

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

One to one property of logarithms-Notes**If  $b^x = b^y$  then  $x = y$  One to one property.**

Using this property, solve the following equations.

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

$$2x-3 = 3(x+3)$$

$$2x-3 = 3x+9$$

$$\begin{array}{r} -2x \quad -9 \quad -2x \quad -9 \\ -2x-9 = 3x+9 \\ -2x-9-3x-9 \\ -5x-18 = 0 \\ -5x = 18 \\ x = -\frac{18}{5} \end{array}$$

$$2.) 2^{3a} = 2^{-1(-2a-3)}$$

$$3a = -2a+3$$

$$\begin{array}{r} -2a \quad -2a \\ 3a = -2a+3 \\ 3a+2a = -2a+3+2a \\ 5a = 3 \\ a = \frac{3}{5} \end{array}$$

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

$$-2x+5 = 3$$

$$\begin{array}{r} -5 \quad -5 \\ -2x+5 = 3 \\ -2x+5-5 = 3-5 \\ -2x = -2 \\ \frac{-2x}{-2} = \frac{-2}{-2} \\ x = 1 \end{array}$$

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

$$3x+1 = 4$$

$$\begin{array}{r} -1 \quad -1 \\ 3x+1 = 4 \\ 3x+1-1 = 4-1 \\ 3x = 3 \\ \frac{3x}{3} = \frac{3}{3} \\ x = 1 \end{array}$$

One to one property of logarithms-Notes

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

Using this property, solve the following equations.

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

$$\begin{aligned} -5x - 10 &= -4x + 4 \\ +4x & \quad +4x \\ -x - 10 &= 4 \\ +10 & \quad +10 \\ -x &= 14 \\ \frac{-x}{-1} &= \frac{14}{-1} \quad \boxed{x = -14} \end{aligned}$$

6.)  $\log_2 (-2x + 3) = \log_2 (-3x + 5)$

$$\begin{aligned} -2x + 3 &= -3x + 5 \\ +3x & \quad +3x \\ x + 3 &= 5 \\ -3 & \quad -3 \\ x &= 2 \quad \boxed{x = 2} \end{aligned}$$

7.)  $\log_{10} (100 + 5x) = \log_{10} (x^2 + 5x)$

$$\begin{aligned} 100 + \cancel{5x} &= x^2 + \cancel{5x} \\ \sqrt{x^2} &= \sqrt{100} \\ \boxed{x = \pm 10} \end{aligned}$$

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

$$\begin{aligned} \cancel{2x} - 6 &= x \\ -2x & \quad -2x \\ -6 &= -x \\ \frac{-6}{-1} &= \frac{-x}{-1} \\ \boxed{6 = x} \end{aligned}$$

## Homework - Worksheet

#'s 2, 4, 7, 8, 9, 10, 11, 16

