

# Washington State Math Championship – 2009

## Probability and Statistics – 8<sup>th</sup>

WASHINGTON STATE  
MATH CHAMPIONSHIP



BLAINE SCHOOL DISTRICT

ConocoPhillips  
Ferndale Refinery

*If asked for a probability, express your answer as a reduced fraction unless otherwise stated.*

1. In the Seattle Mariners' historical 2001 season, Edgar Martinez batted 0.306 (meaning 30.6% of the times he was at the plate he got a hit), Ichiro Suzuki batted 0.350, and Bret Boone batted 0.331. If these three players were to each come up to bat one more time, what is the probability that none of them would get a hit? **Express your answer as a decimal rounded to the nearest thousandth.**
2. If two fair, standard six-sided dice are rolled, what is the probability that the sum of the two numbers rolled is greater than six or that at least one of the two numbers is a five? **Express your answer as a reduced fraction.**
3. What is the smallest number of times you would have to flip a fair coin if you wanted to be at least 90% sure of flipping at least one head?
4. What is the mean of the following values?
  - the range of the integers from 4 to 9, inclusive (that is, including 4 and 9)
  - the average of the first ten positive odd numbers
  - the median of the two-digit prime numbers less than 40
5. It's an early morning, and you are just too tired to even open your eyes. If your drawer contains 12 white socks, 10 blue socks, and 20 black socks, what is the probability that you will pull out a pair of socks that are of the same color? **Express your answer as a reduced fraction.**
6. The Monty Hall problem is a famous problem from the game show *Let's Make a Deal*. It goes as follows: You are on a game show and are shown three doors to choose from, only one of which has the grand prize behind it. After you have chosen a door, one of the other two doors is opened, and this door does not contain the grand prize. If you then change your original pick, what is the probability that you will win the grand prize? **Express your answer as a reduced fraction.**
7. Suppose that there is a 40% chance it will rain on any given day in Bellingham and that there is a 20% chance that frogs will be playing leapfrog out in the fields *and* it will be a rainy day in Bellingham. What is the probability, as a percentage, that the frogs will be playing leapfrog in the fields, given that it is a rainy day in Bellingham? **Express your answer as a reduced fraction.**
8. A *four-of-a-kind* is a poker hand where four of the five cards in the hand are of the same rank (i.e. 3, 3, 3, 3, Q or K, K, K, K, J). If you are given five randomly chosen cards from a standard 52-card deck, what is the probability that you will have a four-of-a-kind? **Express your answer as a reduced fraction.**
9. Suppose you have twelve unique books of three different categories – three fantasy, five children's books, and four biographies. In how many ways can the books be arranged on a bookshelf if all of the children's books must be together?
10. Each of six indistinguishable marbles is randomly placed into one of three distinguishable boxes. What is the probability that the three boxes will *not* each contain two marbles? **Express your answer as a reduced fraction.**