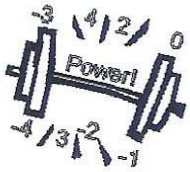
MBF3C – Exponents Date: _____

EXPONENT RULES

In multiplication, the terms that are multiplied together are called factors
A repeated multiplication of equal factors can be expressed as a power



$3 \times 3 \times 3 \times 3 = 3^4$ ← exponent form → 3^4 is the power
→ 3 is the base
→ 4 is the exponent
expanded form → $= 81$ ← standard form

EXAMPLES Write each in expanded form and then evaluate to standard form

$6^3 = 6 \times 6 \times 6 = 216$

$3^2 \times 2^3 = 3 \times 3 \times 2 \times 2 \times 2 = 9 \times 8 = 72$

$6^2 + 3^2 = 6 \times 6 + 3 \times 3 = 36 + 9 = 45$

POWER OF A NEGATIVE NUMBER

Exponents affects ONLY the number it touches in a power. Notice the difference?

IMPORTANT

$-3^2 = -1 \times 3^2 = -1 \times 9 = -9$

$(-3)^2 = -3 \times -3 = 9$

Consider $x - 2^2 = ?$ $x - (2 \times 2) = x - 4$

EXPONENT LAWS

- **Add/Subtract Powers** → You can only add/subtract the coefficients of the powers

$a^m + a^n =$ $a^m + a^n$ but $a^m + 3a^m =$ $4a^m$

- **Multiply Powers** → To multiply powers with the SAME base add the exponents

$a^m \times a^n =$ $a^{(m+n)}$ $x^2 \times x^3 =$ $x^{(2+3)} = x^5$

- **Divide Powers** → To divide powers with the SAME base subtract the exponents

$a^m \div a^n =$ $a^{(m-n)}$ $x^7 \div x^4 =$ $x^{(7-4)} = x^3$

- **Power of a Power** → To simplify a power of a power multiply the exponents

$(a^m)^n =$ $a^{(m \times n)}$ $(x^4)^3 =$ $x^{(4 \times 3)} = x^{12}$

- **Power of a Product or Quotient** → Apply the exponent to each term in the product or quotient.

$(ab)^m =$ $a^m b^m$ $(xy)^3 =$ $x^3 y^3$

$\left(\frac{a}{b}\right)^m =$ $\frac{a^m}{b^m}$ $\left(\frac{x}{y}\right)^2 =$ $\frac{x^2}{y^2}$