Day 3: Combinations

Combinations: A selection of items in which the order is unimportant.
**When you are SELECTING items, you are working with a combination.

3 letter combinations of PARTY:

Permutations
arrangements
order is important

1	2	3
PAR	PAT	PAY
PRA	PTA	PYA
APR	APT	AYP
ARP	ATP	APY
RPA	TPA	YPA
RAP	TAP	YAP

and so on..

6 permutations

In looking at column 1, there are 6 different permutations of P, A and R. When working with combinations and you SELECT the 3 letters P, A and R, the 6 perms make up 1 selection. Hence, there are 10 combinations of 3 letters selected from the word PARTY. The total perms divided by the total number of ways each 3 letter selection can be arranged is

Formula for combinations:

$$ {}_nC_r = \frac{{}_nP_r}{{}_rP_r} = \frac{n!}{(n-r)!r!} $$

Eg 1) In how many ways can 2 players be selected from a team of twelve to serve as captains?

$${}_nC_r$$

$${}_{12}C_2 = \frac{12!}{(12-2)!\,2!} = 66$$

Eg 2) To win the lotto 6-49, a person must correctly choose 6 numbers from 49. how many combinations are possible?

$${}_nC_r$$

$${}_{49}C_6 = \binom{49}{6} = 13,983,816$$

Eg 3) Dana has a penny, a nickel, a dime, a quarter, a halfdollar and a dollar coin. How many different sums of money can she make from any 3 or 4 coins?

$${}_6C_3 = 20$$

$$+$$

$${}_6C_4 = 15$$

$$= 35$$

Eg 4) In how many ways can a committee of 4 male and 3 female students be selected from a math class that has 18 male students and 19 female students?

4 M and 3 F

$_{18}C_4 \times {}_{19}C_3$

3060 × 969

2,965,140

Eg 5) A club consists of 5 boys and 5 girls. How many committees of 4 members can be formed if:

a. No restrictions.

$_{10}C_4 = 210$

b. 4 boys.

$_5C_4 = 5$

c. 3 boys and 1 girl.

$_5C_3 \times {}_5C_1 = 50$

d. At least 2 boys.

2B and 2G = 100

or

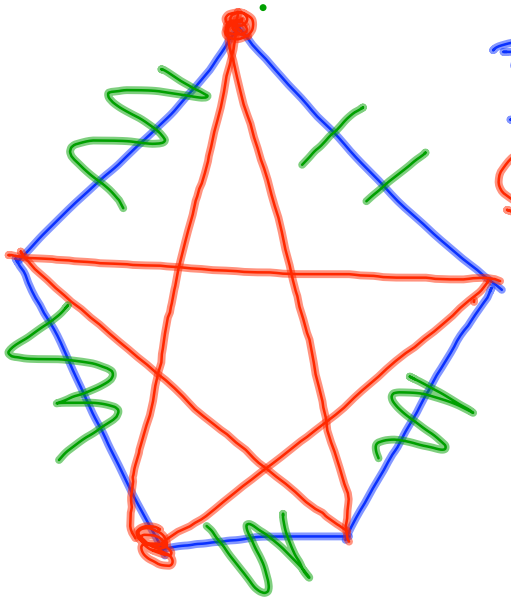
3B and 1G = 50

or

4B and 0G = 5

= 155

November 24, 2009



Diagonals

5 diagonals

$_5C_2 = 10 - 5 = 5$

$_nC_2 - n$

# of sides

Assignment:
Pg. 375 1, 2, 12a, 14, 15ab, 17, 20,
24, 25, 28, 29, 31ab