

Name:

Date:

Period:

Exponent Law Explorations

1. Product Law

Complete all the missing parts in the following table:

$x^m \times x^n$	Exponential form	Expanded form
E.g. $3^1 \times 3^4$	$(3)^{1+4} = (3)^5$	$(3) \times (3)(3)(3)(3)$
$5^2 \times 5^{\square}$	$(5)^{2+3} = \underline{\hspace{2cm}}$	$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$
$(-4)^{\square} \times (\underline{\hspace{1cm}})^{\square}$	$(\underline{\hspace{1cm}})^{\square} + \square = \underline{\hspace{2cm}}$	$(-4)(-4) \times (-4)(-4)$
E.g. $(3)^{-2} \times (3)^4$	$(3)^{-2+4} = (3)^2$	$\frac{1}{(3)(3)} \times (3)(3)(3)(3)$
$(-2)^{-1} \times (\underline{\hspace{1cm}})^{-3}$	$(-2)^{\square} + \square = \underline{\hspace{2cm}}$	$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$
$(\underline{\hspace{1cm}})^{\square} \times (\underline{\hspace{1cm}})^{\square}$	$(-6)^{3+2} = \underline{\hspace{2cm}}$	$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$

Complete the **Product Law**:

When multiplying like bases you must $\underline{\hspace{2cm}}$ the exponents.

2. Quotient Law

Complete all the missing parts in the following table:

$x^m \div x^n$	Exponential form	Expanded form
E.g. $3^4 \div 3^1$	$(3)^{4-1} = (3)^3$	$(3)(3)(3)(3) \div (3)$
$5^3 \div 5^{\square}$	$(5)^{3-2} = \underline{\hspace{2cm}}$	$\underline{\hspace{2cm}} \div \underline{\hspace{2cm}}$
$(-3)^3 \div (-3)^2$	$(-3)^{\square} - \square = \underline{\hspace{2cm}}$	$\underline{\hspace{2cm}} \div \underline{\hspace{2cm}}$
$(-4)^{\square} \div (\underline{\hspace{1cm}})^{\square}$	$(\underline{\hspace{1cm}})^{\square} - \square = \underline{\hspace{2cm}}$	$(-4)(-4)(-4)(-4) \div (-4)(-4)$
E.g. $(3)^{-4} \div (3)^2$	$(3)^{-4-2} = (3)^{-6}$	$\frac{1}{(3)(3)(3)(3)} \div (3)(3)$
$(-2)^{-1} \div (\underline{\hspace{1cm}})^{-3}$	$(-2)^{\square} - \square = \underline{\hspace{2cm}}$	$\underline{\hspace{2cm}} \div \underline{\hspace{2cm}}$
$(\underline{\hspace{1cm}})^{-3} \div (\underline{\hspace{1cm}})^2$	$(-6)^{-3-2} = \underline{\hspace{2cm}}$	$\underline{\hspace{2cm}} \div \underline{\hspace{2cm}}$

Complete the **Quotient Law**:

When dividing like bases you must $\underline{\hspace{2cm}}$ the exponents.

3. Power of a Power Law

Complete all the missing parts of the following table:

$(x^m)^n$	Exponential form	Expanded form
E.g. $(2^3)^2$	$(2)^{3 \times 2} = (2)^6$	$(2)(2)(2)(2)(2)(2)$
$(5^2)^\square$	$(5)^{2 \times 2} = \underline{\hspace{2cm}}$	$\underline{\hspace{2cm}}$
$((-3)^3)^2$	$(-3)^\square \times \square = \underline{\hspace{2cm}}$	$\underline{\hspace{2cm}}$
$((-4)^\square)^2$	$(-4)^\square \times \square = \underline{\hspace{2cm}}$	$(-4)(-4)(-4)(-4)$
E.g. $(-3)^{-4})^2$	$(-3)^{-4 \times 2} = (-3)^{-8}$	$\left(\frac{1}{-3}\right)\left(\frac{1}{-3}\right)\left(\frac{1}{-3}\right)\left(\frac{1}{-3}\right)\left(\frac{1}{-3}\right)\left(\frac{1}{-3}\right)\left(\frac{1}{-3}\right)\left(\frac{1}{-3}\right)$
$((4)^{-3})^{-2}$	$(4)^\square \times \square = \underline{\hspace{2cm}}$	$\underline{\hspace{2cm}}$
$((-2)^{-1})^{-3}$	$(\underline{\hspace{1cm}})^\square \times \square = \underline{\hspace{2cm}}$	$\underline{\hspace{2cm}}$
$((3)^2)^{-2}$	$(\underline{\hspace{1cm}})^\square \times \square = \underline{\hspace{2cm}}$	$\underline{\hspace{2cm}}$

Complete the **Power of a Power Law**:

When raising a power to another power you must the exponents.

