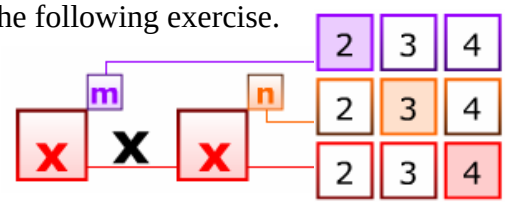
Name: _____

Laws of Exponents Print Activity

1. Use the **Product Law** in the "**Explore It"** mode for the following exercise.



Move the slider bars as directed:

- ***m*** (purple) to 2
- ***n*** (orange) to 3
- ***x*** (red) to 4

a. Use the above example in the **"Explore It"** mode to complete the following:

Exponential form	**Expanded form**
$4^2 \times 4^3$	$4^2 \times 4^3$
$(\_\_)^{2+3}$	$(4)(4) \times$ _____
$(4)^{\square}$	_____
___	_____

b. Complete all the missing parts in the following table:

$x^m \times x^n$	**Exponential form**	**Expanded form**
Eg. $3^1 \times 3^4$	$(3)^{1+4} = (3)^5$	$(3) \times (3)(3)(3)(3)$
$5^2 \times 5^{\square}$	$(5)^{2+3}$ = _____	_____ × _____
$(-4)^{\square} \times (\_\_)^{\square}$	$(\_\_\_)^{\square + \square}$ = _____	$(-4)(-4) \times (-4)(-4)$
Eg. $(3)^{-2} \times (3)^4$	$(3)^{-2+4} = (3)^2$	$\frac{1}{(3)(3)} \times (3)(3)(3)(3)$
$(-2)^{-1} \times (\_\_)^{-3}$	$(-2)^{\square + \square}$ = _____	_____ × _____
$(\_\_\_)^{\square} \times (\_\_\_)^{\square}$	$(-6)^{3+2}$ = _____	_____ × _____
$(2)^4 \times (2)^{-3}$	$(2)^{\square + \square}$ = _____	_____ × _____

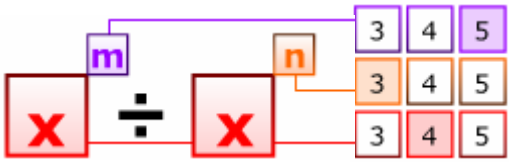
c. Complete the **Product Law**:

When multiplying like bases you must _____ the exponents.

2. Use the **Quotient Law** in the **"Explore It"** mode for the following exercise.

Move the slider bars as directed:

- ***m*** (purple) to 5
- ***n*** (orange) to 3
- ***x*** (red) to 4



a. Answer the following using the above example in the **"Explore It"** mode:

Exponential form	**Expanded form**
$4^5 \div 4^3$	$4^5 \div 4^3$
$(\_)^{5-3}$	$(4)(4)(4)(4)(4) \div (4)(4)(4)$
$(4)^{\square}$	_____
___	_____

b. Complete all the missing parts in the following table:

$x^m \div x^n$	**Exponential form**	**Expanded form**
Eg. $3^4 \div 3^1$	$(3)^{4-1} = (3)^3$	$(3)(3)(3)(3) \div (3)$
$5^3 \div 5^{\square}$	$(5)^{3-2} =$ ____	_____ ÷ _____
$(-3)^3 \div (-3)^2$	$(-3)^{\square - \square} =$ ____	_____ ÷ _____
$(-4)^{\square} \div (\_\_\_)^{\square}$	$(\_\_\_)^{\square - \square} =$ _____	$(-4)(-4)(-4)(-4) \div (-4)(-4)$
Eg. $(3)^{-4} \div (3)^2$	$(3)^{-4-2} = (3)^{-6}$	$\frac{1}{(3)(3)(3)(3)} \div (3)(3)$
$(-2)^{-1} \div (\_\_)^{-3}$	$(-2)^{\square - \square} =$ ____	_____ ÷ _____

$(\_\_)^{-3} \div (\_\_)^{2}$	$(-6)^{-3-2} =$ _____	_____ ÷ _____
$(2)^{3} \div (2)^{-3}$	$(-2)^{\square-\square}$ = _____	_____ ÷ _____

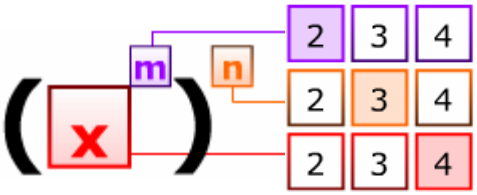
c. Complete the **Quotient Law**:

When dividing like bases you must _____the exponents.

