

Points of Emphasis in M100

The M100 badge ties together concepts from several different areas of mathematics, including fraction and decimal operations, measurement, proportional relationships, and quantitative data, in service of authentic problem-solving. Typical instruction in these areas might emphasize memorization of formulas or rules for computations, and focus time on students performing computations absent relevant or real-world contexts. However, M100 is most fundamentally about using mathematics to solve contextual problems, and as such, students should:

- regularly encounter real-world tasks that require them to make sense of situations and relate expressions, equations, and data displays back to the contexts they represent (LP 1).
- engage with aspects of the modeling cycle (see above), including identifying quantities of interest, representing situations with equations, expressions, and data displays, and choosing an appropriate level of accuracy when reporting quantities (LP 1).
- be able to choose tasks that are organized around different scientific, social, or other topics of interest, allowing students to have agency in their learning (LP 4).
- frequently collaborate and share their solution methods (LP 2).

Spending time manually computing and generating tables or graphs should not be a focus of this badge. In fact, the opposite is true. In M100, 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:
 - make sense of problem situations, discussing and identifying quantities of interest.
 - explain the real-world meaning of expressions, equations, formulas, and data displays, including the units, scales, variables, and parameters in the expressions.
 - compare two different representations of the same context.
 - use models to justify a claim about a real-world context (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).

Applications for M100 are plentiful, since fraction and decimal operations, data displays, measurement concepts, and proportional relationships appear frequently, not only in everyday life, but also in a variety of academic disciplines. Typical applications might include problems involving travel, design, and business. In M100, students should also be given opportunities to understand and reflect on the ways that these mathematical concepts and skills can lend themselves to meeting global economic, social, and environmental challenges (LP 6). Some contexts to consider include:

- climate change and other environmental concerns.
- disparate policy impacts on racial and gender identities.
- wealth inequality.
- equitable housing.

Students should be given frequent opportunities to use spreadsheets and graphing software to allow for a focus on understanding, rather than computation or symbolic manipulation. Students should write spreadsheet formulas to aid in solving design problems with area, surface area, and volume (LP 7).