

**Essential Question:** What are the multiplication properties of exponents?

**Do Now:** Simplify.

(a)  $x \cdot x \cdot x$

(b)  $(y^5)^2$

(c)  $(xy)^2$

**Rules We Know**

- Zero Power and Negative Exponents:**  $a^0 = 1, a \neq 0$

$$a^{-n} = \frac{1}{a^n} \text{ and } \frac{1}{a^{-n}} = a^n, a \neq 0$$



## Multiplication Properties of Exponents

<p><b>Product of Powers Property</b></p> $a^m \cdot a^n = a^{m+n}$	<p>When multiplying powers with the same base, <b>ADD</b> the exponents.</p>	
<p><b>Power of Powers Property (raising a power to a power)</b></p> $(a^m)^n = a^{mn}$	<p>When raising a power to a power, <b>MULTIPLY</b> the exponents.</p>	
<p><b>Power of a Product Property (raising a product to a power)</b></p> $(ab)^m = a^m b^m$	<p>When raising a <i>product</i> to a power, raise <b>EACH</b> factor to the power.</p>	

**Let's practice:**

1.  $z^9 \cdot y \cdot z^3$

2.  $(-2)(-2)(-2)^3$

3.  $[(-3)^3]^2$

4.  $(4yz)^3$

5.  $(-2w)^2$

6.  $(-wy)^2$

**More Practice (Let's recall the rules for negative exponents!)**

7.  $(4x^2y^3)^3$

8.  $(4y)^2(-3y^2)^3$

9.  $-(a^7b^2)(a^4b^9)^3$

10.  $[(-2x^4)^3(-x^8)]^2$

11.  $(2x^{-10}y^{-3})^6$

12.  $\frac{1}{(8x^2)^{-3}}$

13.  $\left(\frac{7x^{-2}}{x^8y^{-5}}\right)^2$