

Appendix A

Whitefish Bay School District

K – 12 Guarantees in Mathematics Instruction

March 2013



Each teacher demonstrates varying areas of expertise, interests, and instructional styles. Along with valuing that uniqueness, we believe a guaranteed and viable curriculum, through teaching from the adopted curriculum documents (including Common Core State Standards) helps to ensure consistent success for our students. Further, we believe every student deserves instruction through research-proven practices.

The following “guarantees” outline the consistent instructional practices employed during Mathematics Instruction. The subsequent pages in this document provide details of preferred student and teacher actions and behaviors.

Proven Practices from Research:

- Guarantee 1: Teachers will consistently teach to the adopted curriculum documents to meet Common Core State Standards.
- Guarantee 2: Students will participate in daily math talk.
- Guarantee 3: Students will engage in instruction in multiple settings.
- Guarantee 4: Teachers will establish a community where students are surrounded by math.
- Guarantee 5: Teachers will use formative and summative assessments to inform instruction.

Math Practices Imbedded in Math Common Core State Standards:

- Guarantee 6: Students will make sense of problems and persevere in solving them.
- Guarantee 7: Students will reason abstractly and quantitatively.
- Guarantee 8: Students will construct viable arguments and critique the reasoning of others.
- Guarantee 9: Students will model with mathematics, including the use of visuals, math drawings, etc.
- Guarantee 10: Students will use the appropriate tools strategically
- Guarantee 11: Students will attend to precision.
- Guarantee 12: Students will look for and make use of structure.
- Guarantee 13: Students will look for and express regularity in repeated reasoning.
- Guarantee 14: Students will make mathematical connections.

Guarantees & Mathematical Practices – The Details (Look-Fors)

WFB Guarantees & Mathematics Practices	Students	Teachers
1. Teachers will consistently teach to adopted curriculum documents to meet Common Core State Standards.	<input type="checkbox"/>	<input type="checkbox"/> Use the skills and content denoted in the curriculum documents to drive the instruction to ensure a viable and consistent curriculum across the various teachers of the same course. <input type="checkbox"/> Implement a variety of resources for instruction with the adopted math program/textbook being the foundational tool. <input type="checkbox"/> Teach the adopted curricular program with fidelity.
2. Students will participate in daily math talk.	<input type="checkbox"/> Engage in collaborative articulation of math thinking, reasoning and problem solving amongst students. <input type="checkbox"/> Engage in written expression of math thinking, as well. <input type="checkbox"/> Math talk is a key strategy for helping the brain to process and remember new learning.	<input type="checkbox"/>
3. Students will engage in instruction in multiple settings.	<input type="checkbox"/> Participate in multiple models of instruction to meet varying learning needs: <ul style="list-style-type: none"> • Whole group instruction • Small group instruction • Individual/personalized instruction, as needed 	
4. Teachers will establish a community where students are surrounded by math.	<input type="checkbox"/> Experience real-life, relevant math tasks. <input type="checkbox"/> Use a variety of math tools as relevant and appropriate to solve problems such as charts, counters, measuring tools, computers, calculators, etc. <input type="checkbox"/> Attempt perplexing, novel problems throughout lessons/assignments.	<input type="checkbox"/> Provide room peripherals and tools for constant and meaningful math exposure such as charts, graphic organizers, calendars, vocabulary and/or process posters, etc. <input type="checkbox"/> Use and model mathematical thinking and vocabulary frequently and throughout the day and different subject areas as possible. <input type="checkbox"/> Provide modeling, think -alouds, guided problem solving, and purposeful math talk.
5. Teachers will use formative and summative assessments to inform instruction.	<input type="checkbox"/> Engage in frequent informal and formative assessments with corresponding instruction to follow. <input type="checkbox"/> Receive frequent and specific feedback from teachers in various forms, such as verbal, grades, written comment, rubric scores, etc. <input type="checkbox"/> Assess their own work based on criteria, rubrics and/or exemplars.	<input type="checkbox"/> Formative and summative assessments will be used on a regular basis. <input type="checkbox"/> Varied informal assessments will be used on a daily basis, such as observations, discussions/listening to student responses, exit slips, work on slates, conferencing, etc.
6. Students will make sense of problems and persevere in solving them.	<input type="checkbox"/> Understand the meaning of the problem and look for entry points to its solution. <input type="checkbox"/> Analyze information (givens, constraints, relationships, goals). <input type="checkbox"/> Make conjectures and plan a solution pathway. <input type="checkbox"/> Monitor and evaluate the progress and change course as necessary. <input type="checkbox"/> Check answers and ask, "Does this make sense?"	<input type="checkbox"/> Involve students in rich problem-based tasks that encourage them to persevere to reach a solution. <input type="checkbox"/> Provide students with perplexing problems. <input type="checkbox"/> Provide opportunities for students to solve problems that have multiple solutions. <input type="checkbox"/> Encourage students to represent their thinking while problem solving. <input type="checkbox"/> Expect and emphasize effort over achievement.
7. Students will reason abstractly and quantitatively.	<input type="checkbox"/> Make sense of quantities and relationships in problem situations. <input type="checkbox"/> Represent abstract situations symbolically and understand the meaning of quantities. <input type="checkbox"/> Create a coherent representation of the problem at hand. <input type="checkbox"/> Consider the units involved. <input type="checkbox"/> Flexibly use properties of operations.	<input type="checkbox"/> Facilitate opportunities for students to discuss or use representations to make sense of quantities and their relationships. <input type="checkbox"/> Encourage the flexible use of properties of operations, objects, and solution strategies when solving problems. <input type="checkbox"/> Provide opportunities for students to decontextualize (abstract a situation) and/or contextualize (identify referents for symbols involved) the mathematics they are learning.

