



Westborough Public Schools

Grade 4 Mathematics

In the spirit of the Common Core State Standards for Mathematics, all fourth grade students will be given an opportunity to participate in rigorous lessons each day. These lessons will support the development of conceptual understanding, procedural fluency, and application/problem solving.

Conceptual understanding: The standards call for conceptual understanding of key concepts, such as fractions, multiplication, division, and place value. Teachers will teach more than just “answer getting.” They support the students’ ability to access concepts from a number of perspectives so that students are able to see math as more than just procedures requiring memorization. Students display their conceptual understanding by applying their knowledge to new situations as well as by speaking and writing about their understanding of the math concepts being presented.

Procedural skill and fluency: The standards call for speed and accuracy with simple calculations. Teachers will structure class time and/or homework time for students to practice core functions such as addition, subtraction, and multiplication fact strategies, so that students are able to understand and manipulate more complex concepts in the future. Students will also work to develop fluency with multiplication and division through place value, properties, and relationship strategies.

Application/Problem Solving: The standards call for students to use their math knowledge flexibly through application and problem solving. Teachers will provide opportunities for students to apply math in context and in “real world” situations.

The Common Core State Standards for Mathematics (CCSSM) consist of two parts: The **Content Standards** and the **Standards for Mathematical Practice**. While the CCSSM content standards describe what mathematics students should be able to understand and do, the mathematical practices describe how students should engage with these mathematical concepts and skills. The Westborough Public Schools math curriculum is designed to promote a deep understanding of mathematics and to develop mathematically proficient students who can think, reason, model, and solve problems.

COMMON CORE CONTENT STANDARDS

Grade 4 instructional time will focus on three critical areas:

1) Developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends.

Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context.

2) Developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers.

Students develop understanding of fraction equivalence and operations with fractions. They recognize that two different fractions can be equal (e.g., $15/9 = 5/3$), and they develop methods for generating and recognizing equivalent fractions. Students extend previous understandings about how fractions are built from unit fractions, composing fractions from unit fractions, decomposing fractions into unit fractions, and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number.

3). Understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.

STANDARDS FOR MATHEMATICAL PRACTICE

The Common Core State Standards for Mathematical Practice are practices for which are expected to be integrated into every mathematics lesson for all students. Below are a few examples of how these practices may be integrated into tasks that 4th grade students complete.

1) Make sense of problems and persevere in solving them.

Mathematically proficient students in grade 4 know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Fourth graders may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, “Does this make sense?” They listen to the strategies of others and will try different approaches. They often will use another method to check their answers.

2) Reason abstractly and quantitatively.

Mathematically proficient fourth grade students should recognize that a number represents a specific quantity. They connect the quantity to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. They extend this understanding from whole numbers to their work with fractions and decimals. Students write simple expressions, record calculations with numbers, and represent or round numbers using place value concepts.

3) Construct viable arguments and critique the reasoning of others.

In fourth grade mathematically proficient students may construct arguments using concrete referents, such as objects, pictures, and drawings. They explain their thinking and make connections between models and equations. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like “How did you get that?” and “Why is that true?” They explain their thinking to others and respond to others’ thinking.

4) Model with mathematics.

Mathematically proficient fourth grade students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, making a chart, list, or graph, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed. Fourth graders should evaluate their results in the context of the situation and reflect on whether the results make sense.

5) Use appropriate tools strategically.

Mathematically proficient fourth grader students consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they may use graph paper or a number line to represent and compare decimals and protractors to measure angles. They use other measurement tools to understand the relative size of units within a system and express measurements given in larger units in terms of smaller units.

6) Attend to precision.

As fourth grade students develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, they use appropriate labels when creating a line plot, labeling measurements, and answering questions.

7) Look for and make use of structure.

In fourth grade, mathematically proficient students look closely to discover a pattern or structure. For instance, students use place value, properties of operations, and relationships to explain calculations (partial products model). They relate representations of counting problems such as tree diagrams and arrays to the multiplication principle of counting. They generate number or shape patterns that follow a given rule.

8) Look for and express regularity in repeated reasoning.

Students in fourth grade should notice repetitive actions in computation to make generalizations. Students use models to explain calculations and understand how algorithms work. They also use models to examine patterns and generate their own algorithms. For example, students use visual fraction models or tables to find equivalent fractions.