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Expected Value and Games of Chance

* **Probability** tells us how often some event will happen after many repeated trials.

$$PROBABILITY OF AN EVENT HAPPENING=\frac{NUMBER OF WAYS IT CAN HAPPEN}{TOTAL NUMBER OF OUTCOMES}$$

**Example 1:**

The chance of rolling a “5” with a die.

**Number of ways it can happen: 1** (there is only 1 face with a “5” on it)

**Total number of outcomes: 6** (there are 6 faces altogether)

So the probability = ⅙.

**Example 2:**

There are 5 marbles in a bag: 4 are red, and 1 is blue. What is the probability that a red marble gets picked?

**Number of ways it can happen: 4** (there are 4 reds)

**Total number of outcomes: 5** (there are 5 marbles in total)

So the probability= ⅘ = 0.8.

* **Expected Value** is a predicted value of a variable, calculated as the sum of all possible values each multiplied by the probability of its occurrence.

$$EXPECTED VALUE=\sum\_{}^{}\left(VALUE OF X\right)×(PROBABILITY OF X)$$

**Example:**

A local club plans to invest $10,000 to host a baseball game. They expect to sell tickets worth $15,000. But if it rains on the day of the game, they won’t sell any tickets and the club will lose all the money invested. If the weather forecast for the day of the game is 20% possibility of rain, is this a good investment?



Expected Value=5000(0.8)-10000(0.2)

=4000-2000

=2000

The club can expect a return of $2,000. So it is a good investment.