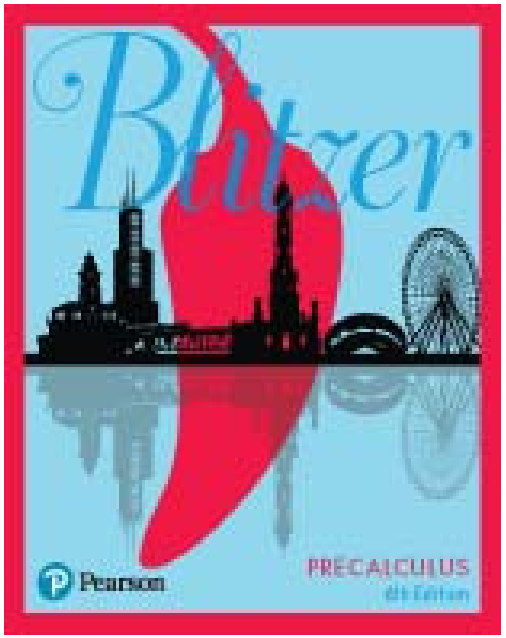
SAVVAS

A Correlation of

Precalculus

©2015, 6th Edition, Blitzer



to the

West Virginia Evaluation Criteria

Mathematics – 3064 – CCR Trigonometry/Pre-Calculus

A Correlation of Precalculus 6th Edition, ©2018
to the West Virginia **Evaluation Criteria**
Mathematics – 3064 - Trigonometry/Pre-Calculus

PUBLISHER:	Pearson Education Inc., publishing as Prentice Hall and Scott Foresman		
SUBJECT:	Mathematics	**SPECIFIC GRADE:**	Trigonometry/Pre-calculus
COURSE:	Mathematics – 3064 – CCR Trigonometry/Pre-Calculus	**TITLE**	Precalculus 6th Edition
COPYRIGHT:	2018		
SE ISBN:	9780134615752	**TE ISBN:**	9780134470078

A Correlation of Precalculus 6th Edition, ©2018
to the West Virginia **Evaluation Criteria**
Mathematics – 3064 - Trigonometry/Pre-Calculus

Table of Contents

NON-NEGOTIBLE EVALUATION CRITERIA 1

GENERAL EVALUATION CRITERIA 3

SPECIFIC EVALUATION CRITERIA 22

A Correlation of Precalculus 6th Edition, ©2018
to the West Virginia Evaluation Criteria
Group VI Mathematics Trigonometry/Pre-Calculus

NON-NEGOTIBLE EVALUATION CRITERIA
2018-2024
Group VI – Mathematics
High School Math IV – Trigonometry/Pre-calculus

Equity, Accessibility and Format				
Yes	No	N/A	CRITERIA	NOTES
X			**1. INTER-ETHNIC** The **instructional** materials meets the requirements of inter-ethnic: concepts, content and illustrations, as set by WV Board of Education Policy (Adopted December 1970).	The Pearson textbook, *Precalculus (Blitzer 6E)* adheres to the mandates of the inter-ethnic policy with the inclusion of concepts and content that embrace students' common interests while at the same time recognize the contributions of different ethnic groups to American culture and heritage and to the advancement of mathematics and science. The review exercises in the opening chapter of the textbook include a data table displaying information about ethnic and racial diversity in the United States.
X			**2. EQUAL OPPORTUNITY** The instructional material meets the requirements of equal opportunity: concepts, content, illustration, heritage, roles contributions, experiences and achievements of males and females in American and other cultures, as set by WV Board of Education Policy (Adopted May 1975).	The Pearson *Precalculus (Blitzer 6E)* textbook promotes equal opportunities for male and female students, as well as students who do not identify with a particular gender and students of both genders with different cultural backgrounds, by providing both examples that are not gender-specific and also examples that are balanced in their inclusion of men and women. One data table accompanying a word problem displays a breakdown by gender of various careers in the United States.

