

10.1 Apply the Counting Principle and Permutations

TEKS a.1, a.2

Before

You counted the number of different ways to perform a task.

Now

You will use the fundamental counting principle and permutations.

Why?

So you can find numbers of racing outcomes, as in Example 4.



Key Vocabulary

- permutation
- factorial

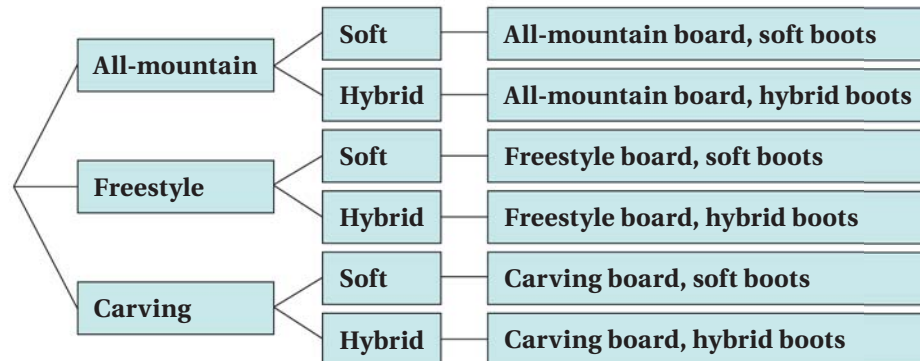
In many real-life problems, you want to count the number of ways to perform a task. One way to do this is to use a *tree diagram*.

EXAMPLE 1 Use a tree diagram

SNOWBOARDING A sporting goods store offers 3 types of snowboards (all-mountain, freestyle, and carving) and 2 types of boots (soft and hybrid). How many choices does the store offer for snowboarding equipment?

Solution

Draw a tree diagram and count the number of branches.



► The tree has 6 branches. So, there are 6 possible choices.

FUNDAMENTAL COUNTING PRINCIPLE Another way to count the choices in Example 1 is to use the *fundamental counting principle*. You have **3** choices for the board and **2** choices for the boots, so the total number of choices is $3 \cdot 2 = 6$.

KEY CONCEPT

For Your Notebook

Fundamental Counting Principle

Two Events If one event can occur in m ways and another event can occur in n ways, then the number of ways that *both* events can occur is $m \cdot n$.

Three or More Events The fundamental counting principle can be extended to three or more events. For example, if three events can occur in m , n , and p ways, then the number of ways that *all* three events can occur is $m \cdot n \cdot p$.