

Lesson 4.5- SWBAT solve exponential equations

Kick off- Take out your homework and answer the following:

1) Simplify and write with no negative exponents:

a)  $\frac{15x^{-4}y}{3y^{-1}}$   
 $1 - -1 = 2$   
 $\frac{5y^2}{x^4}$

b)  $-6a^2b^{-5}$   
 $-\frac{6a^2}{b^5}$

2) Write each in radical form:

a)  $(4x^3)^{\frac{1}{2}}$   
 $\sqrt{4x^3}$

b)  $-8x^{\frac{2}{3}}$   
 $-\sqrt[3]{8x^2}$

**Exponential Equations**- an equation in which the variable appears in an exponent.

Ex:  $5^{x+5} = 5^{2x+10}$   $x+5 = 2x+10$

Things to know: **bases are the same.**  
 If you have the same base, you can set the exponents equal to each other!!  $b^x = b^y \rightarrow x = y$

**If the bases are not the same then change one or both bases as the first step in solving!**  
 cannot do this!

Directions: Solve and check each of the following:

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

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

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

Check  
 $6^{2(3)+1} = 6^{3(3)-2}$   
 $6^7 = 6^7$  ✓

3)  $9^{2x} = 9^{25}$   
 $2x = 25$   
 $x = 12.5$

Check  
 $9^{2(12.5)} = 9^{25}$   
 $9^{25} = 9^{25}$  ✓

4)  $4^{2p} = 4^{-2p-1}$   
 $2p = -2p-1$   
 $+2p +2p$   
 $4p = -1$   
 $\frac{4p}{4} = \frac{-1}{4}$   
 $p = -\frac{1}{4}$

Check  
 $4^{2(-\frac{1}{4})} = 4^{-2(-\frac{1}{4})-1}$   
 $4^{-\frac{1}{2}} = 4^{-\frac{1}{2}}$  ✓

5)  $2^{x-1} = 2^6$

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

7)  $5^{3x-8} = 5^{4x}$

8)  $2^{3(x-1)} = 2^{x+2}$

9)  $8^{2x} = 8^{x+2}$

10)  $9^{2(2x+1)} = 9^{5x-1}$