Binomials and Beyond!

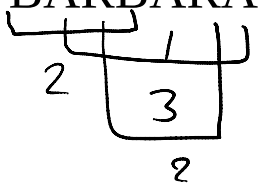
Friday, October 17, 2008
9:47 AM

1. How many rearrangements of BARBARA?

$$210 = \frac{7!}{2!3!2!}$$

7! ← Arrangements of 7 different letters

2!3!2! ← Arrangements of B's, A's, R's



2. What is the coefficient of $a^3b^2r^2$ in $(a + b + r)^7$?

210

$(a+(b+r))^7 \rightarrow \binom{7}{3}a^3(b+r)^4$

$\binom{7}{3}\cdot\binom{4}{2}$

$\binom{7}{3}\cdot a^3\cdot\binom{4}{2}b^2r^2$

$(a+b+r)(a+b+r)(a+b+r)(a+b+r)(a+b+r)(a+b+r)(a+b+r)$

a a a b b r r

a b b a r r a

Just like BARBARA!

Coeff of a^4br^2 $\frac{7!}{4!1!2!}$

$a^4b^2c^3d^2$ in $(a+b+c+d+2)^{13}$ 277200

$\binom{13}{4,2,3,2,2}\cdot 2^2 = 4\binom{11}{4}\binom{7}{2}\binom{5}{3}\cdot\binom{13}{2}$

13 Things: 4 a's, 2 b's, 3 c's, 2 d's, 2 2's.

rearrangements

$= \frac{13!}{4!2!2!2!2!}\cdot 2^2$

= ~~277200~~

= ~~2702700~~ (?)

I think it's wrong

curriculum? ☺

3. Find $Df(x)$ for …

$x^2 \to \frac{2xh+h^2}{h} = 2x+h$

$\lim_{h\to 0}(2x+h) = 2x$

a. $f(x) = x^3$

$3x^2 + 3xh + h^2$

$3x^2$ 0 0

b. $f(x) = x^4$

$(x+h)^4 = x^4 + \binom{4}{1}x^3h + \binom{4}{2}x^2h^2 + \binom{4}{3}xh^3 + \binom{4}{4}h^4$

$-x^4 \quad -x^4$

$\frac{4x^3h + 6x^2h^2 + 4xh^3 + h^4}{h}$

$4x^3 + 6x^2h + 4xh^2 + h^3$

As $h \to 0$, gets closer to slope of tangent line.

4. Use your calculator's nCr function to compute each

value below:

$\binom{1/2}{0}, \binom{1/2}{1}, \binom{1/2}{2}$

Then explain the answers.