

Name: _____

Date: _____

Aim: What are the Laws of Exponents (Day 2)?

D O N O W :

In 1-3, write the power with positive exponents.

1.) c^{-9} $\frac{1}{c^9}$

2.) $a^0 b^{-3}$
 $a^0 \cdot b^{-3}$
 $1 \cdot \frac{1}{b^3}$
 $\frac{1}{b^3}$

3.) $2x^{-2}$
 $2 \cdot x^{-2}$
 $\frac{2}{1} \cdot \frac{1}{x^2}$

Evaluate each power.

4.) $(-2)^{-2}$
 $\frac{1}{(-2)^2}$ $\frac{1}{4}$

5.) -2^{-2}
 $- \cdot \frac{1}{2^2}$ $-\frac{1}{4}$

$\frac{2}{x^2}$

Multiplying Powers

Complete the table below. Write down any interesting observations.

Expression	Written as repeated multiplication	Product as a Power
$3^5 \times 3^2$	$(3)(3)(3)(3)(3)(3)(3)$	3^7
$5^2 \times 5^4$	$(5)(5)(5)(5)(5)(5)$	5^6
$7^5 \times 7^5$	$(7)(7)(7)(7)(7)(7)(7)(7)$	7^{10}
$2^4 \times 2^3$	$(2)(2)(2)(2)(2)(2)(2)$	2^7
$9^2 \times 9^4$	$(9)(9)(9)(9)(9)(9)$	9^6

Law 3: $a^m \cdot a^n = a^{m+n}$

Keep the base, add the exponents

Write the product as a single power (to a positive exponent)

<p>1.) $5^3 \cdot 5^9$</p> <div style="border: 1px solid black; width: 50px; height: 40px; margin: 10px auto; display: flex; align-items: center; justify-content: center;"> 5^{12} </div>	<p>2.) $4^3 \cdot 4^1$</p> <div style="border: 1px solid black; width: 50px; height: 40px; margin: 10px auto; display: flex; align-items: center; justify-content: center;"> 4^4 </div>	<p>3.) $(x^{-3})(x^2)$</p> <div style="border: 1px solid black; width: 50px; height: 40px; margin: 10px auto; display: flex; align-items: center; justify-content: center;"> x^{-1} $\frac{1}{x^1}$ </div>	<p>4.) $(6y^5)(8y^2)$</p> <div style="border: 1px solid black; width: 100px; height: 40px; margin: 10px auto; display: flex; align-items: center; justify-content: center;"> $48y^7$ </div>
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↳ we can multiply coefficients (#'s attached to the)

Dividing Powers

Complete the table below.

Expression	Expression written as repeated multiplication	Simplified Expression	Quotient as a Power
$\frac{8^5}{8^3}$	$\frac{8 \times 8 \times 8 \times 8 \times 8}{8 \times 8 \times 8}$	$\frac{8 \times 8 \times 8 \times \cancel{8} \times \cancel{8}}{\cancel{8} \times \cancel{8} \times \cancel{8}}$	8^2
$\frac{5^6}{5^5}$	$\frac{5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5}{5 \cdot 5 \cdot 5 \cdot 5 \cdot 5}$	$\frac{5 \cdot \cancel{5} \cdot \cancel{5} \cdot \cancel{5} \cdot \cancel{5} \cdot \cancel{5}}{\cancel{5} \cdot \cancel{5} \cdot \cancel{5} \cdot \cancel{5} \cdot \cancel{5}}$	5^1
$\frac{4^9}{4^3}$	$\frac{4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4}{4 \cdot 4 \cdot 4}$	$\frac{4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot \cancel{4} \cdot \cancel{4} \cdot \cancel{4}}{\cancel{4} \cdot \cancel{4} \cdot \cancel{4}}$	4^6

Law 4: $a^m \div a^n = a^{m-n}$

Keep the base, subtract the exponents

Practice

Law 3: $a^m \times a^n = a^{m+n}$	Law 4: $a^m \div a^n = a^{m-n}$
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Write each of the following as a base to a single power.

a) $13^2 \cdot 13^5$
 13^7

b) $x^0 \cdot x^6$
 x^6

c) $15^3 \div 15^1$
 15^2

d) $\frac{25x^7}{5x^3}$
 $5x^4$

e) $3b^2 \cdot 6b^7$
 $18b^9$

f) $w^8 \div w^6$
 w^2

Evaluate each using the laws of exponents.

g) $5^2 \times 5^1$
 5^3 125

h) $\frac{8^8}{8^6}$
 8^2 64

i) $\frac{12^{12}}{12^{12}}$
 12^0 1

j) $\frac{25^{13}}{25^{12}}$
 25^1 25

The
TAKEAWAY

For all non-zero values of a:

When multiplying powers, keep the base and add the exponents.

When dividing powers, keep the base and subtract the exponents.