Multiplying Powers
(same base)

Rule:

For all numbers *x* and all integers *m* and *n* ,

$$x^m \cdot x^n = x^{m+n}$$

"This simply means ...

when you are multiplying,
and the bases are the same,
you ADD the exponents."

Consider:

$$x^2 \cdot x^3 = (x \cdot x) \cdot (x \cdot x \cdot x)$$
$$= x \cdot x \cdot x \cdot x \cdot x$$
$$= x^5$$

...when in doubt, expand terms to see what is happening.

Observe this rule at work in the following examples:

1. $$2^4(2^5)(2^2) = 2^{11}$$

The bases are the same (all 2's), so the exponents are added.

2. $$7b^2 \cdot b^5 = 7b^7$$

The bases are the same, so the exponents are

added. Notice how the numbers in front of the bases (7 and 1) are being multiplied.
3. $a^2(a^3)(a^3) = a^8$ The bases are the same (all a's), so the exponents are added.
4. $x^3(x^{-2})(x^4) = x^{3+(-2)+4} = x^5$ The bases are the same (all *x*'s), so the exponents are added. Be careful when adding the **negative exponent**.
5. $6a^3 \bullet 5a^4 = 30a^7$ The bases are the same, so the exponents are added. The numbers in front of the bases are multiplied.
6. $-2s^3t^2(5s^4)(7t) = -70s^7t^3$ The exponents are added for the bases that are the SAME. The numbers in front, the coefficients, are multiplied. Don't forget powers of 1, such as the power associated with *t*.
7. $(6r^4s^2)(2r^2s) = 12r^6s^3$ The exponents are added for the bases that are the SAME. The coefficients are multiplied.
8. $-9x(x^2 - 7x + 15) =$ $-9x^3 + 63x^2 - 135x$ The ***-9x*** is multiplied times EACH term inside the parentheses, adding the exponents as the multiplication occurs.

9.	$ab(3a + 2b) = 3a^2b + 2ab^2$ The ***ab*** is multiplied times EACH term inside the parentheses, adding the exponents of similar bases as this process occurs.
10.	$x^2y(x^3 - y) = x^5y - x^2y^2$ The ***x²y*** is multiplied times EACH term inside the parentheses, adding the exponents of similar bases as this process occurs.

Take one more look at the distributive property at work with a set of parentheses, along with this new rule:

Use the distributive property to simplify:

$$4x^2(2x^3 + 5)$$
$$= 4x^2(2x^3) + 4x^2(5)$$
$$= 8x^5 + 20x^2$$