WHO LIKES HOMEWORK

QUESTION OF THE DAY

Problem: Multiply out (x-4)^4

Solution: There are two ways to do this

Way 1

$$(x-4)^4 = (x-4)^2(x-4)^2$$
$$= (x^2 - 8x + 16)(x^2 - 8x + 16)$$
$$= x^2(x^2 - 8x + 16) - 8x(x^2 - 8x + 16) + 16(x^2 - 8x + 16)$$
$$= x^4 - 8x^3 + 16x^2 - 8x^3 + 64x^2 - 128x + 16x^2 - 128x + 256$$
$$= x^4 - 16x^3 + 96x^2 - 256x + 256$$

Way 2

We will use a method called Pascal's Triangle. It is a modified version of the Binomial Theorem. It applies to any binomial of the form

$$(x+y)^n = a_0 x^n + a_1 x^{n-1} y + a_2 x^{n-2} y^2 + ... + a_n y^n$$

To determine all of the coefficients *a*, go from left to right and start with a_0. So, a_0=1 and a_1 = 4 and so on.

Pascal's Triangle

N=0					1				
N=1				1		1			
N=2			1		2		1		
N=3		1		3		3		1	
N=4	1		4		6		4		1

For our situation, we have $(x-4)^4$, where *x*=*x* and *y*= - 4. Plugging these into the definition, and using Pascal's Triangle, we have

$$(x-4)^4 = 1 \cdot x^4 + 4(x^3)(-4) + 6(x^2)(-4)^2 + 4(x)(-4)^3 + 1(-4)^4$$
$$(x-4)^4 = x^4 - 16x^3 + 96x^2 - 256x + 256$$

Notice that both ways yield the same answer

$$\boxed{(x-4)^4 = x^4 - 16x^3 + 96x^2 - 256x + 256}$$