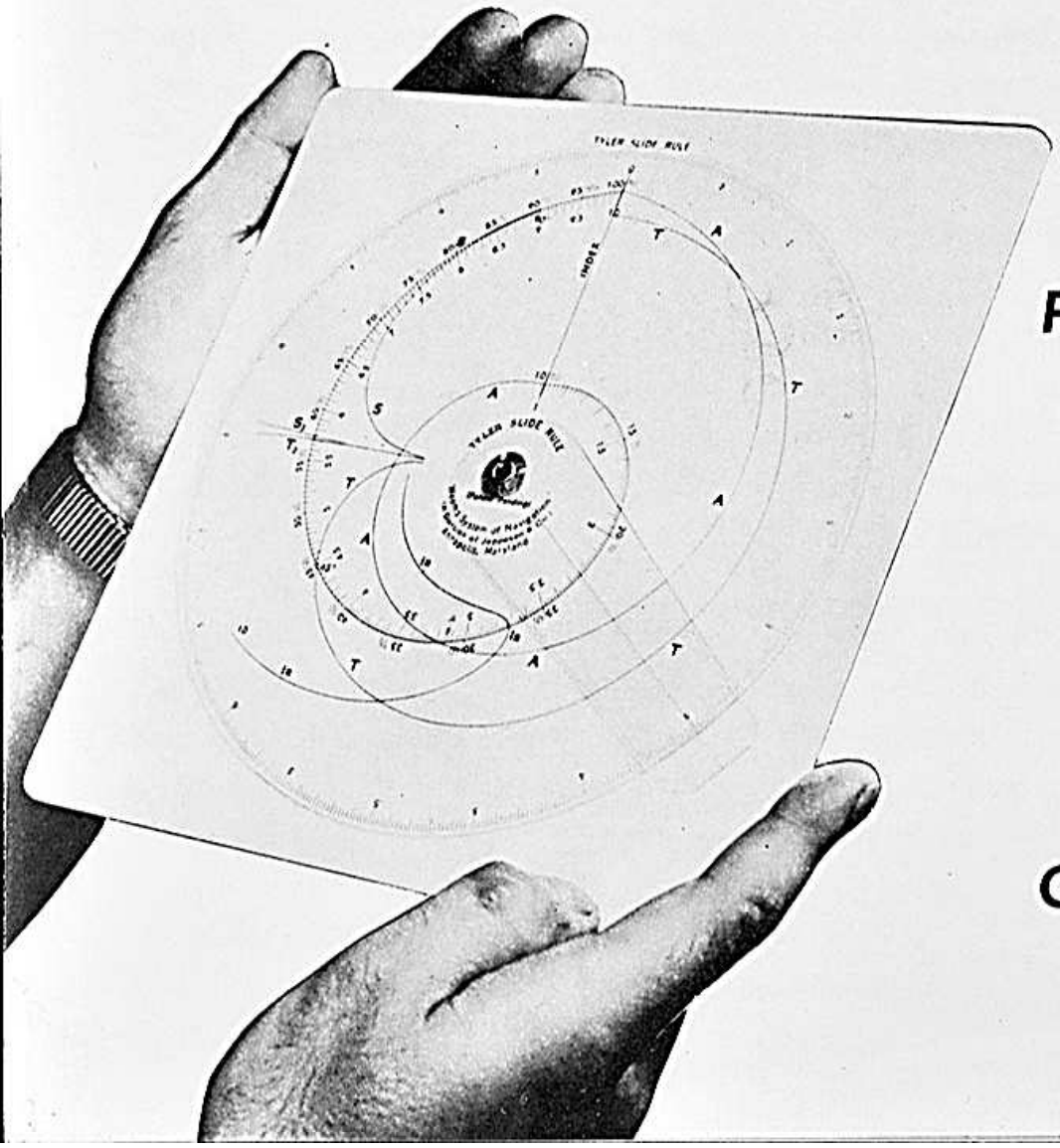
# TYLER SLIDE RULE

## A New Concept : using Curved Indexes : One Scale




**Designed by**

**JOHN TYLER**

**Professor Emeritus**
**of Mathematics**
**United States**
**Naval Academy**

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# THE TYLER RULE

The Tyler Rule is unique in concept, and highly original in design. On first inspection, the most striking feature is its uncluttered face: unlike most slide rules, it requires only one numbered scale to permit speedy solution of mathematical as well as trigonometric problems. This scale is in the form of a spiral of increasing pitch, a design that greatly expands the scale in its upper range as it approaches 10, and makes it far superior to the conventional slide rule.

The Tyler Rule has many advantages compared to the conventional rule. It is flat and thin, and can be stored in a book. It has a single, rather than a multiplicity of numbered scales, which greatly simplifies its use; interpolation is always the same on this scale, regardless of the problem being solved. The Tyler Rule has one definite method of solving all problems, which the mathematician states as a proportion. For those who think in terms of multiplying and dividing, one basic rule applies to all calculations: turn the disc to multiply—turn the cursor to divide.

The Tyler Rule consists of three components: a fixed base, a rotatable disc, and a rotatable cursor. A radial index line is inscribed on the fixed base, as well as six curved index lines. These latter have no numbered scales, but are lettered for identification. The A index is used in determining squares and square roots. The S and T indices are used for determining the value of sines and tangents of angles larger than 10°; the $S_2$ and $T_2$ for angles smaller than 10°. The $1_n$ scale is used in determining powers of e.

The rotatable disc carries the spiral C scale, used in all computations. This scale is numbered in black from 1 to 10 on the inside, and from 10 to 100 on the outside. It is also numbered in reverse in red numerals for use with functions of angles. A scale reading from 0 to 10 is also shown on the outer edge of the disc, for determining the logs of numbers.

