Bell Ringer - Simplify the expresssion

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$$-\frac{1}{3} \cdot w^3 \cdot 3^2 \cdot w^4$$

$$-\frac{1}{\cancel{3}_1} \cdot \frac{\cancel{9}^3}{1} \cdot w^7$$

$$-3w^7$$

Zero and Negative Exponents

Any number/variable raised to the zero power is 1.

A negative exponent is the result of repeated division. Negative exponents are used to express small values, NOT negative values.

An expression containing negative exponents can be written using positive exponents, then evaluated.

Steps:
1) If the negative exponent is in the numerator, move the base and exponent to the denominator making the exponent positive OR
2) If the negative exponent is in the denominator, move the base and exponent to the numerator making the exponent positive

Rewrite and evaluate using positive exponents.

1. 5^{-3}

$\frac{1}{5^3}$

$\frac{1}{125}$

2. m^{-2}

$\frac{1}{m^2}$

3. $3z^{-5}$

$\frac{3}{z^5}$

Rewrite and evaluate using positive exponents.

4. $\left(\frac{3}{5}\right)^{-1}$

$\frac{3^{-1}}{5^{-1}}$

$\frac{5}{3}$

5. $4^0 \bullet \frac{1}{2^{-2}}$

$1 \cdot 2^2$

$1 \cdot 4$

4

6. $(-4x)^{-3}$

$-4^{-3} \cdot x^{-3}$

$\frac{1}{-4^3 x^3}$

$\frac{1}{-64x^3}$

Rewrite and evaluate using positive exponents.

7. $(5x^{-2}y)^3$

$5^3 x^{-6} y^3 \rightarrow \frac{125}{1} \cdot \frac{1}{x^6} \cdot \frac{y^3}{1}$

$\frac{125y^3}{x^6}$

Rewrite and evaluate using positive exponents.

8. $(2x^3y^{-8})^{-3}$

$2^{-3}x^{-9}y^{24}$

$\frac{1}{2^3} \cdot \frac{1}{x^9} \cdot \frac{y^{24}}{1}$

$\frac{y^{24}}{8x^9}$

Graphing Exponential Functions/Equations

$$y = a \cdot b^x$$

To graph,

1. Make a table of values using integer values for x.
2. Plot the points.
3. Connect the points with a smooth curve.

Graph $y = \left(\frac{1}{2}\right)^x$

x	y
2	$\frac{1}{2^2} \cdot \frac{1}{2^2} = \frac{1}{4}$
1	$\frac{1}{2^1}$
0	1
-1	$\frac{1^{-1}}{2^{-1}} = \frac{2}{1} = 2$
-2	$\frac{1^{-2}}{2^{-2}} = \frac{4}{1} = 4$