

Points of Emphasis in M113

In a typical instructional unit, students often focus their time on using probability in fabricated, artificial settings; for example, students may work to understand and analyze situations involving spinners, dice, and cards. By contrast, in this badge, students should be given opportunities to model and reason with probability in ways that are relevant to understanding and analyzing events and situations in the world. Students should come to see the ways that probability can help answer questions of interest, such as “What is the likelihood that a particular candidate will win an election?” or “How likely is it that there will be a recession next year?” In M113, students should:

- regularly encounter real-world tasks that require them to develop probability models and predict values (LP 1).
- engage with multiple parts of the modeling cycle (see above), especially naming their own assumptions and variables and defending their choice of model as much as possible (LP 1).
- be able to choose tasks that are organized around different scientific, social, or other topics, allowing students to have agency in their learning (LP 4).
- frequently collaborate and share their solution methods (LP 2).

In many typical courses, students are asked to treat probabilities procedurally, without full understanding of the real-world meaning of probabilities. Probabilities thus become mere symbols to manipulate. Spending time computing probabilities, with students being asked to simplify, compare, multiply, and add fractions, or to manually convert fractional probabilities to decimal representations, should not be a focus of this course. Instead, in M113, students should:

- regularly engage with tasks that do not require any computation, but instead focus on understanding and reasoning with models. For example, students should:
 - understand probabilities as the long-run relative frequency of an event;
 - relate probability models to simulations and chance experiments;
 - explain the real-world meaning of probabilities;
 - compare probabilities;
 - use a probabilistic model to justify a claim about a real-world context;
 - use probability to make decisions (LP 3).
- have opportunities to share their reasoning with partners or in groups, allowing for practice sharing, critiquing, and revising their arguments and including social interaction as part of the learning process (LP 2).

Instead of focusing only on the applications typically thought of as associated with probability (e.g., fabricated situations involving spinners, coins, or dice), students should also be given opportunities to understand and reflect on the ways that probabilistic modeling can authentically involve real-world situations (LP 6). Some contexts to consider include:

- meteorology;
- insurance and risk management;
- entrepreneurship and finance.

In this badge, students should be given frequent opportunities to use technology to simulate chance experiments to increase understanding (LP 7).