

## 2.7 - Problem Solving with Permutations & Combinations

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### FOUNDATIONS OF MATH 12 Ch. 2 – Day 7: Problem Solving with Permutations & Combinations

Now we bring everything we've learned together. We'll need every formula.

#### Example

How many arrangements of the word POPPIES can be made:

a) With no restrictions

Does order matter?  
Yes!  $\therefore$  permutation.

$$\left. \begin{array}{l} n=7 \\ a=3 \end{array} \right\} \frac{7!}{3!} = 840 \text{ perms.}$$

b) If each one begins with P

P ? ? ? ? ? ?

$\hookrightarrow$  6 remaining letters  
and 1 set of doubly repeated 'P's'

$$\left. \begin{array}{l} n=6 \\ a=2 \end{array} \right\} \frac{6!}{2!} = 360 \text{ perms.}$$

c) If the first 2 letters are P

P P ? ? ? ? ?

$n=5$ . we "locked in" 2  
P's,  $\therefore$  no more repetitions

$$\hookrightarrow 5! = 120 \text{ perms}$$

d) If the first letter is P, and the next one is not P

P ? ? ? ? ?  
 $\uparrow$   
O, I, E, S  $\rightarrow 4P_1 = 4$

2 remaining P's in the last  
5 letters, so we must divide  
by 2!

$$\Rightarrow 4P_1 \times \frac{5!}{2!} = 240 \text{ perms.}$$