

Lesson 12–1

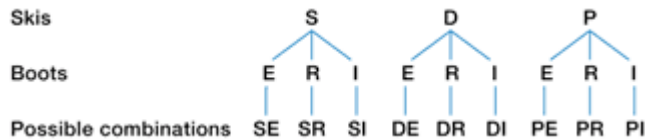
Example 1 Independent Events

RECREATION At a local ski resort you can rent ski equipment. At the rental shop, you can choose standard, deluxe, or professional skis with economy, regular, or insulated ski boots. Any type of boot can be adjusted to fit any type of skis. How many different combinations of skis and boots are available?

First, note that the choice of the type of boots does not affect the choice of the type of skis, so these events are independent.

Method 1 Tree Diagram

Let S represent standard skis, D deluxe skis, P professional skis, E economy boots, R regular boots, and I insulated boots. Make a tree diagram in which the first row shows the choice of skis and the second row shows the choice of boots.



There are nine possible outcomes.

Method 2 Make a table

Make a table in which each row represents a type of skis and each column represents a type of boot.

		Boots		
		Economy	Regular	Insulated
Skis	Standard	SE	SR	SI
	Deluxe	DE	DR	DI
	Professional	PE	PR	PI

This method also shows that there are nine outcomes.

Example 2 Fundamental Counting Principle

Multiple–Choice Test Item

BUSINESS Miriam has a home–based business making gift baskets. One particular basket for children contains one package of snacks and one stuffed toy. For a customized basket, you can select one of five different snack packages and one of seven different stuffed toys. How many different children’s gift baskets are possible?

A. 35

B. 12

C. 24

D. 18

Read the Test Item

The choice of a type of snack package does not affect the choice of a stuffed toy, so these events are independent.

Solve the Test Item

There are 5 ways to choose a snack package and 7 ways to choose a toy. By the Fundamental Counting Principle, there are $5 \cdot 7$ or 35 possible gift baskets. Then answer is A.

Example 3 More than Two Independent Events

SCHOOL Brad is planning to order a class ring. He has choices in the metal option, the stone option, and the initial option. For the metal option, he can order either silver or gold. For the stone option, Brad can choose to have no stone, a stone in the color of his birthstone, or a stone in special school colors. Finally, for the initial option, he can choose to have no initials, his initials, the school's initials, or a special sport's insignia inscribed on the ring. How many different choices for a ring does Brad have?

The choice of any of the three options does not affect the choice of the other options, so the choices in each option are independent events.

There are 2 metal options, 3 stone options, and 4 initial options. There are $2 \cdot 3 \cdot 4$ or 24 different rings possible.

Example 4 Dependent Events

MUSIC Aislyn is having a birthday party and plans to play her 8 favorite CDs. She does not want to repeat playing any of the CDs. How many different ways can she play the 8 CDs?

When Aislyn picks a particular CD to play, she cannot play it again since she does not want to repeat any of the CDs. Therefore, the choices of which CD to play are dependent events.

There are 8 CDs that Aislyn can play first. That leaves 7 CDs for her to choose to play second. After she chooses two CDs, there are 6 CDs to choose from, and so on.

Order of play	1st	2nd	3rd	4th	5th	6th	7th	8th
Number of Choices	8	7	6	5	4	3	2	1

There are $8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$ or 40,320 ways that she could play the CDs. Note that $8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 8!$.