

TUESDAY 11-6-12 (Algebra 2)

CLASS NOTES

Ch 4-5 Exponential AND Logarithmic Equations (and Inequalities)

How?

Exponential
Equations
(variable is an exponent)

(A)

(1)



Try getting both sides of the equation to have same base.

(EX)

$$25 = 5^x$$

$$\underline{5^2} = \underline{5^x}$$

$$\therefore 2 = x$$

(A)

(2)

take the log of both sides

How?

(EX)

pg 266

$$5^{x-2} = 200$$

$$\log(5^{x-2}) = \log 200$$

$$(x-2)\log 5 = \log 200$$

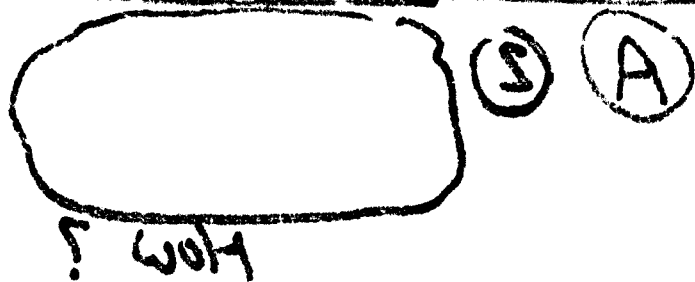
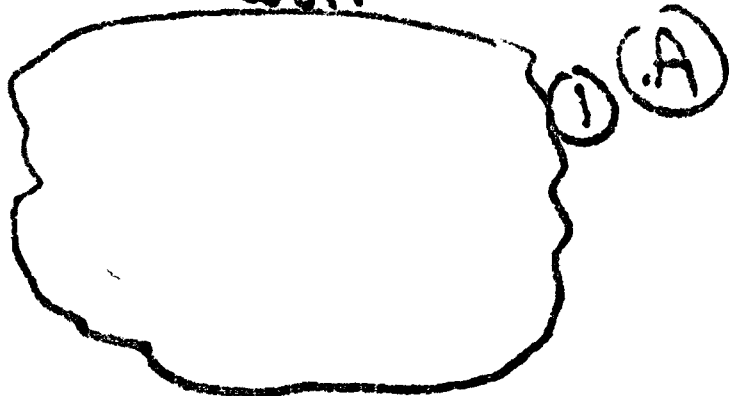
$$(x-2) = \frac{\log 200}{\log 5}$$

$$x = \frac{2.301}{.699} + 2 \approx \boxed{5.292}$$

(S)

(A)

? wotH



EX 1A
PS 266

THIS ONE is a little more
"ACT" like:

$$8^x = 2^{x+6}$$

↑

CAN you MAKE
this a base of 2?

$$(2^3)^x = 2^{x+6}$$

$$2^{3x} = 2^{x+6}$$

$$\therefore \begin{array}{r} 3x = x + 6 \\ -x \quad -x \end{array}$$

$$2x = 6$$

$$\boxed{x = 3}$$

$$\checkmark \quad 8^{(3)} \stackrel{?}{=} 2^{(3+6)}$$

$$512 \stackrel{?}{=} 512 \quad \checkmark$$

② * Logarithmic Equations (variable in the log) ²

EX3
pg 267

$$\log_3 (x-5) = 2$$

$$3^2 = x-5$$

$$9 = x-5$$

$$\boxed{14 = x}$$

How?

use
logarithm
properties

CK

$$\log_3 (14-5) \stackrel{?}{=} 2$$

$$\log_3 (9) \stackrel{?}{=} 2$$

$$3^2 \stackrel{?}{=} 9 \checkmark$$

③ $\log 45x - \log 3 = 1$

$$\log \left(\frac{45x}{3} \right) = 1$$

$$\log_{10} 15x = 1$$

$$10^1 = 15x$$

$$\frac{10}{15} = x$$

$$\boxed{\frac{2}{3} = x}$$

CK

$$\log 45\left(\frac{2}{3}\right) - \log(3) \stackrel{?}{=} 1$$

$$\log 30 - \log 3 = 1$$

$$\log \frac{30}{3} \stackrel{?}{=} 1$$

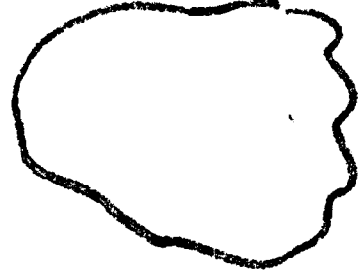
$$\log_{10} (10) \stackrel{?}{=} 1$$

$$10^{(1)} \stackrel{?}{=} 10 \checkmark$$

* Use the properties of
logarithms to solve.

⑧

? Wolf



EX 2 (Pg 26.7)

$$2^N > 2000000.$$

$$N = 0, 1, 2, \dots$$

$$2^N > 2 \times 10^6$$

$$\log(2^N) > \log(2)(10^6)$$

$$N \log 2 > \log 2 + 6 \log 10$$

$$N > \frac{\log 2}{\log 2} + \frac{6}{\log 2}$$

$$N > 1 + \frac{6}{0.30103}$$

$$N > 20.93$$

$$N > 21$$

 $\Rightarrow$

22 days since
N START AT 0

$$2^{21} \approx 2097152$$

Ex C
PS 268

$$\log_4 X^2 = 7$$

$$2 \log_4 X = 7$$

$$\log_4 X = \frac{7}{2}$$

$$4^{\frac{7}{2}} = X \quad \therefore (2\sqrt{4})^7 = X$$

$$\boxed{128 = 2^7 = X}$$

$$a^{\frac{m}{n}} = (\sqrt[n]{a})^m \text{ or } \sqrt[n]{a^m}$$

① $\log X + \log (X+9) = 1$

$$\log (X)(X+9) = 1$$

$$\log (X^2 + 9X) = 1$$

$$10^1 = X^2 + 9X$$

$$\therefore X^2 + 9X - 10 = 0$$

$$\text{sum} = 9$$

$$\text{prod} = -10$$

$$\begin{array}{c} -1 \\ +10 \end{array}$$

$$(X-1)(X+10) = 0$$

$$\boxed{X = \{1, -10\}}$$

Do CKS!!!

✓ No!

$$\boxed{X = \{1\}}$$