Find Permutations and Combinations

MATHEMATICAL PRACTICES

Use appropriate tools strategically.

QUESTION How can you find combinations and permutations using a graphing calculator?

EXAMPLE 1 Find the number of combinations

STARTERS There are 15 players on your softball team, but only 9 of them can be the starting players in one game. How many combinations of starting players are possible?
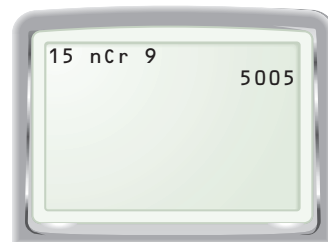
Solution

You are finding $_nC_r$ where $n = 15$ and $r = 9$. Enter 15 for n.

Press **MATH**. Go to the PRB menu and select $_nC_r$.
Then enter 9 for r.

▶ There are 5005 possible combinations of starting players.

```
15 nCr 9
                5005
```

EXAMPLE 2 Find the number of permutations

BATTING ORDER Before each softball game, your coach announces the batting order of the 9 starting players. This is the order in which the starting players will bat. How many batting orders can be formed using 9 players on your team of 15 players?
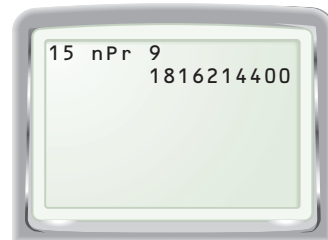
Solution

You are finding $_nP_r$ where $n = 15$ and $r = 9$. Enter 15 for n.

Press **MATH**. Go to the PRB menu and select $_nP_r$.
Then enter 9 for r.

▶ There are 1,816,214,400 possible batting orders.

```
15 nPr 9
         1816214400
```

PRACTICE

Evaluate the expression.

1. $_7C_4$ **2.** $_6C_6$ **3.** $_{10}C_3$ **4.** $_{16}C_8$

5. $_9P_5$ **6.** $_7P_6$ **7.** $_{11}P_8$ **8.** $_{12}P_5$

9. GROUP PROJECT Your teacher selects 3 students from a class of 28 students to work on a project in a group. Within the group, one member must be the writer, one must be the researcher, and one must be the presenter.

   a. How many different groups of 3 can your teacher select?

   b. After the group is formed, in how many ways can the roles in the group be assigned?