

Part One: *Quick and Easy...*

1. A couple plans to have three children. Assuming that boys and girls are equally likely, find the probability that the couple will have exactly two boys. Under the same assumption, find the probability that the couple will have exactly one girl.

2. An experiment consists of tossing a die and flipping a coin. What is the probability of getting a 5 and a head?

3. A card is drawn randomly from a deck of cards. What is the probability that the card will not be a face card (a jack, a queen, or a king)?

4. If the probability of guessing correctly on a multiple choice test is $\frac{1}{4}$, what are the odds against guessing correctly?

5. If the odds against winning the lottery are 3 to 12,346,789, what is the probability of winning the lottery?

Part Two: *Monty Hall's Problem...*

A thoroughly honest game-show host has placed a car behind one of three doors. There is a goat behind each of the other doors. You have no prior knowledge that allows you to distinguish among the doors. "First you point toward a door," he says. "Then I'll open one of the other doors to reveal a goat. After I've shown you the goat, you make your final choice whether to stick with your initial choice of doors, or to switch to the remaining door. You win whatever is behind the door."

1. If you were on the game-show, would you switch doors? Does it matter?
2. Find the empirical probability of winning the car if you switch and if you don't switch.
3. With this knowledge, would you change your answer to Question 1? Can you explain what is happening?

Suppose instead that the host does not know what lies behind the doors. After you point to a door, the host will open one of the other doors randomly. If a goat is revealed, you make your final choice whether to stick with your initial choice of doors, or to switch to the remaining door. If a car is revealed, you win a goat.

4. If you were on the game-show, would you switch doors? Does it matter?
5. Find the empirical probability of winning the car if you switch and if you don't switch.
6. With this knowledge, would you change your answer to Question 4? Can you explain what is happening?