$$(x^a)^b = x^{a \cdot b}$$

Making This Rule Make Sense:

Consider: $(x^3)^2 = (x^3) \cdot (x^3) = (x \cdot x \cdot x) \cdot (x \cdot x \cdot x) = x \cdot x \cdot x \cdot x \cdot x \cdot x = x^6$

→ The squared means that there should be two sets of x^3
This makes a total of 6 x's. In other words $(x^3)^2 = x^6$

Consider: $(x^a)^b = x^{a \cdot b} = the\ rule$

→ There are 'b' sets of these
→ The number of x's multiplied = a

} There are 'b' sets of a's.
So, there are a · b of them

Example #1: $(x^4)^3 = (x^4) \cdot (x^4) \cdot (x^4) = (x \cdot x \cdot x \cdot x) \cdot (x \cdot x \cdot x \cdot x) \cdot (x \cdot x \cdot x \cdot x) = x^{12}$

Example #2: $(5x^7)^2 = (5x^7) \cdot (5x^7) \cdot (5x^7) = 125x^{21}$

Example #3: $(sin^3 x)^4 = sin^{12} x$

Example #4: $(xy^6z^2)^5 = x^5x^{30}x^{10}$

Time to practice… Factor the following on your own:

1. $(r^2)^6 =$
2. $(2x^9)^5 =$
3. $[(e^x - 1)^5]^3 =$
4. $(tan^4 x)^8 =$
5. $(p^5q^2m^8)^3 =$
6. $(ln^2 x)^3 =$

$$(x^a)^b = x^{a \cdot b}$$

ANSWER KEY

1. r^{12}

2. $32x^{45}$

3. $(e^x - 1)^{15}$

4. $(\tan x)^{32}$ *or* $tan^{32}x$

5. $p^{15}q^6m^{24}$

6. ln^6x *or* $(\ln x)^6$