Expand $(2x^6 - 3y^7)^4$ $\rightarrow$ 1 4 6 4 1

$$
\begin{array}{c}
1 \\
1 \quad 1 \\
1 \quad 2 \quad 1 \\
1 \quad 3 \quad 3 \quad 1 \\
1 \quad 4 \quad 6 \quad 4 \quad 1
\end{array}
$$

$$= 1\overset{16}{(2x^6)^4}(-3y^7)^0 + 4\overset{8}{(2x^6)^3}\overset{-3}{(-3y^7)^1} + 6\overset{4}{(2x^6)^2}\overset{9}{(-3y^7)^2} +$$

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

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

Find the numerical coefficient of the x^4y^9 variable

for the binomial $(x^2-2y^3)^5$.

$$10(x^2)^2(-2y^3)^3$$

1

1 1

1 2 1

1 3 3 1

1 4 6 4 1

~~1~~ 5 10 10 5 1

5,0 4,1 3,2 2,3

$$\underbrace{10(1)^2(-2)^3}_{=-80}x^4y^9$$

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

x^6y^9

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1

3,3 1,5 0,6

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

$6 \times 3 \times -32$

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

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

$= 20(27)(-8)$

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

HOMEWORK EXERCISE...

Expand...

a) $\left(x^2 - 2y^2\right)^4$

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#6, 7, 17, 18

Remember: there are still two terms!

b) $\left(3x^3 + y\right)^5$

c) $\left(3x^4 - 4y^3\right)^5$

Probability:

Rolling a 3??

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

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

Odds(Event) = Favorable outcomes : 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

80

$3788\boxed{0}$ $\frac{1}{10}$

378881

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

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.

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

ex: From the Toronoto 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?

# of routes = 4 x 2
= 8 different routes (prove using a tree diagram)

SOLUTION???

Addition Principle - key word is "OR".

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

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

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???

ex: 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?

(#)(#)(#)(let)(let)(let)

Total: $10 \times 10 \times 10 \times 26 \times 26 \times 26$

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

$$6! \leftarrow \text{Factorial}$$

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

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

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

$$12! = 479001600$$

$$8! = 40320$$