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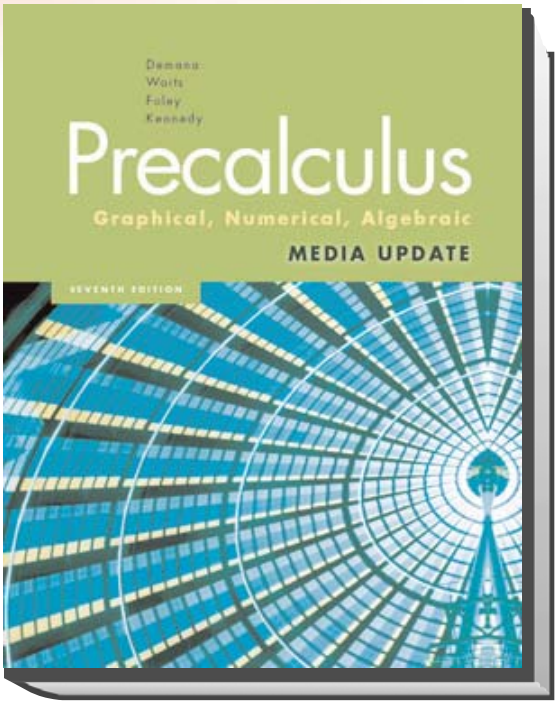

CORRELATED TO

Indiana Math Standards Final Draft from March 2009

Precalculus

PEARSON

TEACH & LEARN • ASSESS & INFORM • DEVELOP & LEAD

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Correlated to:
Indiana's Academic Standards - Mathematics - Precalculus

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PRE-CALCULUS	
Standard 1 Relations and Functions	
PC.1.1 Use paper and pencil methods and technology to graph polynomial, absolute value, rational, algebraic, exponential, logarithmic, trigonometric, inverse trigonometric and piecewise-defined functions, use these graphs to solve problems, and translate among verbal, tabular, graphical, and symbolic representations of functions using technology as appropriate.	**SE/TE: 87-105, 142-143, 147-149, 165-167, 179-180, 182-183, 200-204, 209-211, 240-247, 269-274, 279-284, 286-289, 344-347, 385-404, 439-441**
PC.1.2 Identify domain, range, intercepts, zeros, asymptotes, and points of discontinuity of functions represented symbolically or graphically, using technology as appropriate.	**SE/TE: 88-105, 165-166**
PC.1.3 Solve word problems that can be modeled using functions and equations.	**SE/TE: 151-167**
PC.1.4 Recognize and describe continuity, end behavior, asymptotes, symmetry, and limits and connect these concepts to graphs of functions.	**SE/TE: 90-105, 165-166**
PC.1.5 Find, interpret, and graph the sum, difference, product, and quotient (when it exists) of two functions, indicating the relevant domain and range of the resulting function.	**SE/TE: 117-126, 165-166**
PC.1.6 Find the composition of two functions, and determine the domain and the range of the composite function. Conversely, given a function, find two other functions the composition of which is the given one.	**SE/TE: 117-126, 165-166**
PC.1.7 Define and find inverse functions, their domains and ranges, and verify whether two given functions are inverses of each other, symbolically and graphically.	**SE/TE: 131-137, 165-166**
PC.1.8 Apply transformations to functions and interpret the results of these transformations verbally, graphically, and numerically.	**SE/TE: 138-150, 165-166**
Standard 2 Conics	
PC.2.1 Derive equations for conic sections and use the equations that have been found.	**SE/TE: 636-637, 641-647, 653-659, 663-665, 696-697**
PC.2.2 Graph conic sections with axes of symmetry parallel to the coordinate axes by hand, by completing the square, and find the foci, center, asymptotes, eccentricity, axes, and vertices (as appropriate).	**SE/TE: 638-639, 641-642, 646-647, 653-654, 657-659, 663-664, 696-697**
Standard 3 Logarithmic and Exponential Functions	
PC.3.1 Compare and contrast $y = e$ with other exponential functions, symbolically and graphically.	**SE/TE: 280-289, 345-346**

