## **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 <u>outcome</u>.
- ➤ The sample space is the set of all possible outcomes.
- The <u>complement</u> 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 Situation	3		
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(not B) = 1- P(B).** 

Probability Day 2

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.

<u>Example #3:</u> 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?



<u>You try:</u> 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 BC 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	
- I	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.