

Counting and Probability Problems

1. If a coin is flipped twice, what is the probability that it will land heads at least once?
2. A deck of cards contains 52 cards, 13 from each suit. If a card is flipped over, what is the probability that it is a spade? That it is a face card (J, Q, K) of any suit?
3. Two dice are rolled, find the probability that the sum is equal to 5.
4. What is the probability that a randomly drawn positive factor of 60 is less than 7?
5. What is the probability that an integer in the set $\{1, 2, 3, \dots, 100\}$ is divisible by 2 and not divisible by 3?
6. Bob and Alice each have a bag that contains one ball of each of the colors blue, green, orange, red, and violet. Alice randomly selects one ball from her bag and puts it into Bob's bag. Bob then randomly selects one ball from his bag and puts it into Alice's bag. What is the probability that after this process the contents of the two bags are the same?
7. Samantha randomly selects two distinct numbers from the set $\{1, 2, 3, 4, 5\}$, and Lang randomly selects a number from the set $\{1, 2, \dots, 10\}$. What is the probability that Lang's number is larger than the sum of the two numbers chosen by Samantha?
8. A point P is chosen randomly in the interior of an equilateral triangle ABC. What is the probability that $\triangle ABP$ has a greater area than each of $\triangle ACP$ and $\triangle BCP$?