The cursor is transparent and is inscribed with a hair line, colored red.

We believe the simplicity of this rule will recommend it to the student; its convenience, and the fact that it can easily be read to three figures anywhere on the scale will recommend it to the engineer and scientist.

# TYLER SLIDE RULE INSTRUCTIONS

**The Tyler Slide Rule consists of three parts: (1) A base plate on which is imprinted a straight black index line and a variety of curved index lines, properly labeled for their respective functions. (2) A transparent template on which is located one spiral curve (C) which is used for all computations. The numbers inside the spiral are used for all computations involving numbers. The numbers outside of the spiral in black and red are used for the functions of angles. The L scale is located around the perimeter of the transparent disc as a reference and is used to determine the common logarithms of numbers. (3) A transparent cursor on which is located a straight red index line.**

**PROPORTIONS INVOLVING NUMBERS** — Example: The ratio 3:4. Using the (C) scale set 3 at the black index and turn the red index to 4. Using thumb pressure on the end of the cursor, hold the cursor to the base. If the spiral is rotated, all pairs of numbers passing over and under these two index lines are in ratio 3:4. If (C) is set so that 8 is on red, then black will be on 6. The proportion $3/4 = 6/8$, etc.

**MULTIPLYING AND DIVIDING** — These problems can be set up as proportions. To think of them in terms of multiplication and division always turn the transparent disc to multiply and the cursor to divide. This is the only rule necessary to remember. Make the original setting and read the final answer at the black index. All intermediate settings are at the red index by moving either the cursor or the (C) scale.

Example: Multiply 4.32 x 5.75. Set 4.32 at black index. Move red index to 1. Set 5.75 at red index and read the product 24.8 at black index. The steps are $4.32 \div 1 \times 5.75$.

Example: Divide 7.85 by 3.4. Set 7.85 at black index. Set red index at 3.40. Set 1 at red index and read answer 2.31 at black index. As a proportion this is $\frac{7.85}{3.40} = \frac{2.31}{1}$. To find $6 \div 3 \times 5$, set 6 at black index, set red index to 3, hold cursor and base together and turn disc until 5 is at red index, read the answer 10 at black index.

**SQUARES AND SQUARE ROOTS** — Use the curved index A and the black index. Example: Find the square root of 4. Set 4 to the black index and read the answer 2 at the point where the A index crosses the (C) scale. 6.32 the square root of 40 is located 180° across the slide rule at the other intersection of A and (C). To use squares in a formula note that setting 3 on the A index is identical to setting $3^2$ or 9 on the black index. This principle applies to all of the curved index lines.

**FUNCTIONS OF ANGLES** — The curved indexes S and T are used for setting sines and tangents of angles larger than 10°. $S_2$ and $T_2$ are used for angles of less than 10°. The numbers outside the spiral are used. The black numbers for setting sines and tangents, the red numbers for setting co-sines and co-tangents; example: set 30 at the S index and note that .5 the sine of 30 is located at black index.

Set T index at 36° and read .727, the tangent of 36° at black index. Tangent 62° = 1.88 etc. Set S index at red 15° and read .966 the cosine of 15° at black index. Set $T_2$ at 3° (at this point $T_2$ and $S_2$ are identical) and read .0524 the tangent of 3° at black index. To find angle whose sine is .634 set .634 on black index and read 39.3° at S index. To find angle whose tangent is .384 set .384 at black index, read 21° at T index. The tangent of 45° is 1, and this point is marked on the T index as a reminder to assist in determining which section of the T index to use when it intersects the C scale at two points.

**FORMULAS CONTAINING FUNCTIONS OF ANGLES** (written as proportions)

Find X $\frac{\sin 25°}{6.25} = \frac{\sin X}{7.5}$ Set 25° at S index. Set red index at 6.25. Turn disc to set 7.5 to red index and read answer X = 30.4° at S index.

Find A $\frac{\tan A}{\sin 30°} = \frac{\tan 62°}{\sin 45°}$ Using S and black index determine the sin of 30° and of 45° and write formula $\frac{\tan A}{.5} = \frac{\tan 62°}{.707}$. Set T index at 62° and red index at .707. Turn disc to set .5 at red index and read 53° = A at T index.

**LOGS OF NUMBERS** — Opposite N on (C) scale read Log N on (L) scale. This is the mantissa of the logarithm. Example: Find log of 409. Opposite 409 on (C) read 612 on (L).

Powers of e — For exponents from $e^{.23}$ to $e^{2.3}$ set the exponent at black index and read number at ln index. Example: $e^{1.9} = 6.68$. To obtain numbers representing powers of e not within the above limits use portions of the exponent and multiply. Example $e^3$: As above determine $e^{1.5} = 4.48$ and square to obtain 20.1. Or use $e^2 = 7.39$ and $e = 2.72$, multiply $7.39 \times 2.72$ to obtain $e^3 = 20.1$. As a proportion consider $N = e^x$ then $\frac{\log N}{x} = \frac{\log e}{1}$ Powers of numbers can be worked by the same proportion method. Example $N = 5^3$: $\frac{\log N}{3} = \frac{\log 5}{1}$ opposite 5 on (C) scale read log 5 = .699 on (L) scale. Substitute .699 for log 5 in the formula and solve using the red and black index. Log N = 2.1 and the mantissa is .1. Opposite .1 on (L) read 1.25 on (C). Move decimal 2 places. $5^3 = 125$. To solve ln N = n. Example: find ln 2. Set ln index at 2 on (C) scale and read .693 at black index.

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Annapolis, Maryland 21401