

12-2 Pascal's Triangle and Binomial Theorem

Expand  $(a + b)^n = n+1$  terms

Pascal's  $\Delta$

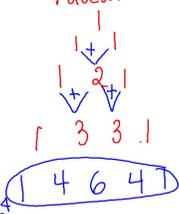
$$(a + b)^0 = 1$$

$$(a + b)^1 = 1a^1 + 1b^1$$

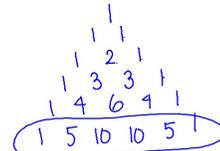
$$(a + b)^2 = 1a^2 + 2ab + 1b^2$$

$$(a + b)^3 = 1a^3 + 3a^2b + 3ab^2 + 1b^3$$

$$(a + b)^4 = 1a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + 1b^4$$



1 Expand  $(x - 2y)^5$



$$1(x)^5 + 5(x)^4(-2y)^1 + 10(x)^3(-2y)^2 + 10(x)^2(-2y)^3 + 5(x)^1(-2y)^4 + 1(-2y)^5$$

$$x^5 - 10x^4y + 40x^3y^2 - 80x^2y^3 + 80xy^4 - 32y^5$$

BINOMIAL THEOREM

$$(a + b)^n = \sum_{r=0}^n \binom{n}{r} a^{n-r} b^r$$

$\binom{n}{r}$  Pascal #  
 $n+1$  terms  $r!(n-r)!$

2 Find the coefficient of  $x^7$  in  $(2 - 3x)^{10}$

$$120(8)(-2187x^7) = \frac{10!}{7!3!} (2)^3 (-3x)^7$$

$$= -2,099,520 x^7$$

$$(a + b)^n = \sum_{r=0}^n \binom{n}{r} a^{n-r} b^r$$

3 Find the 5th term of  $(2 - 3x)^{10}$

$r = 0, 1, 2, 3, 4$

$$\frac{10!}{4!6!} (2)^6 (-3x)^4$$

$$210(64)(81x^4) = 1,088,640 x^4$$