

OFFICE OF CHIEF ACADEMIC OFFICER
Summary of State Board of Education Agenda Items
Consent Agenda
July 16, 2015

OFFICE OF SECONDARY EDUCATION

- F. Approval to establish the *Foundations of Algebra* course
(Has cleared the Administrative Procedures Act process with public comments)

Executive Summary

In an effort to closely align instruction for students who are progressing toward postsecondary study and the workforce, the Mississippi Department of Education has designed the *Foundations of Algebra* course.

The primary purpose of the *Foundations of Algebra* course is to provide a basis for curriculum development for rising 9th grade students in need of substantial support prior to taking Algebra I. The content of the *Foundations of Algebra* course focuses on critical areas such as equations, inequalities, functions, polynomials, geometry, and statistics as well as the standards of mathematical practice. The standards for this course were developed based on core content that should have been mastered by the end of grade 8 and key concepts that will be introduced in Algebra I. This one-credit course will be offered only to 9th grade students. Students who have already successfully completed Algebra I may not take this course.

Recommendation: Approval

Back-up material attached

APA Comments on the *Foundations of Algebra* Course

The Office of Secondary Education received the following APA comments about the *Foundations of Algebra* course.

Comments	MDE Response
I'm asking the committee to please consider allowing some of the students that took Algebra I last year [to be able to take the Foundations of Algebra course] so that they have the foundational skills to be successful in Math in the future.	No change required. The 2014 Mississippi College- and Career-Readiness Standards for Mathematics includes Compensatory courses that may be taken in concert with Algebra I. Compensatory courses include content supportive of the accompanying credit-bearing course and are designed to meet the needs of students in need of instructional support, intervention or remediation. Students that fail Algebra I should be placed in a Compensatory course and re-enrolled in Algebra I.
I wonder [if] 9th grade students that failed Algebra I this past year could take Foundations of Algebra in the fall before retaking Algebra I? We are going to a 4X4 schedule in the fall and wanted to give the students that failed Algebra, Foundations in the fall and Algebra I in the spring. Is that allowed?	No change required. The 2014 Mississippi College- and Career-Readiness Standards for Mathematics includes Compensatory courses that may be taken in concert with Algebra I. Compensatory courses include content supportive of the accompanying credit-bearing course and are designed to meet the needs of students in need of instructional support, intervention or remediation. Students that fail Algebra I should be placed in a Compensatory course and re-enrolled in Algebra I.

APA Comments on the *Foundations of Algebra Course*

From: Randy Grierson [mailto:randy.grierson@cleveland.k12.ms.us]
Sent: Monday, June 08, 2015 2:56 PM
To: Melissa May
CC: Marla Davis
Subject: APA Notification - Foundations of Algebra Course SY16

Dr. Marla Davis

This email is in regards to the Administrative Procedures Act Process in allowing rising 9th graders that didn't get the opportunity to take a preliminary course prior to having to take Algebra I during the 2014-2015 school year. 73% of the students that came to me from DM Smith Middle School scored Basic or below the previous year on MCT2. In stating that, the majority of these students were not ready for Algebra I on the previous Mississippi curriculum, much less Common Core State Standards. Also, this means that students would reach Algebra III by the time they are seniors, which from what I understand simulates Pre-Cal/Trig. Historically, only about 25% of our students make it to that level of Math. We have done a great job of graduating our students and preparing our students to pass all of the SATP tests the first time. I strongly feel that the majority of the 9th graders that took Algebra I last year would've strongly benefitted a year of basic Algebra principles before taking Algebra I, however they weren't given the opportunity. Another reason I am requesting this is that I'm leery about how this test is going to be scored and if they go on to Geometry, then PARCC test scores come back and they don't pass the PARCC Algebra I course, then there will be limited time to remediate "Algebra" competencies and objectives for the Algebra curriculum. I have a plan to put some of our students in Algebra II that are at the level, but again it's a small amount. I'm asking the committee to please consider allowing some of the students that took Algebra I last year so that they have the foundational skills to be successful in Math in the future.

Thank you for your consideration,

Randy Grierson, Ed.D.

Principal

East Side High School

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"If you aren't willing today, don't be surprised tomorrow."

