

Math 30-1  
Solving Exponential Equations

Name: Key.

1.  $27^x = 9^{2x-1}$   $3^{3x} = 3^{2(2x-1)}$   $3x = 4x - 2$   $x = 2$
2.  $4^{2x-1} = 64$   $4^{2x-1} = 4^3$   $2x-1 = 3$   $x = 2$
3.  $6^{3x-6} = 1$   $6^{3x-6} = 6^0$   $3x-6 = 0$   $x = 2$
4.  $2^{-x} = 128$   $2^{-x} = 2^7$   $-x = 7$   $x = -7$
5.  $5^{4-x} = \frac{1}{5}$   $5^{4-x} = 5^{-1}$   $4-x = -1$   $x = 5$
6.  $32^{3x-2} = 64$   $2^{5(3x-2)} = 2^6$   $15x-10 = 6$   $x = 16/15$
7.  $3^{2x} + 1 = 2$   $3^{2x} = 1$   $3^{2x} = 3^0$   $2x = 0$   $x = 0$
8.  $5^{x+1} = 15$   $5^{x+1} = 5^1$   $x+1 = 1$   $x = 0$
9.  $\frac{27^x}{9^{2x-1}} = 3^{x+4}$   $\frac{3^{3x}}{3^{2(2x-1)}} = 3^{x+4}$   $3x - 2(2x-1) = x+4$   $3x - 4x + 2 = x+4$   $-x + 2 = x+4$   $-2 = 2x$   $x = -1$
10.  $27^x(9^{2x-1}) = 3^{x+4}$   $3^{3x} \cdot 3^{2(2x-1)} = 3^{x+4}$   $3x + 4x - 2 = x+4$   $7x - 2 = x+4$   $6x = 6$   $x = 1$
11.  $64^{4x} = 16^{x+5}$   $2^{6(4x)} = 2^{4(x+5)}$   $24x = 4x + 20$   $20x = 20$   $x = 1$
12.  $9^{x-7} = 27^{2x-9}$   $3^{2(x-7)} = 3^{3(2x-9)}$   $2x-14 = 6x-27$   $-4x = -13$   $x = 13/4$
13.  $125^{6x+2} = 25^{8x+1}$   $5^{3(6x+2)} = 5^{2(8x+1)}$   $18x+6 = 16x+2$   $2x = -4$   $x = -2$
14.  $8^{x+2} = \frac{1}{4} 2^{3(x+2)} = 2^{-2(x+3)}$   $3x+6 = -2x-6$   $5x = -12$   $x = -12/5$
15.  $5(3)^x = 135$   $3^x = 3^3$   $x = 3$
16.  $9^x = \sqrt[3]{27}$   $3^{2x} = 3^{3(1/2)}$   $2x = 3/2$   $x = 3/4$
17.  $\sqrt[4]{216} = 36^{x-1}$   $(6^3)^{1/4} = 6^{2(x-1)}$   $3/4 = 2x-2$   $x = 11/8$
18.  $\frac{1}{8} 1^{x+1} = \sqrt[3]{16^x}$   $2^{-3(x+1)} = 16^{x/3}$   $3(-3x-3) = \frac{4x}{3} \cdot 3$   $-9x-9 = 4x$   $-9 = 13x$   $x = -9/13$