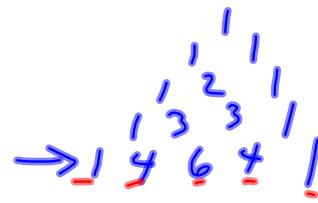


Expand $(2x^6 - 3y^7)^4 \rightarrow$



$$= \overset{16}{1}(2x^6)^4(-3y^7)^0 + \overset{8}{4}(2x^6)^3(-3y^7)^1 + \overset{4}{6}(2x^6)^2(-3y^7)^2 + \overset{2}{4}(2x^6)^1(-3y^7)^3 + \overset{-27}{1}(2x^6)^0(-3y^7)^4$$

$$= 16x^{24} - 96x^{18}y^7 + 216x^{12}y^{14} - 216x^6y^{21} + 81y^{28}$$

Find the numerical coefficient of the $x^4 y^9$ variable
 for the binomial $(x^2 - 2y^3)^5$.

The solution shows the binomial expansion formula: $\binom{5}{k} (x^2)^k (-2y^3)^{5-k}$. A green circle highlights the term for $k=3$, which corresponds to the coefficient 10 in the Pascal's triangle. The final calculation is $10(1)^2(-2)^3 x^4 y^9 = -80$.

Pascal's Triangle (red numbers):

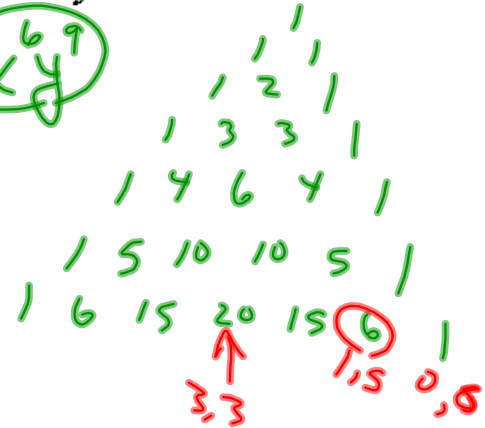
1					
1	2				
1	3	3			
1	4	6	4		
1	5	10	10	5	1

Binomial expansion formula: $\binom{5}{k} (x^2)^k (-2y^3)^{5-k}$

Final calculation: $10(1)^2(-2)^3 x^4 y^9 = -80$

Find the numerical coefficient of the xy^{15} variable
 for the binomial $(3x^2 - 2y^3)^6$

$x^6 y^9$



$$\underline{6} (3x^2)^1 (-2y^3)^5$$

$$6 \times 3x^2 \times (-32)$$

$$= \underline{-576} x^2 y^{15}$$

$$20 (3x^2)^3 (-2y^3)^3$$

$$= 20(27)(-8)$$

$$= \underline{\underline{-4320}} x^6 y^9$$

HOMWORK EXERCISE...

Expand...

a) $(x^2 - 2y^2)^4$

Pg. 542
#6, 7, 17, 18

Remember: there are still two terms!

b) $(3x^3 + y)^5$

c) $(3x^4 - 4y^3)^5$

Probability:

Rolling a 3??
 $P(3) = \frac{1}{6}$

$$P(\text{Event}) = \frac{\text{Favorable outcomes}}{\text{total outcomes}}$$

$$\text{Odds}(\text{Event}) = \frac{\text{Favorable outcomes}}{\text{unfavorable outcomes}}$$

Lotto-649 ... Probability of winning??

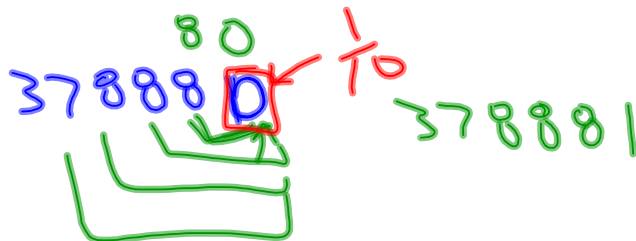
Total outcomes ... ??

6 #'s drawn, Not Replaced

$$(49)(48)(47)(46)(45)(44)$$

$$10,068,347,520$$

TAG: \$100,000



$$(10)(10)(10)(10)(10)$$

$$10^6$$

$$= 1,000,000$$

Fundamental Counting Principles

Multiplication Principle - key word is "AND".

- multiply all possible outcomes from each event to get the total number of possible outcomes.

$$n(\text{A and then B}) = n(\text{A}) \times n(\text{B})$$

ex: From the Toronto International Airport, there are four routes to Montreal and two routes to fly from Montreal to Halifax. How many different routes are there from Toronto to Halifax?

$$\begin{aligned} \# \text{ of routes} &= 4 \times 2 \\ &= 8 \text{ different routes (prove using a tree diagram)} \end{aligned}$$

SOLUTION???

Addition Principle - key word is "OR".

- add all possible outcomes from each event to get the total number of possible outcomes.

$$n(\text{A or B}) = n(\text{A}) + n(\text{B})$$

ex: Mia wishes to purchase a brand new car. Her choices include two foreign models or four domestic models. In how many ways can she select a car?

SOLUTION???

x: License plates in Vermont consist of 3 digits and 3 letters. Given that digits and numbers can be repeated, how many different license plates would be possible? What if digits and letters could not be repeated?

$$\text{Total: } (\#)(\#)(\#)(\text{let})(\text{let})(\text{let}) \\ 10 \times 10 \times 10 \times 26 \times 26 \times 26$$

$$= \underline{17\,576\,000}$$

6! ← Factorial

$$= 6 \times 5 \times 4 \times 3 \times 2 \times 1$$

$$8! = 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$$

$$\frac{12!}{8!} = \frac{12 \times 11 \times 10 \times 9 \times \cancel{8!}}{\cancel{8!}}$$

$$12! = 479001600$$

$$8! = 40320$$