

STEPPINGSTONES TO HIGHER MATHEMATICS



A “No-Frills” School Mathematics Course of Studies

No tutors, no assignments, no exams, no time limits, no fees, no formal credit.

Cost: your time, your mental energy

Benefits: cognitive development, improved mathematical skills with enhanced analytical reasoning

This online mathematical program is a series of mathematical studies intended to take you along a pathway leading to higher mathematical thinking. Such a way of thinking is a complex process which takes time to assimilate and embed into one’s habits of mind. It has been described as follows:

"Developing mathematical thinking is about developing habits of mind: defining, systematizing, abstracting, making connections, developing new ways to describe situations and make predictions, creating, inventing, conjecturing, and experimenting (Cuoco et al., 1996)."

From [*The Journal of Mathematical Behavior* Volume 15, Issue 4, December 1996, Pages 375-402](#) *Habits of mind: An organizing principle for mathematics curricula* Al Cuoco, E. Paul Goldenberg, June Mark

Therefore, I would encourage you to regard this online mathematics program as a series of stepping stones along that pathway – one small step at a time.

This course is encapsulated into modules which are further subdivided into units. Collectively, they cover the topics contained in most junior- and senior-level mathematics courses in schools across the Province of Alberta. Some may even treat it as a preparatory-calculus course.

Each module is a DIY (do-it-yourself) project, constituting a self-study program. The contents include some explanations, relevant online tutorials, and an opportunity for AU students to practice their skills in understanding the concepts and the procedures for solving problems. The

latter option may require separate access to a third-party self-testing application, called Maple TA.

[To access the Maple TA assessment application, see the subscription form on the [MATH SITE](#). Please fill in your first and last names, a valid email address, AND your AU student ID number. Separate Maple TA access credentials will be emailed to you.] In addition, if you are ever asked to log in to a MATH CENTRE tutorial, use your AU student ID number and password.]

MODULE 1 NUMBER THEORY, PLANAR GEOMETRY, and ELEMENTARY ALGEBRA – the basics Steppingstones.Module1.pdf	MODULE 2 MATHEMATICAL MODELING with FUNCTIONS and RELATIONS Steppingstones.Module2.pdf
MODULE 3 POLYNOMIALS linked by the operation of addition and RATIONAL FUNCTIONS linked by the operation of division Steppingstones.Module3.pdf	MODULE 4 EXPONENTIAL and LOGARITHMIC FUNCTIONS – mirror images of one other Steppingstones.Module4.pdf
MODULE 5 TRIGONOMETRY – the GEOMETRY of ANGLES in the PLANE Steppingstones.Module5.pdf	MODULE 6 TRIGONOMETRIC FUNCTIONS and THEIR EQUATIONS– exemplars of periodic motion Steppingstones.Module6.pdf
MODULE 7 SOLVING SYSTEMS of LINEAR EQUATIONS Steppingstones.Module7.pdf	MODULE 8 THE CONIC SECTIONS – the TRACES of PLANES intersecting a CONE Steppingstones.Module8.pdf
MODULE 9 A DEEPER DIVE into the CONIC SECTIONS and Their Applications Steppingstones.Module9.pdf	MODULE 10 INTRODUCTION to PROBABILITY and STATISTICS Steppingstones.Module10.pdf

MODULE 11 The MATHEMATICS of CHOICE – INTRODUCING COMBINATORICS Steppingstones.Module11.pdf	MODULE 12 PATTERNS OF NUMBERS in a SEQUENCE and their SUMS Steppingstones.Module12.pdf
--	---

AU Math Centre

Academic Coordinator Dr. Julie Peschke
