Name: _____ Date: _____

Solving Exponential Functions

Solve each equation:

1. $8^{2x-5} = 8^{x+3}$

$2x-5=x+3$

$-x \quad -x$

$x-5=3$

$+5 \quad +5$

$x=8$

2. $9^{x-5} = 27$

$x=\frac{13}{2}$

3. $5^{2x+3} = 625$

$625=5^4$

$5^{2x+3}=5^4$

$2x+3=4$

$-3 \quad -3$

$\frac{2x}{2}=\frac{1}{2}$

$x=\frac{1}{2}$

4. $9^{x} = 27^{2x+8}$

$x=-6$

5. $3^{2x+3} = 27^{x+1}$

$27=3^3$

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

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

$2x+3=3x+3$

$-3x \quad -3x$

$-x+3=3$

$-3 \quad -3$

$\frac{-x}{-1}=\frac{0}{-1}$

$x=0$

6. $125^{x} = 25^{x+1}$

$x=2$

7. $4^{3x} = 8^{x+1}$

$4=2^2 \quad 8=2^3$

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

$6x=3x+3$

$-3x \quad -3x$

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

$x=1$

8. $4^{x} + 5 = 21$

$x=2$

9. $3^{x-14} = \left(\frac{1}{3}\right)^{2x-1}$

$\frac{1}{3}=3^{-1}$

$3^{x-14}=(3^{-1})^{2x-1}$

$3^{x-14}=3^{-2x+1}$

$x-14=-2x+1$

$+2x \quad +2x$

$3x-14=1$

$+14 \quad +14$

$\frac{3x}{3}=\frac{15}{3}$

$x=5$

10. $81^{x+3} = \left(\frac{1}{3}\right)^{5x-6}$

$x = -2/3$

11. $\left(\frac{1}{3}\right)^{x} - 9 = 18$

$+9 \quad +9$

$\left(\frac{1}{3}\right)^{x} = 27$

$\frac{1}{3} = 3^{-1}$

$27 = 3^{3}$

$(3^{-1})^{x} = 3^{3}$

$3^{-x} = 3^{3}$

$\frac{-x}{-1} = \frac{3}{-1}$

$x = -3$

12. $4^{x} = \left(\frac{1}{2}\right)^{x-3}$

$x = 1$

Solve each inequality:

13. $4^{3x} < 2^{x+10}$

$4 = 2^{2}$

$(2^{2})^{3x} < 2^{x+10}$

$2^{6x} < 2^{x+10}$

$6x < x + 10$

$-x \quad -x$

$\frac{5x}{5} < \frac{10}{5}$

$x < 2$

14. $3^{x} \leq 27^{x-4}$

$x \geq 6$

15. $2^{7x-6} > 2^{5x+2}$

$7x - 6 > 5x + 2$

$-5x \quad -5x$

$2x - 6 > 2$

$+6 \quad +6$

$\frac{2x}{2} > \frac{8}{2}$

$x > 4$

16. Solve each exponential equation. Identify the property of equality that allows you to carry out each step.

* Go Back to Unit 3 to help *

Equation	Steps
$3^{x} - 9 = 72$	Given

17. There are 8 bacteria in a culture. The number of bacteria in the culture quadruples every hour. After how many hours will there be 2,048 bacteria?

$y = ab^{x}$

$\frac{2048}{8} = \frac{8(4)^{x}}{8}$

$256 = (4)^{x}$

$4^{4} = (4)^{x}$

$4 = x$

4 hours