EXAMPLES:

a) $(-4)^2 \cdot (-4)^5$

b) $(2x)^3 \cdot (2x)$

c) $2x^4y^2 \cdot 3x^2y^6$

PRODUCT OF POWERS PROPERTY

When finding the **product** of powers with the **same base**, ________________ ________________________________.

$$a^m \cdot a^n =$$

QUOTIENT OF POWERS PROPERTY

When finding the **quotient** of powers with the **same base**, ________________ ________________________________.

$$\frac{a^m}{a^n} =$$

EXAMPLES:

a) $\frac{2^9}{2^6}$

b) $\left(\frac{5}{8}\right)^6 \div \left(\frac{5}{8}\right)$

c) $h^6k^2 \div h^5k$

EXAMPLES:

a) $(3^4)^2$

b) $[(-x)^4]^3$

c) $[(-4)^2 \cdot (-4)^3]^6$

POWER OF A POWER PROPERTY

When you **raise a power to a power**, keep the ______________ and multiply the ______________________________.

$$(a^m)^n =$$

POWER OF A PRODUCT PROPERTY

When finding the **product** of two algebraic expressions with the **same exponent**, you can __________________ their bases.

$$a^m \cdot b^m =$$

EXAMPLES:

a) $3^4 \cdot 7^4$

b) $\left(-\frac{1}{3}\right)^5 \cdot \left(-\frac{2}{5}\right)^5$

c) $(2r)^5 \cdot (7s)^5$

EXAMPLES:

a) $\frac{(-8)^5}{(-2)^5}$

b) $p^6 \div q^6$

c) $\frac{4^5 \cdot 4^3}{2^2 \cdot 2^6}$

POWER OF A QUOTIENT PROPERTY

When finding the **quotient** of two algebraic expressions with the **same exponent**, you can __________________ their bases.

$$\frac{a^m}{b^m} = \qquad , b \neq 0$$

ZERO EXPONENT PROPERTY

Any **nonzero** number raised to the **zero power** is equal to _________________.

$$a^0 = \qquad , a \neq 0$$

EXAMPLES:

a) 3^0

b) $7^3 \cdot 7^0$

c) $(a^4 \div a^0) \cdot a^3$

EXAMPLES:

a) 5^{-2}

b) $\frac{x^{-7}}{x^4}$

c) $9m \div 3m^{-2}$

NEGATIVE EXPONENT PROPERTY

When finding **negative exponent**, take the ____________________ of the base and raise it to the positive power.

$$a^{-n} = \qquad , a \neq 0$$

FRACTIONAL EXPONENTS

A fractional exponent (like m/n), can be broken into two parts:
* a whole number (m) which acts just like a regular exponent (how many times you multiply)
* a fraction (1/n) which tells you to take the nth root. For example, an exponent of 1/2 means to take the square root. 1/3 means take cube root.

You can simplify using either method below:

$$x^{\frac{m}{n}} = x^{\left(\frac{1}{n} \times m\right)} = \left(x^{\frac{1}{n}}\right)^m = \left(\sqrt[n]{x}\right)^m$$

$$x^{\frac{m}{n}} = x^{\left(m \times \frac{1}{n}\right)} = \left(x^m\right)^{\frac{1}{n}} = \sqrt[n]{x^m}$$