

1 Lesson 4 Example 1

Here's a different illustration of the fact that not all unordered outcomes are equally likely when draws are made with replacement. In the Pick 3 Lotto, a winning number is chosen between 000 to 999. Contestants win if the digits in their chosen number matches the winning number, in any order.

1. What is your chance of winning if you bet on 053?
2. What is your chance of winning if you bet on 055?
3. What is your chance of winning if you bet on 555?

2 Answer

To determine the chances of winning the Pick 3 Lotto for each of the bets (053, 055, 555), let's calculate the number of favorable outcomes for each case and the total number of possible outcomes.

Total Number of Possible Outcomes

The Pick 3 Lotto involves choosing a 3-digit number where each digit can be from 0 to 9. Therefore, the total number of possible outcomes is:

$$10 \times 10 \times 10 = 1000$$

1. Betting on 053

For the bet 053, we are looking at the different permutations of the digits 0, 5, and 3. Since all digits are unique, each permutation is a unique outcome.

Number of permutations of 3 distinct digits:

$$3! = 6$$

Therefore, the probability of winning if you bet on 053 is:

$$\frac{\text{Number of favorable outcomes}}{\text{Total number of possible outcomes}} = \frac{6}{1000} = 0.006$$

2. Betting on 055

For the bet 055, we have two identical digits (5s) and one different digit (0). We need to count the number of distinct permutations of these digits.

Number of permutations of the digits 0, 5, 5:

$$\frac{3!}{2!} = \frac{6}{2} = 3$$

Therefore, the probability of winning if you bet on 055 is:

$$\frac{3}{1000} = 0.003$$

3. Betting on 555

For the bet 555, all three digits are identical. There is only one unique permutation of these digits.

Number of permutations of the digits 5, 5, 5:

$$1$$

Therefore, the probability of winning if you bet on 555 is:

$$\frac{1}{1000} = 0.001$$

Summary of Probabilities

- **Bet on 053:** Probability = 0.006
- **Bet on 055:** Probability = 0.003
- **Bet on 555:** Probability = 0.001