SHIFTS IN THE *2010 ALABAMA COURSE OF STUDY: MATHEMATICS*

ALGEBRA I

ACOS pg. #	Shift / Change	Rationale for Change
81	"Content standards in Algebra IA should focus on rational numbers, arithmetic sequences, and linear function. Standards 3, 4, 5, 6, 7, 7a, 7b, 8, 12, 13, 14, 15, 16, 17, 19, 20, 22, 23, 24, 25, 26, 28, 29, 30, 31, 31a, 32, 33, 34, 34a, 34b, 35, 36, 37a, 37b, 38, 40, 45, 45a, 45b, 45c, and 46 must be taught in the Algebra IA course. Content standards in Algebra IB should focus on irrational numbers, geometric sequences, and quadratic and exponential functions. Standards 1, 2, 3, 7, 7a, 7b, 8, 9, 9a, 9b, 9c, 9d, 10, 11, 12, 13, 16, 18, 18a, 18b, 21, 23, 27, 28, 29, 30, 31, 31a, 31b, 32, 32a, 32b, 33, 34, 34a, 34b, 35, 36, 37, 37a, 37c, 38, 39, 40, 41, 42, 43, 44, 45, 45a, 45b, and 47 must be taught in the Algebra IB course."	Changed narrative to reflect new numbers of standards required for Algebra IA and Algebra IB
82	"For standard 7 **linear, exponential, quadratic**; for standard 8 **linear, exponential, quadratic, rational**"	Added focus to the standard #7 and #8
83	Moved cluster statement and standard #11 from Algebra II and Algebra II w/ Trig to Algebra I. **"Rewrite rational expressions. (Linear and quadratic denominators.) #11. (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. [A-APR7]"**	Match QualityCore course standard
85	Added "an awareness of" to cluster statement about standard #31	Match QualityCore course standard

GEOMETRY

ACOS pg. #	Shift / Change	Rationale for Change
88	"Content standards 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 26, 30, 31, 32, 33, and 34 must be taught in the Geometry A course. Content standards 2, 12, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 35, 36, 37, 38, 40, 41, 42, and 43 must be taught in the Geometry B course."	Changed narrative to reflect new numbers of standards required for Geometry A and B
90	Examples added to standard #15.	Assist with interpretation of standard.
93	Example added to standard #43.	Assist with interpretation of standard.

ALGEBRA I I

ACOS pg. #	Shift / Change	Rationale for Change
96	Added standard #3 from Precalculus – "(+) Find the conjugate of a complex number; use conjugates to find modulii and quotients of complex numbers. [N-CN3]"	Match QualityCore course standard
96-97	Added domain, cluster statement, and standard #7 (added clarification statement) through standard 11 from Precalculus – **Vector and Matrix Quantities** (+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network. *(Use technology to approximate roots.)* [N-VM6] **(AL)** (+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled. [N-VM7] (+) Add, subtract, and multiply matrices of appropriate dimensions. [N-VM8] (+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties. [N-VM9] (+) 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. [N-VM10]"	Match QualityCore course standard
98	Added cluster statement and standard #25 from Algebra I (last sentence only): "**Solve equations and inequalities in one variable.** Recognize when the quadratic formula gives complex solutions, and write them as $a + bi$ for real numbers a and b. [A-REI4b] **(AL)**	Match QualityCore course standard
99	Added cluster statement and standard #26 from Precalculus: **"Solve systems of equations.** (+) 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 x 3 or greater). [A-REI9]"	Match QualityCore course standard
99	Added "**(Emphasize understanding graphs and equations of circles and parabolas.) (AL)** to cluster statement about standard #28.	Match QualityCore course standard
100	Added standard #35 and 35a from Algebra I "Find inverse functions [F-BF4] a. Solve an equation of the form f(x) = c for a simple function f that has an inverse, and write an expression for the inverse. [F-BF4a] Example: $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $\neq 1$."	Match QualityCore course standard