SE = Student Edition TE = Teacher's Edition

A Correlation of Precalculus 6th Edition, ©2018
to the West Virginia Evaluation Criteria
Group VI Mathematics Trigonometry/Pre-Calculus

Equity, Accessibility and Format				
Yes	No	N/A	CRITERIA	NOTES
X			**3. FORMAT** This resource is available as an option for adoption in an interactive electronic format.	The Pearson textbook, *Precalculus (Blitzer 6E)* is available both in print and also as an e-text. Additionally, the textbook is accessible through MyMathLab, a Pearson online site that includes a host of ancillary materials, including video lectures, animations, tutorials, and options for electronic communication between students and their classmates and among students. MyMathLab also contains course management software, so that the teacher is able to enter data in a Gradebook, post announcements to the class electronically, and assign homework and assessments.
X			**4. BIAS** The instructional material is free of political bias.	The instructional material consists of an integration of mathematical content and practices, including contextual and cross-curricular applications that is free from political bias. Students are given opportunities to explore and express their own interests and perspectives in math and science and their applications, with biographical and historical notes that might inspire some students to pursue a career in a related field. Throughout the program, mathematics is applied in a wide variety of real-world situations, but there is no political commentary or philosophical bias embedded in the program content or presentation.

GENERAL EVALUATION CRITERIA
2018-2024
Group VI – Mathematics
High School Math IV – Trigonometry/Pre-calculus

The general evaluation criteria apply to each grade level and are to be evaluated for each grade level unless otherwise specified. These criteria consist of information critical to the development of all grade levels. In reading the general evaluation criteria and subsequent specific grade level criteria, **e.g. means "examples of" and i.e. means that "each of" those items must be addressed**. Eighty percent of the general and eighty percent of the specific criteria must be met with I (in-depth) or A (adequate) in order to be recommended.

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
	In addition to alignment of Content Standards, materials must also clearly connect to Learning for the 21st Century which includes opportunities for students to develop:							
Communication and Reasoning								
For student mastery of College- and Career-Readiness Standards, the instructional materials will include multiple strategies that provide students opportunities to:								
Precalculus students using the Pearson textbook connect tables, equations, graphs, and verbal descriptions of functions as they define functions, translate between the different representations of functions, and solve equations to find intercepts and solutions to related word problems. They explore relationships between quantities represented in linear, exponential, logarithmic, quadratic, and trigonometric equations as well as the correspondence between the different representations of the transformed functions and their properties.	1. Explain the correspondence between equations, verbal descriptions, tables, and graphs.							

