Indiana Department of Education

Indiana Academic Standards for Mathematics – Algebra 2
Adopted April 2014 – Standards Correlation Guide Document 5-28-2014

	Indiana Academic Standards for Mathematics – Algebra 2 Adopted April 2014 Standards Correlation Guide Document	Indiana Academic Mathematics Standard Adopted 2000	Common Core State Standard for Mathematics	Differences From Previous Standards
		Process Standards		
MA.AII.PS.1: Make sense of problems and persevere in solving them.	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway, rather than simply jumping into a solution attempt. They consider analogous problems and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" and "Is my answer reasonable?" They understand the approaches of others to solving complex problems and identify correspondences between different approaches. Mathematically proficient students understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	Connections Connecting mathematical concepts includes linking new ideas to related ideas learned previously, helping students to see mathematics as a unified body of knowledge whose concepts build upon each other. Major emphasis should be given to ideas and concepts across mathematical content areas that help students see that mathematics is a web of closely connected ideas (algebra, geometry, the entire number system). Mathematics is also the common language of many other disciplines (science, technology, finance, social science, geography) and students should learn mathematical concepts used in those disciplines. Finally, students should connect their mathematical learning to appropriate real-world contexts. A2.10.1 Use a variety of problem-solving strategies, such as drawing a diagram, guess-and-check, solving a simpler problem, writing an equation, and working backwards. A2.10.2 Decide whether a solution is reasonable in the context of the original situation.	1 Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.	IAS 2014 removes criteria involving a graphing calculator and does not distinguish between younger and older students.
MA.AII.PS.2: Reason abstractly and quantitatively.	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	A2.10.4 Use the properties of number systems and the order of operations to justify the steps of simplifying functions and solving equations. A2.10.5 Understand that the logic of equation solving begins with the assumption that the variable is a number that satisfies the equation and that the steps taken when solving equations create new equations that have, in most cases, the same solution set as the original. Understand that similar logic applies to solving systems of equations simultaneously.	2 Reason abstractly and quantitatively. Mathematically proficient students make sense of the quantities and their relationships in problem situations. Students bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	IAS 2014 is similar to common core, both expand upon IAS 2000 by having the student decontextualize problems and develop quantitative reasoning.

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MA.AII.PS.3: Construct viable arguments and critique the reasoning of others.	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They analyze situations by breaking them into cases and recognize and use counterexamples. They organize their mathematical thinking, justify their conclusions and communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. They justify whether a given statement is true always, sometimes, or never. Mathematically proficient students participate and collaborate in a mathematics community. They listen to or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	Communication The ability to read, write, listen, ask questions, think, and communicate about math will develop and deepen students' understanding of mathematical concepts. Students should read text, data, tables, and graphs with comprehension and understanding. Their writing should be detailed and coherent, and they should use correct mathematical vocabulary. Students should write to explain answers, justify mathematical reasoning, and describe problem-solving strategies. A2.10.3 Decide if a given algebraic statement is true always, sometimes, or never (statements involving rational or radical expressions or logarithmic or exponential functions). A2.10.6 Use counterexamples to show that statements are false.	3 Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	IAS 2014 is similar to common core, both expand upon IAS 2000 by having students construct arguments , use counterexamples, and critique others arguments. IAS 2014 does not distinguish between younger and older students.
MA.AII.PS.4: Model with mathematics.	Mathematically proficient students apply the mathematics they know to solve problems arising in everyday life, society, and the workplace using a variety of appropriate strategies. They create and use a variety of representations to solve problems and to organize and communicate mathematical ideas. Mathematically proficient students apply what they know and are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	Representation The language of mathematics is expressed in words, symbols, formulas, equations, graphs, and data displays. The concept of one-fourth may be described as a quarter, , one divided by four, 0.25, + , 25 percent, or an appropriately shaded portion of a pie graph. Higher-level mathematics involves the use of more powerful representations: exponents, logarithms, π, unknowns, statistical representation, algebraic and geometric expressions. Mathematical operations are expressed as representations: +, =, divide, square. Representations are dynamic tools for solving problems and communicating and expressing mathematical ideas and concepts.	4 Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	IAS 2014 has removed examples and does not distinguish between younger and older students.

