

## 4-1 Exponent Rules Review

4-1a: I can use properties of exponents to simplify and evaluate exponential expressions.

### Like-terms review

Group the like terms and then

combine

$x^3$   $x$   $-5x$   $-x^2$   $7x^2$   
 $-3x^3$   $x^2$   $-6x^3$   $3x$   $-x$

**EXPONENT RULES***Graphic Organizer*

Name	Rule	Examples
<b>ADDING &amp; SUBTRACTING MONOMIALS</b>	<b>COMBINE LIKE TERMS!!!</b> (DO NOT CHANGE common variables and exponents!)	1. $9x^2y - 10x^2y = -x^2y$ 2. Subtract $6w$ from $8w$ . $8w - 6w = 2w$
<b>PRODUCT RULE</b>	$x^a \cdot x^b =$	1. $h^2 \cdot h^6 =$ 2. $(-2a^2b) \cdot (7a^3b) =$
<b>POWER RULE</b>	$(x^a)^b =$	1. $(x^2)^3 =$ 2. $(-2m^5)^2 \cdot m^3 =$
<b>QUOTIENT RULE</b>	$\frac{x^a}{x^b} =$	1. $\frac{27x^5}{42x} =$ 2. $\frac{(y^2)^2}{y^4} =$
<b>NEGATIVE EXPONENT RULE</b>	$x^{-a} =$	1. $-5x^{-2} =$ 2. $\frac{4k^2}{8k^5} =$
<b>ZERO EXPONENT RULE</b>	$x^0 =$	1. $7x^0 =$ 2. $\frac{(w^4)^2}{w^8} =$

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**ADDING & SUBTRACTING MONOMIALS****COMBINE LIKE TERMS!!!**

(DO NOT CHANGE common variables and exponents!)

1.  $9x^2y - 10x^2y =$

2. Subtract  $6w$  from  $8w$ .

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**PRODUCT RULE**

$$x^a \cdot x^b = x^{a+b}$$

base  $\swarrow$   $\searrow$  exponent

$$1. h^2 \cdot h^6 = h^{2+6} = h^8$$

$$2. (-2a^2b) \cdot (7a^3b) = -14a^5b^2$$

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**POWER RULE**

$$(x^a)^b = x^{ab}$$

$$1. (x^2)^3 = x^{2 \cdot 3} = x^6$$

$$2. (-2m^5)^2 \cdot m^3 = 4m^{10} \cdot m^3 = 4m^{13}$$

$(-2)^2$   $(m^5)^2$

$$x^a \cdot x^b = x^{a+b}$$

## QUOTIENT RULE

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

$$1. \frac{27x^5}{42x^1} = \frac{9x^4}{14}$$

$$2. \frac{(y^2)^2}{y^4} = \frac{y^4}{y^4} = y^0 = 1$$

$$\frac{x \cdot x \cdot x \cdot x \cdot x}{x}$$

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## NEGATIVE EXPONENT RULE

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

$$1. -5x^{-2} = \frac{-5}{x^2}$$

$$2. \frac{4k^2}{8k^5} = \frac{1k^{-3}}{2} = \frac{1}{2k^3}$$

$$4^{-2} = \frac{1}{4^2} = \frac{1}{16}$$

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# ZERO EXPONENT RULE

$$x^0 = 1$$

$$1. \quad 7x^0 = 7 \cdot 1 = 7$$

$$2. \quad \frac{(w^4)^2}{w^8} = \frac{w^8}{w^8} = w^{8-8} = w^0 = 1$$

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## More Practice!

$$\frac{9p^{-2}q^5}{15p^2q^3} = \frac{3p^{-4}q^2}{5p^4}$$

$$p^{-2-2} = p^{-4}$$

$$q^{5-3} = q^2$$

$$\left( \frac{-9c^3d}{c^2d^2} \right)^3$$

$$= \frac{81c^6d^3}{c^4d^4}$$

$$= \frac{81c^2d^{-1}}{d^4} = \frac{81c^2}{d^3}$$

$$4x^2y \cdot -3x^{-5}y^2$$

$$-12x^{-3}y^3$$

$$\frac{-12y^3}{x^3}$$

Simplify each of the following:

$$x \cdot x \cdot x \cdot x \cdot x = x^5$$

$$x^4 \cdot x^9 = x^{13}$$

$$(ab)^{14} = a^{14} b^{14}$$

$$\left(\frac{a}{2}\right)^4 = \frac{a^4}{2^4} = \frac{a^4}{16}$$

$$\frac{k^{12}}{k^5} = k^7$$

$$\left(\frac{1}{4}\right)^0 = 1$$

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