SE = Student Edition TE = Teacher's Edition

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Precalculus students using the Pearson textbook make conjectures about formulas, patterns, and trigonometric identities and apply logical reasoning to explore the validity and truth of those conjectures. For example, students use Mathematical Induction to prove conjectures about partial sums of arithmetic and other sequences.	2. Make conjectures and build a logical progression of statements to explore the truth of their conjectures.							
Precalculus students using the Pearson textbook distinguish correct reasoning from flawed logic as they explore function graphing anomalies and recognize calculator data entry errors. Critical Thinking Exercises ask students to determine whether or not a statement "makes sense," and then to explain their reasoning. A Group Exercise asks students to examine a list of ten common errors involving algebra, trigonometry, and limits frequently made in calculus. Students attempt to identify and correct the errors.	3. Distinguish correct logic or reasoning from that which is flawed.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Precalculus students using the Pearson textbook justify their conclusions as they complete the Exercises for every lesson and demonstrate their reasoning in formative and summative assessments. Group Exercises provide opportunities for students to communicate their ideas and to respond to the arguments of others in their groups. Explaining the Concepts asks students to communicate justifications for algebraic procedures and solution strategies.	4. Justify their conclusions, communicate them to others, and respond to the arguments of others.							
Precalculus students using the Pearson textbook evaluate the reasonableness of numerical solutions to exponential and logarithmic equations, the speed of an airplane flying between cities, a function model for the monthly cost of a text message plan, and different arrangements of five sentences in a paragraph. Students analyze reasonableness of results and conclusions in Application and Critical Thinking Exercises and when they are Explaining the Concepts.	5. Evaluate the reasonableness of intermediate results.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Precalculus students using the Pearson textbook are encouraged to communicate precisely using appropriate mathematical language as they participate in Group Exercises and complete Explaining the Concepts exercises which require students to communicate their understanding of concepts presented in each lesson in writing. Precise mathematical vocabulary is introduced in each lesson with bold-faced font. Definitions are displayed in color-highlighted boxes within the instructional text. Definitions and concepts are reviewed with page references at the conclusion of each chapter, before the Chapter Review Exercises.	6. Communicate precisely to others using appropriate mathematical language. When more than one term can describe a concept, use vocabulary from the West Virginia College- and Career-Readiness Standards.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Precalculus students using the Pearson textbook articulate thoughts and ideas throughout the program using oral, written, and multimedia communications. They communicate orally during class discussions and Group Exercises, they submit written responses to Exercises in each lesson, including problems specifically designed to encourage, facilitate, and practice Explaining the Concepts of a lesson. Students use multimedia communications when they use e-mail and other class communication features available in Pearson's MyMathLab.	7. Articulate thoughts and ideas through oral, written, and multimedia communications.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Mathematical Modeling								
For student mastery of College- and Career-Readiness Standards, the instructional materials will include multiple strategies that provide students opportunities to:								
Precalculus students using the Pearson textbook apply mathematics to solve problems in everyday life on a daily basis. Examples in the instructional pages of the textbook, and Application Exercises at the conclusion of each lesson and in the Chapter Reviews, highlight real-world problems in a wide range of areas. Each chapter opens with a description of real-world phenomena which can be modeled using the mathematical concepts of that particular chapter, and the precise locations of where these applications are found in the chapter are listed with page references and examples or problem numbers.	8. Apply mathematics to solve problems in everyday life.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Pearson's *Precalculus* curriculum includes multiple representations of the same and similar concepts throughout the textbook and ancillary materials to support students with learning style preferences, including visual and auditory. Concrete models may be utilized by the instructor to illustrate motion and measurement. Instructional video clips are accessible within the lessons in the e-text and are one resource for visual and auditory concept presentation. The textbook is replete with pictures, diagrams, and graphs to depict function behavior and other mathematical and real-world phenomena.	9. Use concrete objects, pictures, diagrams, or graphs to help conceptualize and solve a problem.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Students using the Pearson *Precalculus* textbook are exposed to, and asked to create, multiple representations of mathematical concepts and application problems. Functions are represented as tables of variable and related quantities, equations relating dependent and independent variables, and graphs on the coordinate plane, Equations are written in different forms to highlight specific properties, including vertices, intercepts, domain and range, asymptotes and holes, and end behavior. Summations are represented symbolically and formulaically, as well as numerically. Real-world problems are presented verbally and the represented visually in a graph or diagram and algebraically as an equation or formula.	10. Use multiple representations.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Students using the Pearson *Precalculus* textbook use a variety of tools to represent concepts, practice skills, and solve problems. They use grid paper to accurately graph functions by hand, and they use calculators and computers to graph functions electronically. They use graphs, tables, and equations to analyze the behaviors and properties of functions. They use computers to access online resources, including Pearson's MyMathLab, which hosts a course management program and communication options as well as an e-text with access to instructional videos and tutorials.	11. Use a variety of appropriate tools strategically.							