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MA.AII.PS.5: Use appropriate tools strategically.	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Mathematically proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. Mathematically proficient students identify relevant external mathematical resources, such as digital content, and use them to pose or solve problems. They use technological tools to explore and deepen their understanding of concepts and to support the development of learning mathematics. They use technology to contribute to concept development, simulation, representation, reasoning, communication and problem solving.	A2.10.1 Use a variety of problem-solving strategies, such as drawing a diagram, guess-and-check, solving a simpler problem, writing an equation, and working backwards.	5 Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.	IAS 2014 does not distinguish between younger and older students. Both IAS 2014 and CCSS expand upon IAS 2000 by having students consider more than just graphing.
MA.AII.PS.6: Attend to precision.	Mathematically proficient students communicate precisely to others. They use clear definitions, including correct mathematical language, in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They express solutions clearly and logically by using the appropriate mathematical terms and notation. They specify units of measure and label axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently and check the validity of their results in the context of the problem. They express numerical answers with a degree of precision appropriate for the problem context.	Communication The ability to read, write, listen, ask questions, think, and communicate about math will develop and deepen students' understanding of mathematical concepts. Students should read text, data, tables, and graphs with comprehension and understanding. Their writing should be detailed and coherent, and they should use correct mathematical vocabulary. Students should write to explain answers, justify mathematical reasoning, and describe problem-solving strategies.	6 Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.	IAS 2014 does not distinguish between younger and older students.
MA.AII.PS.7: Look for and make use of structure.	Mathematically proficient students look closely to discern a pattern or structure. They step back for an overview and shift perspective. They recognize and use properties of operations and equality. They organize and classify geometric shapes based on their attributes. They see expressions, equations, and geometric figures as single objects or as being composed of several objects.	A2.10.4 Use the properties of number systems and the order of operations to justify the steps of simplifying functions and solving equations.	7 Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 – 3(x – y)2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.	IAS 2014 has removed examples and does not distinguish between younger and older students. Both IAS 2014 and CCSS expand upon IAS 2000 by having students discern patterns, structure, geometric figures, and composition of objects.

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MA.AII.PS.8: Look for and express regularity in repeated reasoning.	Mathematically proficient students notice if calculations are repeated and look for general methods and shortcuts. They notice regularity in mathematical problems and their work to create a rule or formula. Mathematically proficient students maintain oversight of the process, while attending to the details as they solve a problem. They continually evaluate the reasonableness of their intermediate results.		8 Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation (y – 2)/(x – 1) = 3. Noticing the regularity in the way terms cancel when expanding (x – 1)(x + 1), (x – 1)(x2 + x + 1), and (x – 1)(x3 + x2 + x + 1) might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.	IAS 2014 has removed examples and does not distinguish between younger and older students.
Complex Numbers and Expressions				
MA.AII.CNE.1:	AII.CNE.1: Know there is an imaginary number, i, such that i^2 = -1, and every complex number can be written in the form a + bi, with a and b real. Use the relation i^2 = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	A2.3.1 Define complex numbers and perform basic operations with them.	N-CN.1 Know there is a complex number i such that i^2 = –1, and every complex number has the form a + bi with a and b real. N-CN.2 Use the relation i^2 = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	IAS2014 Combines the two CCSS standards
MA.AII.CNE.2:	AII.CNE.2: Translate expressions between radical and exponent form and simplify them using the laws of exponents.	A1.1.4 Use the laws of exponents for rational exponents.	N-RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.	IAS2014 Asks students to translate between radical and exponential forms
MA.AII.CNE.3:	AII.CNE.3: 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 algebraic rational expressions.	A2.6.2 Add, subtract, multiply, divide, and simplify algebraic fractions.		IAS2014 Ask students to understand this is a closed system.
MA.AII.CNE.4:	AII.CNE.4: Rewrite algebraic rational expressions in equivalent forms (e.g., using laws of exponents and factoring techniques).	A1.7.1 Simplify algebraic ratios. A2.6.3 Simplify complex fractions.		IAS2014 Includes using factoring techniques
MA.AII.CNE.5:	AII.CNE.5: Rewrite rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using long division and synthetic division.	A2.6.3 Simplify complex fractions. A1.6.5 Divide polynomials by monomials.		IAS2014 Is very specific about the forms for the solutions
MA.AII.CNE.6:	AII.CNE.6: Find partial sums of arithmetic and geometric series and represent them using sigma notation.	A2.8.3 Find partial sums of arithmetic and geometric series.		IAS2014 Ask students to use Sigma Notation
Functions				
MA.AII.F.1:	AII.F.1: Determine whether a relation represented by a table, graph, or equation is a function.	A1.3.3 Understand the concept of a function, decide if a given relation is a function, and link equations to functions.		IAS2014 includes table recognized as functions
MA.AII.F.2:	AII.F.2: Understand composition of functions and combine functions by composition.	A2.1.3 Understand composition of functions and combine functions by composition.		
MA.AII.F.3:	AII.F.3: Understand that an inverse function can be obtained by expressing the dependent variable of one function as the independent variable of another, as f and g are inverse functions if and only if f(x)=y and g(y)=x, for all values of x in the domain of f and all values of y in the domain of g. Find the inverse of a function that has an inverse.			This standard is NEW
MA.AII.F.4:	AII.F.4: Understand that if the graph of a function contains a point (a, b), then the graph of the inverse relation of the function contains the point (b, a); the inverse is a reflection over the line y = x.			This standard is NEW

