

Assessable Learning Goals for the Mathematics Major

Like other academic disciplines, mathematics encompasses a mode of inquiry, a body of knowledge, and a functional role within the wider world. The mathematical mode of inquiry focuses on identifying axioms and analyzing their consequences using rigorous logic. Math's knowledge base includes arithmetic, geometry, algebra, analysis, and other tools developed across the world over the past several millennia and, at an accelerated pace, over the past century. This knowledge has contributed to many scientific, technological, philosophical, and artistic advances.

Although not all goals of the Carleton mathematics program are easily quantifiable, the Department of Mathematics and Statistics has catalogued five learning goals that can be measured. We offer examples --- not comprehensive, binding lists --- of possible methods for assessing them.

1. *Mathematics majors will be able to read and devise proofs.* We could assess this goal by examining written student work in Math 236, or by examining final projects in proof-heavy courses beyond Math 236, such as Abstract Algebra or Real Analysis.
2. *Mathematics majors will be able to describe a substantive application of mathematics to a real-world problem.* We could assess this goal using a questionnaire or interview, in which each student describes an application.
3. *Mathematics majors will be able to explain canonical concepts and solve representative problems in calculus and linear algebra.* We could assess this goal by studying student work on final exams in our Calculus and Linear Algebra courses, or by studying written work from later courses which rely heavily on this material, such as Ordinary Differential Equations or Advanced Linear Algebra.
4. *Mathematics majors will be able to communicate mathematics orally and in writing.* We could assess writing competence by examining written student work in Math 236, or by examining comps papers. We could use final comps talks to assess speaking competence.
5. *Mathematics majors will be able to use technology appropriately to explore and/or solve mathematical problems.* We could assess this goal by studying student projects and lab reports from courses, independent studies, research experiences, and comps experiences.

Assessment Plan

In the fall of each year we will choose one of the five goals for assessment. Within any ten-year period, we will assess each goal at least once. We will collect appropriate data during the academic year, and at either the last department meeting of the academic year or the department retreat the following fall we will discuss the data and formulate an appropriate response.