Students using the Pearson *Precalculus* textbook calculate accurately and efficiently using paper-and-pencil and calculator tools. Examples in the instructional pages of the text delineate step-by-step calculations needed to solve problems, and include key sequences for calculator applications. Throughout the course, the textbook models appropriate precision in terms of significant digits and decimal places.	12. Calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Every lesson in every chapter of the Pearson *Precalculus* textbook includes several real-world application problems. The examples in the instructional pages of the text include an algebraic representation of the problem, the solution strategy and process, and a statement that couches the solution in the context of the situation. This process is modeled for students so that they will follow the same practices as they solve contextual problems.	13. Interpret their mathematical results in the context of the situation.							
Each example in the instructional pages of the *Precalculus* textbook interprets the solution to the problem in context and verifies that the answer is reasonable, implicitly evaluating the model used to solve the problem. While modeling Applications in the Exercise pages for each lesson, as well as solving other nonroutine problems, students develop and apply their own problem-solving strategies and assess the reasonableness of their solutions, modifying their solution models when necessary.	14. Reflect on whether the results make sense, improving the model if it has not serve its purpose.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
The *Precalculus* textbook features quotations, photographs, short articles, and artwork produced by or about mathematicians and scientists as well as presidents and artists. The subjects of these features of interest are men and women of different races and ethnicities with successful and rewarding careers applying math and science. These notes inspire students of all walks of life to explore careers which apply what they have learned, are learning, and will learn in their mathematics classes.	15. Explore careers which apply the understanding of mathematics.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Seeing Structure and Generalizing								
For student mastery of College- and Career-Readiness Standards, the instructional materials will include multiple strategies that provide students opportunities to:								
Students using the Pearson *Precalculus* textbook gain experience with an array of patterns and structures which they can use to organize the mathematical concepts they are learning and facilitate deeper understanding. For example, students are introduced to linear, polynomial, exponential, logarithmic, rational, radical, trigonometric, and quadratic functions which they can recognize from the pattern in a table of values and the structure and shape of a graph. Inverse functions are derived by interchanging the dependent and independent variables in these patterns and structures. Patterns enable students to make connections between functions and graphs, and structure allows them to explore more and different functions and their transformations.	16. Look closely to discern a pattern or structure.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
The *Precalculus* curriculum as presented in the textbook guides students to infer general methods and develop shortcuts after applying basic definitions to several examples of a specific concept. These methods and shortcuts are then refined and applied to more complex functions and real-world situations. For example, students first learn to identify the x- and y-intercepts of the graph of a linear function, and then they apply these strategies to analyze properties of other functions whose graphs may have multiple x-intercepts.	17. Look both for general methods and for shortcuts.							
The first step in solving any problem is to read and understand the problem. Every exercise set in *Precalculus* contains several problems that apply the mathematics of the lesson in real-world situations. To solve these problems, students must make sense of the quantities and decide which are variable or constant. Then they must know the relationships between the quantities so that they can write one or more equations that can be solved, or formulas that can be evaluated. Finally, the solution is written in the context of the problem.	18. Make sense of quantities and their relationships in problem situations.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Every exercise set in *Precalculus* contains several problems that apply the mathematics of the lesson in real-world situations. To solve these problems, students must determine the type of mathematics needed to solve the problem, e.g., write an equation, write a system of equations, or draw a shape and apply a geometric formula. Finally, students can then implement an appropriate and effective problem solving strategy by solving the equation or system or evaluating the formula or discerning a pattern or making a table or graph.	19. Assess and evaluate the type of mathematics needed to solve a particular problem.							
