authorities as the ideal method of checking trigonometry problems and is being so generally used that the Department of Education of New York State, in the



The whole operation is a matter of a few seconds and the answers are checked to three places.

This is but a single example of the use of the slide rule in trigonometry. For further examples and for a detailed explanation of the operation of the slide, the reader is referred to the "Self Teaching Manual of the Slide Rule," by Wm. Breckenridge.

Regents Examinations, which are given to all high schools in the State, has at the head of the question paper in trigonometry the following statement:

"The use of the slide rule for checking is allowed in the examinations in trigonometry, provided all computations appear on the answer paper."

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## SLIDE RULE CLUBS.

Teachers sometimes find it difficult to include slide rule instruction in the regular course of study.

In order to give their pupils the opportunity of studying the use of this valuable instrument, they are encouraging the formation of Slide Rule Clubs. It is the general practice for these clubs to meet, either during the study period or after regular school hours, about once a week.

These clubs usually meet under the supervision of an instructor, although when some pupil shows particular ability, the task of giving instruction to the other pupils is often passed on to him.

The Southwestern Slide Rule Club, organized by Orrin G. Seaver, was one of the first of these clubs to be organized. It is unique in many features and promises to become an interesting educational project, and is attracting the attention of many teachers who are seeking an incentive to stimulate an active interest in mathematics, when other devices fail.

Many members of the Southwestern Slide Rule Club are pupils who may be justly termed "mathematically shy," but eagerly join the club because of the novelty involved in manipulating a slide rule and the ease in making required computations that by other methods would convert

a pleasant recreation into a tedious and burdensome task. Some of the members have completed the mathematics courses required for graduation, but have joined the club in spite of this fact and, according to the data on their applications for membership, many intend to prepare for professions requiring little or no mathematical knowledge.

A list of the various professions that the individual members of the club aspire to make their life's work is convincing evidence of the popularity and broad appeal a slide rule club has among high school pupils of widely different tastes and temperaments. Some of these slide rule enthusiasts are preparing to become physicians, concert musicians, missionaries, journalists, teachers, surgeons, nurses, stenographers, lawyers, dentists, engineers, business men and contractors.

Another novel feature of this club is the official names of its teachers. Instead of having the conventional titles, the officers are named after the different parts of the slide rule. A further interesting fact is that the girls show as active an interest in the affairs of the club as the boys, and are as adept in acquiring the rudiments of the slide rule and in making the necessary manipulations to obtain the desired results.

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