RECAP FROM YESTERDAY

- YOU CAN ONLY USE YOUR CALCULATOR WHEN YOU HAVE A LOG WITH A BASE 10

EXAMPLE: $\log 8$

- YOU DISCOVERED A NEW NUMBER, THE NUMBER e
  e IS LIKE π. IT'S IRRATIONAL — MEANING ITS DECIMAL IS NEVER ENDING. $e = 2.718\ldots$

THINGS TO UNDERSTAND:

WHEN WE FIRST THE UNIT WE PRACTICED CHANGING FORMS

EXAMPLE: $\log_2 8 = 3 \rightarrow 2^3 = 8$

$\log_{10} 100 = 2 \rightarrow 10^2 = 100$

SO NOW WITH THE DISCOVERY OF e IT PARTNERS WITH NATURAL LOG ($\ln$)

EXAMPLE: $\ln_e x = y \rightarrow e^y = x$

$e^M = N \rightarrow \ln N = M$

USING YOUR CALCULATOR ... DEPENDING ON YOUR CALCULATOR, YOU HAVE THE FOLLOWING OPTIONS

OPTION 1: USING WHAT'S KNOWN AS THE CHANGE OF BASE FORMULA. USE WHEN BASE IS NOT 10

$$\log_A B \rightarrow \frac{\log B}{\log A} = \frac{\ln B}{\ln A}$$

ALSO WORKS WITH NATURAL LOGS (ln)

OPTION 2: TI CALCULATORS

PRESS [MATH]

SCROLL TO log base(

PRESS [ENTER]

SHOULD HAVE SCREEN SAY $\log_{\square}\square$ ENTER NUMBERS AS NEEDED.

SOLVING EXPONENTIAL EQUATIONS

STEPS

- TRY TO GET BASES THE SAME (MANIPULATE)
  - IF SAME, SET EXPONENTS EQUAL TO EACH OTHER

Ex.1) $10^{x+2} = 100^{2x-1}$

$10^{x+2} = 10^{2(2x-1)}$

$x+2 = 2(2x-1)$

$x+2 = 4x-2$

$2 = 3x-2$

$4 = 3x$

$x = 4/3$

Ex.2) BASES CAN'T BE MANIPULATED

- CHANGE FORMS
  - EXPONENTIAL FORM TO LOG FORM
  - USE CALCULATOR

$7^x = 20$

$\log_7 20 = x$

$= x$

Ex.3) $2^x = 5^{x-2}$

- CHANGE FORMS
  - EXPONENTS LEAP FROG
  - DISTRIBUTE $\log_2 5$ WHICH IS A NUMBER
  - GET X's ON SAME SIDE, MOVE #
  - TAKE OUT GCF
  - DIVIDE TO GET X ISOLATED

$\log_2 5^{x-2} = x$

$(x-2)\cdot\log_2 5 = x$

$x\log_2 5 - 2\log_2 5 = x$

$x\log_2 5 - x = 2\log_2 5$

$x(\log_2 5 - 1) = 2\log_2 5$

$$x = \frac{2\log_2 5}{(\log_2 5 - 1)}$$

Ex.4) $8^{2b-5} = 5^{b+1}$

$\log_8 5^{b+1} = 2b-5$

$(b+1)\cdot \log_8 5 = 2b-5$

$b\cdot \log_8 5 + 1\cdot \log_8 5 = 2b-5$

$b\log_8 5 - 2b = -5 - \log_8 5$

$b(\log_8 5 - 2) = -5 - \log_8 5$

$$b = \frac{(-5-\log_8 5)}{(\log_8 5 - 2)}$$

- CHANGE FORMS
- LEAP FROG
- DISTRIBUTE
- MOVE VARIABLES TO ONE SIDE, #'S TO THE OTHER
- TAKE OUT GCF
- DIVIDE TO GET b ISOLATED

EX.5) WHAT IF THE PROBLEM HAS A LOG

$\log_3 (x+4) = 4$

$3^4 = x+4$

$81 = x+4$

$77 = x$

- YOU GUESSED IT!

CHANGE FORMS

- PLEASE CHECK ANSWERS AS YOU CAN NOT TAKE A LOG OF A NEGATIVE NUMBER

EX. 6) WHAT IF THE PROBLEM HAS TWO LOGS

$\log_2(x-6) + \log_2(x+3) = 4$

- THAT'S RIGHT — CONDENSE!
- CHANGE FORMS
- SOLVE

$\log_2(x-6)(x+3) = 4$

$2^4 = (x-6)(x+3)$

$16 = x^2 + 3x - 6x - 18$

$16 = x^2 - 3x - 18$

$0 = x^2 - 3x - 34$

⋮

QUADRATIC FORMULA

EX. 7) $\log_8(x^2+16) + \log_8 2 = 2$

$\log_8(x^2+16)\cdot 2 = 2$

$8^2 = (x^2+16)\cdot 2$

$64 = 2x^2 + 32$

$32 = 2x^2$

$16 = x^2$ $\sqrt{}$ ROOT

$x = \pm 4$