Every exercise set in *Precalculus* contains several problems that apply the mathematics of the lesson in real-world situations. These exercises may include nonroutine or unfamiliar complex problems. To solve these problems, students must employ the same strategies they use to solve more familiar problems: determine the type of mathematics needed to solve the problem, e.g., write an equation, write a system of equations, or draw a shape and apply a geometric formula. Finally, students can then implement an appropriate and effective problem solving strategy by solving the equation or system or evaluating the formula or discerning a pattern or making a table or graph.	20. Apply appropriate mathematical skills to unfamiliar complex problems.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Every exercise set in *Precalculus* contains several problems that apply the mathematics of the lesson in real-world situations. The process of solving a problem begins with reading and understanding the problem and being able to answer the questions, what is known, what is being sought, and how are these variables or quantities related to each other? Then, the problem solver uses the mathematics and tools in his or her repertoire to come up with a solution strategy, implement that strategy, arrive at a solution, verify the reasonableness of the solution, and write a statement that describes the solution in the context of the problem. This basic approach to solving problems is modeled in the instructional pages of the textbook. If the student determines that his or her solution is not reasonable, then the student is able to review the process and either correct a computation error or revise the model. Either way, the student maintains oversight of the process until a reasonable and accurate solution is obtained.	21. Maintain the oversight of the process of solving a problem while attending to the details.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Instructor Resources and Tools								
The instructional materials provide:								
The content of any precalculus course is necessarily a spiraled curriculum because that is naturally how the concepts and skills are developed. In *Precalculus*, students are continually building on what they have learned, and a spiral perfectly describes this natural arrangement of topics. Students progress from analyzing, transforming, combining, inverting, and modeling with linear functions to applying these same skills and procedures to other families of functions. The approach is necessarily spiraling because students are investigating and applying the same concepts to a progressively larger repertoire of functions and relations.	22. An ongoing spiraling approach.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Teachers can use the *Precalculus* textbook and ancillary materials for diagnostic, formative, and summative assessments. The ancillaries provided with the curricular materials include formative quick checks and summative chapter tests. Diagnostic pre-tests can implemented by using alternative forms of the quizzes and tests in MyMathLab, or by evaluating student performance on problems from the Exercises at the end of each lesson, from the Mid Chapter Check Points within each chapter, and from the Chapter Reviews.	23. Ongoing diagnostic, formative, and summative assessments.							
Students complete a variety of assessments in the precalculus course, including quizzes and tests. The textbook includes a wide variety of problem types in the selection of Exercises at the end of each lesson: Application Exercises can be assigned and evaluated as performance tasks and can include data-dependent questions, and Group Exercises can include data-dependent questions as well as open-ended questions. Mid Chapter Check Points and Chapter Reviews in the textbook can also be used to assess student readiness for a formal assessment.	24. A variety of assessment formats, including performance tasks, data-dependent questions, and open-ended questions.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
To bolster mathematical content knowledge and pedagogy, the teacher has access to video presentations for examples and lessons in the *Precalculus* textbook. Management techniques are supported by a course management system embedded within Pearson's MyMathLab which provides tools to manage courses, including a Gradebook; a Study Plan that can be utilized by the students independently or by the teacher to support students; and a means to modify and assign homework, quizzes, and tests.	25. Necessary mathematical content knowledge, pedagogy, and management techniques for educators to guide learning experiences.							
Videos correlated to examples and concepts in the *Precalculus* textbook provide an alternative presentation for the concepts and skills which are the focus of a lesson. The teacher can use these videos as introductions to the lessons or as a guide to structure the teacher's own presentations. Learning Catalytics provide opportunities for formative assessment as questions that evaluate students' understanding in real-time during the course of the lesson.	26. Presentation tools for educators to guide learning.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Every student is provided with the support and challenge required to succeed in the precalculus class in the Pearson program. The instructional pages of the *Precalculus* textbook provide examples with clear, step-by-step solutions. Exercises provided for practice, review, and application provide repetition of basic skills, some deeper application and practice of skills and concepts, often a Group Exercise, and more challenging, nonroutine Applications and Additional Exercises. For students struggling with vocabulary, important terms and definitions are boldfaced in the text and reviewed at the end of the chapter. Pearson's MyMathLab provides a number of supports and challenges, including practice assessments, instructional videos, and Pearson Tutor Services, A Study Plan helps students with a wide range of ability levels to organize and pinpoint areas which require more practice/review and opportunities for enrichment and challenge.	27. Multiple research-based strategies for differentiation, intervention, and enrichment to support all learners.							