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MA.AII.F.5:	AII.F.5: Describe the effect on the graph of f(x) by replacing f(x) with f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative) with and without technology. Find the value of k given the graph of f(x) and the graph of f(x) + k, k f(x), f(kx), or f(x + k).			This standard is NEW
		System of Equations		
MA.AII.SE.1:	AII.SE.1: Solve a system of equations consisting of a linear equation and a quadratic equation in two variables algebraically and graphically with and without technology (e.g., find the points of intersection between the line y = –3x and the circle x^2 + y^2 = 3).	A2.3.7 Solve pairs of equations, one quadratic and one linear or both quadratic.	A-REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line y = –3x and the circle x^2 + y^2 = 3.	
MA.AII.SE.2:	AII.SE.2: Solve systems of two or three linear equations in two or three variables algebraically and using technology.	A2.2.2 Use substitution, elimination, and matrices to solve systems of two or three linear equations in two or three variables.		IAS2014 Includes using technology to solve systems of equations and does not spell out specific methods to use like the IAS2000 shows
MA.AII.SE.3:	AII.SE.3: Represent real-world problems using a system of linear equations in three variables and solve such problems with and without technology. Interpret the solution and determine whether it is reasonable.	A2.2.3 Use systems of linear equations and inequalities to solve word problems.		IAS2014 Uses real-world context for the problems
		Quadratics Equations and Functions		
MA.AII.Q.1:	AII.Q.1: Represent real-world problems that can be modeled with quadratic functions using tables, graphs, and equations; translate fluently among these representations. Solve such problems with and without technology. Interpret the solutions and determine whether they are reasonable.	A2.2.4 Find a linear equation that models a data set using the median fit method and use the model to make predictions.		IAS2014 Uses real-world context for the problems and has the students translate fluently between forms
MA.AII.Q.2:	AII.Q.2: Use completing the square to rewrite quadratic functions into the form y = a(x + h)^2 + k, and graph these functions with and without technology. Identify intercepts, zeros, domain and range, and lines of symmetry. Understand the relationship between completing the square and the quadratic formula.	A1.8.4 Complete the square to solve quadratic equations.	A-SSE.3.a Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Factor a quadratic expression to reveal the zeros of the function it defines.	IAS2014 Includes using technology to solve quadratics and relates the quadratic formula to completing the square
MA.AII.Q.3:	AII.Q.3: Use the discriminant to determine the number and type of solutions of a quadratic equation in one variable with real coefficients; find all solutions and write complex solutions in the form of a ± bi for real numbers a and b.		N-CN.7 Solve quadratic equations with real coefficients that have complex solutions.	IAS2014 Has students use the discriminant to determine the number of solutions
		Exponential & Logarithmic Equations and Functions		
MA.AII.EL.1:	AII.EL.1: Write arithmetic and geometric sequences both recursively and with an explicit formula; use them to model situations and translate between the two forms.	A2.8.1 Define arithmetic and geometric sequences and series. A2.8.4 Solve word problems involving applications of sequences and series.		
MA.AII.EL.2:	AII.EL.2: Graph exponential functions with and without technology. Identify and describe features, such as intercepts, zeros, domain and range, and asymptotic and end behavior.	A2.7.1 Graph exponential functions.	F-IF.7.e Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	IAS2014 Includes using technology to graph exponential functions
MA.AII.EL.3:	AII.EL.3: Identify the percent rate of change in exponential functions written as equations, such as y = (1.02)^t, y = (0.97)^t, y = (1.01)12^t, y = (1.2)^t/10, and classify them as representing exponential growth or decay.	A2.7.8 Solve word problems involving applications of exponential functions to growth and decay.	F-IF.8.b Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)^t, y = (0.97)^t, y = (1.01)12^t, y = (1.2)^t/10, and classify them as representing exponential growth or decay.	
MA.AII.EL.4:	AII.EL.4: Use the properties of exponents to transform expressions for exponential functions (e.g., the expression 1.15^t can be rewritten as (1.15^1/12)^12t ≈ 1.012^12t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%).		A-SSE.3.c Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15^t can be rewritten as (1.15^1/12)^12t ≈ 1.012^12t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.	IAS2014 Does not have students produce equivalent forms like the CCSS