3. Use the **Power of a Power Law** in the **"Explore It"** mode for the following exercise.

Move the slider bars as directed:

- ***m*** (purple) to 2
- ***n*** (orange) to 3
- ***x*** (red) to 4



a. Use the above example in the **"Explore It"** mode to complete the following:

Exponential form	**Expanded form**
$(4^{2})^{3}$	$(4^{2})^{3}$
$(\_\_)^{2\times3}$	$(\_\_)^{\square} \times (\_\_)^{\square} \times (\_\_)^{\square}$
$(\_\_)^{\square}$	_____
_____	_____

b. Complete all the missing parts of the following table:

$(x^{m})^{n}$	**Exponential form**	**Expanded form**
e.g. $(2^{3})^{2}$	$(2)^{3\times2} = (2)^{6}$	(2)(2)(2)(2)(2)(2)
$(5^{2})^{\square}$	$(5)^{2\times2}$ = _____	_____
$((-3)^{3})^{2}$	$(-3)^{\square \times \square}$ = _____	_____
$((-4)^{\square})^{2}$	$(-4)^{\square \times \square}$ = _____	(-4)(-4)(-4)(-4)

e.g. $(-3)^{-4})^{2}$	$(-3)^{-4\times 2} = (-3)^{-8}$	$\left(\frac{1}{-3}\right)\left(\frac{1}{-3}\right)\left(\frac{1}{-3}\right)\left(\frac{1}{-3}\right)\left(\frac{1}{-3}\right)\left(\frac{1}{-3}\right)\left(\frac{1}{-3}\right)\left(\frac{1}{-3}\right)$
$((4)^{-3})^{-2}$	$(4)^{\square\times\square}$ = _____	_____
$((-2)^{-1})^{-3}$	$(\_\_\_)^{\square\times\square}$ = _____	_____
$((3)^{2})^{-2}$	$(\_\_\_)^{\square\times\square}$ = _____	_____

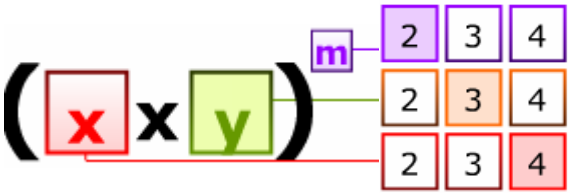
c. Complete the **Power of a Power Law**:

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

4. Use the **Power of a Product Law** in the **"Explore It"** mode for the following exercise.

Move the slider bars as directed:

- ***m*** (purple) to 2
- ***y*** (green) to 3
- ***x*** (red) to 4



a. Use the above example in the **"Explore It"** mode to complete the following:

Exponential form

$(4\times 3)^{2}$

$(4)^{1\times 2}\times(3)^{1\times 2}$

$(4)^{\square}\times(3)^{\square}$

Expanded form

$(4\times 3)^{2}$

(_____)×(_____)

_____

b. Complete all the missing parts in the following table:

$(x \times y)^m$	**Exponential form**	**Expanded form**
e.g. $(2\times 4)^3$	$(2)^{1\times 3}\times(4)^{1\times 3}=(2)^3\times(4)^3$	$(2)(2)(2)\times(4)(4)(4)$
$(3\times 2)^{\square}$	$(\_\_)^{1\times 3}\times(\_\_)^{1\times 3}=(\_\_)^{\square}\times(\_\_)^{\square}$	_____ × _____
$(-3\times 2)^3$	$(-3)^{1\times 3}\times(2)^{\square}$ = _____	_____ × _____
$(4\times 3)^{-2}$	$(\_\_)^{1\times -2}\times(\_\_)^{1\times -2}=(\_\_)^{\square}\times(\_\_)^{\square}$	$\left(\frac{1}{4}\right)\left(\frac{1}{4}\right)\times\left(\frac{1}{3}\right)\left(\frac{1}{3}\right)$
$(-2\times 4)^{\square}$	$(\_\_\_\_)^{\square}\times(\_\_\_\_)^{\square}$ = _____×_____	$\left(\frac{1}{-2}\right)\left(\frac{1}{-2}\right)\left(\frac{1}{-2}\right)\times\left(\frac{1}{4}\right)\left(\frac{1}{4}\right)\left(\frac{1}{4}\right)$
$(\_\_\_\times\_\_\_)^{\square}$	$(-3)^{1\times 2}\times(2)^{1\times 2}=(-3)^2\times(2)^2$	_____ × _____

