Pasco School District







Automatical and a constrained of the co



Acknowledgements

Special Appreciation goes to the District Math Pathways Team for sharing their time, expertise and a focus on student success:

- Carolynn Jones—Mathematics Specialist/Coach, Ochoa Middle School
- Corey Heitschmidt—Assistant Principal, McLoughlin Middle School
- Degen Bushman—Mathematics Teacher on Special Assignment, Pasco School District
- Dominique Dennis—Principal, McLoughlin Middle School
- Elizabeth Guzman—Instructional Coach, Captain Gray STEM Elementary
- Eriberto Frias—Mathematics Teacher/Instructional Coach, Curie STEM Elementary School
- Jacqueline Ramirez—Principal, Ochoa Middle School
- Jaki Gosch—K-8 iPAL Online Facilitator, McLoughlin Campus
- Kristen Donahue—Mathematics Teacher/Instructional Coach, Stevens Middle School
- Maria Keaney— Mathematics Teacher/Instructional Coach, McLoughlin Middle School
- Megan Nelson—Director of STEM Initiatives and Instructional Technology, Pasco School District
- Rachel Roders—Mathematics Teacher/Instructional Coach, Ochoa Middle School
- Shannon Lockard—Assistant Principal, Ochoa Middle School
- Whitney Billman—Mathematics Teacher/Instructional Coach, McClintock STEM Elementary School

Published: 9/27/2023

TABLE OF CONTENTS

Outrageous Outcomes and Mathematics	8
Background	1
Importance of Effective Middle School Math Placement	2
Mathematics Pathways	3
Mathematics Pathways Map	4
Mathematics Placement Criteria—5th to 6th Grade Transition	5
Mathematics Placement Criteria—6th to 7th Grade Transition	6
Mathematics Placement Criteria—7 _{th} to 8 _{th} Grade Transition	6
Washington State Learning Standards for Mathematics (CCSS-M)	7
Mathematics Course Descriptions	9
Curriculum Used in Secondary Mathematics Pathways Courses	12
Resources	13

OUTRAGEOUS OUTCOMES AND MATHEMATICS

As students transition from elementary to middle school, students continue with the next math course in their pathway sequence. However, those who consistently show strong aptitude with the Mathematical Practices as well as earn high scores on tests and quizzes may be good candidates to move to another pathway. A goal of the district is to have more students each year prepared to advance from the *Core Pathway* to the *Accelerated Pathway*. We believe the academic foundation built by students in grade-level mathematics courses allows more learners to be successful in a compacted course in the *Accelerated* or *Advanced* pathways.

All the work done in the Pasco School District pursues at least one of our five OUTRAGEOUS OUTCOMES. In fact, this project touches each of the outcomes related to mathematics. Particularly, by creating a system of support with multiple entry points for students when ready for higher-level mathematics, it is our goal that "100% of 9th grade students will pass Algebra by the end of 9th grade."¹

BACKGROUND

In the winter of 2016, the District established the Mathematics Pathways Team. The purposes of the team include:

- 1. Clearly defining data-driven benchmarks for placement in mathematics pathways
- 2. Providing clear communication to teachers, students and parents about best instructional placement practices
- 3. Supporting and monitoring instruction (teaching and learning) of mathematical concepts outlined in the Washington State Learning Standards for Mathematics (CCSS-M)²

The process to create the *Mathematics Pathways* included cross-functional contributions from elementary and secondary levels, including teachers and principals, as well as district administrators and support staff. This project was informed by the district's Highly Capable Advisory Committee. In the course of development parent focus groups provided feedback.

As in the past, student-learning data and other primary sources of feedback were utilized to evaluate the effectiveness of the system and to make necessary adjustments. This guide provides parents with information about readiness for acceleration. School and district personnel also use it as a resource for identifying best practices for math placement success and course completion in middle and high school.

