p. 38-39 Solving Log Equations- One to One Property

Warm-up: p. 38

Use the Change Of Base Formula to <u>rewrite</u> each expression using common logs, then evaluate expression.

1.) $\log_3 16$

$Log(16) \div Log(3) = 2.52$

2.) $\log_2 15$

$\dfrac{Log\ 15}{Log\ 2} = 3.91$

3.) $\log_7 8$

$\dfrac{log\ 8}{log\ 7} = 1.07$

⑬ $\log_8(x+25) = 2$

$8^2 = x+25$

$64 = x+25$

$\dfrac{-25 \qquad -25}{39 = x}$

One to one property of logarithms-Notes   p. 39

If $b^x = b^y$ then x = y   **One to one property.**

Using this property, solve the following equations.

1.) $6^{2x-3} = 6^{3(x+3)}$

$2x-3 = 3(x+3)$
$2x-3 = 3x+9$
$\underline{-2x \qquad -2x}$
$-3 = x+9$
$\underline{-9 \qquad -9}$
$-12 = x$

2.) $2^{3a} = 2^{-(-2a-3)}$

$3a = -(-2a-3)$
$3a = 2a+3$
$\underline{-2a \quad -2a}$
$a = 3$

3.) $6^{-2x+5} = 216$

$6^{-2x+5} = 6^3$

$-2x+5 = 3$
$\underline{-5 \quad -5}$
$\dfrac{-2x}{-2} = \dfrac{-2}{-2}$
$x = 1$

216
6 36
    6 6

4.) $5^{3x+1} = 625$

$5^{3x+1} = 5^4$

$3x+1 = 4$
$\underline{-1 \quad -1}$
$\dfrac{3x}{3} = \dfrac{3}{3}$
$x = 1$

625
5 125
    5 25
        5 5

One to one property of logarithms-Notes

If $\log_b x = \log_b y$, then x = y   One to one property.

Using this property, solve the following equations.

5.) $\log_9 (-5x -10) = \log_9 (-4x + 4)$

$-5x-10 = -4x+4$
$\underline{+5x \qquad +5x}$
$-10 = x+4$
$\underline{-4 \qquad -4}$
$-14 = x$

6.) $\log (20 + x^2) = \log (2x^2 - x)$

$20 + x^2 = 2x^2 - x$
$\underline{-x^2 \quad -x^2}$
$20 = x^2 - x$
$\underline{-20 \qquad -20}$
$0 = x^2 - x - 20$

$-5 \quad\times\quad 4$
-20
-1

$0 = (x-5)(x+4)$
$x-5=0$ OR $x+4=0$
$x=5$ OR $x=-4$

7.) $\log_5 (2x -6) = \log_5 x$

$2x-6 = x$
$\underline{-2x \qquad -2x}$
$-6 = -x$
$\dfrac{-6}{-1} = \dfrac{-x}{-1}$
$6 = x$

Practice - Worksheet

Do #1 - 12