

NEGATIVE (OR ZERO) EXPONENTS

LEARNING GOAL

1. I can evaluate expressions with **exponents** that are **negative or zero**

Exponential Rules

Product Rule

$$a^x \times a^y = a^{x+y}$$

$$a^2 \times a^3 = a^5$$

Quotient Rule

$$a^x \div a^y = a^{x-y}$$

$$a^7 \div a^3 = a^4$$

Power Rule

$$(a^x)^y = a^{xy}$$

$$(a^7)^2 = a^{14}$$

Negative Rule

$$a^{-x} = \frac{1}{a^x}$$

$$a^{-4} = \frac{1}{a^4}$$

Zero Rule

$$a^0 = 1$$

ESSENTIAL QUESTIONS


LEARNING GOAL

1. We know that a positive exponent tells us how many times to multiply.
2. What does a *negative* exponent mean?
3. What does an exponent of *zero* mean?

Fill in the table

What do you notice?

4^3	$4 \bullet 4 \bullet 4$	64	PATTERN?
4^2			
4^1			
4^0			



Fill in the table


2^3	$2 \cdot 2 \cdot 2$	8	PATTERN?
2^2			
2^1			
2^0			

What do you notice?

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4^3	$4 \bullet 4 \bullet 4$	64	PATTERN?
4^2			
4^1			
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Negative and Zero Exponent Worksheet

Simplify. Express your answers in fraction form using only positive exponents

1. 2^{-4}	2. 4^{-2}	3. x^{-6}
4. $3z^{-2}$	5. $\frac{1}{3^{-2}}$	6. 5^0
7. $2^{-5} \cdot 2^3$	8. $x^3 \cdot x^{-7}$	9. $\frac{3^3}{3^5}$
10. $\frac{x^4}{x^{-6}}$	11. x^0	12. 1001^{-1}

NAME:

The following statements are all INCORRECT.

1. Identify the mistake.
2. Correct.
3. Justify (show) your reasoning.

a) $2^5 = 10$

b) $(-2)^3 = 8$

c) $-6^2 = 36$

d) $\frac{x^2}{x^2} = 0$

e) $x^3 \bullet x^4 = x^{12}$

f) $\frac{x^{10}}{x^5} = x^2$

g) $\frac{x^5}{x^2} = \frac{1}{x^3}$

h) $7^{-2} = -49$

i) $(-3)^4 = -81$

j) $\frac{x^5}{x^9} = x^4$