IMPORTANCE OF EFFECTIVE PLACEMENT

Historically the primary purpose of middle school was to prepare students for high school. In elementary school, mathematics content regularly repeated across grade levels. In addition, most of middle school mathematics was a repeat of elementary school mathematics with the percent of new material decreasing each year through eighth grade. In a study of mathematics textbooks in the 1980s it is estimated that by 8th grade only about 30% of the material was new content.³ Because of the repetition, it became common practice to accelerate students to traditional Algebra classes by skipping the 7th or 8th grade course. However, with the shift in the Washington State Learning Standards, this no longer makes sense because mathematics content is not repeated, but instead builds from grade to grade.² *Therefore, if students accelerate without careful planning, they could miss major concepts that are the foundational building blocks for higher-level mathematics.*

Previously, rigor has been misinterpreted as doing higher grade-level mathematics at earlier grades. In reality, the expectation to balance conceptual understanding, fluency and application is lost when students independently forge ahead. According to a survey by ACT (American College Testing),⁴ college faculty rate topics from middle school and Algebra I as more important than advanced topics for college preparation. Thus, there is a necessity for students to take the time needed to master fundamental number, algebra, and geometry topics addressed in standards at the elementary- and middle-school levels with a depth and ability to communicate understanding.

Furthermore, it can be assumed that at the secondary teachers need to cover a broad range of topics in advanced mathematics courses, while teachers at the post-secondary level are more concerned that high school students receive a rigorous and in-depth coverage of fundamental mathematics such as number sense and algebra.⁵ A solid foundation in middle school mathematics and Algebra I better prepares a student to take an advanced course (beyond Algebra II) in high school, improving their likelihood for success in 4-year college level courses.⁴

In light of these shifts in the mathematics landscape, establishing an effective process of student placement in mathematics courses that maximizes the learning of foundational skills and concepts is paramount. Deep student understanding is the primary concern. We want students to master mathematical concepts and practices that grow success and ultimately leads to mathematical proficiency. This sets a foundation for continued confidence and learning during future courses. Furthermore, an effective placement process may affect when students are ready for high-level mathematics courses during their secondary and post-secondary careers.

MATHEMATICS PATHWAYS

nool District provides multiple pathways for students to

complete the mathematics courses that prepare them for college and career.

Students who pursue the **Core Pathway** through middle school and then continue through Algebra I, Geometry, and Algebra II will have the opportunity to complete Statistics or Pre-Calculus in high school. They will subsequently be ready to pursue college-level math courses after graduation. The **Core Pathway** is NOT "the low" pathway. Students on this trajectory are considered to be working at grade level. The district offers separate classes and interventions as resources for struggling students.

Students, who demonstrate readiness for and pursue the *Accelerated Pathway* through middle school, and complete Pre-Calculus in high school will also be college-ready and have an opportunity to complete at least one additional higher-level course such as Calculus or Statistics during their senior year.

Those students who meet requirements and pursue the *Advanced Pathway*, will be on a trajectory to complete Pre-Calculus as sophomores. They also have an opportunity to take at least two additional higher-level math courses such as Calculus, Calculus 2, and/or Statistics in their junior and senior years.

Students continue with the next math course in their trajectory as they progress from grade to grade along the pathway. However, there are opportunities for students to transfer pathways; either for struggling students who would benefit from another year of experience with a course, other appropriate intervention, or for students who demonstrate readiness for more challenge (see page 4 for pathway flowchart).





Updated - Spring 2021

MATHEMATICS PLACEMENT CRITERIA—5[™] TO 6[™] GRADE TRANSITION

Most students will begin 6th grade on the *Core Pathway*, placed in a Mathematics-Grade 6 course in order to establish a firm foundation in mathematical concepts and practices. The district bases initial placement decisions for students entering the *Core*, *Accelerated*, and *Advanced* pathways on scoring criteria derived from the student's percentile rankings on STAR Math and SBA Mathematics.⁶

Below are tables that provide a simple way to combine test scores to determine placement for student. During spring trimester of Grade 5, screening scores (i.e., STAR Math[®] and SBA Mathematics) are analyzed to determine an appropriate pathway placement for the next school year.

