Finding an Experimental Probability

In Examples 1 and 2, you could find an exact probability because you could determine the exact number of favorable outcomes and the exact number of possible outcomes. In real-life situations, it is sometimes difficult or impossible to determine this information. In these cases, you can try to find a sample that is representative.

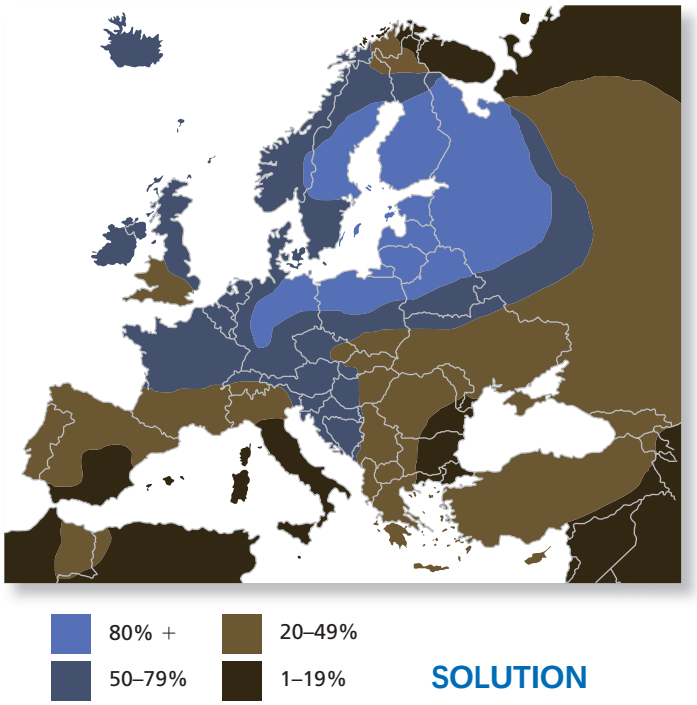
EXAMPLE 3 Finding an Experimental Probability

To form a theory about the inheritance of eye color, a geneticist records the eye color of 2400 sets of parents and their children, as shown below.

a. From this sample, what is the probability that a blue-eyed parent and a brown-eyed parent have a blue-eyed child?

b. What can you conclude about the eye color of the children of a blue-eyed parent and a brown-eyed parent?

Percent of Light-Colored Eyes in Europe



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Eye Color of Parents (400 of each pattern)	Number of Children with Given Eye Color		
+ =	302	72	26
+ =	197	152	51
+ =	203	0	197
+ =	0	301	99
+ =	0	198	202
+ =	0	4	396

SOLUTION

a. Of the 400 children with a blue-eyed parent and a brown-eyed parent, there are 197 blue-eyed children. So, you can estimate the probability to be

$$\text{Probability} = \frac{197}{400} = 49.25\%.$$

b. From this sample, it appears that the children of a blue-eyed parent and a brown-eyed parent are equally likely to have blue eyes or brown eyes.

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From the above sample, what is the probability that a child of two brown-eyed parents will not have brown eyes?