Monday, October 21, 2019 1:42 PM

The toughest part is figuring out when to use what method.

Lesson #7

#1-17

ALWAYS THINK:

Is the order important?

Yes

Permutations

- FCP - Blanks

① × ⑥ × ⑤ × ④ × ③

- Factorials
- $_nP_r$: 'n' different things, arrange 'r' of them
- Repetitions:

$$\frac{n!}{a!\,b!\,c!}$$

No

Combinations

- $_nC_r$: 'n' different things, choose 'r' of them
- at least / at most
- Complement

Ex 1 How many ways can we arrange the letters of 'ADDRESS' given:

a) No restrictions?

Order matters

Permutations

Repetitions ⇒ 2 D's

2 S's

7 total

$$\frac{7!}{(2!2!)} = \boxed{1260}$$

b) each arrangements ends in 'D'?

ADRESS

Fixed

D

_ _ _ _ _ _ | D

6 spots

$$\frac{6!}{2!} = \boxed{360}$$

2 S's → 2!

c) the first and last letter are 'S'?

ADDRE

S _ _ _ _ _ S

5 spots

2 D's → $\frac{5!}{2!} = 60$

d) all the 's's are together?

SS A D D R E

6 'blocks'

2 D's → $\frac{6!}{2!} = 360$

(2) A staff climate committee needs 4 teachers and 3 admin. 9 teachers and 5 admin want to join. How many committees are possible if:

a) NO other restrictions?

Order NOT important

Choose => combinations

Don't use blanks

$$_9C_4 \overset{\text{AND}}{\times} {}_5C_3 = 1260$$

$_9C_4$: teachers; $_5C_3$: admin

b) Mr. Taylor (admin) must be on committee?

$$_1C_1 \cdot {}_4C_2 \cdot {}_9C_4 = 756$$

Mr. Taylor: Admin; Teachers

c) the VP's (Ms. Gill and Mr. Vulgaris) cannot both be on the Committee?

Ms. Gill No Vulgaris (or) Vulgaris, No Gill on Committee (or) neither on Committee

$$_1C_1 \cdot {}_3C_2 \cdot {}_9C_4 \oplus {}_1C_1 \cdot {}_3C_2 \cdot {}_9C_4 \oplus {}_3C_3 \cdot {}_9C_4$$

Gill admin teachers — admin teachers

$$= 378 + 378 + 126$$

$$= \boxed{882}$$

Alternate (complement)

total = Gill and Vul (or) Gill No Vul (or) Vul No Gill (or) No Gill No Vul

X ; not both

$X = \text{total} - \text{Gill and Vul}$

$= 1260 - {}_2C_2 \cdot {}_3C_1 \cdot {}_9C_4$

Gill and Vul — Admin — Teach

$= 1260 - 378 = \boxed{882}$