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MA.AII.EL.5:	AII.EL.5: Know that the inverse of an exponential function is a logarithmic function. Represent exponential and logarithmic functions using graphing technology and describe their inverse relationship.	A2.7.3 Understand and use the inverse relationship between exponents and logarithms.	F-BF.5 Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.	IAS2014 Includes using technology to graph exponential and logarithmic functions
MA.AII.EL.6:	AII.EL.6: Use the laws of exponents to derive the laws of logarithms. Use the laws of logarithms and the inverse relationship between exponential functions and logarithms to evaluate expressions and solve equations in one variable.	A2.7.3 Understand and use the inverse relationship between exponents and logarithms.		IAS2014 Asks students to derive the laws of logarithms from the law of exponents
MA.AII.EL.7:	AII.EL.7: Represent real-world problems using exponential equations in one or two variables and solve such problems with and without technology. Interpret the solutions and determine whether they are reasonable.	PC.2.1 Solve word problems involving applications of logarithmic and exponential functions.		IAS2014 Students must check their solutions for reasonability
	Polynomial, Rational, and Other Equations and Functions			
MA.AII.PR.1:	AII.PR.1: Solve real-world and other mathematical problems involving polynomial equations with and without technology. Interpret the solutions and determine whether the solutions are reasonable.			This standard is NEW
MA.AII.PR.2:	AII.PR.2: Graph relations and functions including polynomial, square root, and piecewise-defined functions (including step functions and absolute value functions) with and without technology. Identify and describe features, such as intercepts, zeros, domain and range, end behavior, and lines of symmetry.	A2.1.1 Recognize and graph various types of functions, including polynomial, rational, and algebraic functions. A2.1.4 Graph relations and functions with and without graphing technology. A2.1.5 Find the zeros of a function. A2.1.7 Graph functions defined piece-wise. A2.2.1 Graph absolute value equations and inequalities.	F-IF.7.c Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	IAS2014 Goes further asking students to identify Domain and Range and lines of Symmetry
MA.AII.PR.3:	AII.PR.3: Solve real-world and other mathematical problems involving rational and radical function, including direct, inverse, and joint variation. Give examples showing how extraneous solutions may arise.		A-REI.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	IAS2014 Uses real-world context for the problems and includes direct, inverse, and joint variation.
	Data Analysis, Statistics, and Probability			
MA.AII.DSP.1:	AII.DSP.1: 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-IC.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.	IAS2014 Asks students to make inference and to recognizes when to use which process
MA.AII.DSP.2:	AII.DSP.2: Use technology to find a linear, quadratic, or exponential function that models a relationship for a bivariate data set to make predictions; compute (using technology) and interpret the correlation coefficient.	PS.3.4 Calculate and interpret the correlation coefficient of a set of data.		IAS2014 Includes using technology to find the correlation coefficient
MA.AII.DSP.3:	AII.DSP.3: Organize, graph (e.g., line plots and box plots), and compare univariate data of two or more different data sets using measures of center (mean and median) and spread (range, inter-quartile range, standard deviation, percentiles, and variance). Understand the effects of outliers on the statistical summary of the data.	PS.1.1 Create, compare, and evaluate different graphic displays of the same data, using histograms, frequency polygons, cumulative frequency distribution functions, pie charts, scatterplots, stem-and-leaf plots, and box-and-whisker plots. Draw these by hand or use a computer spreadsheet program. PS.1.2 Compute and use mean, median, mode, weighted mean, geometric mean, harmonic mean, range, quartiles, variance, and standard deviation.	S-ID.2 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.	IAS2014 includes the concept of outliers
MA.AII.DSP.4:	AII.DSP.4: Record multiple observations (or simulated samples) of random events and construct empirical models of the probability distributions. Construct a theoretical model and apply the law of large numbers to show the relationship between the two models.	PS.2.10 Use other continuous random variables and probability distributions to solve problems.		IAS2014 Asks students to construct a model to show the problem

