**Curriculum Materials Review**
**Delaware Mathematics Coalition**

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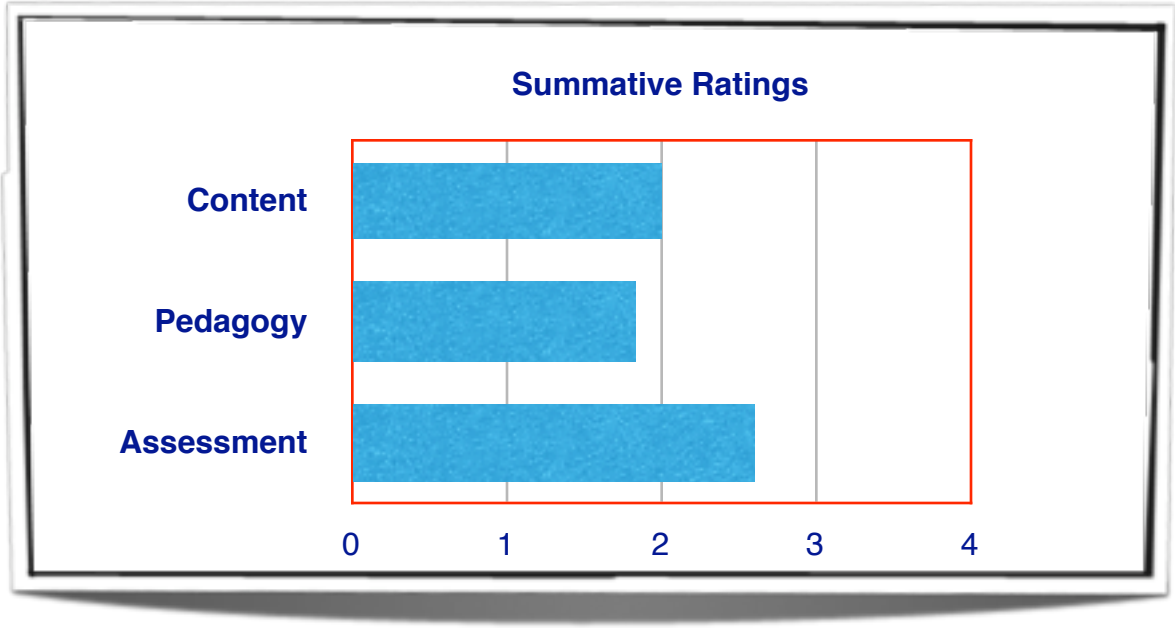
| Name: | *Discovering Algebra: An Investigative Approach* |
| Authors: | Murdock, Kamischke & Kamischke |
| Publisher: | Key Curriculum Press |
| Copyright: | 2nd Edition, 2007 |




☑ Not recommended
☐ Recommended

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| **Rationale** | *Discovering Algebra: An Investigative Approach* was judged to be lots of thunder and little lightening. This was particularly disappointing to our committee since its predecessor from Key Curriculum Press, Michael Serra's *Discovering Geometry*, has many fans among high school teachers and had heightened hopes for an innovative, truly investigative approach to algebra learning. This text, on the other hand, was clearly not written by Michael Serra and failed to live up to the standard for "discovery learning" he set. To its credit, *Discovering Algebra* includes many real-world contexts to motivate learning of the mathematics. Unfortunately, many of these contexts are either ill-chosen or, more frequently, not utilized as completely or as powerfully as they might have been used. There was seldom a unifying example and, instead, the cavalcade of contexts presented was experienced by our reviewers as more often confusing than useful. We also drew the conclusion that there tended to be far too much telling in this text and little opportunity for genuine "discovery." This was particularly disheartening to committee members given the claims implied by the title of the text and the high bar set years ago by *Discovering Geometry*. |

