New Jersey Mathematics Curriculum Correlation

	Algebra 1	Geometry	Algebra 2
4.1 Number and Numerical Operations			
A. Number Sense			
1. *Extend understanding of the number system to all real numbers.*	1.1		1.1
2. *Compare and order rational and irrational numbers.*	12.3		1.1
3. *Develop conjectures and informal proofs of properties of number systems and sets of numbers.*	1.1	2.6	1.1
B. Numerical Operations			
1. *Extend understanding and use of operations to real numbers and algebraic procedures.*	1.4, 1.5		
2. *Develop, apply, and explain methods for solving problems involving rational and negative exponents.*	10.3, 10.4		5.1, 5.2, 5.3
3. *Perform operations on matrices.*			
a. Addition and subtraction	1.6		3.1
b. Scalar multiplication	1.6		3.2
4. *Understand and apply the laws of exponents to simplify expressions involving numbers raised to powers.*	10.3, 10.4		5.1, 5.2, 5.3
C. Estimation			
1. *Recognize the limitations of estimation, assess the amount of error resulting from estimation, and determine whether the error is within acceptable tolerance limits.*	2.7, 2.8		

4.2 Geometry and Measurement			
A. Geometric Properties			
1. *Use geometric models to represent real-world situations and objects and to solve problems using those models (e.g., use Pythagorean Theorem to decide whether an object can fit through a doorway).*	12.1, 12.2, 12.4, 12.5	Used throughout, especially 3.6, 6.3, 6.5, 6.6, 8.5, 8.6, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8	12.1, 12.5, 12.6
2. *Draw perspective views of 3D objects on isometric dot paper, given 2D representations (e.g., nets or projective views).*		10.1, 10.2, 10.3	
3. *Apply the properties of geometric shapes.*			
a. Parallel lines—transversal, alternate interior angles, corresponding angles		3.2, 3.3	
b. Triangles			
-Conditions for congruence		4.1, 4.2, 4.3, 4.4	
-Segment joining midpoints of two sides is parallel to and half the length of the third side.		5.6	
-Triangle Inequality		3.5, 3.6	
c. Minimal conditions for a shape to be a special quadrilateral		5.3, 5.4, 5.5, 5.6	
d. Circles –arcs, central and inscribed angles, chords, tangents		9.1, 9.2, 9.3, 9.4, 9.5, 9.6	12.2
e. Self-similarity		p. 328	
4. Use reasoning and some form of proof to verify or refute conjectures and theorems.			
a. Verification or refutation of proposed proofs		2.2, 2.4, 2.5, 2.7, 2.8	
b. Simple proofs involving congruent triangles		4.2, 4.3	
c. Counterexamples to incorrect conjectures		2.1, 2.2, 2.3, 2.4, 2.5, 2.6	

B. Transforming Shapes			
1. *Determine, describe, and draw the effect of a transformation, or a sequence of transformations, on a geometric or algebraic object, and, conversely, determine whether and how one object can be transformed to another by a transformation or a sequence of transformations.*		11.1, 11.2, 11.3, 11.4, 11.6	
2. *Recognize three-dimensional figures obtained through transformations of two-dimensional figures (e.g., cone as rotating an isosceles triangle about an altitude), using software as an aid to visualization.*	Not covered		
3. *Determine whether two or more given shapes can be used to generate a tessellation.*		11.5	
4. *Generate and analyze iterative geometric patterns.*			
a. Fractals (e.g., Sierpinski's Triangle)		p. 328	11.4
b. Patterns in areas and perimeters of self-similar figures	Not covered		
c. Outcome of extending iterative process indefinitely	Not covered		
C. Coordinate Geometry			
1. *Use coordinate geometry to represent and verify properties of lines.*			
a. Distance between two points		7.1	7.1
b. Midpoint and slope of a line segment		7.1, 7.3	7.1
c. Finding the intersection of two lines	8.3		2.1
d. Lines with the same slope are parallel	4.7	7.3	
e. Lines that are perpendicular have slopes whose product is -1	4.7	7.3	
2. *Show position and represent motion in the coordinate plane using vectors.*			