A combination of standardized test score will be the key indicator for placement into the pathways as students enter 6th grade. The table below indicates the domain points available. *

STAR PERCENTILE	STAR DOMAIN POINT VALUE
95-99	5
90-94	4
85-89	3
80-84	2
75-79	1
0-74	0

MATHEMATICS PLACEMENT SCORING VALUES

SBA LEVEL	SBA DOMAIN POINT VALUE
4	8
3	6
2	4
1	2

By adding the Domain Points earned from the STAR and the SBA Mathematics, a student will earn a

Total Domain Points score that will trigger their pathways placement.

TOTAL DOMAIN POINTS	MATHEMATICS PATHWAY
10-13	ACCELERATED
0-9	CORE

*Schools are given the option to consider the qualifications of additional students based on CoGAT, historical STAR and SBA data, and/or potential language considerations. Other considerations can include teacher input and evidence of rapid growth and/or potential. Those considerations will be determined by the building team at the request of staff, students, or guardians.

MATHEMATICS PLACEMENT CRITERIA—6[™] TO 7[™] GRADE TRANSITION

Like in previous grades, most students will begin 7th grade on the *Core Pathway*, placed in a Mathematics-Grade 7 course, using a similar scoring matrix. During spring of students' sixth grade year, screening scores are analyzed using the table to determine a change in pathway placement may be appropriate for the next year. In 7th grade, students can qualify for one of three pathways, *Core, Accelerated,* or *Advanced*. As in 6th grade, student will qualify based on scoring criteria derived from the student's percentile rankings on STAR Math and SBA Mathematics.⁷

STAR PERCENTILE	STAR DOMAIN POINT VALUE
95-99	5
90-94	4
85-89	3
80-84	2
75-79	1
0-74	0

MATHEMATICS PLACEMENT SCORING VALUES

SBA LEVEL	SBA DOMAIN POINT VALUE
4	8
3	6
2	4
1	2

By adding the Domain Points earned from the STAR and the SBA Mathematics, a student will earn a Total Domain Points score that will trigger their pathways placement.

TOTAL DOMAIN POINTS	MATHEMATICS PATHWAY
12-13	ADVANCED
10-11	ACCELERATED
0-9	CORE

*Schools are given the option to consider the qualifications of additional students based on CoGAT, historical STAR and SBA data, and/or potential language considerations. Other considerations can include teacher input and evidence of rapid growth and/or potential. Those considerations will be determined by the building team at the request of staff, students, or guardians.

MATHEMATICS PLACEMENT CRITERIA—8[™] TO 9[™] GRADE TRANSITION

Students who are in the Core Pathway will be scheduled to take an academically appropriate Algebra class. Schools will look at the student's percentile rankings on STAR Math and SBA Mathematics as well as in-class assessments, work, and teacher input. Combined with language and cognitive considerations, students will be scheduled into Algebra 1 or Intensified Algebra 1.

Algebra 1 will have students work at a normalized pacing, consistent with the traditional model of skill development established in the Common Core Mathematics Standards

Intensified Algebra 1 is a comprehensive, extended-period course that is designed to help students who are behind in their mathematics development. The objective in this course is to re-engage and motivate learners and have themsucceed in competing the Algebra 1 standards within a single academic year.

CONTINUING MATHEMATICS PLACEMENT MIDDLE SCHOOL AND HIGH SCHOOL

Students should continue on the Mathematics Pathway that they qualified for as they progress through middle school and high school. Academic progress will be monitored with continued assessment with the STAR Mathematics and SBA Math as well as in-class assessments and assignements. In the situation where a student is unsuccessful in maintain academic progress, the student may be removed from their mathematics pathway. As with high school credit acquisition, successful completion of the course will be necessary before moving on to the next course in the pathway.

WASHINGTON STATE LEARNING STANDARDS FOR MATHEMATICS (CCSS-M)

Washington, one of forty-three states, adopted the Common Core State Standards for Mathematics⁸ on July 11, 2011. In terms of both content and practice, these standards provide focus, clarity, and rigor to mathematics instruction.

For *K-8 Content Standards*, domains provide overarching structure and flow between grades. Whereas, the individual learning targets outlined are grade specific. For high school mathematics, a similar structure of conceptual categories (i.e., number and quantity, algebra, functions, modeling, geometry, and statistics and probability) provide the framework for the content standards.

