

Points of Emphasis in M151

The study of geometric figures like cylinders, pyramids, and circles is often taught with an emphasis on memorization of the formulas for volume or area and performing computations with these formulas. In M151, students should instead:

- collaboratively explore geometric figures, with opportunities to discuss and gain deep understanding of formulas for volume and area (LP 2).
- regularly engage with tasks that do not require any computation, but instead focus on understanding and reasoning about geometric models (LP 2).
- explain formulas, developing logical justifications using different representations and modes of expression (LP 3).
- employ technology as a tool for viewing and understanding geometric figures, and also as a tool for computing (LP 7).

Furthermore, the study of geometric figures often involves a significant amount of work without context, as students apply formulas and perform computations without connection to the real world. Often, when problems are given in context, they center around a single computation and do not require the modeling cycle (see above). Instead, in M151, students should:

- 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).
- be able to make decisions and assumptions in developing their own models (LP 4).
- engage with models beyond mere computation, including
 - explaining assumptions that underlie a geometric model;
 - comparing two different geometric models;
 - critiquing and improving a geometric model;
 - using a geometric model to justify a claim about a real-world context (LP3).
- frequently collaborate and share models with each other (LP2).

Geometric models also present opportunities to understand and reflect on the ways that geometric modeling can authentically involve real-world situations (LP 6). Some contexts to consider include:

- the mathematics of congressional districts.
- product redesign.