Worked Examples

1) The student government has 15 members. We will select a three-person committee. In how many ways can this be done?

$$_{15}C_3 = \frac{15!}{3!\,12!} = \frac{15\cdot 14\cdot 13\cdot \cancel{12\cdot 11\cdot 10\cdots 2\cdot 1}}{(3\cdot 2\cdot 1)\cancel{(12\cdot 11\cdot 10\cdots 2\cdot 1)}}$$

$$= \frac{\overset{5}{\cancel{15}}\cdot \overset{7}{\cancel{14}}\cdot 13}{\underset{1}{\cancel{3}}\cdot \underset{1}{\cancel{2}}\cdot 1}$$

$$= 455$$

ANS: The committee can be selected in 455 ways.

Order does not matter here (one committee member is not "ahead" of another member).
We use the combinations formula

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

2) The Emerald Key Board has 9 members. We will select a chairperson, parliamentarian, and a secretary. In how many ways can this be done?

$$_9P_3 = \frac{9!}{6!} = \frac{9\cdot 8\cdot 7\cdot \cancel{6\cdot 5\cdot 4\cdot 3\cdot 2\cdot 1}}{\cancel{6\cdot 5\cdot 4\cdot 3\cdot 2\cdot 1}}$$

$$= 504$$

ANS: We can select the officers in 504 ways.

Order does matter here.
We use the permutations formula

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

use three blanks

Check: $\underset{\text{chr.}}{\underline{9}}\cdot\underset{\text{parl.}}{\underline{8}}\cdot\underset{\text{sec.}}{\underline{7}}$

multiply to get 504

fundamental counting principle

Objective: Solve counting problems, using permutations and combinations.