

The Multiplication Principle

1. A box contains 3 balls colored red, green, and yellow. One ball is removed from the box, its color is recorded, and it is not returned. A second ball is removed from the box and its color is recorded. How many different outcomes are possible?
2. A box contains 3 balls colored red, green, and yellow. One ball is removed from the box, its color is recorded, and it is returned. A second ball is removed from the box and its color is recorded. How many different outcomes are possible?
3. **The Multiplication Principle**
If an outcome consists of k successive selections where there are n_i choices for the i th selection, then the total number of possible outcomes is $n_1 \cdot n_2 \cdot n_3 \cdot \dots \cdot n_k$.
4. How many four-digit personal identification numbers are possible if zero cannot be used as the first digit and no digit is repeated.
5. A license plate is made up of 3 letters followed by 4 digits.
 - A. How many different plates are possible?
 - B. How many different plates are possible if no letter is repeated?
 - C. How many different plates are possible if no digit is repeated?
 - D. How many different plates are possible if no letter is repeated and no digit is repeated?
 - E. How many different plates are possible if no letter is repeated, no digit is repeated, and the first digit is not a zero?
6. An exam has 5 easy problems and 3 hard problems.
 - A. How many ways are there to order the problems on the exam?
 - B. How many ways are there to order the problems on the exam if the easy problems are first?
 - C. How many ways are there to order the problems on the exam if the easy problems are first or the hard problems are first?