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 ith selection, then the total number of possible outcomes is $n_1 \cdot n_2 \cdot n_3 \cdot ... \cdot n_k$.

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?