Indiana Academic Standards for Mathematics – Pre-Calculus
Adopted April 2014 – Standards Correlation Guide Document 10/02/2017

	Indiana Academic Standard for Pre-Calculus Mathematics – Adopted April 2014	Indiana Academic Mathematics Standard Adopted 2000	Common Core State Standard for Mathematics	Differences From Previous Standards
Process Standards				
MA.PC.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. PC.9.1 Use a variety of problem-solving strategies, such as drawing a diagram, guess-and-check, solving a simpler problem, examining simpler problems, and working backwards. PC.9.2 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.PC.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.	PC.9.4 Use the properties of number systems and order of operations to justify the steps of simplifying functions and solving equations. PC.9.5 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.

	Indiana Academic Standard for Pre-Calculus Mathematics – Adopted April 2014	Indiana Academic Mathematics Standard Adopted 2000	Common Core State Standard for Mathematics	Differences From Previous Standards
MA.PC.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. PC.9.3 Decide if a given algebraic statement is true always, sometimes, or never (statements involving rational or radical expressions, trigonometric, logarithmic or exponential functions). PC.9.6 Define and use the mathematical induction method of proof.	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.PC.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.

Indiana Academic Standards for Mathematics – Pre-Calculus
Adopted April 2014 – Standards Correlation Guide Document 10/02/2017

	Indiana Academic Standard for Pre-Calculus Mathematics – Adopted April 2014	Indiana Academic Mathematics Standard Adopted 2000	Common Core State Standard for Mathematics	Differences From Previous Standards
MA.PC.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.		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.PC.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.

Indiana Academic Standards for Mathematics – Pre-Calculus
Adopted April 2014 – Standards Correlation Guide Document 10/02/2017

	Indiana Academic Standard for Pre-Calculus Mathematics – Adopted April 2014	Indiana Academic Mathematics Standard Adopted 2000	Common Core State Standard for Mathematics	Differences From Previous Standards
MA.PC.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.		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 × 5 + 7 × 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.
MA.PC.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.
Polar Coordinates and Complex Numbers				
MA.PC.PCN.1:	PC.PCN.1: Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.		N-CN.3 Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers. N-CN.6 Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.	IAS2014 Takes two CCSS standards and combines them so the entire concept is taught together instead of individual parts

Indiana Academic Standards for Mathematics – Pre-Calculus
Adopted April 2014 – Standards Correlation Guide Document 10/02/2017

	Indiana Academic Standard for Pre-Calculus Mathematics – Adopted April 2014	Indiana Academic Mathematics Standard Adopted 2000	Common Core State Standard for Mathematics	Differences From Previous Standards
MA.PC.PCN.2:	PC.PCN.2: Understand and use complex numbers, including real and imaginary numbers, on the complex plane in rectangular and polar form, and explain why the rectangular and polar forms of a given complex number represent the same number.	PC.6.3 Graph equations in the polar coordinate plane. PC.6.4 Define complex numbers, convert complex numbers to trigonometric form, and multiply complex numbers in trigonometric form.	N-CN.4 Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.	IAS2014 combines two standards from the IAS2000 to teach various forms of complex numbers.
MA.PC.PCN.3:	PC.PCN.3: Understand and use addition, subtraction, multiplication, and conjugation of complex numbers, including real and imaginary numbers, on the complex plane in rectangular and polar form.	PC.6.3 Graph equations in the polar coordinate plane. PC.6.4 Define complex numbers, convert complex numbers to trigonometric form, and multiply complex numbers in trigonometric form.	N-CN.3 Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers. N-CN.4 Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number. N-CN.5 Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation.	IAS2014 combines three standards from the CCSS to teach the various forms of complex numbers. IAS2014 combines two standards from the IAS2000 to teach various forms of complex numbers.
MA.PC.PCN.4:	PC.PCN.4: State, prove, and use DeMoivre's Theorem.	PC.6.5 State, prove, and use De Moivre's Theorem.		The IAS2014 is the same as the IAS2000
		Functions		
MA.PC.F.1:	PC.F.1: 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.	PC.1.5 Describe the symmetry of the graph of a function.	F-IF.4 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.	The IAS2014 is the same as the CCSS
MA.PC.F.2:	PC.F.2: Find linear models by using median fit and least squares regression methods. Decide which among several linear models gives a better fit. Interpret the slope and intercept in terms of the original context.	PC.8.1 Find linear models using the median fit and least squares regression methods. Decide which model gives a better fit.		IAS2014 Asks students to do more than the IAS2000 standard and interpret the slope and intercepts in context
MA.PC.F.3:	PC.F.3: Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.		F-IF.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.	The IAS2014 is the same as the CCSS without the specific examples
MA.PC.F.4:	PC.F.4: Determine if a graph or table has an inverse, and justify if the inverse is a function, relation, or neither. Identify the values of an inverse function/relation from a graph or a table, given that the function has an inverse. Derive the inverse equation from the values of the inverse.	PC.1.4 Define, find, and check inverse functions.	F-BF.4.a Find inverse functions. 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. For example, f(x) =2 x3 or $f(x) = (x+1)/(x-1)$ for $x \neq 1$. F-BF.4.c Find inverse functions. Read values of an inverse function from a graph or a table, given that the function has an inverse. F-BF.4.d Find inverse functions. Produce an invertible function from a non-invertible function by restricting the domain.	IAS2014 combines three standards from the CCSS to find inverse functions. IAS2014 combines two standards from the IAS2000 to find inverse functions.

