Lesson 4.6.2: Counting the Outcomes of Experiments

How to Count the Outcomes of an Experiment?

1. Table
2. Tree Diagram
3. Systematic Listing
4. Fundamental Counting Principle (FCP)

Fundamental Counting Principle: If one event can occur in m ways, and a second event can occur in n ways, and a third event can occur in p ways, and so on, then the sequence of events can occur in $m \times n \times p \times \ldots$ ways.

Practice Exercises 4.6.2

A. Find the number of possible outcomes for each scenario using the tree diagram and the fundamental counting principle.

1. Boys and girls in a family with two children.
2. Choosing a cellphone that comes in black, white, or transparent that is 3G or 4G.
3. A choice of muffin or toast bread with coffee, milk, or juice.
4. Elias has a choice of a queen or king with a choice of hearts, diamonds, clubs, or spades.
5. A die is rolled and a coin is tossed.

B. Solve each problem completely.

1. In how many ways can 1 out of 4 blue flags, 1 out of 3 red flags, and 1 out of 2 green flags be arranged on a pole?
2. A teacher wants to write an ordered 4-question test from a pool of 12 questions. How many different forms of the test can the teacher write?
3. A lock contains 3 dials, each with ten digits. How many possible sequences of numbers exist?
4. Four students are to be chosen from a group of 9 to fill the positions of president, vice-president, treasurer and secretary. In how many ways can this be accomplished?
5. How many 5-number license plates can be made using the digits 0, 1, 2, 3, 4, 5, if:
   5.1 repetitions ARE allowed?
   5.2 repetitions are NOT allowed?
6. Bill has three pairs of pants, 5 shirts and 2 pairs of shoes. How many outfits can he make?
7. In how many ways can 6 different cards be laid out on a table in a row?

Activity 4.6.2

A. Find the number of possible outcomes for each scenario using the fundamental counting principle.

1. Clocks come in 2 styles: wall or desk. They come in 5 colors: white, black, red, blue, or orange.
2. Basketball uniform in white, red, or green which comes in sizes small, medium, or large.
3. A coin is tossed three times.
4. A coin is tossed and a die is rolled.
5. Notebooks come in 4 colors: red, yellow, green, and blue. They come in 2 types: 5-subject and 7-subject.

B. Solve each problem completely.

1. A restaurant offers four sizes of pizza, two types of crust, and eight toppings. How many possible combinations of pizza with one topping are there?
2. How many ways can 5 paintings be lined up on a wall?
3. Rob has 4 shirts, 3 pairs of pants, and 2 pairs of shoes that all coordinate. How many outfits can you put together?
4. Grace loves to eat salad! How many salads can she put together if she can pick out one type of lettuce from 2 choices, one vegetable from 4 choices and one dressing from 7 choices?
5. Motorcycle license plates have 2 letters followed by 4 numbers.
   5.1 If the same letter or number can be repeated, how many can be made?
   5.2 If the same letter CANNOT be repeated, how many can be made?
6. How many 5-digit numbers can be formed (using 0 – 9)?
7. How many 5-digit numbers can be formed if each one uses all the digits 0, 1, 2, 3, 4 without repetition?
8. In how many ways can 6 bicycles be parked in a row?
9. How many ways can the letters MATH be arranged?

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