A Correlation of

Thinking Mathematically
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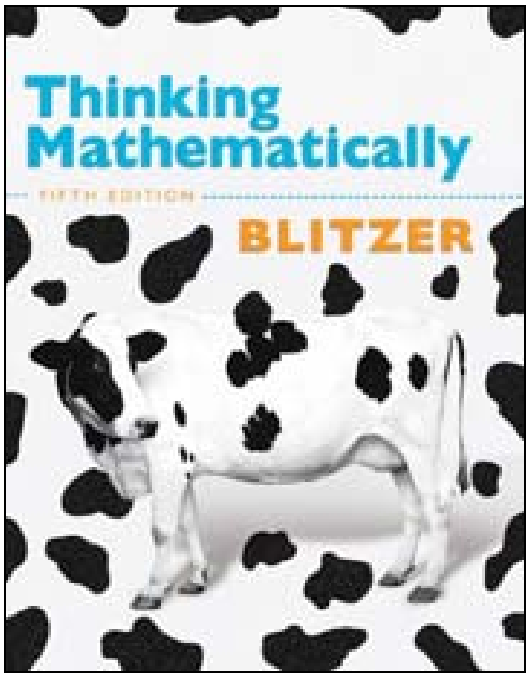

To the

Virginia Standards of Learning for Discrete Math

February 2009

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Introduction

The following correlation demonstrates the alignment of content between ***Thinking Mathematically*** and the Virginia Standards of Learning for Discrete Math. This document contains references from the Annotated Instructor's Edition as well as the Student Edition.

Thinking Mathematically is a program developed to motivate students from diverse majors and backgrounds by presenting math in the context of real-world applications. Additionally, ***Thinking Mathematically*** is built to support students' success every step of the way. Helpful features include the following:

- **Clearly stated section objectives** help students recognize and focus on the most important ideas. Objectives are restated in the margin when the concept appears in the text.
- **Worked-out, annotated examples** are written clearly and provide step-by-step solutions to help students work through "sticking points" that can cause frustration. Conversational annotations help students understand the solutions by providing the reasoning behind the mathematics.
- **Voice balloons** translate mathematical language into plain English, clarifying problem-solving procedures, presenting alternative ways of understanding, and connecting complex problems to the basic concepts students have already learned.
- **Check Points** follow each worked example with a similar problem so students have an opportunity to immediately test comprehension through additional practice. The answers to the Check Points are provided in the answer section.
- **Study Tip** boxes offer suggestions for problem solving, point out common errors to avoid, and provide informal hints and suggestions. By seeing common mistakes, students learn to avoid them.

Through the instructor's access code, students using ***Thinking Mathematically*** also have access to MyMathLab, Pearson's powerful personalized online learning environment for students who seek additional support. MyMathLab offers a variety of resources, including multimedia and tutorial practice that helps students measure their own progress.

This document demonstrates the high degree of success students will achieve by using ***Thinking Mathematically*.**

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Discrete Mathematics	
The following standards outline the content of a one-year course in Discrete Mathematics. If a one-semester course is desired, the standards with an asterisk (*) would apply. Students enrolled in Discrete Mathematics are assumed to have mastered the concepts outlined in the Standards of Learning for Algebra II. Discrete mathematics may be described as the study of mathematical properties of sets and systems that have a countable (discrete) number of elements. With the advent of modern technology, discrete (discontinuous) models have become as important as continuous models. In this course, the main focus is problem solving in a discrete setting. Techniques that are not considered in the current traditional courses of algebra, geometry, and calculus will be utilized. As students solve problems, they will analyze and determine whether or not a solution exists (existence problems), investigate how many solutions exist (counting problems), and focus on finding the best solution (optimization problems). Connections will be made to other disciplines. The importance of discrete mathematics has been influenced by computers. Modern technology (graphing calculators and/or computers) will be an integral component of this course.	
*DM.1 The student will model problems, using vertex-edge graphs. The concepts of valence, connectedness, paths, planarity, and directed graphs will be investigated. Adjacency matrices and matrix operations will be used to solve problems (e.g., food chains, number of paths).	**SE/AIE:** 585-586, 821-824, 830-831, 842-846, 852-856
*DM.2 The student will solve problems through investigation and application of circuits, cycles, Euler Paths, Euler Circuits, Hamilton Paths, and Hamilton Circuits. Optimal solutions will be sought using existing algorithms and student-created algorithms.	**SE/AIE:** 830-833, 842-845, 848
*DM.3 The student will apply graphs to conflict-resolution problems, such as map coloring, scheduling, matching, and optimization. Graph coloring and chromatic number will be used.	**SE/AIE:** 589, 822-823, 825-827, 831-835, 842-845
*DM.4 The student will apply algorithms, such as Kruskal's, Prim's, or Dijkstra's, relating to trees, networks, and paths. Appropriate technology will be used to determine the number of possible solutions and generate solutions when a feasible number exists.	**SE/AIE:** 826, 830-833, 835-837, 842-845, 850-853, 855-856
*DM.5 The student will use algorithms to schedule tasks in order to determine a minimum project time. The algorithms will include critical path analysis, the list-processing algorithm, and student-created algorithms.	**SE/AIE:** 604-605, 830-834, 842-845

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*DM.6 The student will solve linear programming problems. Appropriate technology will be used to facilitate the use of matrices, graphing techniques, and the Simplex method of determining solutions.	**SE/AIE:** 370-374, 383-387, 408-411, 416-420
DM.7 The student will analyze and describe the issue of fair division (e.g., cake cutting, estate division). Algorithms for continuous and discrete cases will be applied.	**SE/AIE:** 791-792, 794-798
DM.8 The student will investigate and describe weighted voting and the results of various election methods. These may include approval and preference voting as well as plurality, majority, run-off, sequential run-off, Borda count, and Condorcet winners.	**SE/AIE:** 768- 773, 775-776, 780-783, 801
DM.9 The student will identify apportionment inconsistencies that apply to issues such as salary caps in sports and allocation of representatives to Congress. Historical and current methods will be compared.	**SE/AIE:** 791-793, 796-798, 800-801
DM.10 The student will use the recursive process and difference equations with the aid of appropriate technology to generate	
a) compound interest;	**SE/AIE:** 460-462, 464-465, 469-470, 496
b) sequences and series;	**SE/AIE:** 292-294, 296-298
c) fractals;	**SE/AIE:** 590-591
d) population growth models; and	**SE/AIE:** 298, 422-425, 450
e) the Fibonacci sequence.	**SE/AIE:** 5-6, 293, 301
DM.11 The student will describe and apply sorting algorithms and coding algorithms used in sorting, processing, and communicating information. These will include	
a) bubble sort, merge sort, and network sort; and	**SE/AIE:** 602-603, 605-606
b) ISBN, UPC, zip, and banking codes.	**SE/AIE:** 210, 763
DM.12 The student will select, justify, and apply an appropriate technique to solve a logic problem. Techniques will include Venn diagrams, truth tables, and matrices.	**SE/AIE:** 65-69, 71-72, 82, 104-105, 158-161

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DM.13 The student will apply the formulas of combinatorics in the areas of	
a) the Fundamental (Basic) Counting Principle;	**SE/AIE:** 602-605
b) knapsack and bin-packing problems;	**SE/AIE:** 415-420
c) permutations and combinations; and	**SE/AIE:** 608-611, 615-619
d) the pigeonhole principle.	**SE/AIE:** 630-634