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MA.AII.DSP.5:	AII.DSP.5: Understand dependent and independent events, and conditional probability; apply these concepts to calculate probabilities.	PS.2.3 Understand and use the multiplication rule to calculate probabilities for independent and dependent events.		
MA.AII.DSP.6:	AII.DSP.6: Understand the multiplication counting principle, permutations, and combinations; apply these concepts to calculate probabilities.	A2.9.1 Understand and apply counting principles to compute combinations and permutations. PS.2.1 Understand the counting principle, permutations, and combinations and use them to solve problems.		

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A2.1.2 Use function notation. Add, subtract, multiply, and divide pairs of functions.	N-Q.2 Define appropriate quantities for the purpose of descriptive modeling.
A2.3.2 Understand how real and complex numbers are related, including plotting complex numbers as points in the plane.	A-SSE.4 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. For example, calculate mortgage payments.
A2.3.3 Solve quadratic equations in the complex number system.	A-APR.4 Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity (x2 + y2)2 = (x2 – y2)2 + (2xy)2 can be used to generate Pythagorean triples.
A2.3.5 Solve word problems using quadratic equations.	A-REI.11 Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
A2.3.6 Solve equations that contain radical expressions.	F-IF.6 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.
A2.5.1 Understand the binomial theorem and use it to expand binomial expressions raised to positive integer powers.	F-IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
A2.5.2 Divide polynomials by others of lower degree.	F-BF.1.a Write a function that describes a relationship between two quantities. Determine an explicit expression, a recursive process, or steps for calculation from a context.
A2.5.3 Factor polynomials completely and solve polynomial equations by factoring.	F-LQE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
A2.5.4 Use graphing technology to find approximate solutions for polynomial equations.	F-LQE.4 For exponential models, express as a logarithm the solution to a bct = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.
A2.5.5 Use polynomial equations to solve word problems.	S-IC.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
A2.6.1 Understand and use negative and fractional exponents.	S-CP.3 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 the probability of A, and the conditional probability of B given A is the same as the probability of B.
A2.6.4 Solve equations involving algebraic fractions.	S-CP.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.

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		A2.6.5 Solve word problems involving fractional equations.	S-CP.6 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.	
		A2.6.6 Solve problems of direct, inverse, and joint variation.	S-CP.7 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.	
		A2.7.4 Solve logarithmic and exponential equations and inequalities.		
		A2.7.5 Use the definition of logarithms to convert logarithms from one base to another.		
		A2.7.7 Use calculators to find decimal approximations of natural and common logarithmic numeric expressions.		
		A2.8.2 Find specified terms of arithmetic and geometric sequences.		
		A2.9.2 Use the basic counting principle, combinations, and permutations to compute probabilities.		