Indiana Academic Standards for Mathematics – Pre-Calculus
Adopted April 2014 – Standards Correlation Guide Document 10/02/2017

	Indiana Academic Standard for Pre-Calculus Mathematics – Adopted April 2014	Indiana Academic Mathematics Standard Adopted 2000	Common Core State Standard for Mathematics	Differences From Previous Standards
MA.PC.F.5:	PC.F.5: Produce an invertible function from a non-invertible function by restricting the domain.			This standard is NEW
MA.PC.F.6:	PC.F.6: Describe the effect on the graph of replacing f(x) by f(x) + k, k f(x),f(kx), and f(x + k) for specific values of k (both positive and negative). Find the value of k given the graph f(x) and the graph of f(x) + k, k f(x), f(kx), or f(x + k). Experiment with cases and illustrate an explanation of the effects on the graph using technology. Recognize even and odd functions from their graphs and algebraic expressions.	PC.1.6 Decide if functions are even or odd. PC.1.7 Apply transformations to functions.	F-BF.3 Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	The IAS2014 is the same as the CCSS and goes into much more depth than the IAS2000
MA.PC.F.7:	PC.F.7: Decide if a function is continuous at a point. Find the types of discontinuities of a function and relate them to finding limits of a function. Use the concept of limits to describe discontinuity and end-behavior of the function.	PC.1.2 Find domain, range, intercepts, zeros, asymptotes, and points of discontinuity of functions. Use paper and pencil methods and graphing calculators.		IAS2014 goes into more depth relating limits to discontinuity and end-point behavior
MA.PC.F.8:	PC.F.8: Define arithmetic and geometric sequences recursively. Use a variety of recursion equations to describe a function. Model and solve word problems involving applications of sequences and series, interpret the solutions and determine whether the solutions are reasonable.	PC.7.4 Use recursion to describe a sequence. PC.7.6 Solve word problems involving applications of sequences and series.	F-BF.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	IAS2014 Has students model and solve real-world problems with sequences and series
MA.PC.F.9:	PC.F.9: Use iteration and recursion as tools to represent, analyze, and solve problems involving sequential change.	DM.3.1 Use recursive thinking to solve problems.		IAS2014 is basically the same as the IAS2000 standard
MA.PC.F.10:	PC.F.10: Describe the concept of the limit of a sequence and a limit of a function. Decide whether simple sequences converge or diverge. Recognize an infinite series as the limit of a sequence of partial sums.	PC.7.5 Understand and use the concept of limit of a sequence or function as the independent variable approaches infinity or a number. Decide whether simple sequences converge or diverge.		IAS2014 is basically the same as the IAS2000 standard
	Quadratic, Polynomial, and Rational Equations and Functions			
MA.PC.QPR.1:	PC.QPR.1: Use the method of completing the square to transform any quadratic equation into an equation of the form (x – p)^2 = q that has the same solutions. Derive the quadratic formula from this form.	A1.8.5 Derive the quadratic formula by completing the square.	A-REI.4.a Solve quadratic equations in one variable. Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x – p)2 = q that has the same solutions. Derive the quadratic formula from this form.	IAS2014 Asks students to derive the Quadratic Formula from the completing the square method.
MA.PC.QPR.2:	PC.QPR.2: Graph rational functions with and without technology. Identify and describe features such as intercepts, domain and range, and asymptotic and end behavior.	A2.5.7 Understand and describe the relationships among the solutions of an equation, the zeros of a function, the x-intercepts of a graph, and the factors of a polynomial expression.	F-IF.7.d Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.	IAS2014 Integrates technology for graphing rational functions
MA.PC.QPR.3:	PC.QPR.3: Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).	A2.5.6 Write a polynomial equation given its solutions. A2.5.7 Understand and describe the relationships among the solutions of an equation, the zeros of a function, the x-intercepts of a graph, and the factors of a polynomial expression.	A-APR.2 Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).	IAS2014 is the same as the CCSS standard and combines two IAS2000 standards into one
MA.PC.QPR.4:	PC.QPR.4: Understand the Fundamental Theorem of Algebra. Find a polynomial function of lowest degree with real coefficients when given its roots.	A2.5.6 Write a polynomial equation given its solutions.	N-CN.9 Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.	IAS2014 Combines both the IAS2000 and the CCSS standards together into one standard
	Exponential and Logarithmic Equations and Functions			