Besides content standards, there are also *Practice Standards*,⁹ which rest on important "processes and proficiencies" with longstanding ties to mathematics education. Just as important to success in college mathematics as the content standards, these practices describe ways in which developing student practitioners of mathematics (as the discipline) increasingly ought to engage with the subject matter as they grow in maturity and expertise. Therefore, the Practice Standards span a student's K-12 career, forming the groundwork of what is means to "do mathematics" and are the "habits of mind" we want all to cultivate. Stemming out of these practices, students develop *mathematical proficiency* (i.e., conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and a productive disposition) during the various experiences and interactions they encounter along their pathway.¹⁰

Interventions and non-Pathway classes are available to assist students in reaching grade-level standards.

The Standards for Mathematical Practice are:

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

MATHEMATICS COURSE DESCRIPTIONS

6TH GRADE MATH COURSES

GRADE 6 MATH



Grade 6 Math addresses all the sixth-grade standards as outlined by the Washington State Learning Standards. This course emphasizes rigor and real-world relevance while embedding the Standards for Mathematical Practice. In the Mathematics–Grade 6 course, students explore the following content areas:

- •
- ★ Algebraic Expressions and Properties
- ★ Area of Polygons
- Equations and Inequalities
- ★ Multi-Digit Computation, Factors, and Multiples
- ★ Operations with Fractions and Decimals
- ★ Ratios, Rates, and Proportional Reasoning
- ★ Statistical Displays and Their Attribute
- ★ Statistics Measures of Center and Variability
- Volume and Surface Area
- ★ Working with the Rational Number System (Integers)

MATHEMATICS-COMPACTED 6-7 (PREREQUISITE-5[™] GRADE MATH STANDARDS)

Accelerated PATHWAY Mathematics–Compact 6-7 addresses all the sixth and part of the seventh-grade standards outlined in the Washington State Learning Standards for Mathematics. This course emphasizes rigor and real-world relevance while infiltrating the Standards for Mathematical

Practice. In the Mathematics–Compact 6-7 course, students investigate the following concepts:

- ★ Algebraic Expressions and Properties
- ★ Area of Polygons
- ★ Equations and Inequalities
- ★ Formulas of Circles
- ★ Multi-Digit Computation, Factors, and Multiples
- ★ Operations with Fractions and Decimals
- ★ Ratios, Unit Rates, and Proportional Reasoning
- ★ Statistical Displays and Their Attribute
- ★ Statistics Measures of Center and Variability
- ★ Surface Area, Volume, and Nets
- ★ Compare Data Displays to Infer About Two Populations
- ★ Use Random Sampling to Infer About a Population
- ★ Working with the Rational Number System (Integers)

MATHEMATICS-COMPACTED 7-8 (PREREQUISITE-COMPACTED 6-7 MATH STANDARDS)

Advanced PATHWAY

Mathematics–Compact 7-8 addresses the second part of the seventh grade and most eighth grade standards as outlined by the Washington State Standards for Mathematics. This course emphasizes rigor and real-world relevance while engaging the Standards for

Mathematical Practice. In the Mathematics–Compact 7-8 course, students consider the following ideas:

- ★ Construct and Describe Geometric Figures and Understand The Relationship Between Them
- Expressions, Equations, Functions, and Inequalities
 Probability and Evaluating Models of Probability
- ★ Ratios, Proportional Reasoning, and Percentages
- ★ Explore Characteristics of Congruence and Similarity

- ★ Recognize and Connect Proportional Relationships to Linear Functions
- ★ Surface Area and Volume of all solids
- ★ Transformations of Figures, Angles, Triangles and Circles
- ★ Understand and Use Real Numbers (Rational and Irrational)
- ★ Working with Radicals and Integer Exponents
- * *

7TH GRADE MATH COURSES

MATHEMATICS-GRADE 7



Mathematics–Grade 7 addresses all the seventh-grade standards as outlined by the Washington State Learning Standards. This course emphasizes rigor and real-world relevance while infusing the Standards for Mathematical Practice. In the Mathematics–Grade 7 course, students explore the following content areas:

*

- * Constructions and Scale Drawings
- Expressions, Equations, and Inequalities \star
- * Facts about Angles to Solve Problems
- Formulas of Circles *
- **Operations with Integers** \star
- **Probability and Statistics** \star
- **Ratios, Proportions and Percentages** *
- Surface Area and Volume \star
- Using the Rational Number System \star

MATHEMATICS-COMPACTED 7-8 (PREREQUISITE-COMPACTED 6-7 MATH STANDARDS)



Mathematics–Compact 7-8 addresses the second part of the seventh and all eighth-grade standards as outlined in the Washington State Learning Standards. This course prepares students with the final skills and understanding necessary before taking their high school

algebra course. Instruction emphasizes the Mathematical Practices by integrating rigorous and realworld problem solving. In the Mathematics–Compact 7-8 course, students investigate these big ideas:

- Construct and Describe Geometric Figures and \star Understand The Relationship Between Them
- \star Explore Characteristics of Congruence and Similarity
- Expressions, Equations, Functions, and Inequalities \star
- Probability and Evaluating Models of Probability *
- Ratios, Proportional Reasoning, and Percentages \star
- **Recognize and Connect Proportional Relationships to** * **Linear Functions**
- Surface Area and Volume of all solids *
- Transformations of Figures, Angles, Triangles and Circles
- Understand and Use Real Numbers (Rational and Irrational)
- Working with Radicals and Integer Exponents

MATHEMATICS-COMPACTED 8-ALGEBRA I (PREREQUISITE-COMPACTED 7-8 MATH STANDARDS)



Mathematics-Compact 8-Algebra I addresses the second part of the eighth grade and all Algebra I standards as outlined in the Washington State Learning Standards for Mathematics. This course stresses rigor and real-world relevance while engaging students in the Mathematical Practices. In this compacted course, students examine these mathematics concepts:

- ★ Descriptive Statistics to Model Data
- ★ Exponential, Quadratic, and Piecewise Functions
- ★ Expressions to Solve Problems
- ★ Patterns of Association in Bivariate Data
- ★ Polynomial Operations
- ★ Properties of Real Numbers
- ★ Radicals and Exponents
- ★ Representations and Quantitative Reasoning
- ★ Systems of Linear Equations and Inequalities
- ★ The Pythagorean Theorem

8[™] GRADE MATH COURSES

MATHEMATICS-GRADE 8



Mathematics–Grade 8 addresses all of eighth grade standards as outlined by the Washington State Learning Standards. It also provides Grade 8 students with a study of Linear Equations and Functions, preparing them for a full algebra experience as freshmen.

This course emphasizes rigor and real-world relevance while incorporating the Mathematical Practices. In the Mathematics–Grade 8 course, students investigate the following big ideas:

- ★ Expressions, Equations, Functions, and Inequalities
- ★ Geometric Figures and Their Relationships
- ★ Explore Characteristics of Congruence and Similarity
- ★ Patterns of Association in Bivariate Data
- ★ Solving Linear and Systems of Linear Equations
- ★ Surface Area and Volume of all solids
- ★ Systems of Linear Equations
- ★ Transform Figures, Angles, Triangles and Circles
- ★ Understand and Apply the Pythagorean Theorem
- ★ Use Real Numbers (Rational and Irrational)
- ★ Working with Radicals and Integer Exponents

MATHEMATICS-COMPACT 8-ALGEBRA I (PREREQUISITE-COMPACTED 7-8 MATH STANDARDS)

Accelerated PATHWAY Mathematics–Compact 8-Algebra I addresses the second part of the eighth grade and all Algebra I standards as outlined in the Washington State Learning Standards. This course stresses rigor and real-world relevance while engaging students in the Mathematical

Practices. In this compacted course, students examine the following mathematics concepts:

- ★ Descriptive Statistics to Model Data
- ★ Expressions to Solve Problems
- ★ Linear, Exponential, Quadratic, and Piecewise Functions
- ★ Patterns of Association in Bivariate Data
- ★ Polynomial Operations
- ★ Properties of Real Numbers
- ★ Radicals and Exponents
- * Representations and Quantitative Reasoning
- ★ Systems of Linear Equations and Inequalities
- ★ The Pythagorean Theorem