4. Power of a Product Law

Complete all the missing parts of the following table:

$(x \times y)^m$	Exponential form	Expanded form
E.g. $(2 \times 4)^3$	$(2)^{1 \times 3} \times (4)^{1 \times 3} = (2)^3 \times (4)^3$	$(2)(2)(2) \times (4)(4)(4)$
$(3 \times 2)^\square$	$(\underline{\hspace{1cm}})^{1 \times 3} \times (\underline{\hspace{1cm}})^{1 \times 3} = (\underline{\hspace{1cm}})^\square \times (\underline{\hspace{1cm}})^\square$	$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$
$(-3 \times 2)^3$	$(-3)^{1 \times 3} \times (2)^\square = \underline{\hspace{2cm}}$	$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$
$(4 \times 3)^{-2}$	$(\underline{\hspace{1cm}})^{1 \times -2} \times (\underline{\hspace{1cm}})^{1 \times -2} = (\underline{\hspace{1cm}})^\square \times (\underline{\hspace{1cm}})^\square$	$\left(\frac{1}{4}\right)\left(\frac{1}{4}\right) \times \left(\frac{1}{3}\right)\left(\frac{1}{3}\right)$
$(-2 \times 4)^\square$	$(\underline{\hspace{1cm}})^\square \times (\underline{\hspace{1cm}})^\square = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$	$\left(\frac{1}{-2}\right)\left(\frac{1}{-2}\right)\left(\frac{1}{-2}\right) \times \left(\frac{1}{4}\right)\left(\frac{1}{4}\right)\left(\frac{1}{4}\right)$
$(\underline{\hspace{1cm}} \times \underline{\hspace{1cm}})^\square$	$(-3)^{1 \times 2} \times (2)^{1 \times 2} = (-3)^2 \times (2)^2$	$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$

Complete the **Power of a Product Law**:

When finding the power of a product you must the exponent outside the bracket by all the exponents inside the bracket.

5. Power of a Quotient Law

Complete all the missing parts in the following table:

$\left(\frac{x}{y}\right)^m$	Exponential form	Expanded form
E.g. $\left(\frac{2}{4}\right)^3$	$\frac{(2)^{1 \times 3}}{(4)^{1 \times 3}} = \frac{(2)^3}{(4)^3}$	$\left(\frac{2}{4}\right)^1 \times \left(\frac{2}{4}\right)^1 \times \left(\frac{2}{4}\right)^1$
$\left(\frac{3}{2}\right)^\square$	$\frac{(3)^{1 \times 4}}{(2)^{1 \times 4}} = \frac{(3)^\square}{(2)^\square}$	_____
$\left(\frac{-3}{4}\right)^3$	$\frac{(-3)^\square}{(4)^\square} = \underline{\hspace{2cm}}$	_____
$\left(\frac{\hspace{1cm}}{\hspace{1cm}}\right)^\square$	$\frac{(-4)^{1 \times 2}}{(-3)^{1 \times 2}} = \underline{\hspace{2cm}}$	_____
$\left(\frac{-3}{-4}\right)^{-2}$	$\frac{(-3)^\square}{(-4)^\square} = \underline{\hspace{2cm}}$	_____

Complete the **Power of a Quotient Law**:

When finding the power of a quotient you must _____ the exponent outside the bracket by all the exponents inside the bracket.

6. Zero Exponent Law

Complete all the missing parts in the following table:

$(x)^0$	Exponential form	Expanded form
E.g. $(4)^0$	$(4)^0 = \underline{\hspace{2cm}}$	$\frac{4}{4} = \underline{\hspace{2cm}}$
$(\hspace{1cm})^0$	$(y)^0 = \underline{\hspace{2cm}}$	$\frac{y}{y} = \underline{\hspace{2cm}}$
$(-3)^0$	$(\hspace{1cm})^\square = \underline{\hspace{2cm}}$	$\frac{(\hspace{1cm})}{(\hspace{1cm})} = \underline{\hspace{2cm}}$
$(\hspace{1cm})^\square$	$(-6)^0 = \underline{\hspace{2cm}}$	$\frac{(\hspace{1cm})}{(\hspace{1cm})} = \underline{\hspace{2cm}}$

Complete the **Zero Exponent Law**:

The value of any base to the zero exponent is _____.

7. Negative Exponent Law:

Complete all the missing parts in the following table:

$(x)^{-n}$	Exponential form	Expanded form
E.g. $(4)^{-2}$	$\frac{1}{(4)(4)} = \frac{1}{(4)^2}$	$\left(\frac{1}{4}\right)\left(\frac{1}{4}\right)$
$(5)^{-3}$	$\frac{1}{(\quad)(\quad)(\quad)} = \frac{1}{(\quad)^3}$	_____
$(-6)^{-2}$	$\frac{1}{(\quad)(\quad)} = \frac{1}{(\quad)} \square$	_____

Complete the **Negative Exponent Law**:

$(x)^{-n}$ is defined to be the _____ of $(x)^n$.