Steps to Simplify One Term in a ( ) to a Power

1. Write original problem
2. Simplify in the ( ) so that there is only one instance of each variable. If there is a fraction, make sure coefficients are simplified.
3. Simplify exponent outside of ( ) as follows:
   a. Put each coefficient or number and its sign in a ( ).
   b. Put each variable and its exponent in a ( ).
   c. Put exponent on original ( ) on each of the new ( ).
4. If a number in a ( ) has a negative exponent outside of ( ), flip up or down in fraction to make exponent positive.
5. Go off to side and expand any number in a ( ) with a positive exponent. Put result back in problem.
6. For any variable with an exponent in a ( ) to a power outside, multiply exponent inside times power outside to clear ( ).
7. If positive exponents are required, flip base and its exponent up or down in fraction to make exponent positive.

Examples with comments

Problem: 5.6 #97 (Final step should have all exponents positive.)

Simplification	Comments	Side work
$\left(\frac{20t^{19}}{5t^2}\right)^{-4} = (4t^{17})^{-4}$	The expression is not simplified inside of ( ). We have to simplify the $\frac{20}{5}$ and the $\frac{t^{19}}{t^2}$.	
$= (4)^{-4}(t^{17})^{-4}$	The expression inside of the ( ) is now simplified. Insert a ( ) and its exponent on each number and around each variable and its exponent.	
$= \frac{(t^{17})^{-4}}{(4)^4}$	We cannot expand the $(4)^{-4}$ because it has a negative exponent. We have to flip it down to the denominator so that the exponent becomes positive.	
$= \frac{(t^{17})^{-4}}{256}$	The $(4)^4$ now has a positive exponent and it can be expanded on the side.	$(4)^4 = (4)(4)(4)(4)$ $= 16(4)(4)$ $= 64(4)$ $= 256$
$= \frac{t^{-68}}{256}$	Each variable and its exponent inside of a ( ) is simplified by multiplying exponent inside of ( ) by exponent outside of the ( ).	
$= \frac{1}{256t^{68}}$	The final step needs to have positive exponents. The t^{-68} is flipped to go down to the denominator so that it can have a positive exponent	

Problem: 5.7 #32

Simplification	Comments	Side work
$(4r)^2 = (4)^2(r)^2$	The expression is simplified inside of ( ), so now insert a ( ) and its exponent on each number and around each variable and its exponent.	
$= 16(r)^2$	We expand the $(4)^2$ on the side since the exponent is positive.	$(4)^2 = (4)(4)$ $= 16$
$= 16r^2$	The $(r)^2$ is simplified by multiplying the exponent of the *r*, which is understood to be a one, times the exponent of 2 outside the ( ).	

Problem: 5.7 #35

Simplification	Comments	Side work
$(-2x^5)^3 = (-2)^3(x^5)^3$	The expression is simplified inside of ( ), *so* now insert a ( ) and its exponent on each number and around each variable and its exponent.	
$= -8(x^5)^3$	We expand the $(-2)^3$ on the side since the exponent is positive.	$(-2)^3 = (-2)(-2)(-2)$ $= 4(-2)$ $= -8$
$= -8x^{15}$	The $(x^5)^3$ is simplified by multiplying the exponent on the x, which is 5, times the exponent outside the ( ) of 3.	

Problem: 5.7 #87

Simplification	Comments	Side work
$\left(\frac{-3}{8x^8}\right)^2 = \frac{(-3)^2}{(8)^2(x^8)^2}$	The expression is simplified inside of ( ), *so* now insert a ( ) and its exponent on each number and around each variable and its exponent.	
$= \frac{9}{64(x^8)^2}$	We expand the $(-3)^2$ on the side since the exponent is positive and we can do the same for $(8)^2$	$(-3)^2 = (-3)(-3)$ $= 9$ $(8)^2 = (8)(8)$ $= 64$
$= \frac{9}{64x^{16}}$	The $(x^8)^2$ is simplified by multiplying the exponent on the x, which is 8, times the exponent outside the ( ) of 2.	

Problem: 5.7 #92

Simplification	Comments	Side work
$\left(\frac{x^9}{2y^8z^5}\right)^2 = \frac{(x^9)^2}{(2)^2(y^8)^2(z^5)^2}$	The expression is simplified inside of ( ), *so* now insert a ( ) and its exponent on each number and around each variable and its exponent.	
$= \frac{(x^9)^2}{4(y^8)^2(z^5)^2}$	We expand the $(2)^2$ on the side since the exponent is positive.	$(2)^2 = (2)(2)$ $= 4$
$= \frac{x^{18}}{4y^{16}z^{10}}$	Each variable and its exponent inside of a ( ) is simplified by multiplying exponent inside of ( ) by exponent outside of the ( ).	

Problem: 5.7 #107

Simplification	Comments	Side work
$(-5y^{-13})^{-3} = (-5)^{-3}(y^{-13})^{-3}$	The expression is simplified inside of ( ). Insert a ( ) and its exponent on each number and around each variable and its exponent.	
$= \frac{(y^{-13})^{-3}}{(-5)^3}$	We cannot expand the $(-5)^{-3}$ because it has a negative exponent. We have to flip it down to the denominator so that the exponent becomes positive.	
$= \frac{(y^{-13})^{-3}}{-125}$	The $(-5)^3$ now has a positive exponent and it can be expanded on the side.	$(-5)^3 = (-5)(-5)(-5)$ $= 25(-5)$ $= -125$
$= \frac{y^{39}}{-125}$	Each variable and its exponent inside of a ( ) is simplified by multiplying exponent inside of ( ) by exponent outside of the ( ).	
$= -\frac{y^{39}}{125}$	We now have a positive divided by a negative and that will make the answer negative.	