

# Permutations & Combinations

CKSTEM Math Problem Solving · Grades 5–8

Try each problem on your own first — then watch the solution videos.

## ★ Factorial · Permutation · Combination

Five students stand in a single line for a welcome photo. How many different lineups are possible?

WORK IT OUT HERE

## L0 Factorial Lineup

Five students stand in a single line for the welcome photo. How many different lineups are possible?

WORK IT OUT HERE

**L1 Block Trick**

Six students stand in a welcome line. Anna and Ben (buddies) must stand next to each other. Cara is holding the welcome sign, so she must stand at the front of the line. How many different lineups are possible?

WORK IT OUT HERE

**L2 Subtract the Bad**

Six students in an inclusive welcome line. Anna and Ben (buddies) must stand together. Cara holds the welcome sign at the front. Dan and Erin help different groups, so they must not stand next to each other. How many lineups are possible?

WORK IT OUT HERE

### L3 Ordered Pairing

Four student helpers will each be paired one-to-one with a different new student chosen from six new students. However, Helper Anna cannot be paired with new student Xavier, because Xavier needs language support from a different helper. How many different buddy pairings are possible?

WORK IT OUT HERE

### L4 Group Combinations

An inclusive student support committee of 4 students will be chosen. There are 3 mentors, 3 club leads, and 3 athletes (9 students total). Each of the three groups must be represented on the committee. However, Anna (a mentor) and Zane (an athlete) cannot both be chosen. How many different committees are possible?

WORK IT OUT HERE

### L5 Quotas + Exclusion

An inclusive outreach team of 6 students will be chosen from 3 mentors, 3 club leads, and 3 athletes. The team must include at least 2 mentors, at least 1 club lead, and at least 2 athletes. Anna (a mentor) and Yara (a club lead) cannot both be chosen. How many different teams are possible?

WORK IT OUT HERE