SPECIFIC EVALUATION CRITERIA
2018-2024
Group VI – Mathematics
High School Math IV – Trigonometry/Pre-calculus

All West Virginia teachers are responsible for classroom instruction that integrates content standards and mathematical habits of mind. Students in this course will generalize and abstract learning accumulated through previous courses as the final springboard to calculus. Students will take an extensive look at the relationships among complex numbers, vectors, and matrices. They will build on their understanding of functions, analyze rational functions using an intuitive approach to limits and synthesize functions by considering compositions and inverses. Students will expand their work with trigonometric functions and their inverses and complete the study of the conic sections begun in previous courses. They will enhance their understanding of probability by considering probability distributions and have previous experiences with series augmented. Students will continue developing mathematical proficiency in a developmentally-appropriate progressions of standards. Mathematical habits of mind, which should be integrated in these content areas, include: making sense of problems and persevering in solving them, reasoning abstractly and quantitatively; constructing viable arguments and critiquing the reasoning of others; modeling with mathematics; using appropriate tools strategically; attending to precision, looking for and making use of structure; and looking for and expressing regularity in repeated reasoning. Continuing the skill progressions from previous courses, the following chart represents the mathematical understandings that will be developed:

Building Relationships among Complex Numbers, Vectors, and Matrices	**Analysis and Synthesis of Functions**
• Represent abstract situations involving vectors symbolically.	• Write a function that describes a relationship between two quantities. (e.g., if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.)
Trigonometric and Inverse Trigonometric Functions of Real Numbers	**Derivations in Analytic Geometry**
• Make sense of the symmetry, periodicity, and special values of trigonometric functions using the unit circle. • Prove trigonometric identities and apply them problem solving situations.	• Make sense of the derivations of the equations of an ellipse and a hyperbola.
Modeling with Probability	**Series and Informal Limits**
• Develop a probability distribution. (e.g., Find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.)	• Apply mathematical induction to prove summation formulas.

For student mastery of content standards, the instructional materials will provide students with the opportunity to