APA Comments on the *Foundations of Algebra* Course

From: Missy Tello [mailto:mtello@vwsd.org]
Sent: Friday, June 12, 2015 10:12 AM
To: Donnell Bell
Subject: Re: [s_cnslr] FW: Foundations to Algebra

Dear Mr. Bell,

Thank you for the update about Foundations of Algebra. I wonder 9th grade students that failed Algebra I this past year could take Foundations of Algebra in the fall before retaking Algebra I? We are going to a 4X4 schedule in the fall and wanted to give the students that failed Algebra, Foundations in the fall and Algebra I in the spring. Is that allowed?

Sincerely,

Missy Tello
Vicksburg High School

Title 7: Education K-12 Part 146

Mathematics | Foundations of Algebra

Foundations of Algebra is a one-credit course offered only to 9th grade students. The primary purpose of the *Foundations of Algebra* course is to provide a basis for curriculum development for rising 9th grade students in need of substantial support prior to taking Algebra I. The content of the *Foundations of Algebra* course focuses on equations, inequalities, functions, polynomials, geometry, and statistics as well as the standards of mathematical practice. The standards for this course were developed based on core content that should have been mastered by the end of the grade 8 and key skills that will be introduced in Algebra I. These standards are indicated in red font. Additional standards have been developed to ensure conceptual understanding. Students who have already successfully completed Algebra I may not take this course.

Teachers of this course are encouraged to incorporate real-world contexts, appropriate manipulatives, and technology to assist students in developing the conceptual understanding needed to master course content.

Foundations of Algebra Course

Equations and Inequalities

1	Interpret key features of an expression (i.e., terms, factors, and coefficients). (A-SSE.1a)
2	Create expressions that can be modeled by a real-world context.
3	Use the structure of an expression to identify ways to rewrite it. (A-SSE.2)
4	Simplify and evaluate numerical and algebraic expressions. (7.EE.1)
5	Compare and contrast an expression and an equation and give examples of each.
6	Given an equation, solve for a specified variable of degree one (i.e. <i>isolate a variable</i>). (6.EE.7, 7.EE.4)
7	Fluently solve and check multi-step equations and inequalities with an emphasis on the distributive property, variables on both sides, and rational coefficients. Explain each step when solving a multi-step equation and inequality. Justify each step using the properties of real numbers.
8	Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. (7.EE.4a)
9	Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p , q , and r are specific rational numbers. Solve inequalities of these forms fluently. (7.EE.4b)
10	Graph the solution point of an equation and the solution set of an inequality in one variable on a horizontal number line. For inequalities, be able to interpret and write the solution set in a variety of ways (e.g., set notation).
11	Justify when linear equations in one variable will yield one solution, infinitely many solutions, or no solution. (8.EE.7a)

Functions

12	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. Use function notation, where appropriate. (F-IF.1, F-IF.2)
13	Compare and contrast a function and a relation. Use appropriate strategies to assess whether a given situation represents a function or a relation (e.g., the vertical line test).
14	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. (F-IF.7)
15	Determine the rate of change of a linear function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. (8.F.4) Use the rate of change to determine if two lines are parallel, perpendicular, or neither.
16	Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. (8.F.4)
17	Create and graph the equation of a linear function given the rate of change and y-intercept. Compare and contrast up to three linear functions written in a various forms (i.e., point-slope, slope-intercept, standard form).
18	Given two points, a graph, a table of values, a mapping, or a real-world context determine the linear function that models this information. Fluently convert between the point-slope, slope-intercept, and standard form of a line.