a. Addition and subtraction of vectors		7.2	
D. Units of Measurement			
1. *Understand and use the concept of significant digits.*	2.7		
2. *Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation.*			
a. Degree of accuracy of a given measurement tool	2.7	1.2, 1.3	12.2
b. Finding the interval in which a computed measure (e.g., area or volume) lies, given the degree of precision of linear measurements	2.7, 2.8		
E. Measuring Geometric Objects			
1. *Use techniques of indirect measurement to represent and solve problems.*			
a. Similar triangles	12.1	6.2, 6.3, 6.4, 6.5	
b. Pythagorean theorem	12.2	6.6	
c. Right triangle trigonometry (sine, cosine, tangent)	12.5	6.8, 6.9	12.1
2. *Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures.*			
a. Approximation of area using grids of different sizes		8.1	
b. Finding which shape has minimal (or maximal) area, perimeter, volume, or surface area under given conditions using graphing calculators, dynamic geometric software, perimeter, volume, and surface area		Ch. 8 Labs, Ch.8 Applications, Ch. 10 Applications	2.4
c. Estimation of area, perimeter, volume, and surface area		Ch. 8 Labs, Ch. 10 Labs	

4.3 Patterns and Algebra			
A. Patterns			
1. *Use models and algebraic formulas to represent and analyze sequences and series.*			
a. Explicit formulas for nth terms	1.2		11.1
b. Sums of finite arithmetic series			11.2
c. Sums of finite and infinite geometric series			11.3, 11.4
2. *Develop an informal notion of limit.*			
3. Use inductive reasoning to form generalizations	1.2	2.1	11.1
B. Functions and Relationships			
1. *Understand relations and functions and select, convert flexibly among, and use various representations for them, including equations or inequalities, tables, and graphs.*	5.1, 5.4, 5.5		4.1, 4.3, 4.4, 4.5
2. *Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies.*			
a. Slope of a line or curve	4.3		1.4
b. Domain and range	5.1		4.1, 4.2
c. Intercepts	4.4, 4.5		
d. Continuity	Not Covered		
e. Maximum/minimum	11.1		6.1
f. Estimating roots of equations	11.1		6.1
g. Intersecting points as solutions of systems of equations	8.1		2.1
h. Rates of change	4.3		1.4
3. *Understand and perform transformations on commonly-used functions.*			
a. Translations, reflections, dilations	11.1		4.5
b. Effects on linear and quadratic graphs of parameter changes in equations			4.5

c. Using graphing calculators or computers for more complex functions	4.8		Used throughout Activities
4. *Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions.*			
a. Linear vs. non-linear	5.4		
b. Symmetry	11.2		Ch Labs
c. Increasing/decreasing on an interval	Not covered		
C. Modeling			
1. *Use functions to model real-world phenomena and solve problems that involve varying quantities.*			
a. Linear, quadratic, exponential, periodic (sine and cosine), and step functions (e.g., price of mailing a first-class letter over the past 200 years)			Ch. 4, Ch.6, and Ch. 8 Applications
b. Direct and inverse variation	5.3		10.6
c. Absolute value			4.4
d. Expressions, equations and inequalities	Ch. 3 Applications		Ch. 1 Applications
e. Same function can model variety of phenomena	Used throughout Ch. 5		Used throughout Ch. 4
f. Growth/decay and change in the natural world	5.6		Ch. 8 Applications
2. *Analyze and describe how a change in an independent variable leads to change in a dependent one.*	4.3		1.4
3. *Convert recursive formulas to linear or exponential functions (e.g., Tower of Hanoi and doubling).*			Ch. 8