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Building Relationships among Complex Numbers, Vectors, and Matrices								
Perform arithmetic operations with complex numbers.								
SE/TE: 310-311, 757-758, 761-762, 768	1. Find the conjugate of a complex number; use conjugates to find moduli (magnitude) and quotients of complex numbers. Instructional Note: In Math II students extended the number system to include complex numbers and performed the operations of addition, subtraction, and multiplication.							
Represent complex numbers and their operations on the complex plane.								
SE/TE: 758-760, 767	2. Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.							
SE/TE: 761-762, 767, 768	3. Represent addition, subtraction, multiplication and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. (e.g., $(-1 + \sqrt{3}\,i)^3 = 8$ because $(-1 + \sqrt{3}\,i)$ has modulus 2 and argument 120°.							
SE/TE: 760, 761-762, 767	4. Calculate the distance between numbers in the complex plane as the modulus of the difference and the midpoint of a segment as the average of the numbers at its endpoints.							
Represent and model with vector quantities.								
SE/TE: 372-373, 764-766, 768	5. Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments and use appropriate symbols for vectors and their magnitudes (e.g., v, |v|, ||v||, $\vec{v}$). Instructional Note: This is the student's first experience with vectors. The vectors must be represented both geometrically and in component form with emphasis on vocabulary and symbols.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
SE/TE: 770-771	6. Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.							
SE/TE: 771-775, 781-784	7. Solve problems involving velocity and other quantities that can be represented by vectors.							
Perform operations on vectors.								
SE/TE: 775-777, 782 a. **SE/TE:** 775-777, 782 b. **SE/TE:** 775-777, 782 c. **SE/TE:** 775-777, 782	8. Add and subtract vectors. a. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes. b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. c. Understand vector subtraction v – w as v + (–w), where –w is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order and perform vector subtraction component-wise.							
SE/TE: 776, 777, 782 a. **SE/TE:** 776, 777, 782 b. **SE/TE:** 776, 777, 782	9. Multiply a vector by a scalar. a. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as c(vx, vy) = (cvx, cvy). b. Compute the magnitude of a scalar multiple c**v** using $\|c\mathbf{v}\| = \|c\| \cdot \|\mathbf{v}\|$. Compute the direction of c**v** knowing that when |c|v ≠ 0, the direction of c**v** is either along **v** (for c > 0) or against **v** (for c < 0).							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Perform operations on matrices and use matrices in applications.								
SE/TE: 919 (#61-64)	10. Use matrices to represent and manipulate data (e.g., to represent payoffs or incidence relationships in a network).							
SE/TE: 908-909	11. Multiply matrices by scalars to produce new matrices (e.g., as when all of the payoffs in a game are doubled.							
SE/TE: 906-908, 910-914	12. Add, subtract and multiply matrices of appropriate dimensions.							
SE/TE: 910-914	13. Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties. Instructional Note: This is an opportunity to view the algebraic field properties in a more generic context, particularly noting that matrix multiplication is not commutative.							
SE/TE: 921-928, 935-936, 945	14. Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.							
SE/TE: 910-914, 915-916, 917-918	15. Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.							
SE/TE: 917-918	16. Work with 2 × 2 matrices as transformations of the plane and interpret the absolute value of the determinant in terms of area. Instructional Note: Matrix multiplication of a 2 x 2 matrix by a vector can be interpreted as transforming points or regions in the plane to different points or regions. In particular a matrix whose determinant is 1 or -1 does not change the area of a region.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Solve systems of equations.								
SE/TE: 882-885, 892	17. Represent a system of linear equations as a single matrix equation in a vector variable.							
SE/TE: 925-929, 932-933	18. Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater). Instructional Note: Students have earlier solved two linear equations in two variables by algebraic methods.							
Analysis and Synthesis of Functions								
Analyze functions using different representations.								
SE/TE: 175, 181-191, 195-197, 208-210, 283-289, 291-295, 316-324, 330-332, 336-337, 344-347, 349-352, 385-389, 390-394, 399, 440-441, 448-449, 456-457, 464, 579-591, 592-593, 595-597, 600-608, 609-611	19. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Instructional Note: This is an extension of graphical analysis from Math III or Algebra II that develops the key features of graphs with the exception of asymptotes. Students examine vertical, horizontal, and oblique asymptotes by considering limits. Students should note the case when the numerator and denominator of a rational function share a common factor. Utilize an informal notion of limit to analyze asymptotes and continuity in rational functions. Although the notion of limit is developed informally, proper notation should be followed.							
Build a function that models a relationship between two quantities.								
SE/TE: 204-206, 210-212, 214-215, 282-290, 291-296, 331-332, 395-397, 401, 444-447, 449-450, 459-462, 465	20. Write a function that describes a relationship between two quantities, including composition of functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Build new functions from existing functions.								
SE/TE: 261, 263-268, 269-272, 613-623	21. Find inverse functions. Instructional Note: This is an extension of concepts from Math III where the idea of inverse functions was introduced.							
a. **SE/TE:** 261, 263-268, 269-272, 613-623	a. Verify by composition that one function is the inverse of another.							
b. **SE/TE:** 261, 263-268, 269-272, 613-623	b. Read values of an inverse function from a graph or a table, given that the function has an inverse. Instructional Note: Students must realize that inverses created through function composition produce the same graph as reflection about the line y = x.)							
c. **SE/TE:** 261, 263-268, 269-272, 613-623	c. Produce an invertible function from a non-invertible function by restricting the domain. Instructional Note: Systematic procedures must be developed for restricting domains of non-invertible functions so that their inverses exist.)							
SE/TE: 452-453, 456	22. Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.							
Trigonometric and Inverse Trigonometric Functions of Real Numbers								
Extend the domain of trigonometric functions using the unit circle.								
SE/TE: 535-540, 554-556	23. Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for $\pi-x$, $\pi+x$, and $2\pi-x$ in terms of their values for x, where x is any real number. Instructional Note: Students use the extension of the domain of the trigonometric functions developed in Math III to obtain additional special angles and more general properties of the trigonometric functions.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
SE/TE: 541-545	24. Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.							
Model periodic phenomena with trigonometric functions.								
SE/TE: 613-621	25. Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.							
SE/TE: 629-636, 637-640	26. Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context. Instructional Note: Students should draw analogies to the work with inverses in the previous unit.							
SE/TE: 693-702	27. Solve more general trigonometric equations. (e.g., $2 \sin^2 x + \sin x - 1 = 0$ can be solved using factoring.							
Prove and apply trigonometric identities.								
SE/TE: 661-668, 669-672	28. Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.							
Apply transformations of function to trigonometric functions.								
SE/TE: 578-592, 595-599, 600-608, 609-612	29. Graph trigonometric functions showing key features, including phase shift. Instructional Note: In Math III, students graphed trigonometric functions showing period, amplitude and vertical shifts.)							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Derivations in Analytic Geometry								
Translate between the geometric description and the equation for a conic section.								
SE/TE: 955-957, 959, 966, 969-970, 972, 981	30. Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant. Instructional Note: In Math II students derived the equations of circles and parabolas. These derivations provide meaning to the otherwise arbitrary constants in the formulas.)							
Explain volume formulas and use them to solve problems.								
For supporting content, see: **SE/TE:** 380 (#91)	31. Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures. Instructional Note: Students were introduced to Cavalieri's principle in Math II.							
Modeling with Probability								
Calculate expected values and use them to solve problems.								
For supporting content, please see: **SE/TE:** 1105-1120	32. Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions. Instructional Note: Although students are building on their previous experience with probability in middle grades and in Math II and III, this is their first experience with expected value and probability distributions.							
For supporting content, please see: **SE/TE:** 1105-1120	33. Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
For supporting content, please see: **SE/TE:** 1105-1120	34. Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. (e.g., Find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.)							
For supporting content, please see: **SE/TE:** 1105-1120	35. Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households? Instructional Note: It is important that students can interpret the probability of an outcome as the area under a region of a probability distribution graph.							
Use probability to evaluate outcomes of decisions.								
For supporting content, please see: **SE/TE:** 1105-1120 a. **SE/TE:** 1105-1120 b. **SE/TE:** 1105-1120	36. Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. a. Find the expected payoff for a game of chance. (e.g., Find the expected winnings from a state lottery ticket or a game at a fast food restaurant.) b. Evaluate and compare strategies on the basis of expected values. (e.g., Compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.)							

