Dear Parents and Caregivers,

Thank you for supporting your child to achieve success in school. We value your input and active participation in your child's education. These letters are designed to help you understand the work your child brings home and the academic expectations of Arizona's College and Career Ready Standards. Your child is developing the necessary skills and knowledge to help them compute, think, and reason mathematically. This letter is about **probability of simple and compound events in seventh grade.**

End-of-year goals

Probability is introduced in seventh grade. Students will investigate chance processes and develop, use, and evaluate probability models. They will work with simple and compound events and apply their understanding of statistical measures to analyze the results.

Vocabulary

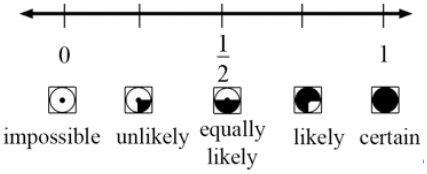
- probability: a measure of the likelihood of a random phenomenon or chance behavior
- event: a specific outcome or set of outcomes
- simple event: an event that results in just one outcome
- compound event: an event containing more than one outcome
- compatible events: two events that can occur at the same time
- incompatible events: two events that cannot occur at the same time
- independent event: the outcome or occurrence of the first event does not affect the outcome of the second event
- dependent event: the outcome or occurrence of the first event affects the outcome of the second event
- sample space: the set of all the possible outcomes/results of an event or experiment/simulation
- theoretical probability: the calculated probability; If every event is equally likely, the probability of an event is equal to the number of favorable outcomes, divided by the number of possible outcomes.

  $$P = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$
- experimental probability: the probability based on data collected in experiments/simulations

  $$P = \frac{\text{number of times the event occurred}}{\text{total number of outcomes}}$$

Probability

Probability can be expressed in terms of impossible, unlikely, likely, or certain or as a number between 0 and 1 as shown.



Students will solve problems that are simple events. This is an event that consists of a single outcome in the sample space. For example:

- There are 3 pink pencils, 2 blue pencils, and 1 green pencil. If one pencil is picked randomly, what is the theoretical probability it will be blue?
  - Find the total number of possible outcomes (3 + 2 + 1 = 6 pencils that could be chosen).
  - Find the number of specified outcomes (blue pencils = 2).
  - Find the theoretical probability. (2 out of 6 or 2:6 or $\frac{2}{6}=\frac{1}{3}$) This means that for every 6 times of selecting a pencil, one would expect 2 of those selections to be blue. That is the same as $\frac{1}{3}$ of the time.

If students actually performed this experiment (experimental probability), they might obtain different results. However after multiple trials, they would expect their results to come closer to the theoretical probability.

Students will learn that multiple trials of an experiment/simulation provide more consistent data. Students might perform probability experiments/simulations using common items such as spinners, dice, coins and cards.

Probability of compound events

Compound probability is the likeliness of two events occurring. The events can be dependent or independent.

- Example of dependent events: (The outcome of the first event affects the outcome of the second event.) If you draw a card from a deck and do not replace it, the set is changed for the next draw. The two events – drawing one card without replacing it, then drawing a second card – are dependent events.
- Example of independent events: (The outcome of the first event does not affect the outcome of the second event.) If you draw a card from the deck but replace it before you draw again, the two events are independent.

To find the sample space (all the possible outcomes), students could use an organized list, table, tree diagram, or simulation. For example, the table shows all the possible outcomes of one spin on each of the two spinners shown below.

Spinner A Spinner B

The theoretical probability of spinning black on Spinner A is $\frac{1}{4}$ (one black space out of 4 spaces) and $\frac{1}{3}$ on Spinner B. The theoretical probability of spinning black on both spinners is $\frac{1}{12}$ (one possibility out of 12 possible combinations). This can also be found by multiplying the probability of the first event by the probability of the second event ($\frac{1}{4} \bullet \frac{1}{3} = \frac{1}{12}$). These events are independent of each other because the color spun on Spinner A does not affect the color spun on Spinner B.

Spinner A	Spinner B
White	White
White	Light Grey
White	Black
Black	White
Black	Light Grey
Black	Black
Dark Grey	White
Dark Grey	Light Grey
Dark Grey	Black
Light Grey	White
Light Grey	Light Grey
Light Grey	Black

In the following example, the second event is dependent upon the first event. Allen pulls an ace from a deck of 52 regular playing cards. He does not replace the card in the deck before pulling another card. What is the probability of pulling a second ace from the deck?

First draw: $\frac{4}{52}$ (4 aces out of 52 cards) Second draw: $\frac{3}{51}$ (3 aces left out of 51 cards left to pull from)

The probability of the second event has changed because the ace was not replaced in the deck before the second draw.

How to help at home

- Encourage your child to identify real-world examples of probability, such as lottery odds and rolling a number on dice when playing a game. Help them to realize that understanding the probability of events can make them smart consumers and less vulnerable to false claims of "winning a prize" or "get rich quick" schemes.
- Watch these videos about probability from LearnZillion: http://learnzillion.com/lessonsets/88-understand-the-probability-of-chance-events
- Remember, making mistakes is a part of learning.