## Theoretical Probability

Probability is the measure of how likely an event is to occur.
$>$ Written as fractions or decimals from 0 to 1 , or as percents from 0\% to 100\%.
$>$ Each possible result of a probability experiment or situation is an outcome.
$>$ The sample space is the set of all possible outcomes.
$>$ The complement of an event $E$ is the set of all outcomes in the sample space that are not in $E$.

|  | Rolling a number cube | Spinning a spinner |
| :--- | :---: | :--- |
| Experiment or <br> Situation |  |  |
| Sample Space | $\{1,2,3,4,5,6\}$ | \{red, blue, green, yellow $\}$ |

## Theoretical Probability

For equally likely outcomes,

$$
P(\text { event })=\frac{\text { number of favorable outcomes }}{\text { number of outcomes in the sample space }} .
$$

Example \#1: Each letter of the word PROBABLE is written on a separate card. The cards are placed face down and mixed up.
$>$ What is the probability that a randomly selected card has a consonant?
$>$ What is the probability that a randomly selected card is a "B"?
$>$ What is the probability that a randomly selected card is not "B"?

$$
P(\operatorname{not} B)=1-P(B) .
$$

Example \#2: A red number cube and a blue number cube are rolled. If all numbers are equally likely, what is the probability that the sum is a 6 ?

You try: A spinner for a game is circular shaped and has 5 equal sections. Each section is labeled with the numbers 1-5. What is the probability of spinning a 5 ? Spinning an even number? Spinning a number greater than or equal to 3 ?

Geometric probability is a form of theoretical probability determined by a ratio of lengths, areas, or volumes.

Example \#3: A figure is created placing a rectangle inside a triangle inside a square as shown. If a point inside the figure is chosen at random, what is the probability that the point is inside the shaded region?

You try: Find the probability that a point chosen at random is inside the triangle given that the radius of the circle is 10 and the length of side $B C$ is 12 .

## Probability Day 2



## Experimental Probability

You can estimate the probability of an event by using data from an experiment.

Example \#4: The table shows the results of a spinner experiment.

| Number | Occurrences |
| :---: | :---: |
| 1 | 6 |
| 2 | 11 |
| 3 | 19 |
| 4 | 14 |

Find the experimental probability of rolling a 3.
Find the experimental probability of rolling a 2 or 4.

You try: The table shows the results of choosing one card from a deck of cards, recording the suit, and then replacing the card.

| Card Suit | Hearts | Diamonds | Clubs | Spades |
| :--- | :---: | :---: | :---: | :---: |
| Number | 5 | 9 | 7 | 5 |

Find the experimental probability of choosing a club. Find the experimental probability of choosing a black card.