Indiana Academic Standards for Mathematics – Pre-Calculus
Adopted April 2014 – Standards Correlation Guide Document 10/02/2017

	Indiana Academic Standard for Pre-Calculus Mathematics – Adopted April 2014	Indiana Academic Mathematics Standard Adopted 2000	Common Core State Standard for Mathematics	Differences From Previous Standards
MA.PC.EL.1:	PC.EL.1: Use the definition of logarithms to convert logarithms from one base to another and prove simple laws of logarithms.	A2.7.2 Prove simple laws of logarithms.		IAS2014 is basically the same as the IAS2000 standard
MA.PC.EL.2:	PC.EL.2: Use the laws of logarithms to simplify logarithmic expressions and find their approximate values.	A2.7.6 Use the properties of logarithms to simplify logarithmic expressions and to find their approximate values.		IAS2014 is the same as the IAS2000 standard
MA.PC.EL.3:	PC.EL.3: Graph and solve real-world and other mathematical problems that can be modeled using exponential and logarithmic equations and inequalities; interpret the solution and determine whether it is reasonable.	PC.2.3 Draw and analyze graphs of logarithmic and exponential functions.		IAS2014 Asks students to do more than the IAS2000 standard asking student to solve real-world problems
MA.PC.EL.4:	PC.EL.4: Use technology to find a quadratic, exponential, logarithmic, or power function that models a relationship for a bivariate data set to make predictions; compute (using technology) and interpret the correlation coefficient.	PC.8.2 Calculate and interpret the correlation coefficient. Use the correlation coefficient and residuals to evaluate a "best-fit" line.		IAS2014 Integrates technology into making predictions and finding the correlation coefficient
		Parametric Equations		
MA.PC.PE.1:	PC.PE.1: Convert between a pair of parametric equations and an equation in x and y. Model and solve problems using parametric equations.	PC.1.8 Understand curves defined parametrically and draw their graphs.		IAS2014 Asks students to do more than the IAS2000 standard to model and solve parametric equations
MA.PC.PE.2:	PC.PE.2: Analyze planar curves, including those given in parametric form.	PC.1.8 Understand curves defined parametrically and draw their graphs.		The IAS2014 is the same as the IAS2000

Unaligned Indiana Academic Mathematics Standard Adopted 2000	Unaligned Common Core State Standard for Mathematics
PC.1.1 Recognize and graph various types of functions, including polynomial, rational, algebraic, and absolute value functions. Use paper and pencil methods and graphing calculators.	N-CN.8 Extend polynomial identities to the complex numbers. For example, rewrite x2 + 4 as (x + 2i)(x – 2i).
PC.1.3 Model and solve word problems using functions and equations.	N-VM.1 Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, |v|, ||v||, v).
PC.1.9 Compare relative magnitudes of functions and their rates of change.	N-VM.2 Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.
PC.2.2 Find the domain, range, intercepts, and asymptotes of logarithmic and exponential functions.	N-VM.4.a Add and subtract vectors. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.
PC.2.4 Define, find, and check inverse functions of logarithmic and exponential functions.	N-VM.4.b Add and subtract vectors. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.
PC.7.1 Understand and use summation notation.	N-VM.4.c Add and subtract vectors. Understand vector subtraction v – w as v + (–w), where –w is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.
PC.7.2 Find sums of infinite geometric series.	N-VM.5 Multiply a vector by a scalar.

Indiana Academic Standards for Mathematics – Pre-Calculus
Adopted April 2014 – Standards Correlation Guide Document 10/02/2017

	Indiana Academic Standard for Pre-Calculus Mathematics – Adopted April 2014	Indiana Academic Mathematics Standard Adopted 2000	Common Core State Standard for Mathematics	Differences From Previous Standards
		PC.7.3 Prove and use the sum formulas for arithmetic series and for finite and infinite geometric series.	N-VM.11 Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.	
			N-VM.12 Work with 2 x 2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.	
			F-BF.1.c Write a function that describes a relationship between two quantities. Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.	
			F-BF.4.b Find inverse functions. Verify by composition that one function is the inverse of another.	
			G-GMD.2 Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.	

	Indiana Academic Standard for Pre-Calculus Mathematics – Adopted April 2014	Indiana Academic Mathematics Standard Adopted 2000	Common Core State Standard for Mathematics	Differences From Previous Standards

Indiana Academic Standards for Mathematics – Pre-Calculus
Adopted April 2014 – Standards Correlation Guide Document 10/02/2017

	Indiana Academic Standard for Pre-Calculus Mathematics – Adopted April 2014	Indiana Academic Mathematics Standard Adopted 2000	Common Core State Standard for Mathematics	Differences From Previous Standards