Name _____ Date _____ Class _____

Evaluating Expressions with Zero and Negative Exponents

Zero Exponent: Any nonzero number raised to the zero power is __**1**__.

$4^0 = $ __**1**__

Negative Exponent: A nonzero number raised to a negative exponent is

equal to one divided by that number raised to the __**opposite**__ exponent.

$3^{-4} = \dfrac{1}{3^{\boxed{4}}}$

Evaluate each expression for the given value(s) of the variable(s).

A. $a^{-3}b^2$ for $a = 2$ and $b = 3$

$\underline{\mathbf{2}}^{-3} \cdot 3^{\boxed{2}}$ Substitute $\underline{\mathbf{2}}$ for a and $\underline{\mathbf{3}}$ for b.

$= \dfrac{1}{2^{\boxed{3}}} \cdot \mathbf{9}$ Use the definition $x^{-n} = \dfrac{1}{x^n}$ and simplify.

$= \dfrac{1}{2 \cdot \boxed{2} \cdot \boxed{2}} \cdot \mathbf{9}$ Write the power in the denominator as a product.

$= \dfrac{1}{\boxed{\mathbf{8}}} \cdot 9$ Evaluate the power in the denominator.

$= \dfrac{9}{\boxed{\mathbf{8}}}$ Simplify.

B. $x^0 y^{-3}$ for $x = 7$ and $y = -5$

$\underline{\mathbf{7}}^0 \cdot (-5)^{\boxed{-3}}$ Substitute $\underline{\mathbf{7}}$ for x and $\underline{\mathbf{-5}}$ for y.

$= \underline{\mathbf{1}} \cdot \dfrac{1}{(-5)^{\boxed{3}}}$ Any nonzero number raised to the zero power is __**1**__

and $x^{-n} = \dfrac{1}{x^n}$.

$= 1 \cdot \dfrac{1}{\boxed{\mathbf{-125}}}$ Evaluate the power.

$= -\dfrac{\boxed{\mathbf{1}}}{\boxed{\mathbf{125}}}$ Simplify.

Simplifying Expressions with Zero and Negative Exponents

A. $9a^{-7}$

$9a^{-7} = 9 \cdot \dfrac{\mathbf{a^{-7}}}{}$

$= 9 \cdot \dfrac{1}{\boxed{\mathbf{a^7}}}$

$= \dfrac{9}{\boxed{\mathbf{a^7}}}$

B. $\dfrac{x^{-6}}{y^{-4}}$

$\dfrac{x^{-6}}{y^{-4}} = x^{-6} \cdot \dfrac{1}{\boxed{\mathbf{y^{-4}}}}$

$= \dfrac{1}{\boxed{\mathbf{x^6}}} \cdot \dfrac{y^4}{1} = \dfrac{\boxed{\mathbf{y^4}}}{x^6}$