Inspiring Greatness

INDEPENDENCE SCHOOL DISTRICT

Math Virtual Learning

College Prep Algebra

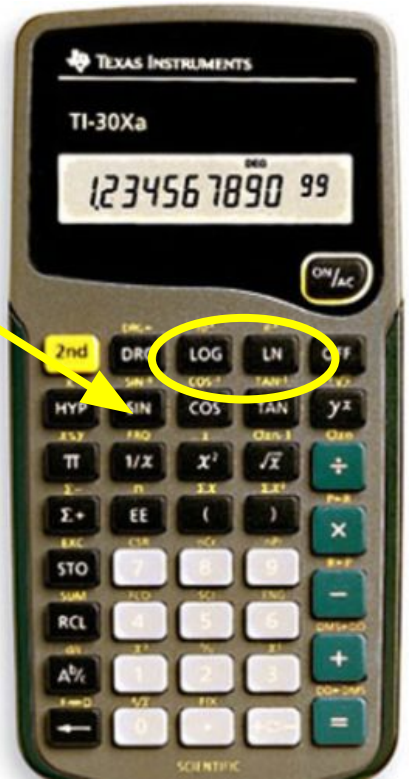
April 15, 2020

College Prep Algebra
Lesson: April 15, 2020

Objective/Learning Target:
Students will use the Change-of-Base formula to evaluate logarithmic expressions.

Let's get started:

If you can, find a basic scientific calculator like the one pictured here. How would you enter $\log_5(12)$ when the only keys you have are LOG and LN?



Lesson:
Mathematicians had the same question—only they didn't have calculators, they had Base 10 log charts (LOG) and Base *e* log charts (LN).

Watch this video for this really simple solution to the question

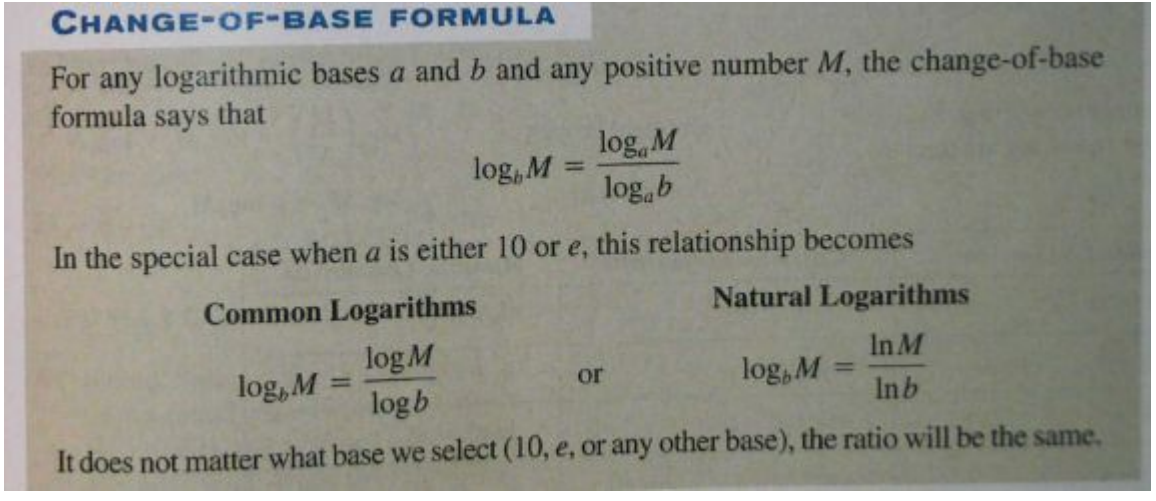
- **What is $\log_4(17)$ when you only have LOG or LN on your calculator?**

Lesson: This formula is known as the

Change-of-Base formula.

Here is a picture of it from the textbook "College Algebra, 3rd Edition" by Cynthia Young, page 517

Notice you can use the **LOG key** or the **LN key**



CHANGE-OF-BASE FORMULA

For any logarithmic bases a and b and any positive number M, the change-of-base formula says that

$$\log_b M = \frac{\log_a M}{\log_a b}$$

In the special case when a is either 10 or e, this relationship becomes

Common Logarithms

$$\log_b M = \frac{\log M}{\log b}$$

or

Natural Logarithms

$$\log_b M = \frac{\ln M}{\ln b}$$

It does not matter what base we select (10, e, or any other base), the ratio will be the same.

Practice:

To practice the Change-of-Base formula, use the worksheet link and the scientific calculator link below.

Change of base practice AND answer key

Scientific Calculator

Additional Practice

Khan Academy Online Practice Problems

IXL free online practice:
ONLY USE FORMULA
WITH LOG