Name _____ Class _____ Date _____

Reteaching 8-5

Exponential and Logarithmic Equations

OBJECTIVE: Using logarithms to solve exponential equations

MATERIALS: None

- When solving exponential equations, use inverse operations to isolate the variable. Remember that the inverse of raising to an exponent is taking the logarithm.

Example

Solve $7 - 5^{2x-1} = 4$.

$7 - 5^{2x-1} = 4$

$-5^{2x-1} = -3$ ← **First isolate the term that has the variable in the exponent. Begin by subtracting 7 from each side.**

$5^{2x-1} = 3$ ← **Multiply each side by -1.**

$\log_5 5^{2x-1} = \log_5 3$ ← **Since the variable is in the exponent, use logarithms. Take $\log_5$ of each side since 5 is the base of the exponent.**

$(2x - 1)\log_5 5 = \log_5 3$ ← **Use the Power Property of Logarithms.**

$2x - 1 = \log_5 3$ ← **Simplify. (Recall that $\log_b b = 1$.)**

$2x - 1 = \dfrac{\log 3}{\log 5}$ ← **Apply the Change of Base Formula.**

$2x = \dfrac{\log 3}{\log 5} + 1$ ← **Add 1 to each side.**

$x = \dfrac{1}{2}\left(\dfrac{\log 3}{\log 5} + 1\right)$ ← **Divide each side by 2.**

$x \approx 0.84$ ← **Use a calculator to find a decimal approximation.**

Exercises

Solve each equation. Round the answer to the nearest hundredth.

1. $2^x = 5$

2. $10^{2x} = 8$

3. $5^{x+1} = 25$

4. $2^{x+3} = 9$

5 $3^{2x-3} = 7$

6. $4^x - 5 = 3$

7. $5 + 2^{x+6} = 9$

8. $4^{3x} + 2 = 3$

9. $1 - 3^{2x} = -5$

10. $2^{3x} - 2 = 13$

11. $5^{2x+7} - 1 = 8$

12. $7 - 2^{x+7} = 5$