GEOMETRY (PREREQUISITE—COMPACTED 8-ALGEBRA I MATH STANDARDS)



Geometry at the middle school is analogous to the Geometry taught at high school by aligning to the Washington State Learning Standards for Mathematics. Instruction highlights the Standards for Mathematical Practices, integral to developing a student's ability to solve

problems in the real world and mathematical situations. In the Geometry course, students investigate these major topics:

★ Circles, Chords, Arcs, Angles

Shapes

★ Circumference, Area, and Volume of Planer and Solid

★ Conditional Statements and Converses

- ★ Congruence and Similarity
- ★ Constructions and Transformations on Coordinates
- ★ Deductive Reasoning Logic, Postulates, and Proofs
- ★ Lines, Angles, and Transversals
- ★ Making Connections Between Algebra and Geometry
- ★ Quadrilaterals and Other Polygons
- ★ Right and Non-Right Triangles and Trigonometric Relationships

CURRICULUM USED IN SECONDARY MATHEMATICS PATHWAY COURSES

Rigorous college- and career-ready standards improve and deepen student learning. However, to reach these standards, teachers need access to high quality, well-aligned instructional materials



that support learning. At the same time, curricular materials claiming alignment to the Common Core have saturated the market. Yet many such claims are proven inaccurate based on independent analysis of program alignment (e.g., EdReports.org). Thus, in April 2016, the board of directors adopted Agile Mind as the district's core curriculum for 7th grade through Algebra II.

Agile Mind supports the development and implementation of rigorous curricula and interventions, designed by leading academics researchers and practitioners. Their middle and high school mathematics programs, authored by the Charles A. Dana Center at the University of Texas at Austin, in partnership with their community of educator-users, is deeply committed to supporting the design and implementation of college-ready standards.

In an independent review, <u>EdReports.org</u> gave top marks to Agile Mind Mathematics at both middle school (6-8 grades) and high school levels.¹¹

RESOURCES

1. Use the QR code



to access more information about the Outrageous Outcomes or on district website https://www.psd1.org/domain/1367

2. Access the Washington State Learning Standards for Mathematics via the QR code http://k12.wa.us/



or from the OSPI webpage

Use the QR code 3. called "How Much Teachers of



to access Flanders, J.R. (1987) article in The Arithmetic Teacher, Vol. 35, No. 1, pp. 18-23, of the Content In Mathematics Textbooks Is New?," published by the National Council of Mathematics or via the website http://www.jstor.org/stable/41193199

To view research conducted in 4 2007, 2009, and 2012 by ACT, scan the corresponding QR code or visit their website

http://www.act.org.



ACT (2007)





ACT (2012)

5. Know and How D.C. or visit the



Use the QR code to accessing Chai & A. Venezia (2009) article called "Improving Academic Preparation for College: What We State and Federal Policy Can Help," published by the Center for American Progress. Washington, website https://www.americanprogress.org/

Scan the corresponding QR code to view research that compares 6. Renaissance (2015) STAR MathTM scale scores to Washington State SBAC Assessment scale scores



STAR Math Scale Scores Comparison



SBAC Scale Scores by Levels

7. Use the QR code Gaesser (n.d.) System for the



to access J.S. Renzulli & A.H.

article called "A Multi Criteria

Identification of High Achieving and Creative/Productive Giftedness" or via the webpage http://gifted.uconn.edu/schoolwide-enrichment-model/high achieving creative-productive giftedness/

8. Access the Washington State Learning Standards for Mathematics via the QR code http://k12.wa.us/



or from the OSPI webpage



to access the Standards for Mathematical Practice or retrieve them from the Common Core website http://www.corestandards.org/Math/Practice/

10. Scan the QR code Helping Children helping-children-

Use the QR code

State Standards

9.



to access the National Research Council (2001) research findings, called "Adding It Up: Learn Mathematics," or visit the website https://www.nap.edu/catalog/9822/adding-it-uplearn-mathematics

11. To view the research conducted by EdReports.org of Agile Mind materials, scan the corresponding QR code.



Agile Mind Middle School Mathematics



Agile Mind (High School)

