Algebra RH

Essential Question: How do we solve for an unknown exponent?

DO NOW:

a) Solve for x: $9x^{-\frac{2}{3}} + 7 = 71$

b) When simplified, the expression $(\sqrt[3]{m^4})(m^{-\frac{1}{2}})$ is equivalent to

    (1) $\sqrt[3]{m^{-2}}$ (3) $\sqrt[5]{m^{-4}}$

    (2) $\sqrt[4]{m^3}$ (4) $\sqrt[6]{m^5}$

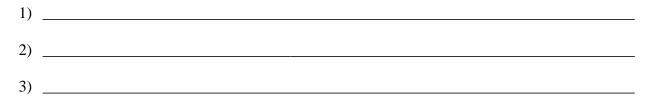**RECAP:**   When solving for an unknown **base**...

         1) Isolate the **exponential** component.

         2) Raise both sides to the **reciprocal** of the exponent.

         3) Use power over root to simplify.

Example: Solve for x: $9^x = 27$

- What makes this equation different from question a) in the Do Now?

- When solving for an unknown **exponent**, we must find a **common base**. What is a common base for 9 and 27?

- Let's solve!

To solve for an **unknown exponent:**

1) _____

2) _____

3) _____

Solve each equation for the unknown variable.

1) $2^{\frac{x}{3}} = 32$

2) $8^{2x+1} = 4^{4x}$

3) $4^{-1} = 2^{x+4}$

4) $\left(\frac{1}{3}\right)^{x} = 9^{x+7}$

5) $\left(\frac{1}{25}\right)^{2x} = 125^{x-1}$

6) $x^{-3} = \frac{27}{64}$

#6 IS NOT THE SAME AS THE OTHER PROBLEMS! DO NOT CONFUSE THE TWO TYPES OF EQUATIONS!!!

SUMMARY:
- When the variable is the _____, remember **reciprocal exponents,** and **power over root**.
- When the variable is in the _____, remember **common base**, and **power to a power**.

Solve each equation for the unknown variable.

1) $8^{2x} = 4^6$

2) $9^{2b-3} = 27^{1-b}$

3) $27^x = 9^{x+2}$

4) $9^{3x} = 3^{3x+1}$

5) $4^{2x-3} = \left(\dfrac{1}{2}\right)^{3x}$

6) $25^{3x-4} = \left(\dfrac{1}{125}\right)^{2x}$

7) $\left(\dfrac{1}{9}\right)^{3x} = \left(\dfrac{1}{27}\right)^{x-1}$

8) $\left(a^x\right)^{\frac{2}{3}} = \dfrac{1}{a^2}$

(see back)

9) If $2^{4x+1} = 8^{x+a}$, which expression is equivalent to x?

(1) $a - 1$

(3) $3a - 1$

(2) $\dfrac{a-1}{15}$

(4) $\dfrac{a-1}{3}$

10) If x is a positive integer, $4x^{\frac{1}{2}}$ is equivalent to

(1) $2x$

(3) $4\sqrt{x}$

(2) $\dfrac{2}{x}$

(4) $4\dfrac{1}{x}$