ACOS pg. #	Shift / Change	Rationale for Change
101-102	Added domain, cluster statement, and standard #39 from Algebra I and standards #40-46 from Geometry. **"Conditional Probability and the Rules of Probability** **Understand independence and conditional probability and use them to interpret data. (Link to data from simulations or experiments.)** Describe events as subsets of a sample space (the set of outcomes), using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or", "and," "not"). [S-CP1] Understand the conditional probability of *A* given *B* as *P(A* and *B)/P(B)*, and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*. [S-CP3] Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. [S-CP4] Example: Collect data from a random sample of students in your school on their favorite subject among mathematics, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student in the tenth grade. Do the same for other subjects and compare the results. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.* [S-CP5] **Use the rules of probability to compute probabilities of compound events in a uniform probability model.** Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.* [S-CP6] Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.* [S-CP7] Apply the general Multiplication Rule in a uniform probability model, P(A and B) = [P(A)]x[P(B|A)] =[P(B)]x[P(A|B)], and interpret the answer in terms of the model.* [S-CP8] Use permutations and combinations to compute probabilities of compound events and solve problems.* [S-CP9]	Match QualityCore course standard

ALGEBRA II w/ TRIGONOMETRY

ACOS pg. #	Shift/Change	Rationale for Change
103	Added standard #3 from Precalculus – "(+) Find the conjugate of a complex number; use conjugates to find modulii and quotients of complex numbers. [N-CN3]"	Match QualityCore course standard
103-104	Added domain, cluster statement, and standard #7 (added clarification statement) through standard 11 from Precalculus – **Vector and Matrix Quantities** (+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network. *(Use technology to approximate roots.)* [N-VM6] **(AL)** (+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled. [N-VM7] (+) Add, subtract, and multiply matrices of appropriate dimensions. [N-VM8] (+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties. [N-VM9] (+) 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. [N-VM10]"	Match QualityCore course standard
105	Added cluster statement and standard #25 from Algebra I (last sentence only): "**Solve equations and inequalities in one variable.** Recognize when the quadratic formula gives complex solutions, and write them as $a + bi$ for real numbers a and b. [A-REI4b] **(AL)**	Match QualityCore course standard
106	Added cluster statement and standard #26 from Precalculus: **"Solve systems of equations.** (+) 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 x 3 or greater). [A-REI9]"	Match QualityCore course standard
106	Added "**(Emphasize understanding graphs and equations of circles and parabolas.) (AL)** to cluster statement about standard #28.	Match QualityCore course standard
107	Added standard #35 and 35a from Algebra I "Find inverse functions [F-BF4] a. Solve an equation of the form f(x) = c for a simple function f that has an inverse, and write an expression for the inverse. [F-BF4a] Example: $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $\neq 1$."	Match QualityCore course standard

ACOS pg. #	Shift / Change	Rationale for Change
108-109	Added domain, cluster statement, and standard #39 from Algebra I and standards #40-46 from Geometry. **"Conditional Probability and the Rules of Probability** **Understand independence and conditional probability and use them to interpret data. (Link to data from simulations or experiments.)** Describe events as subsets of a sample space (the set of outcomes), using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or", "and," "not"). [S-CP1] Understand the conditional probability of *A* given *B* as *P(A* and *B)/P(B)*, and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*. [S-CP3] Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. [S-CP4] Example: Collect data from a random sample of students in your school on their favorite subject among mathematics, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student in the tenth grade. Do the same for other subjects and compare the results. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.* [S-CP5] **Use the rules of probability to compute probabilities of compound events in a uniform probability model.** Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.* [S-CP6] Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.* [S-CP7] Apply the general Multiplication Rule in a uniform probability model, P(A and B) = [P(A)]x[P(B|A)] =[P(B)]x[P(A|B)], and interpret the answer in terms of the model.* [S-CP8] Use permutations and combinations to compute probabilities of compound events and solve problems.* [S-CP9]	Match QualityCore course standard

