Perms with Repeating Objects

Ex) How many ways can you arrange the letters of "WOW"?

$$\frac{3}{3} \cdot \frac{\partial}{\partial x} = 6 \text{ ways}$$

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$$\frac{6}{3} = 3$$

$$\frac{3}{3} \cdot \frac{\partial}{\partial x} = 3$$

Since the W repeats twice, we correct by dividing by 2!

Ex) How many ways can you arrange the letters of WOWW?

In general, the number of perms of n objects with r identical objects is n! r!

Ex) Using all letters in the AARDVARK how many different arrangements are possible?

Perms with Restrictions

Note: Must ALWAYS fill restrictions first!!

Ex) Using the first 10 letters of the alphabet, how many different arrangements can you make if you must

(a) start with a vowel

$$\frac{3}{\sqrt{9.8.7.6.5.4.3.2.1}}$$

(b) start and end with a vowel

$$\frac{3}{\sqrt{876943212}}$$

(c) Not start or end with a vowel

Ex) Using all the letters of the word BRAINS (no reps), how many 4-letter arrangements are possible

(a) ending in "R"

(b) with consonants only

$$\frac{4}{c}$$
 $\frac{3}{c}$ $\frac{2}{c}$ $\frac{1}{c}$

(c) with consonants and vowels alternating

extraction
$$\frac{4}{c} \cdot \frac{2}{v} \cdot \frac{3}{c} \cdot \frac{1}{v} = 24$$

$$\frac{2}{v} \cdot \frac{4}{c} \cdot \frac{1}{v} \cdot \frac{3}{c} = 24$$

$$\frac{2}{v} \cdot \frac{4}{c} \cdot \frac{1}{v} \cdot \frac{3}{c} = 24$$

Ex) If there are six chairs in a row, how many ways can 3 boys and 3 girls sit if they must alternate?

$$\frac{3}{8} \cdot \frac{3}{6} \cdot \frac{3}{8} \cdot \frac{3}{6} \cdot \frac{3}{8} \cdot \frac{3}{6} = 36 \times 2$$

$$= \frac{3}{6} \times 2$$

$$= \frac{3}{6} \times 2$$

$$= \frac{3}{6} \times 2$$

$$= \frac{3}{6} \times 2$$

Arrangements within Arrangements

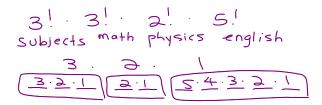
Ex) How many ways can you arrange 8 people in a row if 3 people insist on sitting together?

When items must be together, tie them together and count them as a single item.

There are now 6 items above, so arrange:

Ex) How many ways can you arrange 4 people in a row if 2 people must sit together?

Ex) How many ways can you arrange 3 Math books, 2 Physics books, and 5 English books on a shelf keeping the books of each subject area together?



Ex) How many ways can 6 people sit in a row if 2 people must not sit together?

Total arrangements possible - total arrangements when together

$$6! - 5! 2!$$
 $6! - 5! 2!$
 $720 - 240$
 480

Ex) How many different four-digit numbers can be made that are even using the digits 0, 1, 2, 3, 4, 5, 6?

Ex) How many different 3-digit numbers can be made using the digits 2, 3, 4, 5, and 0 if the number must be divisible by 5?

$$\frac{3}{10000} = 9$$
 $\frac{3}{10000} = 9$
 $\frac{4}{10000} = 12$

Ex) How many different numbers of at <u>least three digits</u> can be formed from the integers 1, 2, 3, 4, 5?

$$\frac{5.4.3}{5.4.3} = 60$$

$$\frac{5.4.3}{3.2} = 120$$
Pink WS
P.701 #23.4,67,10
P.712 #3,4,67,10
Polynomials Test
Stomphow
Perms Ouiz + Friday