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PC.3.2 Define the logarithmic function g(x) = *log$_a$ x* as the inverse of the exponential function *f(x) = a^x*. Apply the inverse relationship between exponential and logarithmic functions and the laws of logarithms to solve problems.	**SE/TE: 300-304, 308-314, 317-319, 345-346**
PC.3.3 Analyze, describe, and sketch graphs of logarithmic and exponential functions by examining intercepts, zeros, domain and range, and asymptotic and end behavior.	**SE/TE: 305-306, 308-309, 313-314, 317-319, 344-347**
PC.3.4 Solve problems that can be modeled using logarithmic and exponential functions. Interpret the solutions, and determine whether the solutions are reasonable.	**SE/TE: 323-333, 344-347**
Standard 4 Trigonometry	
PC.4.1 Define and use the trigonometric ratios *cotangent, secant,* and *cosecant* in terms of angles of right triangles.	**SE/TE: 360-363, 366-369, 439-441**
PC.4.2 Model and solve problems involving triangles using trigonometric ratios.	**SE/TE: 425-441**
PC.4.3 Develop and use the laws of sines and cosines to solve problems.	**SE/TE: 478-499**
PC.4.4 Define sine and cosine using the unit circle.	**SE/TE: 378-383, 439-441**
PC.4.5 Develop and use radian measures of angles, measure angles in degrees and radians, and convert between degree and radian measures.	**SE/TE: 352-359, 439-441**
PC.4.6 Deduce geometrically and use the value of the sine, cosine, and tangent functions at ,0 $\pi/6$, $\pi/4$, $\pi/3$ and $\pi/2$, radians and their multiples.	**SE/TE: 360-364, 366-369, 439-441**
PC.4.7 Make connections between right triangle ratios, trigonometric functions, and the coordinate function on the unit circle.	**SE/TE: 360-364, 366-369, 377-378, 439-441**
PC.4.8 Analyze and graph trigonometric functions, including the translation of these trigonometric functions. Describe their characteristics (spread, amplitude, zeros, symmetry, phase, shift, vertical shift, frequency).	**SE/TE: 385-395, 439-441**
PC.4.9 Define, analyze and graph inverse trigonometric functions and find the values of inverse trigonometric functions.	**SE/TE: 397-404, 439-441**
PC.4.10 Solve problems that can be modeled using trigonometric functions, interpret the solutions, and determine whether the solutions are reasonable.	**SE/TE: 425-441**

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PC.4.11 Derive the fundamental Pythagorean trigonometric identities, sum and difference identities, half-angle and double-angle identities and the secant, cosecant, and cotangent functions and use these identities to verify other identities and simplify trigonometric expressions.	**SE/TE: 445-448, 451-477, 497-499**
PC.4.12 Solve trigonometric equations and interpret solutions graphically.	**SE/TE: 450-454, 497-499**
Standard 5 Polar Coordinates and Complex Numbers	
PC.5.1 Define and use polar coordinates and relate polar coordinates to Cartesian coordinates.	**SE/TE: 534-540. 562-564**
PC.5.2 Represent equations given in Cartesian coordinates in terms of polar coordinates.	**SE/TE: 535-540, 562-564**
PC.5.3 Graph equations in the polar coordinate plane.	**SE/TE: 541-549, 562-564**
PC.5.4 Define complex numbers, convert complex numbers to polar form, and multiply complex numbers in polar form. PC.5.5 Prove and use De Moivre's Theorem.	**SE/TE: 550-564**
Standard 6 Sequences and Series	
PC.6.1 Define arithmetic and geometric sequences and series.	**SE/TE: 734-741, 746-751, 786-789**
PC.6.2 Derive and use formulas for finding the general term for arithmetic and geometric sequences.	**SE/TE: 734-741, 786-789**
PC 6.3 Develop, prove and use sum formulas for arithmetic series and for finite and infinite geometric series.	**SE/TE: 746-751, 786-789**
PC.6.4 Generate a sequence using recursion.	**SE/TE: 713, 736-741, 786-789**
PC.6.5 Describe the concept of the limit of a sequence and a limit of a function. Decide whether simple sequences converge or diverge, and recognize an infinite series as the limit of a sequence of partial sums.	**SE/TE: 747-751, 786-789**
PC.6.6 Model and solve word problems involving applications of sequences and series, interpret the solutions and determine whether the solutions are reasonable.	**SE/TE: 738-741, 750-751**
PC.6.7 Derive the binomial theorem by combinatorics.	**SE/TE: 714-717, 786-789**
Standard 7 Vectors and Parametric Equations	
PC.7.1 Define vectors as objects having magnitude and direction and represent vectors geometrically.	**SE/TE: 502-513, 562-564**
PC.7.2 Use parametric equations to represent situations involving motion in the plane.	**SE/TE: 522-533, 562-564**

