Plainfield Public Schools

Plainfield Secondary Math

Sequence & Pacing Guide

New Jersey Student Learning Standard

REVISED

PLAINFIELD PUBLIC SCHOOLS

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Standards for Mathematical Practice

Mathematical Practice	Explanation
Mathematical Practice 1: Make sense of problems and persevere in solving them	High school students start to examine problems 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. By high school, 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. They check their answers to problems using different methods and continually ask themselves, —Does this make sense?‖ They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
Mathematical Practice 2: Reason abstractly and quantitatively.	High school students seek to make sense of quantities and their relationships in problem situations. They abstract a given situation and represent it symbolically, manipulate the representing symbols, and pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Students use quantitative reasoning to create coherent representations of the problem at hand; consider the units involved; attend to the meaning of quantities, not just how to compute them; and know and flexibly use different properties of operations and objects.
Mathematical Practice 3: Construct viable arguments and critique the reasoning of others.	High school 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. High school 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. High school students learn to determine domains to which an argument applies, listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

Mathematical Practice 4: Model with mathematics.	High school students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. 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. High school students 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
Mathematical Practice 5: Use appropriate tools strategically.	High school 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. High school students should be 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, 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. They 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.
Standard for Mathematical Practice 6: Attend to precision.	High school students try to communicate precisely to others by using clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, 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. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
Standard for Mathematical Practice 7: Look for and make use of structure	By high school, students look closely to discern a pattern or structure. In the expression x 2 + 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. High school students use these patterns to create equivalent expressions, factor and solve equations, and compose functions, and transform figures.
Standard for Mathematical Practice 8: Look for and express regularity in repeated reasoning.	High school students notice if calculations are repeated, and look both for general methods and for shortcuts. Noticing the regularity in the way terms cancel when expanding (x – 1)(x + 1), (x – 1)(x 2 + x + 1), and (x – 1)(x 3 + x 2 + x + 1) might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, derive formulas or make generalizations, high school students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

The Plainfield Secondary Math Curriculum is based on New Jersey Student Learning Standard. These standards are based on a philosophy of teaching and learning mathematics that is consistent with the current research and exemplary practices. Each unit is comprised of standards that are identified as major (), supporting ()and/or additional content(). Not all of the content in a given grade is emphasized equally in the standards. Some clusters require greater emphasis than others based on the depth of the ideas, time needed to master or model, and their importance to future grade level. Major standards are purposefully placed in tested grades for ensuring time for formal instruction. The goal of the curriculum is to ensure all students possess the following:

- conceptual understanding—comprehension of mathematical concepts, operations, and relations
- procedural fluency—skill in carrying out procedures flexibly, accurately, efficiently, and appropriately
- strategic competence—ability to formulate, represent, and solve mathematical problems
- adaptive reasoning—capacity for logical thought, reflection, explanation, and justification
- productive disposition—habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy.

Algebra II Pacing Chart

Unit /Quarter 1		
# Days	Topics	Standards
30	**Polynomials** • Use the Remainder Theorem to determine factors of a polynomial. • use the zeros of the polynomial to create rough graph; show key features of the graph, including end behavior. • prove polynomial identities. • write simple rational equations in one variable and use the rational equation to solve problems. • determine key features including intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maxima and minima; symmetries; end behavior. • find the solution to f(x)=g(x) approximately, e.g., using technology to 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.	HSA.APR.B.2 HSA.ASSE.A.2 HSA.APR.B.3a HSA.REI.A.1 HSA.REI.A.2 HSF.IF.B.4 HSF.IF.B.6 HSA.REI.D.11 HSF.IF.C.7 HSF.IF.C.7c HSA.APR. D.6 HSA.CED. A.1 HSA.APR.C.4 HSG.GPE.A.2

Unit / Quarter 2		
# Days	Topics	Standards
35	**Expressions and Equations** • Rewrite expressions containing radical notation into exponential expressions containing rational exponents. • Write simple rational equations in one variable and use the rational equation to solve problems. • Determine the practical domain of a radical function. • Determine key features including intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maxima and minima; symmetries; end behavior.	N.RN.1 N.RN.2 A.REI.1 A.REI.2 A.SSE.3 A.SSE.3c F.IF.4 A.APR.6 F.IF.C.8 F.IF.C.8c A.REI.C.6 A.REI. C.7 A.APR.D.6

Unit / Quarter 3		
# Days	Topics	Standards
35	**Statistics** • Use the mean and standard deviation of a normal distribution to estimate population percentages. • Identify and evaluate random sampling methods. • Design simulations of random sampling. • Explain how under coverage, nonresponse, and question wording can lead to bias in a sample survey. Explain how the results relate to variability in the population. • Visualize unions, intersections and complements of events with Venn diagrams. • use the probabilities to assess independence of two variables. calculate probabilities using the Addition rule P(A or B) = P(A) + P(B) – P(A and B).	S.IC.A.1 S.IC.A.2 S.IC.B.3 S.IC.B.4 S.IC.B.5 S.IC.A.6 S.ID.A.4 S.CP.A.1 S.CP.A.2 S.CP.A.3 S.CP.A.4 S.CP.A.5 S.CP.B.6 S.CP.B.7

Unit / Quarter 4		
#Days	**Topics**	**Standards**
35	**Expressions and Equations II** • Find the solution to f(x)=g(x) approximately, e.g., using technology to 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. • Use function notation to represent the inverse of a function – f-1(x); transform an equation in order to isolate the independent variable, recognizing that the domain/input for f(x) is the inverse function's range/output and that the range/output for f(x) is the inverse function's domain/input. • Graph trigonometric functions, showing period, midline, and amplitude. • Analyze residuals in order to informally evaluate the fit of exponential and trigonometric functions. • Use the unit circle to evaluate sine, cosine and tangent of standard reference angles.	N.Q.A.2 A.REI.11 F.BF.2 F. BF.B.4a F.IF.4 F.IF.7 F.IF.7e F.LE.B.5 S.ID.B.6.A

Glossary

Additional Content Standards: Standards that are taught in addition to the context for supporting and focus standards, but do not require the same level of attention.

Big Ideas: The foundational understandings – main ideas, conclusions, or generalizations relative to the unit's "unwrapped" concepts – that educators want their students to discover and state in their own words by the end of the unit of study. Big Ideas convey to students the benefit or value of learning the standards in focus that they are to remember long after instruction ends.

Depth of Knowledge (DOK): A four-level framework used to analyze the cognitive demand of a standard, assessment, or task.

- Level One – recall
- Level Two – skill/concept
- Level Three – strategic thinking
- Level Four – extended thinking

Essential Questions: Engaging, open-ended questions that educators use to spark student interest in learning the content of the unit about to commend. Even though plainly worded, they carry with them an underlying rigor. Responding to them in a way that demonstrates genuine understanding requires more than superficial thought. Along with the "unwrapped" concepts and skills from the Priority Standards, educators use the Essential Questions throughout the unit to sharply focus instruction and assessment.

Focus Standards: The most essential standards for students to master, the most critical outcomes of their learning experience. Focus Standards are "key learnings" that will prepare students for the next grade level

Supporting Standards: Standards that support, connect to, and enhance the Focus Standards. They are taught within the context of the Focus Standards but do not receive the same degree of instruction and assessment emphasis.