PRECALCULUS

ACOS pg. #	Shift / Change	Rationale for Change
115	Added **"conic sections"** to first paragraph, last sentence of Precalculus narrative	Match QualityCore course standard
117	Added domain, cluster statement, and standard #12 (added clarification statement) from Algebra II and Algebra II with Trig **"Seeing Structure in Expressions** **Write expressions in equivalent forms to solve problems.** Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems.* *(Extend to infinite geometric series.)* [A-SSE4] **(AL)** Example: Calculate mortgage payments."	Match QualityCore course standard
117	Added domain, cluster statement, and standard #13 (added clarification statement) from Algebra II and Algebra II with Trig **"Arithmetic With Polynomials and Rational Expressions** **Use polynomial identities to solve problems.** (+) Know and apply the Binomial Theorem for the expansion of $(x+y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined, for example, by Pascal's Triangle. (The Binomial Theorem can be proved by mathematical induction or by a combinatorial argument.) [A-APR5]	Match QualityCore course standard
118	Added cluster statement and standards #16 and #17 from Algebra II and Algebra II w/ Trig. **"Interpret functions that arise in applications in terms of the context*. (Emphasize selection of appropriate models. "Understand limits of functions.")* (AL)** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *(Key features include intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. "Determine odd, even, neither.")** [F-IF4] **(AL)** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.* [F-IF6]	Match QualityCore course standard

ACOS pg. #	Shift / Change	Rationale for Change
118	Added **(Focus on using key features to guide selection of appropriate type of model function "with emphasis on piecewise, step, and absolute value. Also emphasize inverse and transformations of polynomials, rational, radical, absolute value, and" trigonometric functions.)** to cluster statement above standard #18 deleted **"logarithmic"** from cluster clarification. Added standards #18, #18a, and #18d from Algebra I, Algebra II, and Algebra II w/ Trig and, #18b from Algebra II and Algebra II w/ Trig. "Graph functions expressed symbolically, and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* [F-IF7] a. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. [F-IF7b] b. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. [F-IF7c] d. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. [F-IF7e]"	Match QualityCore course standard
119	Added standard #33 from Algebra II w/ Trig "Prove the Pythagorean identity $\sin^2\beta + \cos^2\beta = 1$, and use it to find sin (β), cos (β), or tan (β) given sin (β), cos (β), or tan (β) and the quadrant of the angle. [F-TF8] **(AL)**	Match QualityCore course standard
120	Added domain, cluster statement, and standard #35 (added clarification statement) from Geometry **"Similarity, Right Triangles, and Trigonometry** **Apply trigonometry to general triangles.** (+) Derive the formula A = (½) *ab* sin(*C*) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. *(Apply formulas previously derived in Geometry.)* [G-SRT9]	Match QualityCore course standard
120	Added domain, cluster statement, and standards #39 and #40 (added clarification statements to standards) from Algebra I and standard #41 from Algebra II and Algebra II w/ Trig. **"Interpreting Categorical and Quantitative Data** **Summarize, represent, and interpret data on a single count or measurement variable.** Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. *"(Focus on increasing rigor using standard deviation."* [S-ID2] **(AL)** Interpret difference in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers), *"(Identify uniform, skewed, and normal distributions in a set of data. Determine the quartiles and interquartile range for a set of data.")* [S-ID3] **(AL)** Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. [S-ID4]"	Match QualityCore course standard

ACOS pg. #	Shift / Change	Rationale for Change
121	Added cluster statement and standards #42 and #43 from Algebra I **"Interpret linear models.** Compute (using technology) and interpret the correlation coefficient of a linear fit. [S-ID8] Distinguish between correlation and causation. [S-ID9]	Match QualityCore course standard
121	Added domain, cluster statement, and standards #44 and #45 from Algebra II and Algebra II w/ Trig **"Making Inferences and Justifying Conclusions** **Understand and evaluate random processes underlying statistical experiments.** Understand statistics as a process for making inferences about populations parameters based on a random sample from that population. [S-IC1] Decide is a specified model is consistent with resultsw from a given data-generating process, e.g., using simulation. [S-IC2]	Match QualityCore course standard
121	Added cluster statement and standards #46, #47, #48, #49 from Algebra II and Algebra II w/ Trig. **"Make inferences and justify conclusions from sample surveys, experiments, and observational studies.** Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. [S-IC3] Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. [S-IC4] Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. [S-IC5] Evaluate reports based on data. [S-IC6]	Match QualityCore course standard