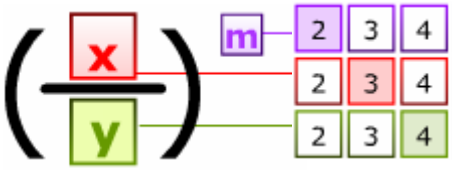
c. Complete the **Power of a Product Law**:

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

5. Use the **Power of a Quotient Law** in the **"Explore It"** mode for the following exercise.

Move the slider bars as directed:

- ***m*** (purple) to 2
- ***x*** (red) to 3
- ***y*** (green) to 4



a. Use the above example in the **"Explore It"** mode to complete the following:

Exponential form	**Expanded form**
$\left(\frac{3}{4}\right)^2$	$\left(\frac{3}{4}\right)^2$
$\frac{(\_\_)^{1\times 2}}{(\_\_)^{1\times 2}}$	$\frac{(3)^1}{(4)^1}\times\frac{(\_\_)^1}{(\_\_)^1}$
____	

b. Complete all the missing parts in the following table:

$\left(\frac{x}{y}\right)^m$	**Exponential form**	**Expanded form**
e.g. $\left(\frac{2}{4}\right)^3$	$\frac{(2)^{1\times 3}}{(4)^{1\times 3}}=\frac{(2)^3}{(4)^3}$	$\left(\frac{2}{4}\right)^1\times\left(\frac{2}{4}\right)^1\times\left(\frac{2}{4}\right)^1$
$\left(\frac{3}{2}\right)^{\square}$	$\frac{(3)^{1\times 4}}{(2)^{1\times 4}}=\frac{(3)^{\square}}{(2)^{\square}}$	_____
$\left(\frac{-3}{4}\right)^3$	$\frac{(-3)^{\square}}{(4)^{\square}}=$ _____	_____
$\left(\frac{\_\_}{\_\_}\right)^{\square}$	$\frac{(-4)^{1\times 2}}{(-3)^{1\times 2}}=$ _____	_____
$\left(\frac{-3}{-4}\right)^{-2}$	$\frac{(-3)^{\square}}{(-4)^{\square}}=$ _____	_____

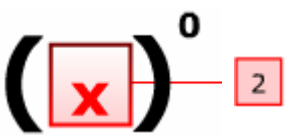
c. Complete the **Power of a Quotient Law**:

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

6. Use the **Zero Exponent Law** in the **"Explore It"** mode for the following exercise**.**

Move the slider bar as directed:

- ***x*** (red) to 2



a. Use the above example in the **"Explore It"** mode to complete the following:

Exponential form	**Expanded form**
$2^0 =$ _____	$(2)^0$ $\frac{2}{2}$ _____

b. Complete all the missing parts in the following table:

$(x)^0$	**Exponential form**	**Expanded form**
e.g. $(4)^0$	$(4)^0 =$ _____	$\frac{4}{4} =$ _____
$(\_\_\_)^0$	$(y)^0 =$ _____	$\frac{y}{y} =$ _____
$(-3)^0$	$(\_\_\_)^{\square} =$ _____	$\frac{(\_\_)}{(\_\_)} =$ _____
$(\_\_\_)^{\square}$	$(-6)^0 =$ _____	$\frac{(\_\_)}{(\_\_)} =$ _____

c. Complete the **Zero Exponent Law**:

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

7. Use the **Negative Exponent Law** in the **"Explore It"** mode for the following exercise.

Move the slider bar as directed:

- ***n*** (orange) to -1
- ***x*** (red) to 2

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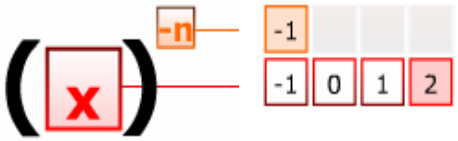

a. Use the above example in the **"Explore It"** mode to complete the following:

Exponential form	**Expanded form**
$(2)^{-1}$	$(2)^{-1}$
_____	_____

b. Complete all the missing parts in the following table:

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

c. Complete the **Negative Exponent Law**:

$(x)^{-n}$ is defined to be the _____ of **$(x)^{n}$**.
(inverse/opposite/reciprocal)