(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS	(IMR Committee) Responses							
	I=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent	**I**		**A**		**M**		**N**
Series and Informal Limits								
Use sigma notations to evaluate finite sums.								
For supporting content, please see: **SE/TE:** 1045-1047	37. Develop sigma notation and use it to write series in equivalent form. For example, write $\sum_{i=1}^{n} (3i^2 + 7)$ as $3\sum_{i=1}^{n} i^2 + 7\sum_{i=1}^{n} 1$.							
For supporting content, please see: **SE/TE:** 1078-1084	38. Apply the method of mathematical induction to prove summation formulas. For example, verify that $\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$. Instructional Note: Some students may have encountered induction in Math III in proving the Binomial Expansion Theorem, but for many this is their first experience.							
Extend geometric series to infinite geometric series.								
SE/TE: 1070-1073	39. Develop intuitively that the sum of an infinite series of positive numbers can converge and derive the formula for the sum of an infinite geometric series. Instructional Note: In Math I, students described geometric sequences with explicit formulas. Finite geometric series were developed in Math III.							
SE/TE: 1072, 1074-1075	40. Apply infinite geometric series models. For example, find the area bounded by a Koch curve. Instructional Note: Rely on the intuitive concept of limit developed in unit 2 to justify that a geometric series converges if and only if the ratio is between -1 and 1.							