D. Procedures			
1. *Evaluate and simplify expressions.*			
a. Add and subtract polynomials	10.1		9.1
b. Multiply a polynomial by a monomial or binomial	10.6		9.1
c. Divide a polynomial by a monomial			8.3, 9.4
2. *Select and use appropriate methods to solve equations and inequalities.*			
a. Linear equations—algebraically	3.1, 3.3, 3.4		1.2
b. Quadratic equations—factoring (when the coefficient of x^2 is 1) and using the quadratic formula	11.3		6.4
c. All types of equations using graphing, computer, and graphing calculator techniques.	Used throughout		Used throughout
3. *Judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology.*	Used throughout		Used throughout

4.4 Data Analysis, Probability, and Discrete Mathematics			
A. Data Analysis			
1. *Use surveys and sampling techniques to generate data and draw conclusions about large groups.*			
a. Advantages/disadvantages of sample selection methods (e.g., convenience sampling, response to survey, random sampling)	Covered in *Cord PreAlgebra*		
2. *Evaluate the use of data in real-world contexts.*			
a. Accuracy and reasonableness of conclusions drawn	Covered in *Cord PreAlgebra*		
b. Bias in conclusions drawn (e.g., influence of how data is displayed)	Covered in *Cord PreAlgebra*		
c. Statistical claims based on sampling	Covered in *Cord PreAlgebra*		
3. *Design a statistical experiment, conduct the experiment, and interpret and communicate the outcome.*	6.2		Ch. 14 Labs
4. *Estimate or determine lines of best fit (or curves of best fit if appropriate) with technology, and use them to interpolate within the range of the data.*			1.6
5. *Analyze data using technology, and use statistical terminology to describe conclusions.*			
a. Measures of dispersion: variance, standard deviation, outliers	7.5, 7.6		
b. Correlation coefficient	Not Covered		
c. Normal distribution (e.g., approximately 95% of the sample lies between two standard deviations on either side of the mean)	7.6		

B. Probability			
1. *Calculate the expected value of a probability-based game, given the probabilities and payoffs of the various outcomes, and determine whether the game is fair.*	Used throughout Ch. 8		Used throughout Ch. 14
2. *Use concepts and formulas of area to calculate geometric probabilities.*		8.7	
3. *Model situations involving probability with simulations (using spinners, dice, calculators and computers) and theoretical models, and solve problems using these models.*	6.2, Ch. 6 Applications, Ch. 6 Labs		14.1, 14.2. Ch. 14 Applications, Ch. 14 Labs
4. *Determine probabilities in complex situations.*			
a. Conditional events			14.2
b. Complementary events			14.2
c. Dependent and independent events.	6.5		14.1
5. *Estimate probabilities and make predictions based on experimental and theoretical probabilities.*	6.1, 6.2		14.1, 14.2
6. *Understand and use the "law of large numbers" (that experimental results tend to approach theoretical probabilities after a large number of trials).*	Not covered		
C. Discrete Mathematics—Systematic Listing and Counting			
1. *Calculate combinations and replacement (e.g., the number of possible ways of tossing a coin 5 times and getting 3 heads) and without replacement (e.g., number of possible delegations of 3 out of 23 students).*	6.4, 6.5		14.1, 14.2
2. *Apply the multiplication rule of counting in complex situations, recognize the difference between ordered and unordered counting situations.*			14.3, 14.4

3. *Justify solutions to counting problems.*			14.3, 14.4
4. *Recognize and explain relationships involving combinations and Pascal's Triangle, and apply those methods to situations involving probability.*			14.3, 14.4
D. Discrete Mathematics—Vertex-Edge Graphs and Algorithms			
1. *Use vertex-edge graphs and algorithmic thinking to represent and solve practical problems.*			
a. Circuits that include every edge in a graph	Not Covered		
b. Circuits that include every vertex in a graph	Not Covered		
c. Scheduling problems (e.g., when project meetings should be scheduled to avoid conflicts) using graph coloring	Not Covered		
d. Applications to science (e.g., who-eats-whom graphs, genetic trees, molecular structures)	Not Covered		
2. *Explore strategies for making fair decisions.*			
a. Combining individual preferences into a group decision (e.g., determining winner of an election or selection process)	Not Covered		
b. Determining how many student council representatives each class (9^{th}, 10^{th}, 11^{th}, and 12^{th} grade) gets when the classes have unequal sizes (apportionment)	Not Covered		

