

Preface

This book is intended to serve the many mathematics instructors who desire more enjoyment and engagement in their classes, whether for a class with skeptical non-math majors, or a proof-based course for math majors, or undergraduate research projects. In other words, it serves any instructor of college-level mathematics who wants to add a bit of fun to their curriculum. The chapters of this volume showcase a variety of games, from the familiar tic-tac-toe to student-designed games, as aids for teaching mathematics.

It is not a new idea to consider connections between mathematics and games. We could look far back in history. For example, Archimedes invented a mathematical game similar to tangrams. Or we could consider games providing continued, fruitful investigation, such as chess. The card game SET is a current favorite of mathematicians (and has a chapter in this book). There is a natural affinity between mathematicians and games or puzzles.

Games allow for investigations of patterns and student conjectures, fostering a sense of ownership of the mathematics, and can be used to practice and thoroughly learn difficult topics. While games have been more widely accepted and employed in mathematics classrooms at the elementary and middle school levels, they are a relatively untapped resource at the collegiate level. This book aims to inspire instructors in higher education, although some chapters also apply to K-12 mathematics.

Each chapter of this book provides an opportunity to engage students in ways supported by the Mathematical Association of America's Instructional Practices Guide (MAA IP Guide, freely downloadable on the MAA website). Many activities foster collaborative learning and help build a classroom community (IP.CP.1.1 and IP.CP.1.5). Learning mathematics through board or card games challenges students' innate ideas about the subject, as it is often seen as dry or formulaic. Games allow students to be creative in their applications of mathematics and challenge them to be persistent in problem solving (IP.CP.1.7). All of the chapters naturally offer inquiry-based or active learning opportunities (IP.CP.1.8).

The primary goal of *Teaching Mathematics Through Games* is to inspire instructors of mathematics as well as present the tools necessary for them to incorporate games into their classrooms. Various levels of college mathematics are included, from quantitative literacy to proof-based mathematics. The type of game also varies, although most chapters use board or card games. Some chapter activities are short term, such as a drop-in lesson for a day, and some are longer, including semester-long projects. A "road-map" follows this preface to make it easier to identify which chapters may be of the most interest given your needs.

Each chapter will typically include the following:

- A brief introduction providing an overview of the chapter.
- A background section describing the game-related idea and the context in which it has been, or could be, used.
- A description/implementation section outlining details that allow for easy replication of the teaching method.
- A conclusions section summarizing the chapter and/or suggesting additional directions to explore.

You could use this book as a starting or an ending point. In reading the chapters, you might be inspired to expand upon an idea by using a different game or applying the given game in a new way. Some chapters include ideas for extensions, pointing you in a direction of additional exploration. On the other hand, the chapters are intended to allow for easy adoption of materials with as little work as possible required by an instructor. To this purpose, the book is accompanied by downloadable supplementary materials for some chapters. These files can be found at the AMS bookstore webpage (<https://bookstore.ams.org/c1rm-65/>) which includes a link to “Supplementary Materials.”

I hope that you and your students enjoy “gamifying” mathematics!

Mindy Capaldi
Editor