M10 - 4.3 - Add/Sub/Multiply Exponents Laws Notes

Coefficient $\longrightarrow 4x^2 \longrightarrow$ Exponent
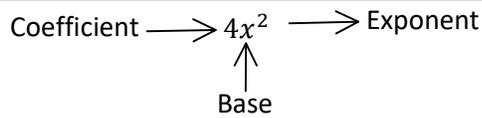
Base

Remember:
-Never multiply the base by the exponent
-Must have same base to use laws.

Multiplying with the Same Base, Add Exponents.

$$x^3 \times x^2 = (x \times x \times x) \times (x \times x) = \boxed{x^5}$$

$$x^3 \times x^2 = x^{3+2} = \boxed{x^5}$$ | Add Exponents

Check Answer

$$2^3 \times 2^2 = 32 = 2^5 \checkmark$$

Arbitrary Numbers

Dividing with the Same Base, Subtract Exponents.

$$\frac{x^5}{x^2} = \frac{x \times x \times x \times x \times x}{x \times x} = \boxed{x^3}$$

$$\frac{x^5}{x^2} = x^{5-2} = \boxed{x^3}$$ | Subtract Exponents

Check Answer

$$\frac{3^5}{3^2} = 27 = 3^3 \checkmark$$ | Arbitrary Numbers

Exponents to Exponents, Multiply Exponents

$$(x^2)^3 = (x \times x)^3 = (x \times x) \times (x \times x) \times (x \times x) = \boxed{x^6}$$

$$(x^2)^3 = x^{2\times3} = \boxed{2^6}$$ | Multiply Exponents

Check Answer

$$(5^2)^3 = 15625 = 5^6 \checkmark$$

Arbitrary Numbers

Ultimately you will either use:

Exponent Laws

OR

Repeated Multiplication/Division Theory

Product/Quotients to Exponents, Multiply Exponents

$$(x^1 \times y^1)^2 = \boxed{x^2 y^2}$$ | Multiply Exponents

$$\left(\frac{2^1 x^1}{y^3}\right)^2 = \frac{2^2 x^2}{y^{2\times3}} = \boxed{\frac{4x^2}{y^6}}$$

$$(2x)^3 = (2x) \times (2x) \times (2x) = \boxed{8x^3}$$
$$(2x)^3 = 2^3 x^3 = \boxed{8x^3}$$

Cannot distribute into a sum!
$$(3+4)^2 \neq 3^2 + 4^2 = 25$$
$$(3+4)^2 = (3+4)(3+4) = 7 \times 7 = 7^2 = 49$$

$$\left(\frac{6mn^3}{4m^2n}\right)^3 \quad \text{OR} \quad \left(\frac{6mn^3}{4m^2n}\right)^3$$

$$\left(\frac{3n^2}{2m}\right)^3 \quad \text{Simplify} \qquad \frac{6^3 m^3 n^9}{4^3 m^6 n^3} \quad \text{Multiply}$$

$$\frac{3^3 n^6}{2^3 m^3} \qquad \text{1st} \qquad \frac{216n^6}{64m^3} \qquad \text{Exponents 1st}$$

$$\boxed{\frac{27n^6}{8m^3}} \qquad\qquad \boxed{\frac{27n^6}{8m^3}}$$