

# 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
<p><b>Mathematical Practice 1:</b> Make sense of problems and persevere in solving them</p>	<p>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.</p>
<p><b>Mathematical Practice 2:</b> Reason abstractly and quantitatively.</p>	<p>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.</p>
<p><b>Mathematical Practice 3:</b> Construct viable arguments and critique the reasoning of others.</p>	<p>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.</p>

<p><b>Mathematical Practice 4:</b> Model with mathematics.</p>	<p>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</p>
<p><b>Mathematical Practice 5:</b> Use appropriate tools strategically.</p>	<p>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.</p>
<p><b>Standard for Mathematical Practice 6:</b> Attend to precision.</p>	<p>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.</p>
<p><b>Standard for Mathematical Practice 7:</b> Look for and make use of structure</p>	<p>By high school, students look closely to discern a pattern or structure. In the expression <math>x^2 + 9x + 14</math>, older students can see the 14 as <math>2 \times 7</math> and the 9 as <math>2 + 7</math>. 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 <math>5 - 3(x - y)^2</math> as 5 minus a positive number times a square and</p>

	<p>use that to realize that its value cannot be more than 5 for any real numbers <math>x</math> and <math>y</math>. High school students use these patterns to create equivalent expressions, factor and solve equations, and compose functions, and transform figures.</p>
<p><b>Standard for Mathematical Practice 8:</b> Look for and express regularity in repeated reasoning.</p>	<p>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 <math>(x - 1)(x + 1)</math>, <math>(x - 1)(x^2 + x + 1)</math>, and <math>(x - 1)(x^3 + x^2 + x + 1)</math> 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.</p>

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.

## Geometry Pacing Chart

Unit /Quarter 1		
# Days	Topics	Standards
30	<p>Congruence and Construction</p> <ul style="list-style-type: none"> <li>• given two figures, decide if they are congruent by applying rigid motions.</li> <li>• given that corresponding pairs of sides and angles of two triangles are congruent, show, using rigid motion (transformations) that they are congruent.</li> <li>• explain the relation of the criteria for triangle congruence to congruence in terms of rigid motion.</li> <li>• perform formal constructions using a variety of tools and methods .</li> </ul>	<p>G.COB.6 ▲</p> <p>G.COB.7 ▲</p> <p>G.CO.B8 ▲</p> <p>G.CO.A.1 ●</p> <p>G.CO.A.2 ●</p> <p>G.CO.A.3 ●</p> <p>G.CO.A.4 ●</p> <p>G.CO.A.5 ●</p> <p>G.CO.C.9 ●</p> <p>G.CO.C10 ●</p> <p>G.CO.C.11 ●</p>







## Unit / Quarter 2

# Days	Topics	Standards
35	<b>Similarity &amp; Proof</b> <ul style="list-style-type: none"> <li>• Perform dilations in order to verify the impact of dilations on lines and line segments.</li> <li>• Explain, using similarity transformations, the meaning of similarity for triangles</li> <li>• Construct and explain proofs of theorems about triangles.</li> <li>• Construct and explain proofs of theorems about parallelograms .</li> </ul>	G.SRT.A.1 ▲ G.SRT.A.1a ▲ G.SRT. A.1b ▲ G.SRT.2 ▲ G.SRT.3 ▲ G.SRT.4 ▲ G.CO.10 ▲







## Unit / Quarter 3

# Days	Topics	Standards
35	<b>Trigonometry</b> <ul style="list-style-type: none"> <li>• Use coordinates to prove geometric theorems including:</li> <li>• Solve problems using the slope criteria for parallel and perpendicular lines</li> <li>• Given an equation of a circle in any form, use the method of completing the square to determine the center and radius of the circle</li> <li>• Show and explain that definitions for trigonometric ratios derive from similarity of right triangles.</li> <li>• Solve right triangles (determine all angle measures and all side lengths) using</li> </ul>	G.GPE. B.4 ▲ G.GPE. B.5 ▲ G.GPE. B.6 ▲ G.GPE. B.7 ▲ G.SRT.4 ▲ G.SRT.5 ▲ G.SRT.6 ▲



	trigonometric ratios and the Pythagorean Theorem. <ul style="list-style-type: none"> <li>• Prove properties of the angles of a quadrilateral that is inscribed in a circle.</li> </ul>	G.SRT.7  G.SRT.8  G.GPE.A.1  G.C.A.1  G.C.A.2  G.C.A.3 
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**Unit / Quarter 4**

<b>#Days</b>	<b>Topics</b>	<b>Standards</b>
35	<b>Extending Three Dimensional</b> <ul style="list-style-type: none"> <li>• Describe the measures and properties of geometric shapes that best represent a real-world object.</li> <li>• Model real-world situations, applying density concepts based on area and volume.</li> <li>• Solve design problems</li> <li>• Construct an informal argument for the formula for the volume of a cylinder, pyramid, and cone.</li> </ul>	G.MG.A.1  G.MG.A.2  G.MG.A.3  G.GMD.1  G.GMD.2  G.GMD.3 

# 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.