Foundations of Algebra Course

19	Create and identify the parent function for linear and quadratic functions in the Coordinate Plane.
20	Compare the properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.</i> (Limited to linear and quadratic functions only.) (8.F.2)
21	Describe the following characteristics of linear and quadratic parent functions by inspection: domain/range, increasing/decreasing intervals, intercepts, symmetry, and asymptotic behavior. Identify each characteristic in set notation or words, where appropriate. (Algebra III, standard 8)
22	Graph a system of two functions, $f(x)$ and $g(x)$, on the same Coordinate Plane by hand for simple cases, and with technology for complicated cases. Explain the relationship between the point(s) of intersection and the solution to the system. Determine the solution(s) using technology, a tables of values, substitution, or successive approximations. (Limited to linear and quadratic functions only.) (8.EE.7b, A-REI.6, A-REI.11)
23	With accuracy, graph the solutions to a linear inequality in two variables as a half-plane, and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes on the same Coordinate Plane. (A-REI.12) Construct graphs of linear inequalities and systems of linear inequalities without technology. Use appropriate strategies to verify points that may or may not belong to the solution set.
24	Identify real-world contexts that can be modeled by a system of inequalities in two variables. (Limited to three inequalities.)
25	Identify when systems of equations and inequalities have constraints. (A-CED.3)
26	Perform simple translations on linear functions given in a variety of forms (e.g., two points, a graph, a table of values, a mapping, slope-intercept form, or standard form). Explain the impact on the parent function when the slope is greater than one or less than one and the effect of increasing/decreasing the y-intercept.
27	Given the graph of function in the form $f(x) + k$, $kf(x)$, $f(kx)$, or $f(x + k)$, where k belongs to the set of integers, identify the domain/range, increasing/decreasing intervals, intercepts, symmetry, and asymptotic behavior, where appropriate. (F-BF.3) Identify each characteristic in set notation or as an inequality, where appropriate. (Limited to linear and quadratic functions only.)
28	Identify and graph real-world contexts that can be modeled by a quadratic equation.
29	Solve quadratic equations in standard form by factoring, graphing, tables, and the Quadratic Formula. Know when the Quadratic Formula might yield complex solutions and the location of the solutions in relationship to the x-axis. Know suitable alternatives for the terminology “ <i>solution of a quadratic</i> ” and when each is appropriate to use.
30	Understand the relationship between the constants of a quadratic equation and the attributes of the graph. Recognize the relationship between the value of the discriminant and the type and number of solutions (i.e., <i>predict the characteristics of a graph given the equation</i>).
Polynomials	
31	Describe and identify a polynomial of degree one, two, three and four by examining a polynomial expression or a graph.

Foundations of Algebra Course

32	Add and subtract polynomials using appropriate strategies (e.g. by using Algebra Tiles).
33	Factor polynomials using the greatest common factor and factor quadratics that have only rational zeros.
34	Justify why some polynomials are prime over the rational number system.
35	Use the zeros of a polynomial to construct a rough graph of the function. (A-APR.3)
Geometry	
36	Explain and apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (8.G.7)
37	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. (8.G.8)
38	Fluently use formulas and/or appropriate measuring tools to find length and angle measures, perimeter, area, volume, and surface area of polygons, circles, spheres, cones, cylinders, pyramids, and composite or irregular figures. Use them to solve real-world and mathematical problems. (8.G.9)
39	Solve real-world and mathematical problems involving two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. (7.G.6,)
Statistics	
40	Without technology, fluently calculate the measures of central tendency (mean, median, mode), measures of spread (range, interquartile range), and understand the impact of extreme values (outliers) on each of these values. (6.SP.5, 8.SP.1, S-ID.3) Justify which measure is appropriate to use when describing a data set or a real-world context.
41	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. (8.SP.1)
42	Know when it is and is not appropriate to use a linear model to make predictions about a data set beyond a given set of values. Explain extrapolation and interpolation and the impact both have on predicted values.
43	For scatter plots that suggest a linear association, informally fit a straight line and predict the equation for the line of best fit. (8.SP.2)
44	Justify the relationship between the correlation coefficient and the rate of change for the line of best fit.
45	Understand the difference between correlation and causation and identify real-world contexts that depict each of them. (S-ID.9)

Foundations of Algebra Course

Additional Resource

2015 Mississippi College- and Career-Standards Scaffolding Document

The primary purpose of the 2015 Mississippi College- and Career-Readiness Standards Scaffolding Document is to provide teachers with a deeper understanding of the Standards as they plan for classroom instruction. Based on the 2015 Mississippi College- and Career-Readiness Standards for Mathematics, this document provides a close analysis of the requirements for student mastery. Because of the rigor and depth of the Standards, scaffolding instruction to meet the needs of all learners is essential to individual success. The Scaffolding Document will aid teachers' understanding of how to teach the Standards through a natural progression of student mastery. The Scaffolding Document can be found at <http://www.mde.k12.ms.us/ESE/ccr>.

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.