

Expressions you can evaluate on a slide rule!

Consider general scales **U** (body), **V** (slide), **Z** (body)

Multiplication procedure:

- Select u on **U**, align with index on **V**.
- Find v on **V**, align with result z on **Z**.
- If **U** = **Z** = **D** and **V** = **C** then $z = uv$.
- What if **U**, **V**, and **Z** are different?

Division Procedure:

- Select u on **U**, align with v on **V**.
- Align the index of **V** with result z on **Z**.
- If **U** = **Z** = **D** and **V** = **C** then $z = \frac{u}{v}$.
- What if **U**, **V**, and **Z** are different?

Suppose we have the following scales. x is the corresponding value on the **C** or **D** scale.

C and **D**: x

CI and **DI**: $1/x$

CF and **DF**: πx

CIF and **DIF**: $1/(\pi x)$

A and **B**: x^2

R: \sqrt{x}

K: x^3

E: e^x

L: $\log_{10} x$

S: $\arcsin x$

T: $\arctan x$

P: $\sqrt{1 - x^2}$

H: $\sqrt{1 + x^2}$

- **This display** shows all **3,540** distinct expressions that can be so evaluated on a **hypothetical slide rule** that has all 13 scales on both the slide and the body.
- **Caveats apply!** The numbers involved may have to be in certain ranges, and you may have to be judicious about which relevant variant of a scale you use to read your result.
- **Look up** the reference number of an expression in the accompanying book to find the scales needed to evaluate it.
- **Log** means the base 10 logarithm, and **Exp** the base 10 exponential.
- **Angles** are measured in **degrees!** Yikes!
- The expressions are **computer generated** and can often be simplified.
- Replacing the index of **V** in the multiplication procedure with a number w on a scale **W** (on the slide) gives **24,314** distinct expressions in three variables.
- The corresponding (never printed) book would have 2,143 pages.
- **Exercise:** Why not do the same thing in the division procedure?
- See www.math.utah.edu/~pa/sliderules
- or email pa@math.utah.edu
- for more information.