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PC.7.3 Convert between a pair of parametric equations and an equation in x and y	**SE/TE: 535-540, 562-564**
PC.7.4 Analyze planar curves, including those given in parametric form.	**SE/TE: 542-549, 562-564**
PC.7.5 Model and solve problems using parametric equations.	**SE/TE: 522-533, 562-564**
Standard 8 Data Analysis	
PC.8.1 Use linear models using the median fit and least squares regression methods. Decide which among several linear models gives a better fit. Interpret the slope in terms of the original context	**SE/TE: 171-187, 269-271**
PC.8.2 Calculate and interpret the correlation coefficient. Use the correlation coefficient and residuals to evaluate a "best-fit" line.	**SE/TE: 158-167, 174**
Process Standards	
Problem Solving	
• Build new mathematical knowledge through problem solving.	**SE/TE: 76-85, 165-167**
• Solve problems that arise in mathematics and in other contexts.	**SE/TE: 76-85, 165-167**
• Apply and adapt a variety of appropriate strategies to solve problems.	**SE/TE: 76-85, 165-167**
• Monitor and reflect on the process of mathematical problem solving.	**SE/TE: 76-85, 165-167**
Reasoning and Proof	
• Recognize reasoning and proof as fundamental aspects of mathematics.	**SE/TE: 79-85, 165-167**
• Make and investigate mathematical conjectures.	**SE/TE: 79-85, 165-167**
• Develop and evaluate mathematical arguments and proofs.	**SE/TE: 79-85, 165-167**
• Select and use various types of reasoning and methods of proof.	**SE/TE: 79-85, 165-167**
Communication	
• Organize and consolidate their mathematical thinking through communication.	**SE/TE: 79-85, 165-167**
• Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.	**All Writing to Learn exercises, for example: pages 227, 266, 267, 625. These appear throughout the book. The book also embraces a problem-solving process (pages 76-77) that goes well beyond the mere "finding" of the answer. The proper uses of algebraic, numeric, and graphical analysis are constantly referenced, and the importance of proof (pages 79-80) is underscored from the outset.**