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| **Content** | *Discovering Algebra* does attempt to exploit a range of real-world **contexts** but there was a consensus among the reviewers that this often seemed to be variety for variety's sake rather than as an optimal way to advance the learning of the mathematics. There was seldom a "unifying context" nor were the contexts particularly "familiar to the intended audience." As one reviewer put it, "because of the number of contexts used, the mathematics becomes lost" and went on to explain that "the mathematics jumps too quickly rather than building in such a way that allows sense-making for the students." This "little bit of everything" approach to the mathematical content seemed to have the effect of "obscuring" rather than clarifying often laudable learning goals and also seemed to result in a step-by-step procedural approach to learning rather than a scaffolding of conceptual understanding. Explained one reviewer, "there was a little of everything in each lesson to the point of being distracting for both the student and the teacher." Some members of the panel felt that these materials might make a better reference book than a student text. Technology is utilized in dynamic ways and this was seen as a major strength of the *Discovering Algebra* materials. |
| **Pedagogy** | Despite its title, there is not likely to be, in the estimation of our panel, a lot of "discovering" on the part of the learner. Because most or all of the "investigations" are heavily scaffolded, our reviewers felt that this might well communicate to students using this text a lack of faith in their ability to actually solve the problems on their own. These materials do not seem likely to promote genuine collaboration and communication among students**: "**even the discovering portion has been proceduralized in such a way that the rich conversations that one would hope for will probably not occur." As another reviewer put it, "there were some promising opportunities for exploration, however, the text did not allow for exploration but rather chose to just tell students the next step or the appropriate rule to apply." Furthermore, in the opinion of our panel, this text does not present many thought-provoking questions and "students are not asked to be reflective in their learning." One possible result is that "students will need quite a bit of teacher intervention." As another reviewer commented, "there is no access point for students to attach and connect to." |
| **Assessment** | Panelists felt the quizzes for the unit were rich, required reasoning, and provided opportunities for students to explain their thinking. According to one panelist "as pleasing as the quizzes are, the chapter test is that displeasing… The chapter test is entirely too short to fully show student understanding of the material covered in this unit. Some questions are directly pulled from the quizzes as well, so students could simply memorize answers from quizzes and replicate them on the test. Finally, the chapter test needs more variety in the type of questions." The unit also includes a "constructive assessment" option which included a variety of nice alternative assessments. |

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| **Support** | The *Discovering Algebra* series features a range of support materials including a guide for parents, technology masters, practice masters, and condensed lessons. While the name implies that is it investigative in nature, the teacher notes call for minimal time for both the investigation and summarizing portions of the lesson. Notes related to "guiding the investigation" appear throughout the text, as do suggestions for what to do while visiting groups (sharing ideas and assessing progress). Panelists felt that the "investigation" was more of a guided step-by-step approach and that most of the lesson was illustrated with examples that presumably the teacher would show or students would work through and copy into their notebooks. In the closing of the lesson, teachers are prompted as to what to say about the important ideas, but the notes are generally vague and ambiguous (e.g. "Briefly say something about each new mathematical idea"). Teacher resources include answers to suggested problems, however panelists found little or no evidence that students are expected to have a diverse set of strategies for finding the solutions.<br><br>The authors do make suggestions for problems that can be used for journal prompts and portfolio entries. A nice "assessing what you have learned" segment is included at the end of each unit. It includes prompts related to updating one's portfolio, writing in a journal, and giving a presentation. This does provide some opportunities for students to be meta-cognitive about their learning. For example, in selecting a piece of work for the portfolio, students are prompted to describe the objective, the result, and what they might have done differently. |
| **Organization** | The organization of *Discovering Algebra* contains a few welcome surprises but typically disappoints in the end. So, for example, the text begins with a chapter on Data Exploration but then lapses into a chapter which is essentially a review of proportional reasoning and subsequently launches into three chapters on lines and linear functions. The second of these, Fitting a Line to Data, seems to break the mold of the traditional text but, ultimately, appears to be an elaborate introduction to estimating the equation of a line using two points. Linear regression, per se, is never addressed despite many opportunities to do so. To the authors' credit, Exponents and Exponential Models is included in *Discovering Algebra* right after the chapters on linear functions but then, we find, the modeling does not actually occur until the final two sections of that chapter. Once again, the emphasis seems to be on learning rules and then, much later, applying these rules. So, despite the title of the book and series, this text would seem to subscribe to the "manipulate first, model later" philosophy of mathematics teaching. |