

Definition: Probability is concerned with events of chance or uncertainty.

Probabilities are normally and usually represented as fractions e.g.  $2/3$  or  $4/5$

|                       |     |            |       |         |
|-----------------------|-----|------------|-------|---------|
| Scale of Probability: |     | Impossible | Maybe | Certain |
| ----- -----           |     |            |       |         |
| 0                     | Low | $1/2$      | High  | 1       |

**Sample Space (Universe of Event)**

A listing or diagram of all possible outcomes from an experiment or occurrence.

**Specific Event (Subset of Universe)**

Simple (single event) or Non-Simple (multiple events) of chance.

Types of Probabilities for an Experiment (Event) of Chance or Uncertainty.

P = Probability   \* = Not   P\* = Not Probability

|   |  |
|---|--|
| Probability Experiment:<br>Draw a Marble<br>from a box containing<br>( 8 ) marbles with ( 3 ) colors. | <u>Marbles:</u><br>Blue Blue Blue<br>Purple<br>Green Green Green Green |
|---|--|

Probability of Success = (Success / Total )

Probability of Failure\* = ( Failure / Total )\*

|                                      |               |   |
|--------------------------------------|---------------|---|
| P (B) = ____                         | P (P) = ____  | P (G) = ____                                  |
| P* (B) = ____                        | P* (P) = ____ | P* (G) = ____                                 |
| P (R) $\cup$ P*(R) = 1               |               | P (R) $\cap$ P*(R) = 0                        |
| The Sum of P <u>and</u> P* equals 1. |               | The intersection of P <u>and</u> P* equals 0. |

Definition: Odds represents the probability of an event occurring and/or happening.

**Definition:** Odds is the **Ratio** of the (Probability of Success) / (Probability of Failure)

Odds are normally and usually represented as ratios e.g. 2:3 or 2 to 3

|  |   |
|--|---|
| Summary of Odds: Marble Experiment<br>Drawing marble from box ( 8 ) marbles. | <u>Marbles:</u> Blue Blue Blue Purple<br>Purple Green Green Green Green |
|--|---|

Simple Example of the Odds for the above Experiment of Chance or Uncertainty.

Odds equals ratio of Probabilities. Thus represent Odds then reduce as ratios.

Odds in favor of Blue event:  $O_f(B) = \underline{\quad} : \underline{\quad} = \underline{\quad} \text{ to } \underline{\quad}$

Odds against Blue event:  $O_a(B) = \underline{\quad} : \underline{\quad} = \underline{\quad} \text{ to } \underline{\quad}$

Odds in favor of Purple event:  $O_f(P) = \underline{\quad} : \underline{\quad} = \underline{\quad} \text{ to } \underline{\quad}$

Odds against Purple event:  $O_a(P) = \underline{\quad} : \underline{\quad} = \underline{\quad} \text{ to } \underline{\quad}$

Odds in favor of Green event:  $O_f(G) = \underline{\quad} : \underline{\quad} = \underline{\quad} \text{ to } \underline{\quad}$

Odds against Green event:  $O_a(G) = \underline{\quad} : \underline{\quad} = \underline{\quad} \text{ to } \underline{\quad}$

Reference for this information from Fundamentals of Mathematics by Edwin I. Stein