4.5 Mathematical Processes			
A. Problem Solving			
1. *Learn mathematics through problem solving, inquiry, and discovery.*	Covered throughout entire program		
2. *Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3).*			
a. Open-ended problems	Covered throughout entire program		
b. Non-routine problems	Covered throughout entire program		
c. Problems with multiple solutions	Covered throughout entire program		
d. Problem that can be solved in several ways	Covered throughout entire program		
3. *Select and apply a variety of appropriate problem-solving strategies (e.g., "try a simpler problem" or "make a diagram") to solve problems.*	Covered throughout entire program, especially in 4-Step Problem Solving Features		
4. *Pose problems of various types and levels of difficulty.*	Covered throughout entire program, especially in Math Applications		
5. *Monitor their progress and reflect on the process of their problem solving activity.*	Covered throughout entire program, especially in 4-Step Problem Solving Features		
B. Communication			
1. *Use communication to organize and clarify their mathematical thinking.*			
a. Reading and writing	Covered throughout entire program		
b. Discussion, listening, and questioning	Covered throughout entire program		
2. *Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.*	Covered throughout entire program		
3. *Analyze and evaluate the mathematical thinking and strategies of others.*	Covered throughout entire program		
4. *Use the language of mathematics to express mathematical ideas precisely.*	Covered throughout entire program		

C. Connections			
1. *Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).*	Covered throughout entire program		
2. *Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).*	Covered throughout entire program		
3. *Recognize that mathematics is used in a variety of contexts outside of mathematics.*	Covered throughout entire program, especially in Math Applications		
4. *Apply mathematics in practical situations and in other disciplines.*	Covered throughout entire program, especially in Math Applications		
5. *Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).*	Covered throughout entire program, especially in Cultural Connections feature		
6. *Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.*	Covered throughout entire program		
D. Reasoning			
1. *Recognize that mathematical facts, procedures, and claims must be justified.*	Covered throughout entire program		
2. *Use reasoning to support their mathematical conclusions and problem solutions.*	Covered throughout entire program		
3. *Select and use various types of reasoning and methods of proof.*	Covered throughout entire program		
4. *Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.*	Covered throughout entire program		
5. *Make and investigate mathematical conjectures.*			
a. Counterexamples as a means of disproving conjectures		2.1	

b. Verifying conjectures using informal reasoning or proofs.		Used throughout Ch. 2	
6. *Evaluate examples of mathematical reasoning and determine whether they are valid.*	Covered throughout entire program		
E. Representations			
1. *Create and use representations to organize, record, and communicate mathematical ideas.*			
a. Concrete representations (e.g., base-ten blocks or algebra tiles)	Covered throughout entire program		
b. Pictorial representations (e.g., diagrams, charts, or tables)	Covered throughout entire program		
c. Symbolic representations (e.g., a formula)	Covered throughout entire program		
d. Graphical representations (e.g., a line graph)	Covered throughout entire program		
2. *Select, apply, and translate among mathematical representations to solve problems.*	Covered throughout entire program		
3. *Use representations to model and interpret physical, social, and mathematical phenomena.*	Covered throughout entire program		
F. Technology			
1. *Use technology to gather, analyze, and communicate mathematical information.*	Covered throughout entire program, especially in Math Labs		
2. *use computer spreadsheets, software, and graphing utilities to organize and display quantitative information (cr. Workplace readiness standard 8.4-D).*	Covered throughout entire program, especially in Math Labs		
3. U*se graphing calculators and computer software to investigate properties of functions and their graphs.*	Covered throughout entire program		
4. *Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).*	Covered throughout entire program		
5. *Use computer software to make and verify conjectures about geometric objects.*		Used throughout	

6**.** *Use computer-based laboratory technology for mathematical applications in the sciences (cf. science standards).*	Covered throughout entire program, especially in Math Labs and Math Applications