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• Analyze and evaluate the mathematical thinking and strategies of others.	**SE/TE: 76-85, 165-167**
• Use the language of mathematics to express mathematical ideas precisely.	**SE/TE: 513 Exs. 61, 62** **521 Exs. 57-60** **Proof exercises meets this appear throughout the book. The book is also careful to model this kind of communication about mathematical language where appropriate. For example, consider the paragraph about two meanings of "+" at the bottom of page 117 and the paragraph about four meanings of "=" on page 444.**
Connections	
• Recognize and use connections among mathematical ideas.	**SE/TE: 76-85, 165-167**
• Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	**SE/TE: 476 Exs. 53, 54** **495 Exs. 43, 44** **533 Exs. 71, 72** **All the language and tools of function analysis are introduced in the first chapter and applied to the "basic" functions around which the remainder of the book is built. This was a deliberate pedagogical choice to keep the course from resembling (as many precalculus courses do) a disjoint series of algebraic techniques.**
• Recognize and apply mathematics in contexts outside of mathematics.	**SE/TE: 425-437, 439-441**
Representation	
• Create and use representations to organize, record, and communicate mathematical ideas.	**SE/TE: 759-770, 786-789**
• Select, apply, and translate among mathematical representations to solve problems.	**SE/TE: 759-770, 786-789**
• Use representations to model and interpret physical, social, and mathematical phenomena.	**SE/TE: 759-770, 786-789**
Estimation and Mental Computation	
• Know and apply appropriate methods for estimating the results of computations.	**Most of these methods are learned in earlier courses, but we extend them to new areas (e.g., end behavior of functions, asymptotes, the early introduction of limit notation, regression analysis) as they arise.**

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• Use estimation to decide whether answers are reasonable.	**The book emphasizes looking at a problem in a variety of ways (pages 76-78) to support or confirm solutions. The book also shows how calculators can mislead someone who does not think about the reasonableness of answers (examples: pages 78—79, 363—364).**
• Decide when estimation is an appropriate strategy for solving a problem.	**This book has deliberately put data problems in almost every section and exercise set in order to show how function models can be used to approximate real-world behavior. The power and the limitations of this strategy are continually analyzed.**
• Determine appropriate accuracy and precision of measurement in problem situations.	**SE/TE 365 (A Word about Rounding Answers) Also the paragraph following Example 6 on page 156 about the limitations of data-based models.**
• Use properties of numbers and operations to perform mental computation.	**While the book encourages the use of calculator technology to solve most applied problems, the basic exercises through which students learn function behavior (e.g., page 308, page 381) are done with mental computation. The authors are prescriptive about this when they feel it is necessary.**
• Recognize when the numbers involved in a computation allow for a mental computation strategy.	**The book attempts to instill this recognition throughout (e.g. see pages 415—418), but it is really up to the teacher to see how students approach problems when they have the freedom to choose a strategy.**
Technology	
• Technology should be used as a tool in mathematics education to support and extend the mathematics curriculum.	**SE/TE: 75-76, 78-85, 165-167**
• Technology can contribute to concept development, simulation, representation, communication, and problem solving.	**SE/TE: 75-76, 78-85, 165-167**
• The challenge is to ensure that technology supports-but is not a substitute for- the development of skills with basic operations, quantitative reasoning, and problem-solving skills.	**Graphing technology is used as a tool for mathematical discovery and effective problem solving throughout the book. For example, SE/TE xvii Also note the careful analysis of problem-solving (pages 76—80), which is frequently referenced throughout the book. In Exercises, the authors (who are well aware of how calculators can compromise the intended learning experience) are more prescriptive than most books (for example, see page 497).**

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o Graphing calculators should be used to enhance middle school and high school students' understanding and skills.	**Throughout the text the authors balance algebraic, numerical, graphical, and verbal methods of representing problems. Students will obtain solutions algebraically when that is the most appropriate technique to use and will obtain solutions graphically or numerically when algebra is difficult to use. The authors are uncompromising in their support of graphing calculators to enhance student learning. For example, the calculators enable the exploration of the Twelve Basic Functions that begin the course.**
o The focus must be on learning mathematics, using technology as a tool rather than as an end in itself.	**Throughout the book, students solve problems by one method and then support or confirm their solutions by using another method. Students learn to choose the one most appropriate for solving the particular problem under consideration. This book has been the best exemplar of this philosophy for many years. While technology tips are given (usually in margin notes) where appropriate, the narrative is about the mathematics and how it can be explored through the technology. We never allow the mathematics to be obscured by keystrokes or calculator tricks.**