Probability

There are many important definitions to know as we begin looking at probability:

1) What is Sample Space?

Puzzles:

What is the sample space when flipping a fair coin once?

What is the sample space when flipping a fair coin 3 times?

2) What is Chance (also known as Probability)?

- The chance (probability) of an outcome is:
    - The percentage of times one _____
      when the process is repeated over and over again under the same
      conditions.

- The chance of an outcome is equal to:

- Probability Notation:

Puzzles:

What is the chance of drawing the queen of hearts from a deck of 52 cards?

What is the chance of drawing a queen from a deck of 52 cards?

What is the chance of rolling an odd number with a fair, six-sided die?

Chances ALWAYS range from _____ to _____ (aka: _____ to _____)

3) What is the complement?

The complement of an event A is the set of all outcomes in the sample space that are not included in the outcomes of event A.

Chance of something NOT occurring =

$$P(A^C) = 1 - P(A)$$

$P(A^C)$ *also appears as* $P(\neg A)$ *or* $P(\sim A)$

Puzzles:

What is the chance of NOT rolling a 2 with a fair die?

What is the chance of NOT drawing a heart from a standard deck of cards?
- In other words: *what is the complement of drawing a heart?*

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4) What is independence?

Two events are independent if the chance of the second event happening is the same regardless of whether or not the first happens. Two events are dependent if the chance of the second event changes depending on whether or not the first event happened.

Puzzle: Drawing Cards from a Deck with and without replacement.

Are the following events independent?
- Rolling a fair die twice

- Guessing on each answer for a 10-question True/False test

- Flipping a coin 4 times

- Drawing students randomly without replacement