

To solve exponential equations:

1. Rewrite the bases as the same number
2. Use the power to the power property to simplify the exponents on each side
3. Set the exponents equal to each other and solve

EXAMPLE 1:

$$6^{2b} = 6^{b-1}$$

$$\begin{aligned} 2b &= b-1 \\ -b & \quad -b \\ \hline b &= -1 \end{aligned}$$

Example 3:

$$5^{3x} = \frac{1}{125}$$

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

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

$$x = -1$$

EXAMPLE 2:

$$\frac{1}{25} = 5^{-2} \quad \left(\frac{1}{25}\right)^{3n} = 625 \quad 625 = 5^4$$

$$(5^{-2})^{3n} = 5^4$$

$$5^{-6n} = 5^4$$

$$\frac{-6n}{-6} = \frac{4}{-6}$$

$$n = -\frac{2}{3}$$

Example 4:

$$\frac{1}{9} = 9^{-1}$$

$$\left(\frac{1}{9}\right)^{-n-1} = 81^{-n}$$

$$81 = 9^2$$

$$(9^{-1})^{-(n-1)} = (9^2)^{-n}$$

$$\frac{n+1}{-n} = \frac{-2n}{-n}$$

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

$$\boxed{-\frac{1}{3} = n}$$

Exponential Equations

Exponential Equations - Day One HW

Solve each equation.

1) $5^{2b-1} = 5^{-3b}$

$$b = \frac{1}{5}$$

2) $64^{2r} = \frac{1}{4}$

$$r = -\frac{1}{6}$$

3) $25^{-r} = 625^{-2r}$

$$0 = r$$

4) $\left(\frac{1}{32}\right)^{2v} = 64^{-2v}$

$$v = 0$$

5) $27^{n-2} = 243$

$$n = \frac{11}{3}$$

6) $243^{2b} = 27^b$

$$b = 0$$

7) $216^x = 36$

$$x = \frac{2}{3}$$

8) $5^{-2r} = 5^{-r}$

$$r = 0$$

9) $2^{-3n} = 32$

$$n = -\frac{5}{3}$$

10) $343^{2n-1} = \frac{1}{49}$

$$n = \frac{1}{6}$$

$$11) 4^{2m} = 4^{-m}$$

$$12) 5^{2-k} = 5^2$$

$$13) 5^{3n} = 25$$

$$14) 3^{-3k+2} = 81$$

$$15) 4^{-m+1} = 4^{-2m-2}$$

$1000 = 10^3$
 $100 = 10^2$

$$16) 1000^{-2n} = 100$$

$(10^3)^{-2n} = 10^2$
 $10^{-6n} = 10^2$

$$\frac{-6n}{-6} = \frac{2}{-6}$$
$$n = -\frac{2}{6}$$
$$= -\frac{1}{3}$$

$$17) \left(\frac{1}{5}\right)^{-2v} = 125^{2v}$$

$$18) 4^{-2a} = 4^{-2a-1}$$

$$19) 36^{-2x} = \left(\frac{1}{6}\right)^{-x-1}$$

$$20) 3^{3n} = \frac{1}{243}$$