Guarantees and Math Practices	Students	Teachers
<p>8. Students will construct viable arguments and critique the reasoning of others.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Use definitions and previously established causes and effects (results) in constructing arguments. <input type="checkbox"/> Make conjectures and use counterexamples to build a logical progression of statements to explore and support ideas. <input type="checkbox"/> Communicate and defend mathematical reasoning using objects, drawings, diagrams, the written word, and/or actions. <input type="checkbox"/> Provide opportunities to write about the thinking and reasoning process. <input type="checkbox"/> Listen to or read the arguments of others. <input type="checkbox"/> Decide if the arguments of others make sense and ask probing questions to clarify or improve the arguments. 	<ul style="list-style-type: none"> <input type="checkbox"/> Provide and orchestrate opportunities for students to listen to the solution strategies of others, discuss alternative solutions, and defend their ideas. <input type="checkbox"/> Ask higher-order questions that encourage students to defend their ideas. <input type="checkbox"/> Provide prompts that encourage students to think critically about the mathematics they are learning.
<p>9. Students will model with mathematics.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Apply prior knowledge to solve real-world problems. <input type="checkbox"/> Identify important quantities and map their relationships using such tools as diagrams, two-way tables, graphs, flow charts, and/or formulas. <input type="checkbox"/> Use assumptions and approximations to make a problem simpler. <input type="checkbox"/> Check to see if an answer makes sense within the context of a situation and change a model when necessary. 	<ul style="list-style-type: none"> <input type="checkbox"/> Use mathematical models appropriate for the focus of the lesson. <input type="checkbox"/> Encourage student use of developmentally and content-appropriate mathematical models (e.g. variables, equations, coordinate grids). <input type="checkbox"/> Remind students that a mathematical model used to represent a problem's solution is a work in progress, and may be revised as needed.
<p>10. Students will use appropriate tools strategically.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Make sound decisions about the use of specific tools (examples might include calculator, concrete models, digital technologies, pencil/paper, ruler, compass, and protractor). <input type="checkbox"/> Use technological tools to visualize the results of assumptions, explore consequences, and compare predications with data. <input type="checkbox"/> Identify relevant external math resources (digital content on a website) and use them to pose or solve problems. <input type="checkbox"/> Use technological tools to explore and deepen understanding of concepts. 	<ul style="list-style-type: none"> <input type="checkbox"/> Use appropriate physical and/or digital tools to represent, explore, and deepen student understanding. <input type="checkbox"/> Help students make sound decisions concerning the use of specific tools appropriate for the grade-level and content focus of the lesson. <input type="checkbox"/> Provide access to materials, models, tools, and/or technology-based resources that assist students in making conjectures necessary for solving problems.
<p>11. Students will attend to precision.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Communicate precisely using clear definitions. <input type="checkbox"/> State the meaning of symbols, carefully specify units of measure, and provide accurate labels. <input type="checkbox"/> Calculate accurately and efficiently, expressing numerical answers with a degree of precision. <input type="checkbox"/> Provide carefully formulated explanations. <input type="checkbox"/> Label accurately when measuring and graphing. <input type="checkbox"/> Provide instruction and practice promoting computational fluency/automaticity. 	<ul style="list-style-type: none"> <input type="checkbox"/> Emphasize the importance of precise communication by encouraging students to focus on clarity of the definitions, notation, and vocabulary to convey their reasoning. <input type="checkbox"/> Encourage accuracy and efficiency in computation and problem-based solutions, expressing numerical answers, data, and/or measurements with a degree of precision appropriate for the context of the problem.

	Guarantees & Mathematics Practices	Students	Teachers
	<p>12. Students will look for and make use of structure.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Look for patterns or structure, recognizing that quantities can be represented in different ways. <input type="checkbox"/> Recognize the significance in concepts and models and use the patterns or structure for solving related problems. <input type="checkbox"/> View complicated quantities both as single objects or compositions of several objects and use operations to make sense of problems. 	<ul style="list-style-type: none"> <input type="checkbox"/> Engage students in discussions emphasizing relationships between particular topics within a content domain or across content domains. <input type="checkbox"/> Recognize that the quantitative relationships modeled by operations and their properties remain important regardless of the operational focus of a lesson. <input type="checkbox"/> Provide activities in which students demonstrate their flexibility in representing mathematics in a number of ways, e.g. $76 = (7 \times 10) + 6$; discussing types of quadrilaterals, and so on.
	<p>13. Students will look for and express regularity in repeated reasoning.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Notice repeated calculations and look for general methods and shortcuts. <input type="checkbox"/> Continually evaluate the reasonableness of intermediate results (comparing estimates), while attending to details, and make generalizations based on findings. 	<ul style="list-style-type: none"> <input type="checkbox"/> Engage students in discussion related to repeated reasoning that may occur in a problem's solution. <input type="checkbox"/> Draw attention to the prerequisite steps necessary to consider when solving a problem. <input type="checkbox"/> Urge students to continually evaluate the reasonableness of their results.
	<p>14. Students will make mathematical connections.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Connect prior knowledge to similar situations and extend to novel situations. <input type="checkbox"/> Relate mathematics to other subjects, real-world situations, and their own interests and experiences. 	<ul style="list-style-type: none"> <input type="checkbox"/> Help students realize that high forms of problem solving involve applying the skills to a novel situation successfully; provide formative and summative ways of doing so. <input type="checkbox"/> Engage students in authentic, relevant situations wherein math applications are observed and used.