

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Foundations of Math & Pre-Calculus 10**  
**Grade 9 Exponent Laws Review**

- **Exponent Law for a Product of Powers:**

$$a^m \times a^n = a^{(m+n)}, a \neq 0$$

To multiply powers with the same base, add the exponents. The variable  $a$  is any integer, except 0. The variables  $m$  and  $n$  are any whole numbers.

- **Exponent Law for a Quotient of Powers:**

$$a^m \div a^n = a^{(m-n)}, a \neq 0$$

To divide powers with the same base, subtract the exponents. The variable  $a$  is any integer, except 0. The variables  $m$  and  $n$  are any whole numbers.

Example #1: Simplify each expression (write as a single power).

a)  $8^5 \times 8^7$

b)  $(-4)^{12} \div (-4)$

c)  $k^6 \times k^2$

d)  $\frac{h^2 \times h^5}{h^9}$

Example #2: Simplify and evaluate each expression.

a)  $2^2 + 2^3 \times 2^2$

b)  $(-3)^4 [(-3)^6 \div (-3)^4] - 3^2$

- **Exponent Law for a Power of a Power:**

$$(a^m)^n = a^{mn}, a \neq 0$$

To raise a power to a power, multiply the exponents. The variable  $a$  is any integer, except 0. The variables  $m$  and  $n$  are any whole numbers.

Example #3: Simplify each expression (write as a single power).

a)  $(8^2)^5$

b)  $[(-7)^3]^4$

- **Exponent Law for a Power of a Product:**

$$(a \times b)^m = a^m \times b^m, a, b \neq 0$$

The variables  $a$  and  $b$  are any integers, except 0. The variable  $m$  is any whole number.

- **Exponent Law for a Power of a Quotient:**

$$(a \div b)^m = a^m \div b^m, a, b \neq 0$$

The variables  $a$  and  $b$  are any integers, except 0. The variable  $m$  is any whole number.

Example #4: Write each expression as a product or quotient of powers.

a)  $(cd)^2$

b)  $(e^2f^4g)^3$

c)  $\left(\frac{j}{k}\right)^4$

d)  $\left(\frac{m^2}{n^5}\right)^5$

Example #5: Simplify the following expression.

$$\left(\frac{4p^{-2}r^4}{p^0r^5 \times p^3r^3}\right)^2$$